# LOOKING AT OUR ROOTS

## NEW STUDY BY HAWTHORNE VALLEY FARM EXPLORES THE NATURAL ENVIRONMENT OF COLUMBIA COUNTY FARMS

**By CONRAD VISPO and CLAUDIA KNAB-VISPO**

*This is the first of a multi-week series of excerpts from "The Flora and Fauna of Columbia County Farms: Their Diversity, History and Management" by Conrad Vispo and Claudia Knab-Vispo of the Farmscape Ecology Program at Hawthorne Valley Farm. This first installment begins with a summary of the report followed by some of its observations on the history of farmscapes in the county and facts about plant life today. In succeeding weeks, sections on hedgerows, birds, other wildlife and streams will appear.—Ed.*

**FOR AT LEAST** the past 250 years, agriculture has played a major role in determining the landscape of Columbia County. While it continues to do so, agriculture in the County faces a challenging future due to competition from farther away and increased land demand for other uses. While there are important socio-economic reasons to consider the future of local farming, the goal of our work is to evaluate the nature conservation value that current farming plays in our landscape. What are likely to be the conservation repercussions should farms disappear from our landscape?

To address this question, we have begun to evaluate the value of on-farm habitats to native plants and animals. We conducted farmstead surveys of herbaceous (and, to a certain degree, woody) plants, of birds, of butterflies, and of a variety of aquatic organisms.

Our work to date has concentrated most heavily on our "home farm," Hawthorne Valley Farm. However, it also includes information from six additional Columbia County farms which we are studying.

Obviously, farms affect the native landscape. Were we not already a largely forested county, the negative impacts of farms on woodland organisms might be of concern. However, given the current scale of agriculture in the county, farms generally add to the native diversity of our county by providing refuge for grassland and shrubland organisms that might otherwise be largely absent. Many of these organisms found their original home in habitats that have diminished substantially at the national scale (e.g., prairies and wetlands). Thus, grasslands and shrublands of farms in our area can contribute to the conservation of species whose natural habitats have dwindled.

We found that Columbia County farms are home to at least 350 species of native plants, of which around 10% are open-land plants of conservation concern. We cite at least 150 species of birds found on Columbia County farms; these include 25-30 grassland and shrubland species, many of which are declining globally. Our farms provide habitat for at least 49 species of butterflies. While there does not seem to be a set of butterflies completely analogous to the grassland and shrubland birds, we present a list of 18 butterfly species to watch if farmlands decline.

Our work with aquatic organisms added nuance to this picture. In most cases, it is difficult to argue that farms provided important habitat for these species. However, our results do suggest that careful farming can be compatible with many species and, in the case of pond amphibians, can actually provide useful habitat if those ponds are managed appropriately. We are currently studying open land ponds throughout the county in order to better understand the effects of management.

In sum, we believe that there are conservation reasons for preserving working farmland in Columbia County. These benefits do not come without potential costs. However, given adequate safeguards and compared to the frequent alternative of large-scale development, we conclude that the conservation value of farmland supplements the already compelling socio-economic reasons for maintaining viable agriculture in our region.

> *What are likely to be the conservation repercussions should farms disappear from our landscape?*

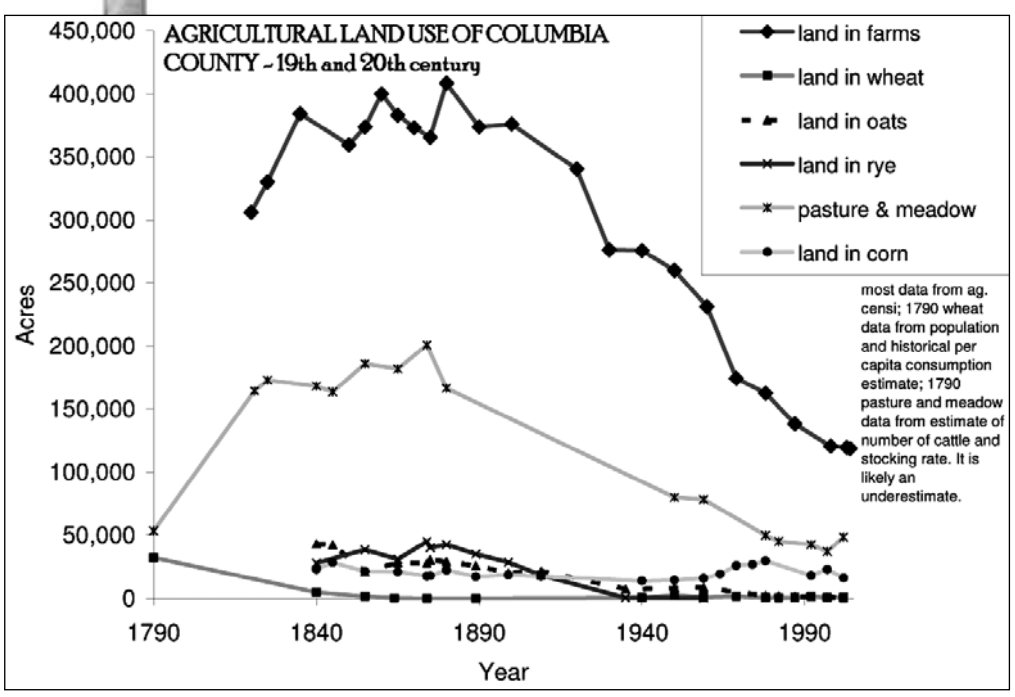
**THE ARRIVAL OF EUROPEANS** in the County is generally marked as 1609 when Henry Hudson sailed up the river since named in his honor. By 1614, a spot called "Kinderhook" was already listed on a regional map, although permanent settlement probably occurred some 30 years later, by which time the numbers of native Mohicans had likely plunged. Until about 1700, European settlement seems to have been light and largely limited to the banks of the Hudson, although both the Livingston and Rensselaer manors were established before that date. By 1750, settlement had spread well inland, with the population of colonists in Albany County (which, until 1772, held Columbia, Greene, Rensselaer, Albany, Schenectady and Saratoga counties) increasing from around 2,000 in 1700 to 10,000 in 1750 to over 40,000 in 1771. Conflicts between the Dutch and English may have made for a line of tension (and hence reduced settlement) running through the eastern portions of the county during the middle portion of 18th century. Nonetheless, by the end of the 18th century, there were probably some 250,000 acres of farmland in the county; this compares to current levels of roughly 120,000 acres. Farmland expansion continued into the 1800s, with maximum clearing in the county being reached by 1835. The landscape persisted with little change in total cleared area for the rest of the century.

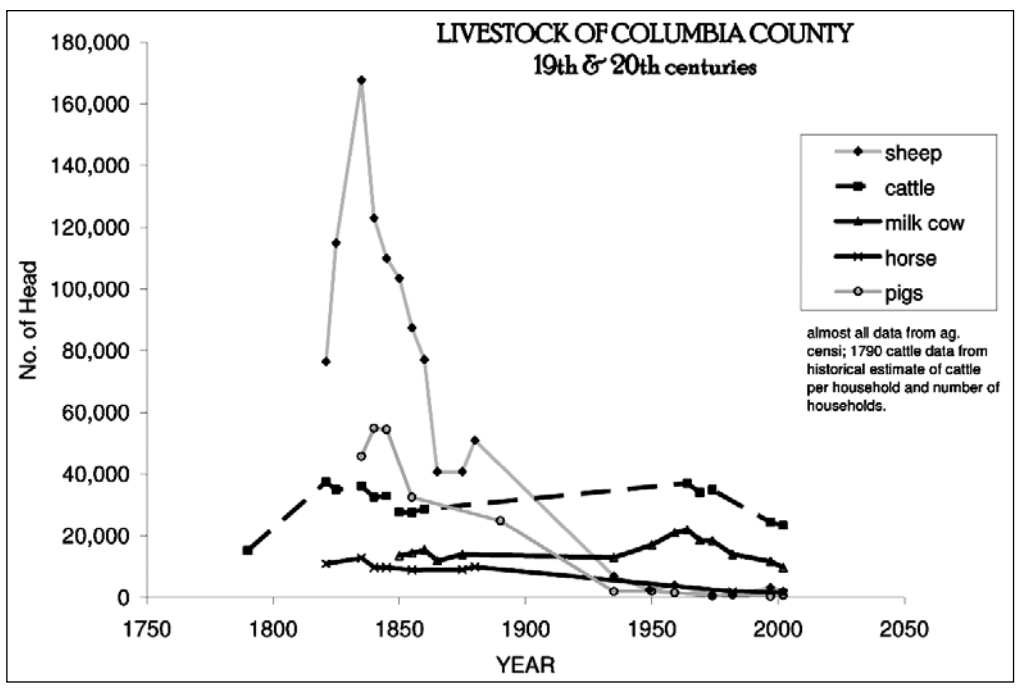
Evidently, species favoring agricultural habitats have had some 200-300 years to establish themselves in our area. To understand what habitats they found, it is important to think about how historical farming used the land.

Early agriculture in the county was probably traditional diversified farming, providing mainly for a family's needs. However, we still need more information on the production from farms run by the Dutch patroons. During the first decades of the 19th century, farming transitioned from more diversified production towards wool production (fueled by tariffs on British wool from about 1825 to 1845 and the proximity of the county's woolen mills). Once tariffs were lifted, the county appeared to move towards grains and hay.

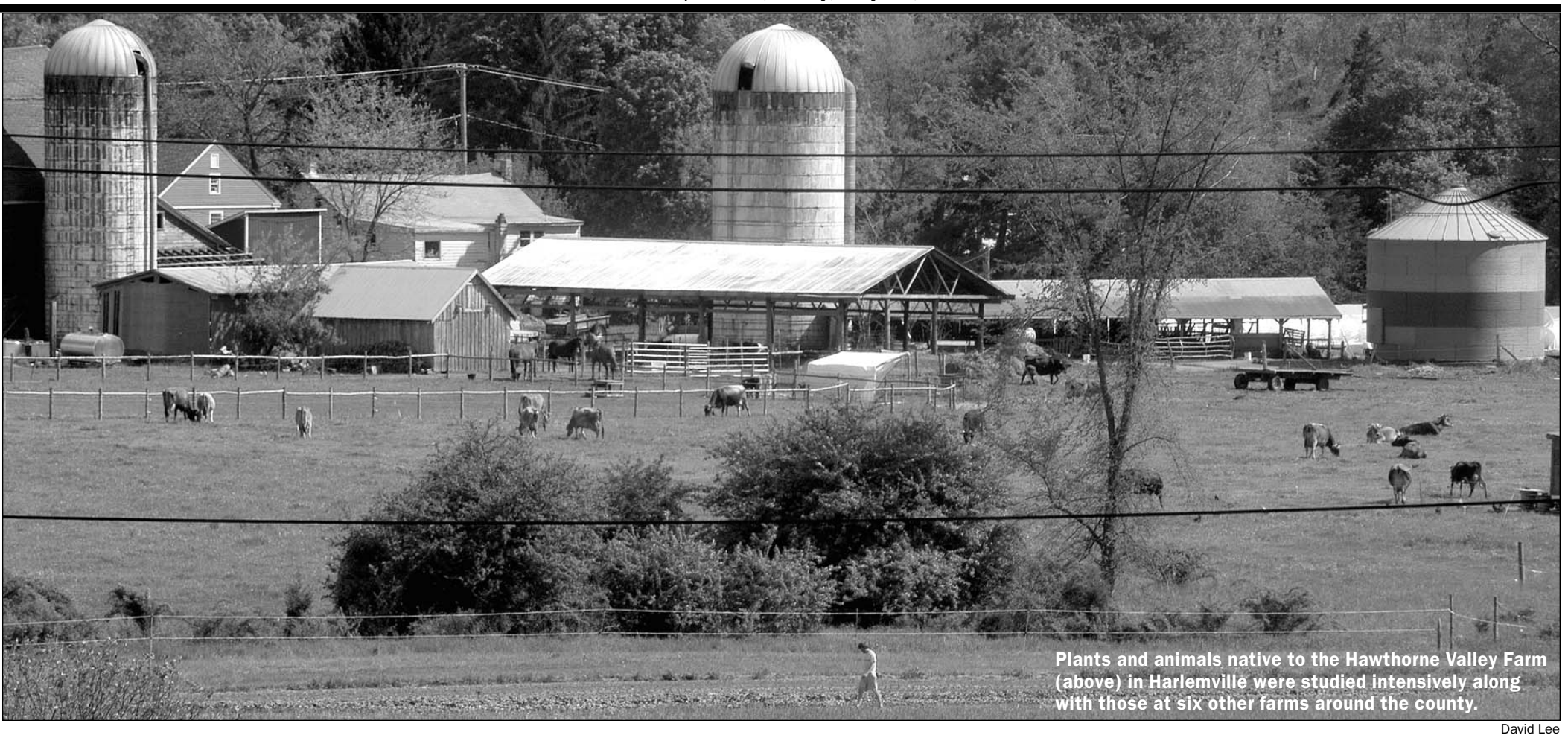
In the second half of the 1800s, Columbia County was one of New York's leading rye producers. Rye was apparently used mainly for paper and straw. Much of the production of hay, straw and grains went down the Hudson to feed and bed New York City horse power. Joel G. Curtis, owner of Hawthorne Valley Farm at the turn of the last century, left farming to pursue a career in upstate/downstate agricultural trade. More recently, Columbia County farms specialized in apples and dairy, and while their numbers have dwindled, these products have remained the mainstay of the county's agriculture in terms of production value.

The extent of agriculture has dwindled since the late 1800s, initially due to the opening of better soils farther west, and more recently, due to land pressure from development. At present, the only growing components appear to be niche




**The charts above illustrate statistical data on Columbia County agricultural production. The top graph shows agricultural activity in terms of acres under different uses. In some cases, acreage has been derived from production combined with historical estimates of production per acre. The above graph shows livestock numbers.**



Plants and animals native to the Hawthorne Valley Farm (above) in Harlemville were studied intensively along with those at six other farms around the county.

David Lee

farms (i.e., specialized farms often involved in direct marketing) and horse farms.

As this brief history illustrates, the "farmscape" has not been fixed during its history. The past two or three centuries of European activity have been a major factor shaping today's natural landscape. Because of that, we have concentrated substantial effort on understanding the ecological effects of that historical activity. Against this backdrop, historical research into native plants and animals also gives us insight into which native species were best served by agriculture. The land around us is not wilderness, and its dynamics cannot be understood by simply studying its current ecology and supposing a steady state. What we see today reflects a mosaic of effects—current land use, historical land use, and the natural ecological tendencies of the players.

**THE MAJORITY** of the work presented here was conducted on Hawthorne Valley Farm, a 400-acre commercial organic/biodynamic farm in Harlemville, roughly in the middle of Columbia County. The farm is a component of the Hawthorne Valley Association, an educational non-profit. Approximately 300 acres of the land is in agricultural use, as are an additional 500 acres or so of land owned by others but worked by the farm. The farm has a dairy herd of about 60 animals and 12 acres of vegetable gardens. In addition, there are a few pigs and beef cattle. The milking herd is rotationally grazed during the summer and mainly hay-fed during the winter; no corn or other grains are grown.

This report also includes information from six additional farms in Columbia County. These are, working from south to north, the following:

•Chaseholm Farm, a 329-acre conventional dairy farm located in Ancramdale. Herd size is roughly equal to that of Hawthorne Valley's. Cows are fed corn and other grains (almost all of which are grown on-farm), along with hay and grazing. The farmland is a combination of corn, grain and hay fields with a few pastures. There are wooded sections around the periphery, and several ponds.

•The Farm at Miller's Crossing, a 200-acre organic farm in Claverack, between Philmont and Hudson, situated along the Agawamuck. It grows mainly vegetables, although it also has a small, mainly grass-fed beef cattle herd. The farm has garden plots, plus some hay fields and pastures together with riparian forest and wooded draws.

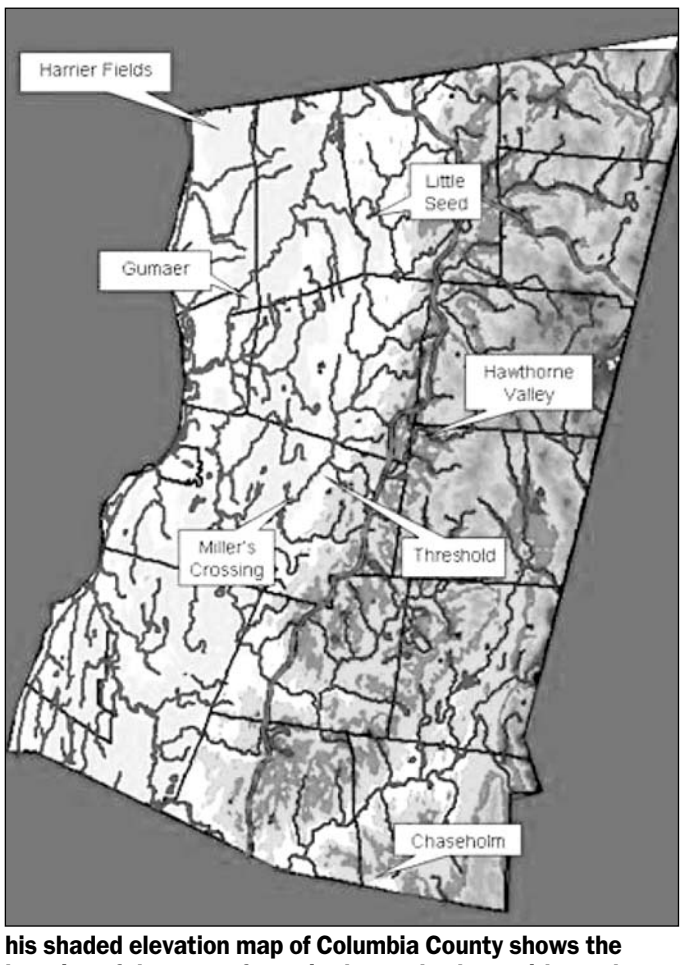
•Threshold Farm, just south of Philmont is, at 40-acres, the smallest farm we studied. It is a mixed production organic/biodynamic farm, specializing in apples, pears and peaches. It also has a few acres of vegetable gardens and a small cattle herd. The Farm is a long-term lease; the leased area itself includes only the fields, gardens and orchard, but it is completely surrounded by forest.

•Little Seed Gardens, an 87-acre organic farm located on the banks of Kinderhook Creek and the Stony Kill. This farm mainly produces vegetables although it also has a pair of cows. Aside from the vegetable gardens, there are also stretches of old field and riparian woods.

•Gumaer Farm, a conventional dairy farm of roughly 60 animals. The herd has a corn-based diet, and much of the land is in corn production, with at least a couple of hay fields. There are two interesting woodlots. One is a wooded wetland where Rusty Blackbirds were seen during migration. The other is a stretch of riparian woods along Kinderhook Creek.

•Harrier Fields Farm, an organic 60-acre farm in Stuyvesant near the Rensselaer County border, specializes in grass-fed Red Devon cattle for beef production and breed conservation. The farm is mainly pasture, with no woodlot but with a small, old orchard. Due to its location on high ground near the Hudson, it receives many migrating birds.

**IT IS OBVIOUS** that plants play a central role in agriculture. They are cultivated for human consumption or animal fodder, seeded for ground cover, and/or planted as wind breaks, living fences or shade trees. But aside from these cultivated plants, intentionally put in certain places by the farmer and carefully tended to ensure their establishment and growth, wild plants also make their home on farms. Some of them contribute directly to agricultural production as components of pastures or hayfields. Some may provide more subtle benefits to agriculture as food plants for beneficial insects, such as pollinators and pest predators. Notorious are the "weeds," which, by their presence, interfere with the growth of cultivated or agriculturally more productive species. However, the presence of the right amount of the right kind of weeds has also been suggested to benefit agricultural production.




his shaded elevation map of Columbia County shows the location of the seven farms in the study along with creeks, major highways and town borders.

Many native wild plants (i.e., plants found here prior to European colonization) occur in the "neglected," or less intensively managed, areas of farms: along cow lanes; in hedgerows and field margins; in riparian areas; on the shores of ponds; in wet meadows and shrubby swamps; and in old fields. Finally, most farms have long-maintained woodlots composed in large part of native vegetation.

Our main questions about farmland plants are: What role (if any) do farms play in the conservation of native plant species? What are the beneficial and detrimental effects of native plants on agricultural production? And finally, what can be done to enhance the farms' role in native plant conservation and to increase the beneficial, while reducing the detrimental, effects of native plants on agricultural production? These "big" questions are our roadmap, and we won't be able to tell you all the answers quite yet. However, our first two years of research have yielded sufficient information to start "chipping away" at these big themes and to discuss promising directions our work might take in the future.

At least 536 plant species grow wild on farms (including their woodlots) in Columbia County. This means that the seven studied farms provide habitat for 42% of the 1,289 species known to occur in Columbia County. Even more impressive, Hawthorne Valley Farm alone harbors at least 486 wild plant species, or 38% of the flora of our county.

At least 350 species (65%) of the plants documented on the farms are considered native to our region. This is basically the same proportion of native plants as in the flora of the entire state of New York.

Native plants occur throughout the range of general habitats found on farms. However, the highest diversity of native plants outside farm woodlots tends to grow in wetlands, shrubby pastures and hay meadows. These latter habitats have also the highest proportion of native species of conservation interest. For example, we found the state-protected **cardinal flower**, **turtlehead** and the orchid **nodding lady's tresses** exclusively on grazed wet meadows. Shrubby pastures provide habitat for another set of uncommon species, many of which are also components of the Midwest's vastly diminished tallgrass prairie ecosystem. These include the state-protected **ragged-fringed orchis**, the regionally rare **New Jersey tea,** and the native grass **little bluestem**.

**TO OUR KNOWLEDGE,** native plants rarely become really toublesome weeds in market gardens and cornfields in Columbia County (compared, at least, to the headaches caused by certain introduced weed species). Probably the worst native weed around is ragweed.

Of the non-native plants listed in the *New England Invasive Plant Atlas*, 33 were found on Columbia County farms. Most of them occur on the meadows and include such common pasture weeds as **gill-over-the-ground, field garlic, bittersweet, creeping buttercup, moneywort, sheep sorrel, ragged robin**, and **reed canary grass**. These seem to occur

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# Roots

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in tolerable densities on all studied farms and don't seem to worry the farmers.

An invasive species that might merit more concern and active management is **spotted knapweed**, which was found on most farms and in particularly dense populations on the dry hill-side meadows of Hawthorne Valley Farm. This species produces a chemical that inhibits the growth of other plants in the immediate area and might well contribute to the degradation of these already marginally productive meadows. Its population dynamics and interaction with more desirable native species, such as **little bluestem**, might be an interesting subject for further study.

A well-recognized introduced nuisance on most farms is **multiflora rose,** which spreads quickly in hedgerows and into meadows. Of the other invasive shrubs found in the hedgerows, **oriental bittersweet** and **autumn eleagnus** might merit monitoring. The gardener of Hawthorne Valley Farm names **Canada thistle** as the most aggressive and hardest to manage garden weed. Currently, the fastest spreading invasive species in our farmscape seem to be **purple loosestrife** and **common reed** in wetlands, **Japanese knotweed** (often also called "**Mexican bamboo**") along the creeks, and **garlic mustard** and **Japanese barberry** in woodlots. Where feasible, these plants should be mowed or cut before they go to seed to discourage their spread.

**IF THE CONSERVATION of native, open-area plants i**s of interest to the landowner, the following general measures will likely be of benefit:

- Keep woodlots
- Don't remove established hedgerows. Don't keep field margins too tidy.
- Avoid drainage of wet meadows and continue the management that has kept them open, e.g., light grazing. Should wet meadows directly abut a creek, it usually is justified to restrict the access of grazing animals to the creek to reduce siltation, even if that measure may result in a reduction of habitat for native plants of open wetlands. The same is true for the shore of watering ponds. Restricted access reduces wetland plant damage from trampling and benefits the amphibians at the same time.
- If the farm has old fields or marginally productive pastures that are slowly being overgrown by shrubs, consider rotational brush-hogging or browsing and continuation of light grazing to maintain their suitability as habitat for native tallgrass prairie species. Where considerable populations of native grasses already occur, consider management for these grasses as forage.

Farms have been an important part of our county's social, economic, and nutritional landscape. As illustrated here with plants and in future installments with other organisms, they have also contributed to the richness of our natural landscape.

*Copies of this and related information are available on the Farmscape Ecology Program website, www.hawthornevalley-farm.org/fep/fep.htm. If you have questions, comments, or would like a free, digital copy of the full report, please contact Conrad at 672 7500 ext 254 or fep@taconic.net.*

# LIFE ON THE HEDGE

## Hawthorne Valley Farm study probes the diversity of hedgerows and the connections between butterflies and farming

By CONRAD VISPO and CLAUDIA KNAB-VISPO

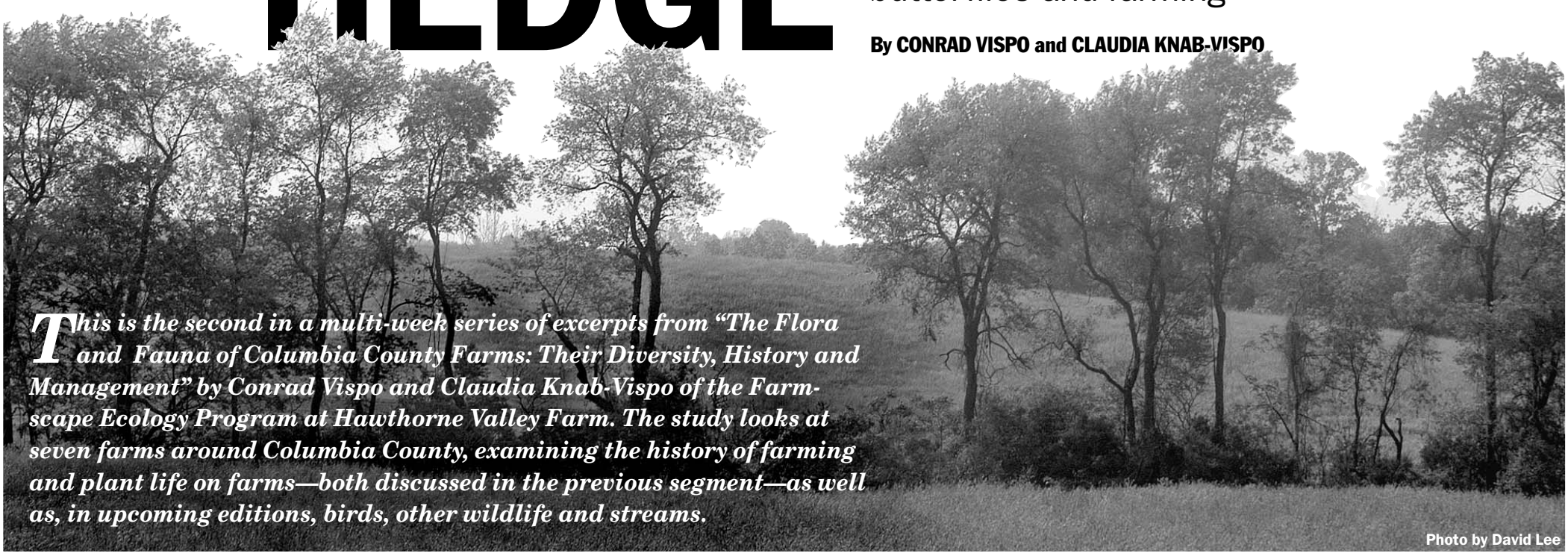


Photo by David Lee

*This is the second in a multi-week series of excerpts from "The Flora and Fauna of Columbia County Farms: Their Diversity, History and Management" by Conrad Vispo and Claudia Knab-Vispo of the Farmscape Ecology Program at Hawthorne Valley Farm. The study looks at seven farms around Columbia County, examining the history of farming and plant life on farms—both discussed in the previous segment—as well as, in upcoming editions, birds, other wildlife and streams.*

LAST WEEK, after reviewing the history of our fields, we considered the habitat that farms provide to native plants. We highlighted the high diversity of certain areas such as brushy pasture and wet meadow. This week, we turn to hedgerows and butterflies. Our work on hedgerows focuses on the distributions and dynamics of the species they contain, and what that suggests about how they formed. In our work with butterflies we try to identify those on-farm habitats most important for butterfly conservation and those butterfly species most at risk.

Hedgerows have a checkered reputation. From England comes the image of hedgerows and windbreaks as bastions of botanical diversity—surely a truism once one has removed most of the forest. From the Midwest comes the demonizing of hedgerows as the aeries of raptors that fall upon hapless grassland birds. This is perhaps most true when hedgerows are the only trees in sight. The role of hedgerows, in our landscape, where forest abounds, is probably more subtle.

When we discuss "hedgerows," we also mean windbreaks or fence rows—basically any stretch of woody vegetation bordered on either side by grass and/or brush. For our purposes, this can include riparian woods along the banks of streams that wind through agricultural land. At what width a stretch of woods goes from being a hedgerow to being a patch of forest is arbitrary and depends upon which forest-like attribute one chooses to focus on. For some small insects, a 6-foot-wide strip of trees may feel sylvan indeed. For a large buck, such a slim portion would hardly suffice.

Hedgerows can arise in several ways:

1) As relicts—the last standing remains of what was once a forest blanket

2) As spontaneous incidentals—the woody "weeds" that happen to grow up along walls and fences as those areas escape the repeated clearing occurring on adjacent fields

3) As plantings—shrubs or trees intentionally planted as living fences or windbreaks.

Mixed origins are possible, but these scenarios help one think about what hedgerows can represent ecologically. Relict fence rows are probably the rarest sort around here. Judging from historical images, most of our farmland was probably well cleared of forest when it was initially laid out in fields. Most of our hedgerows are probably of the second class, having grown in of their own accord. Hedgerow planting is probably most common as a form of domestic gardening rather than farming. There may have been sporadic agricultural attempts at "live fences" constructed by planting rows of certain spiny trees or bushes, but none seemed to be widely successful. Multifloral rose, initially introduced for live fencing, has taken up creative hedgerow building of its own accord and strays well into open pastures to the dismay of many farmers.

OUR HEDGEROW WORK has so far focused on Haw-thorne Valley Farm. We spent late autumn and early winter of 2004 mapping the woody vegetation of many of that farm's hedgerows. With the help of a GPS (global positioning system), we mapped the location of different shrubs and trees in our hedgerows. We spent a lot of time "unsticking" hats and sleeves from the grasp of brambles and roses.

We found that the diversity of native woody plants was highest where hedgerows abutted forest and lowest in the center of the farm. Two collaborating factors probably resulted in this pattern. On the one hand, because these are mostly spontaneous hedgerows ("planted" by birds, squirrels and the whims of wind-blown seeds), they are most diverse nearest the source of such seeds, i.e., the forests. At the same time, the more centrally-located stretches are probably the ones most heavily influenced by farming activities, such as the grazing, which may well exclude some plant species.

To better understand the botanical dramas being played out in our hedgerows, we divided the fence row woody plants into five different ecological groups based upon their distribution patterns and their means of seed dispersal.

The most abundant fence row species are the **Super Colonizers**. These are species that have many small, bird-dispersed seeds; which are thorny (and thus deter browsing); fast-growing; and which prosper in full sunlight. The archetypal species in this group are the multiflora rose and the various brambles (blackberry, raspberry and their ilk). These species were found in almost all hedgerows, although, because of their sun-loving nature, they probably become less common in those fence rows with taller, more forest-like woody vegetation.

Next in apparent abundance are the **Browse-sensitive Colonizers**. These are shrubs that share the love of sunlight and ease of seed dispersal characteristic of the first class, but that are unarmed. Their smooth stems do little to deter browsing. Exemplars of this group are arrowwood and the dogwoods, both native taxa. While they range widely in the hedgerows, they are largely absent from the most intensively-used central stretches.

The **Weedy Trees** are also fairly widespread. They produce fruits and have bird-dispersed seeds, or they have light, wind-blown seeds. They are dispersed widely, and they are eager to grow in sunlit spaces. Being slower growing and perhaps more delectable to browsers, they are somewhat rarer than the earlier classes. Typical of this group are black cherry, apple, and American elm. At least with black cherry and elm, one begins to see hints of greater abundance near forested areas.

The **Adventurous Forest Trees** have a more limited distribution. These species tend to have heavier seeds; some are still wind-dispersed, others distributed by mammals and gravity. They are likely browse-sensitive. Representatives of this group include red maple, white ash, red oak, and the hickories. Here the pattern of greater abundance near forests is readily apparent.

Finally, the distributions of the **Habitat Specialists** may be most affected by soil conditions; for example, the lovers of moist soil (e.g, willows, red-osier dogwood, speckled alder, and Spirea species) are confined to places where hedgerows cross seeps and wetlands.

That our hedgerow species can be rather neatly categorized into these groups provides, together with historical research, strong evidence that our hedgerows evolved spontaneously as fence rows went uncleared and plants re-colonized them.

Our results also support an interesting supposition more strongly developed by other researchers: the idea that those woody plants that grow up under fences may differ from those growing along old stonewalls.

Picture for a moment a wire fence and a stone wall. Likely as not, a bird will fly into your image of the first and a chipmunk scurry into your vision of the latter. Think then about what these animals eat, and you will quickly realize how plants such as black cherry, multiflora rose, and viburnums may quickly arrive below fences, and how oaks and hickories may rapidly colonize stonewalls. In our case, the pattern may be somewhat confused by the fact that most of our "stonewalls" are probably more accurately described as long stone heaps, piles that field-clearing farmers created as they threw stones beneath wooden fences that were subsequently replaced by wire. Thus, both bird and rodent have likely visited our stone wall "fence lines." However, the hedgerows along simple barbed wire do show an abundance of bird-dispersed species such as cherries, brambles and roses.

WE HAVE DISCUSSED the internal dynamics of hedgerows, but, regardless of how they evolve, what role do they play as habitat for native plants and animals? And, when is this habitat a conservation benefit and when a pest-control issue?

While few of the woody plants that we found in hedgerows were unusual, the growth of certain native woodland shrubs, such as beaked hazel and nannyberry, seemed particularly exuberant in certain hedgerows.

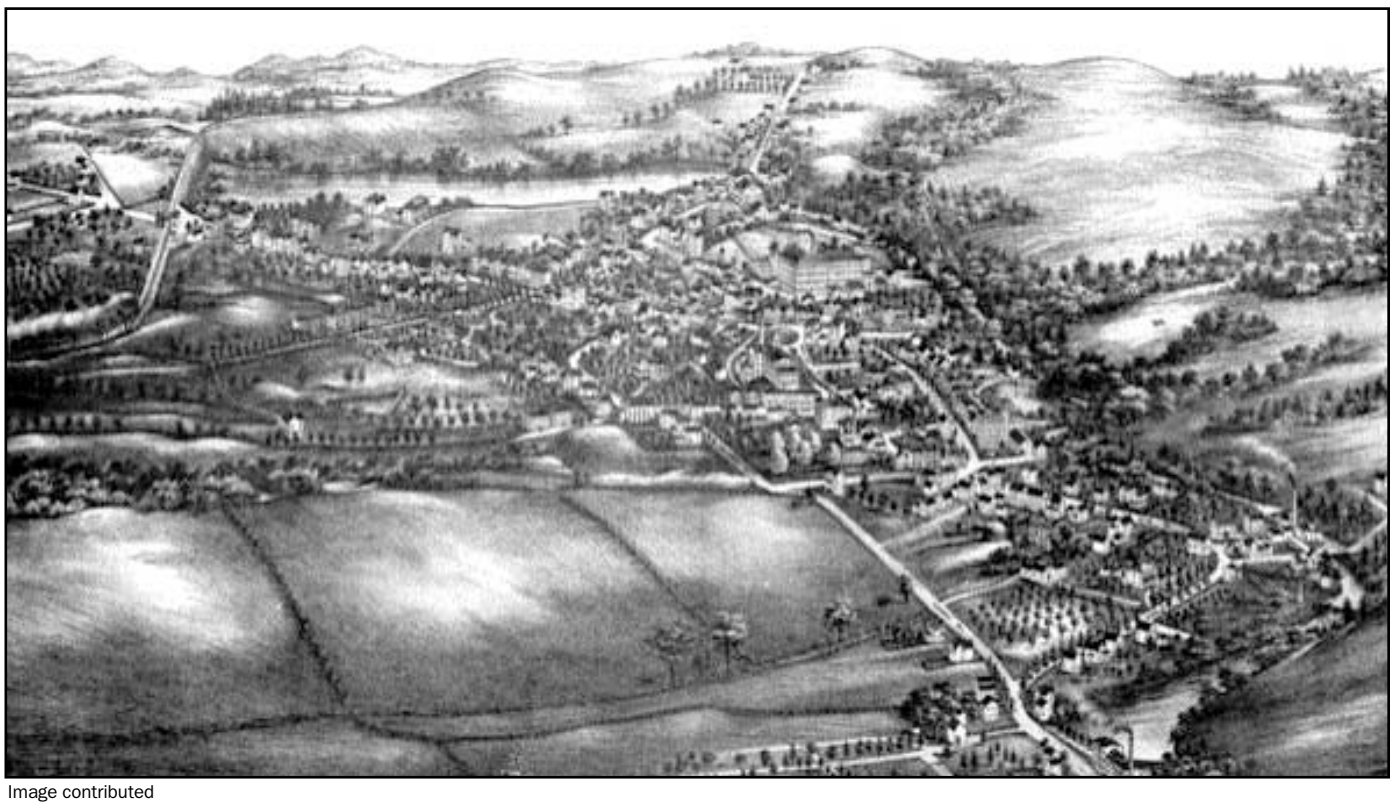


Image contributed

**This 1881 etching of Philmont, which lies just east of the Hawthorne Valley Farm, shows hedgerows bordering farmland much as they do today on farms around Columbia County.**

Winterberry and flowering dogwood, two woody species of conservation interest, were also found in hedgerows. Hedgerows also happened to be the only place we found green briar, carrion flower, smooth sumac and common elderberry at Hawthorne Valley, although these are not generally considered unusual species. Although we did not systematically survey the herbaceous plants of hedgerows, incidental observations suggested few rarities. It is thus difficult, in our forest-rich landscape, to claim that hedgerows are important for plant conservation.

Their relative value to wildlife may be higher and is one focus of our current work. Certainly, shrubland birds use them as habitat. These are a group of birds that, as we shall see next week, are in demographic trouble. In slightly over 1¾ miles of hedgerow, we found roughly 50 birds nests. Brushy hedgerows may also help house the New England cottontail. Nearly identical to the much more common eastern cottontail, these are one of our most endangered mammals. Finally, just as important as providing home habitat for wildlife, hedgerows can also serve as corridors or bridges that help woodland animals move between interconnected forest patches. We have snow-tracked mink, fisher and bobcat moving along board hedgerows.

While we haven't studied it personally, maintaining vegetation along waterways is said to work as a filter, trapping nutrients and sediments that might otherwise escape from farmland and sully streams. Such strips can also stabilize stream banks and prevent their erosion during floods. The recommended width for forested strips is at least 35 feet, but depends heavily on the slope of the land and the nature of the soils.

From an agricultural perspective, hedgerows have a darker side. It has been suggested that hedgerows are areas where agricultural weeds can escape weed-control efforts on adjacent farmland and then re-invade fields. Researchers in Quebec looked at this issue. Studying both woody and herbaceous plants, these researchers found that the lowest weed density was in mature, woody fence rows, as opposed to planted hedgerows or mainly herbaceous ones. This work implied that, if you want to reduce the number of farmland weeds lurking in hedgerows, then the hedgerows should be allowed to develop their woody vegetation rather than being cut back periodically. Such woody hedgerows also were home to a higher number of native plants of "conservation interest."

Don't tell our vegetable farmer, but we found roughly 140 groundhog holes in those 1¾ miles of hedgerow. This species can be a serious pest in vegetable fields. The highest densities were in the hedgerows around the vegetable gardens. Because groundhogs may dig numerous burrow entrances and because probably not all of these holes were active, this is not an estimate of groundhog numbers (thank goodness!), but it does indicate patterns of occurrence. Some burrows were found at a distance into the neighboring fields, and whether the groundhogs were looking for hedgerows per se or simply for less-utilized land near the gardens was not clear. While removing hedgerows might make groundhog control easier, in and of itself, it might not reduce their populations.

Hedgerows are also sometimes considered in relation to microclimate. Their ameliorating effects on wind speed and evapotranspiration apparently result in a slight net positive influence on crops, at least in large Midwestern and Australian agricultural settings. The swirling air associated with our small fields and hilly terrain, coupled with a climate that does not see the growing season extremes of more continental areas, may reduce their microclimatic benefits in our region.

In sum, our hedgerows are certainly used by a variety of plants and animals. From the farmer's viewpoint, some of these are probably beneficial (e.g., pest-eating birds and native pollinators) while others might be less desired. When located along waterways, they can help purify runoff. Their balance sheet is mixed, but one farmer we work with was happy to think of what his self-admittedly scruffy fencerows provided to wildlife in comparison to the well kempt fences of a nearby property. He was right; nature doesn't relish neatness.

Images contributed

**From top, Baltimore Checkerspot, Wild Indigo Duskywing, Banded Hairstreak. At right, American Copper. They are all found locally.**

## Farmland Butterflies

BECAUSE MORE PEOPLE are familiar with birds than with butterflies, it is useful to compare the ecologies of the two groups as we think about how butterflies interact with our landscape.

A few of our butterflies, like many of our birds, are migratory and over-winter in warmer climes. However, unlike birds, breeding often occurs on the wintering grounds, and it is a subsequent generation that returns in the spring. The many butterflies that stay through the winter do not remain active like birds. Rather, they hibernate as eggs, caterpillars, or, more rarely, as adult butterflies. This pattern of year-round residency means that, for most of our butterflies (the migratory monarchs are a noted exception), the habitat that we provide here makes all the difference.

In describing habitat, nesting location seems to be an important characteristic for birds. Butterflies don't nest; rather, the food of the caterpillars seems to be one important habitat descriptor. Most adult butterflies feed on the nectar of a wide variety of plants, however, their caterpillars are usually much more finicky, and it is the distribution of these caterpillar host plants that seems to largely determine butterfly occurrence patterns.

Finally, in comparing birds and butterflies, we need to take scale into account. Being much smaller than birds, a little quarter-acre patch of habitat may mean as much to a butterfly as a multi-acre spread does to a bird; most butterflies are thus better able to survive in the interstices of the human environment.

Our basic "butterflying" protocol involved doing field-specific, timed butterfly surveys. We attempted to identify as many of the butterflies that we saw as possible, photographing those we were uncertain of. We let the nature of the patch determine the duration of the survey, with larger, more complex patches requiring more time to tour thoroughly. Our goal was to make, to the best of our ability, a complete list of the butterfly species using a given patch during our visit. Aside from recording a generalized description of the habitat patch, we also noted down which plants were seen flowering during each survey. Few things are as enjoyable (for us anyway) as roaming about a sunlit meadow, camera in hand, tracking down butterflies. We can always use an extra pair of eyes for these surveys, and anyone interested in helping should contact us.

WE RECORDED 49 species of butterflies on Columbia County farms during 90 surveys lasting a total of about 22 ¾ hours. While none of the species that we found are considered to be of conservation concern at the national level, Hudsonia's regional work highlights conservation issues for several of these species. Hudsonia is a non-profit environmental research institution based at Bard College.

Hayfield, old-field, orchard, wet meadow and woody pasture were our most diverse habitats, averaging about six-to-seven species per survey. The remaining habitats (cropland, fallow field, garden, and well-grazed pasture) averaged only three-to-four species. This pattern occurred because some butterflies occurred in nearly all habitats, while others were restricted to the first set of habitats mentioned.

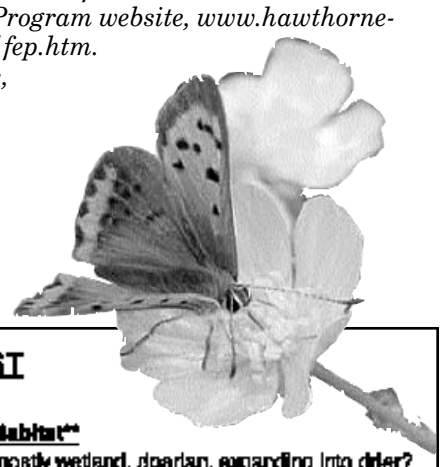
In most cases, butterfly diversity seemed to parallel the diversity of plants in flower. This does not necessarily mean that a higher diversity of flowers is attracting a higher diversity of butterflies. Rather, areas with a higher diversity of blooming plants may have been more likely to have a higher diversity of caterpillar host plants (which may or may not have been flowering during our visits). Further, more different kinds of flowers may have sometimes translated into more nectar in general, but we did not record the density of blooming plants.

Ornithologists often talk of concern for "grassland birds" when they consider the implications of declining agriculture, and we wanted to identify some equivalent, flagship group for butterflies. Based upon the results just described, we assembled a "Farmland Butterfly Watch List" including the butterfly species we found to be confined to those old field, hayfield, wet meadow and woody pasture habitats. Our designations were corroborated by information presented in *The Butterflies of the East Coast* by Rick Cech and Guy Tudor (a great starting place for nascent butterfliers). Nine out of 20 of the butterflies we included in our watch list were described by them as something less than consummate ecological generalists, whereas only one of the 18 species we excluded from our list as ubiquitous was anything but a generalist. Furthermore, four of our brushy-habitat species (Milbert's tortoiseshell, meadow fritillary, great-spangled fritillary, and Leonard's skipper) are considered by Hudsonia to be regionally rare or scarce, whereas only one of the ubiquitous species (black swallowtail) was so designated. *This list includes only those species we saw during our field-work.* There are doubtless several other species of equal or greater conservation concern that we did not see during our work and that may or may not occur on Columbia County farms. The regal fritillary, for example, once haunted our fields, but has now largely disappeared from the Northeast. Species such as the monarch face conservation challenges, but more because of their wintering habitat than their summer haunts. We believe that the populations of the butterflies listed should be followed as land use changes in our county.

THE MOST INTERESTING farm habitats for butterflies appear to be the wet or mature meadows and brushy old fields. Such habitats are rarely valued and often disappear under current land use patterns. They are maintained only through periodic disturbance. In our region, this is often accomplished by brush hogging, but grazing is widely used in Europe, and our results from Hawthorne Valley would suggest that it can be useful. Cows feed quite selectively, and control of woody plants on occasionally grazed pastures will require either periodic cutting or grazing by browsers such as goats or Highland Cattle. Aside from large old-field patches, farmland value can be enhanced by allowing the growth of ample nectaring plants along field edges and in other less-utilized portions of the land. From our experience, clusters of wildflowers are often butterfly oases in intensively utilized areas.

While the patterns that we have described for hedgerows and butterflies are perhaps not as clear-cut as those we previously detailed for herbaceous plants, the vitality of nature on farms is evident.

*Copies of this and related information are available on the Farmscape Ecology Program website, www.hawthorne-valleyfarm.org-/fep/fep.htm. If you have questions, comments, or would like a free, digital copy of the full report, please contact Conrad at 672-7500 ext 254 or fep@taconic.net.*



### FARMLAND BUTTERFLIES WATCH LIST

| Common Name | Scientific Name | Caterpillar Food Plants* | Habitat** |
|---|---|---|---|
| Checkerspot, Baltimore | *Euphydryas phaeton* | turtlehead and English plantain | mostly wetland, riparian, expanding into drier? |
| Copper, American | *Lycaena phlaeas* | dock species | disturbed area, pastures, roadsides etc |
| Crescent, Northern?? | *Phyciodes selenis* | asters | moist partially open woods |
| Duskywing, Wild Indigo | *Erynnis baptisiae* | wild indigo and now alfalfa | open (orig barrens) |
| Fritillary, Aphrodite | *Speyeria aphrodite* | violets | upland acid soils, moist grasslands |
| Fritillary, Great Spangled | *Speyeria cybele* | violets | open, moist |
| Fritillary, Meadow | *Bolonia bellona* | violets | wet open places |
| Hairstreak, Banded | *Satyrium calanus* | oaks and hickories | edges, opens |
| Hairstreak, Grey | *Strymon melinus* | various field/brush plants | open, weedy,dist'd |
| Hairstreak, Hickory | *Satyrium caryaevorum* | hardwoods | edges of rich decid forests |
| Pearly Eye, Northern | *Enodia anthedon* | grasses | forest, hilly, oft near wet |
| Purple, Red-spotted | *Limenitis arthemis astyanax* | cherry | decid, often moist forest |
| Skipper, Leonard's | *Hesperia leonardus* | native grasses such as Little Bluestem | dry upland oft near moist nectaries |
| Skipper, Long Dash | *Polites mystic* | grasses | open grassy oft moist |
| Swallowtail, Black | *Papilio polyxenes* | parsely, carrot and other umbels | an array of open areas |
| Tortoiseshell, Compton | *Nymphalis vau-album* | birches and willows | forest openings and edges |
| Tortoiseshell, Milbert's | *Nymphalis milberti* | nettles | wet/damp near woods |
| Viceroy | *Limenitis archippus* | willow | moist, shrubby |

*- from Cech & Tudor 2005
**- from Cech & Tudor 2005 and Opler et al 1995

A killdeer takes wing in Columbia County. It is one of many grassland species here, but the loss of open space threatens birds.

David Lee

# Flight patterns

## Farmscape Ecology Program documents reasons for decline of farmland bird species

**By Conrad Vispo and Claudia Knab-Vispo**

*(This is the third in a multi-week series of excerpts from "The Flora and Fauna of Columbia County Farms: Their Diversity, History and Management" by Conrad Vispo and Claudia Knab-Vispo of the Farmscape Ecology Program at Hawthorne Valley Farm. The study looks at seven farms around Columbia County, examining the history of farming, plant life, wildlife and streams. This the first of two excerpts from the section on birds.)*

ABOUT ONE HUNDRED YEARS AGO a Miss E. Sackett of East Chatham and a Margaret R. Wilbur of Old Chatham looked at the birds around their Columbia County homes. They were hardly alone, but, unlike other county residents, they reported their observations to Elon Eaton who, in 1910, would publish *Birds of New York*.

Theirs is a snapshot of county bird life at the turn of the 19th century. While some of their observations are hardly surprising to this generation of birders, others are more startling: Vesper Sparrow, an abundant summer resident; Loggerhead Shrike, a fairly common summer resident; Bobwhite, a fairly common resident; Pileated Woodpecker, unreported. This week's installment is the story of those changes, why they happened and what they might portend.

Birds are well suited for studying the effects of land use history because of their need for extensive tracts of suitable habitat and because, as we've already noted, people notice them. Such study is not dead history; by noting which birds were abundant here 100-150 years ago, we can better understand the interaction of our current bird fauna and its diminishing farmland habitats.

WHO ARE the farm birds? Given that our definition of a farm includes its woodlots, potential farm birds are all the birds that might occur in the county. However, we'll concentrate on the birds of grasslands and shrublands. These are the habitats that farms are most directly responsible for creating and maintaining.

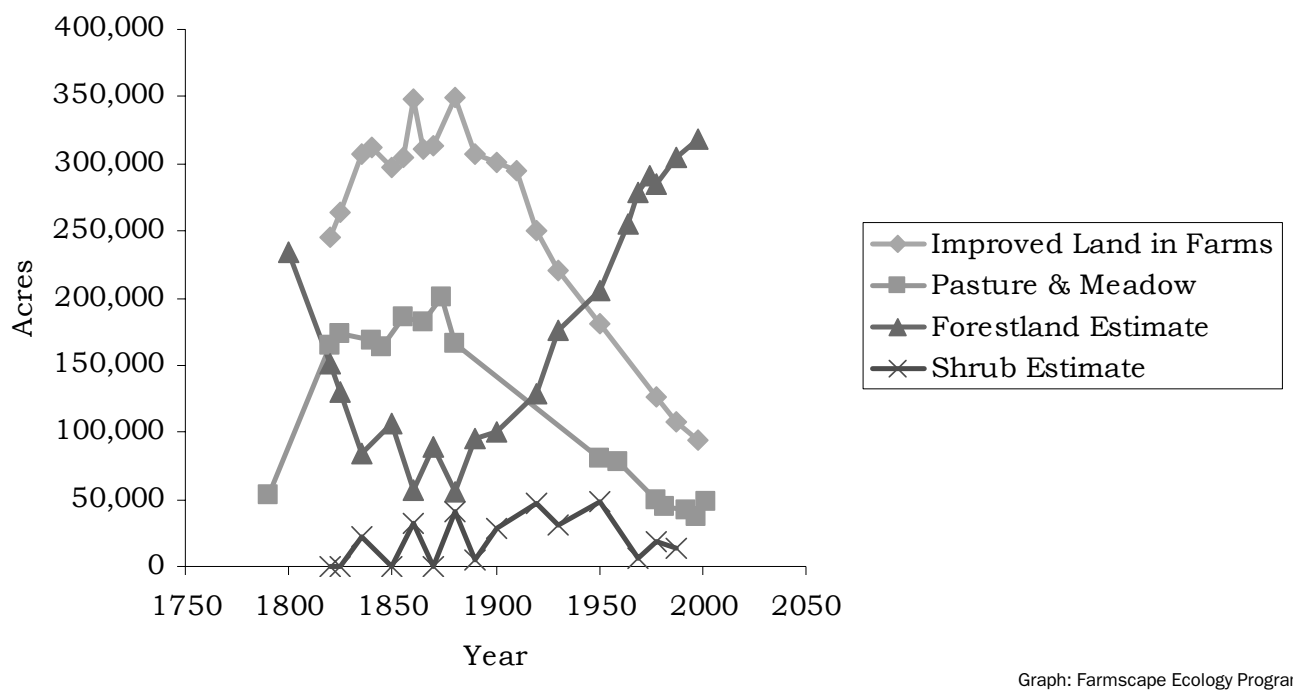
The declines in North American grassland birds have been widely recognized. The declines in shrubland birds are only beginning to come to light. The decline of both groups is attributed at least in part to loss of habitat as first natural and then anthropogenic grasslands and shrublands waned.

Given that prior to European settlement much of our region was forest, one can well ask why grassland birds and their habitats should be preserved in the Northeast at all.

The decline of farming (and hence the loss of grasslands) in the Northeast was paralleled by the expansion of agriculture in the Midwest. The result was that as grassland birds lost ground in our region, their original native prairies were likewise disappearing and in many but not all cases being replaced by monocultures unsuitable for many bird species. Reportedly less than 10% of original North American grasslands remain. Due to this decline in their demographic heartland, the Northeast's on-farm grasslands became more important for the conservation of these birds.

The justification for the preservation of shrubland habitats is a bit different. Most birds that we consider to be shrubland species were probably associated with shrubby wetlands prior to the extensive shrublands created by agricultural edges and abandoned farmland. They probably experienced a historic population boom from which they are only now receding as farmland reverts to forest or development. As agriculture wanes, their populations naturally decrease toward earlier levels. There would be little justification for concern if it weren't for the fact that much of the scattered natural habitat that they once relied upon has disappeared. Overall, in the continental United States, it is estimated that wetlands have declined more than 50% during the past 200 years. In New York, Pennsylvania and southern New England, acreage has decreased from about 7% of the surface area to 3%. The majority of this loss was due to draining of lands for agriculture and to development along the banks of streams, rivers, ponds and lakes. Furthermore, we have largely controlled some of the natural disturbances, such as flood and fire, which can create new shrublands. Thus, if shrubland birds were to be forced to rely upon their former haunts, their populations would likely drop below pre-European settlement levels.

WE COLLECTED BIRD information in two ways. First, we kept running lists of birds that we saw during farm visits and used lists assembled by others. Mike Scannell of Harrier Fields Farm is an astute birder and for many years




Graph: Farmscape Ecology Program

**This graph shows the estimated historical extents of different habitat types in Columbia County. Grassland birds have declined as forests have replaced grasslands.**

has kept a list of the birds that he sees on his property. Hudsonia, a respected regional ecological research group, surveyed the birds of Roxbury Farm. Our own list is most extensive for Hawthorne Valley Farm, because that is where we have the most field time. Given the varying durations and efforts associated with these lists, they don't represent standardized descriptions of each farm's bird population. However, they do help us identify the most common farm birds of our region and, to a certain degree, allow us to talk of geographic patterns.

In order to have a more standardized set of data that might let us compare fields more specifically, we conducted point counts. During 10-minute point counts, we tallied all birds that we saw within a 100 foot radius circle. Point counts were completed between sunrise and 9:30 a.m. during early summer.

Many of the grassland and shrubland birds we found on farms are, according to the National Breeding Bird Survey, experiencing significant declines nationally. Of the 31 birds we chose to explore in depth (because they occurred in our data and were grassland or shrubland species), 23 (or nearly 75%) are declining in North America. This is a stunning number given that it includes not only such relative rarities as Henslow Sparrows and Northern Bobwhite, but also such familiar birds as Red-winged Blackbirds, Baltimore Orioles and Eastern Kingbirds. While the breadth of these declines indicates the need for broad action, much of what is happening continentally is reflected locally—13 of these bird species appeared to be absent or declining locally. These are grim statistics that reflect dramatic changes occurring in our bird fauna.

So, what has driven these declines? Part of the answer is loss of breeding habitat. (For migratory birds, another part of the answer is loss of wintering habitat.) Below, we will mainly discuss the case of grassland birds; next week, we'll focus more on the shrubland species.

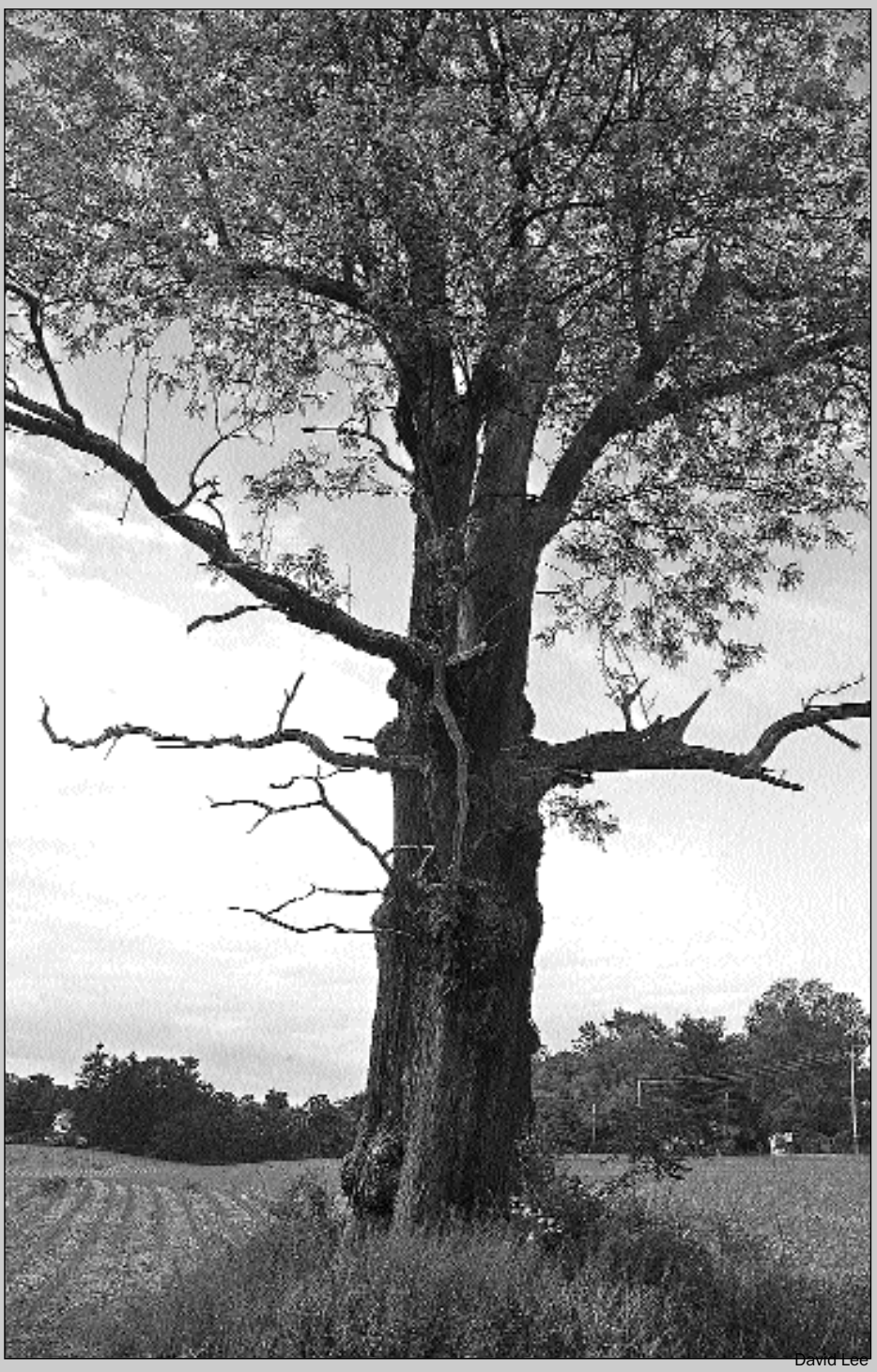
Between 1800 and 1900 Columbia County was part of the USA's "breadbasket" producing, if little wheat, then other grains, straw and hay. At the peak of agricultural activity (ca. 1830-1900), more than 75% of the County's land was actively being farmed. This meant that there was a lot of habitat for grassland birds. Subsequent to 1900, farmland declined precipitously and forests rebounded. Shrubland, the transition stage between field and forest, went through a boom and bust, as the vast areas left by farm abandonment grew through brush and into woods.

The data document why our grassland birds have declined: forests have replaced grasslands. At the end of our agricultural era (ca. 1900), grassland birds were substantially more abundant than at present. Grasshopper Sparrow, Vesper Sparrow, Northern Harrier, Upland Sandpiper, Loggerhead Shrike and Northern Bobwhite were all reported to breed in or near the County around the turn of the 19th century. Few if any of these species currently do so. Eastern Meadowlark, while still present, is apparently rarer. Only Bobolink and Savannah Sparrow are still fairly frequent breeders in the county, although even they may be less common.

Given the historical landscape, it is surprising that some grassland birds remained in the county as long as they did. According to the local Breeding Bird Survey data, Vesper Sparrows, Grasshopper Sparrows and Horned Larks were all registered with some regularity in the County prior to 1980. Does this indicate that we are not so far from supporting such populations again or, rather, that there is an ecological lag-time during which a species persists in the area even if populations are not self-supporting? Woodland birds, such as Pileated Woodpecker and Wild Turkey, rebounded after 1980, suggesting perhaps that some tipping point had been reached where forest integrity returned at the expense of grasslands. Forest mammals (e.g., bobcat, fisher and black bear) likewise reappeared during this period.

In sum, grassland birds are declining nationally and at least some of the factors responsible for this decline are probably also functioning locally. There is good reason to be concerned for the future of these species and to believe Columbia County farmland can play a role in their conservation.

*The declines in North American grassland birds have been widely recognized. The declines in shrubland birds are only beginning to come to light. The decline of both groups is attributed at least in part to loss of habitat as first natural and then anthropogenic grasslands and shrublands waned.*



David Lee

OUR STANDARDIZED SURVEYS let us look a bit closer at grassland habitat. Habitat serves a range of needs for most species: source of food, source of shelter, nesting location, and component of predator protection, just to name a few. While the benefits of adequate habitat can be overwhelmed by influences such as hunting, poisoning or disease, in most cases, habitat is key to a species' survival. Thus we explored the habitat requirements of our grassland birds in more detail.

"Grassland" is a broad term that includes some not terribly grassy habitats such as ploughed fields and fallow cornfields. We need to be broad in our definition because, when taken as a group, grassland birds are broad in their definition of suitable habitat. We only saw a subset of Columbia County's grassland birds (i.e., Bobolink, Song Sparrow, Field Sparrow, Savannah Sparrow, Killdeer and Red-winged Blackbird) during these surveys, and so our habitat discussion is restricted to these species.

We considered three inter-related aspects of grassland habitat: vegetation height, habitat type and the occurrence of nearby brush.

Several patterns were evident. For example, Bobolink and Field Sparrows definitely favored taller grasslands. Neither was present in the shortest fields. However, they differ in their preferred habitats, with Bobolink occupying hay fields (or fields used for hay and pasture), while Field Sparrows were found in pastures and cornfields. Indeed, that latter species favored brushy areas, while the former restricted itself to open grasslands. Field Sparrow straddles the fence between a grassland and a shrubland species. Song Sparrows were ubiquitous, occurring at all vegetation heights and in all habitat classes. They appeared to favor areas with some shrubs. Red-winged Blackbirds favored similar vegetation height to Bobolinks, but were more wide-ranging in their choice of habitat types and more tolerant of brush. Finally, the Killdeer sought the lowest vegetation, found mainly in and around gardens or in short-cropped pastures. These results parallel the findings of other researchers.

While this detail might be of interest to an ardent birder or a wildlife manager, it also has broader significance. There's both good news and bad news. The good news is that a variety of habitats, not just mature hayfields, can provide habitat for at least some grassland species. Pasture and grassy shrubland, for example, can also be important. The bad news is that, if we want to keep our complete roster of grassland species, we need to maintain a diversity of grassland habitats; just maintaining hayfields is not the full picture.

One trait that complicates the picture further is that many grassland birds apparently rely on grassland patches of a certain size. A postage-stamp of grass is rarely enough. Other researchers have estimated that Upland Sandpipers, for example, usually choose areas with at least 100 acres of contiguous, suitable habitat. As farmland goes from being the matrix in which the rest of our habitats are embedded to being scattered outposts midst forest and houses, many of such species disappear. Some grassland species have more modest land requirements. Some of the species that still persist in the county, Savannah Sparrow, Bobolink, and Eastern Meadowlark, for example, apparently need fields (or field blocks: birds probably view fields separated by narrow fence lines as single patches of habitat) on the order of at least 25 acres.

YET ANOTHER HISTORICAL force has been at work. If one looks at the evolution of agricultural yield over the past 100 years, the increases have been dramatic. In the case of hay, current yields (in tons of hay per acre) are two to three times what they were a century ago. Much of this improvement comes from the intensification of use, and this causes an additional problem for grassland birds.

Birds choose their nesting sites based in large part on what they see when they arrive in spring. A field that looks good in spring but whose nesting habitat disappears prior to fledging can be considered an *ecological trap,* that is, a place that attracts birds but then proves unproductive if not fatal. ("Fledging" is the growth stage at which young birds first fly.)

Aside from habitat loss, historical changes in haying schedules have severely impacted some grassland species. Many fields are now cut as early as late May, especially when hay is cut and wrapped green for "haylage." In the 1800s, at least, most haying did not happen until substantially later: a New York almanac from 1842 gives July 5 as the average *starting* date for haying. That one month can be crucial; when haying occurs before the young birds are fledged, pairs may be unable to raise any young. Some birds do re-nest, but some fields are also re-cut.

Early cutting appears to most affect the late hayfield nesters such as the Meadowlark, Bobolink, Vesper Sparrow and Grasshopper Sparrow. The mean fledging date for these species is probably in late June. Species that can make do in pastures, that may utilize brushy/marshy areas for their nests and/or that nest earlier (e.g., Killdeer, Field Sparrows, Savannah Sparrows and Red-winged Blackbirds), seem less affected by hay schedules.

COLUMBIA COUNTY is unlikely to revert to extensive grassland anytime soon. It is thus unlikely that those bird

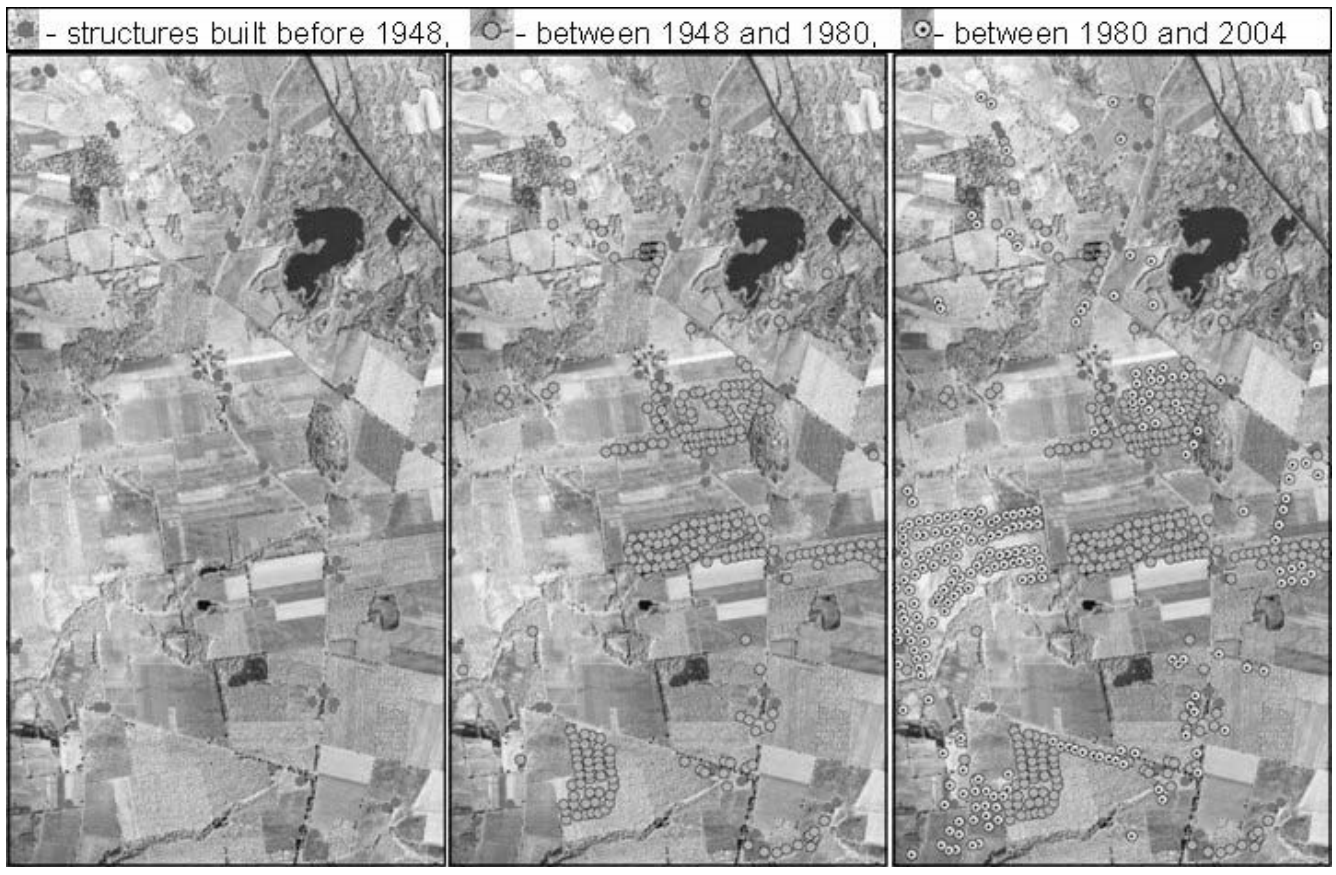
species that require large grassland tracts (e.g. Upland Sandpiper) will attain any abundance. Our recompense is the rebounding woodland wildlife. However, there is a set of grassland species, such as the Savannah Sparrow, Bobolink and Meadowlark, which can make do with smaller fields and which find refuge on our hayfields when those fields are managed compatibly. As prelude to next week's more detailed consideration of management, we will simply pose a dilemma.

*Given the historical landscape, it is surprising that some grassland birds remained in the county as long as they did.*

The neighbors of Miss E. Sackett and Margaret R. Wilbur were not managing for grassland birds; they were making a living as best they could. Their techniques and tools just happened to be largely agreeable to grassland bird species. Today, we are little different in attitude; it is just that our tools are more powerful. We can drive and communicate much faster (and so settle farther from work and stores), can build houses more rapidly, can cut hay earlier and quicker, can import food from farther away.

These new abilities give us novel capabilities and motivations for changing our landscape. But how should the land use ethics that guide our hands take into account the tremendous new powers of those hands? How can we make room for Bobolink in a modern landscape? How can we make room for productive farmland?

*Copies of this and related information are available on the Farmscape Ecology Program website, www.hawthornevalleyfarm.org/fep/fep.htm. If you have questions, comments, or would like a free, digital copy of the full report, please contact Conrad at 672-7500 ext 254 or fep@taconic.net.)*




**Images of the Route 9 corridor north of Valatie, Columbia County. The base photo is from 1948; subsequent housing development was outlined from more recent aerial photographs. Notice how first apple orchards and then fields have been converted to housing development, and how the extent of grassland habitat shrinks.**



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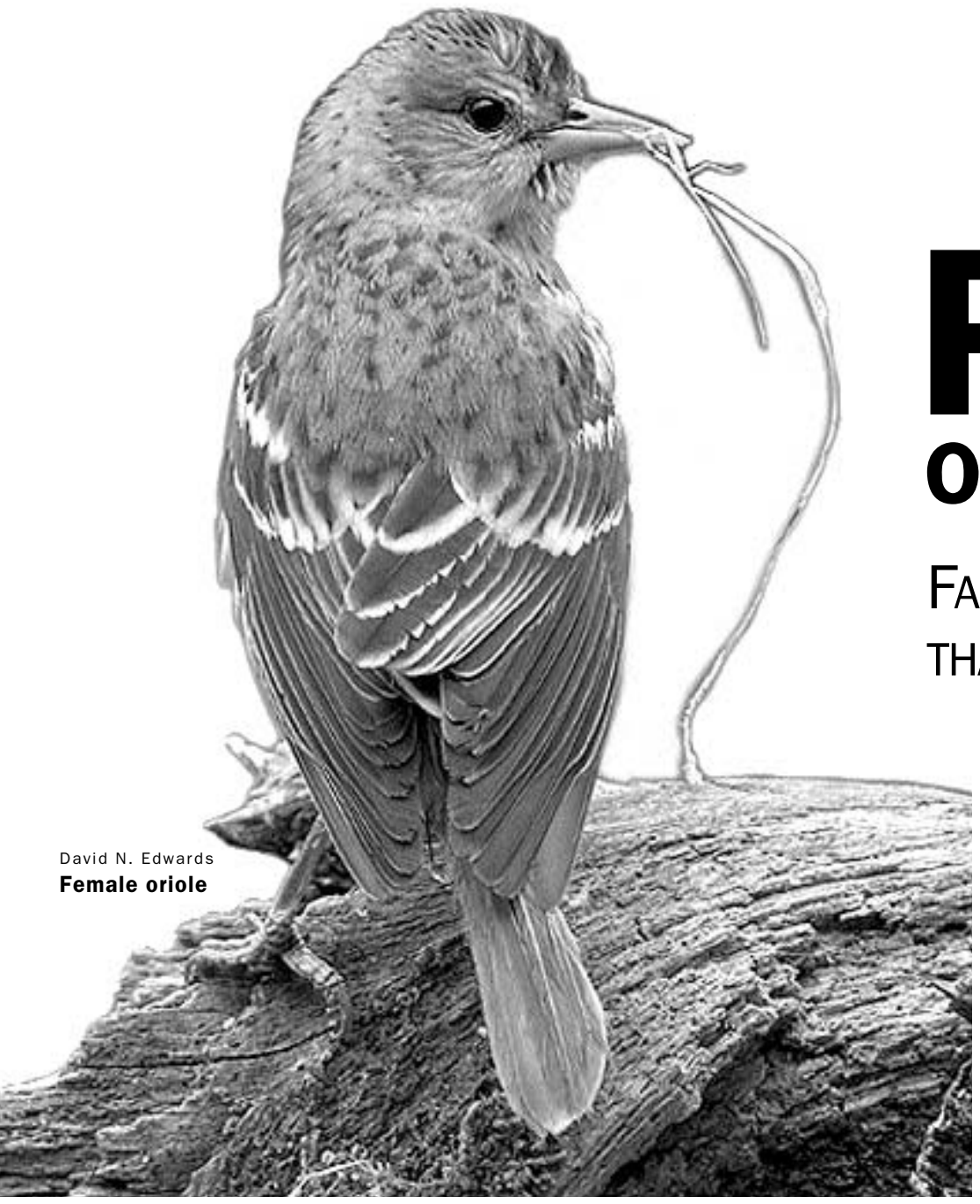


David N. Edwards
**Female oriole**

David Lee
**Red-wing black bird**

# PERCHED ON THE EDGE

## FARMLAND STUDY EXPLORES THE BIRDS THAT LIVE AT THE EDGES OF FIELDS

**By CONRAD VISPO and CLAUDIA KNAB-VISPO**

*This is the fourth in a multi-week series of excerpts from "The Flora and Fauna of Columbia County Farms: Their Diversity, History and Management" by Conrad Vispo and Claudia Knab-Vispo of the Farmscape Ecology Program at Hawthorne Valley Farm. The study looks at seven farms around Columbia County, examining the history of farming, plant life, wildlife and streams. This is the second of two excerpts from the section on birds.*

HISTORY IS DONE and gone, and the best a historian can do is imaginatively recreate it from the existing evidence. It is a detective story in which the excitement is in the hunt, as much as in the results. In past installments, we presented graphics depicting the trends in different habitats in Columbia County—grassland, shrubland and forest. However, we didn't discuss where those numbers came from. This week, we explore that "detective story" a bit more, both to give you a taste of our methods and to make a point about shrubland bird habitat.

Almost all the land-use figures we have presented derive from state and national census data. Unfortunately, for our purposes, census takers did not record anything as esoteric as bird habitat; instead they were interested in indicators of productivity. As a consequence, the information collected corresponded to total farmland, "improved land" (i.e., actively farmed areas), "unimproved land", and the area of land in various productive uses including hay, pasture and woodlot. We used these numbers as building blocks to help us estimate the extent of grassland, shrubland, and woodland.

Calculating grassland is relatively easy. Because there was probably little off-farm grassland at least until the mid 1950s, we can get our estimate by simply adding up hayfield and pasture values.

Woodland is a little more complicated; however, we assume that, for much of the past 200 years, most of what wasn't in farm was in forest. So we add non-farmland to on-farm woodlots to estimate total forest area.

Estimating shrubland is more complicated and requires understanding something about where shrubland comes from. Left to its own devices, most of our land would be covered with forest. Shrubland arises when something strips the land of forest and then lets reforestation begin; shrubland is a step in the familiar succession of grassland to shrubland to woodland. We estimated shrubland based upon change in forest extent. If, for example, forestland rose 50,000 acres between two censuses, then we assumed that the same amount of land went through a shrubland stage before reaching forest. Based upon this, we can sketch out the general shape of shrubland evolution in the county: it rose as farm abandonment increased at the end of the 19th century, peaked around 1950 as the rate of farmland accelerated and tapered off once much of the former farmland returned to forest.

**Approximate Fledging Date in New York State***

| Species | Start | Stop |
|---|---|---|
| Bobolink | 18-Jun | 18-Jul |
| Eastern Meadowlark | 9-Jun | 9-Jul |
| Field Sparrow | 16-Jun | 16-Jul |
| Grasshopper Sparrow | 27-Jun | 27-Jul |
| Henslow Sparrow | 17-Jun | 17-Jul |
| Horned Lark | 28-Mar | 28-Apr |
| Killdeer | ca. 21 May | - |
| Northern Harrier | ca. 4 July | - |
| Red-winged Blackbird | 26-May | 26-Jun |
| Savannah Sparrow | 11-Jun | 11-Jul |
| Song Sparrow | 17-May | 17-Jun |
| Upland Sandpiper | ca. 15 June | - |
| Vesper Sparrow | 5-Jun | 5-Jul |

*-derived from Bull's *Birds of New York*

This statistical aside not only gives you a sense for our methods, but also highlights one of the main issues facing shrubland management: if grassland birds are the Hollywood stars, albeit battered ones, of North American bird conservation, then shrubland birds live on the wrong side of the tracks (or, better put, right along the tracks). Many people don't even consider brush to be a habitat of its own. "Wasteland," "old field" and "abandoned pasture" are all names which suggest that shrubland is not a habitat in its own right. But it is.

Find a shrubby field and walk around it. You're likely to hear birds that you find almost nowhere else: the bouncing ping-pong ball chirp of a Field Sparrow, the rising buzz of a Prairie Warbler, the burred "Ho—Humm" of the Blue-winged/Golden-winged Warbler, the Eastern Towhee's "Drink your Tea–ee–ee–ee", the Brown Thrasher's hoarsely shouted mimics, and, if you're lucky, the non-musical, almost-mechanical rasp of a Clay-colored Sparrow. If our description of shrubland as a transition is correct, then how can it be home to a unique suite of birds? Obviously, these birds must have had natural haunts that they frequented before the advent of shrubby pastures, and to understand what might happen as agriculturally created shrubland wanes, we need to understand where these natural habitats are.

Prior to European colonization, shrubland in our area arose in at least three ways: human clearing, natural disaster (e.g., hurricane, tornados, ice storms, fire) and "extreme" conditions (e.g., sodden soils, exposed hilltops). Although there is substantial debate, regional indigenous peoples probably did not create extensive shrublands. The Northeast does experience natural disasters from wind and fire, but rarely with a frequency or intensity that creates much shrubland. Alpine habitats are rare in Columbia County. Hence, it seems that brushy areas in and about wetlands were the main original habitats for many of our shrubland birds.

This is an important point because, as we mentioned last week, over the past 200 years wetland area has declined by more than 50% in New York. Furthermore, fire and flood control have reduced the effects of natural disasters. Thus, as the agriculturally created shrublands disappear, shrubland bird populations are likely to tumble below their initial densities due to the disappearance of the natural habitats. Many of the species whose songs we described above have begun their declines; we don't know where they will end.

JUST AS GRASSLAND includes a variety of bird habitats, so does shrubland. We distinguish several kinds of on-farm shrublands: abandoned fields and

brushy pastures; hedgerows; forest edges; and wetland margins. Below are informal assignments of our species to different shrub types based upon field notes and recollections (improvements are welcome); some species occur across several types, others appear more picky.

•Old fields/brushy pastures: Prairie Warbler, Brown Thrasher, Clay-colored Sparrow, Northern Mockingbird, Song Sparrow, American Woodcock, Eastern Towhee, Eastern Kingbird, Field Sparrow, Yellow Warbler, Brown-headed Cowbird

•Forest edges: Baltimore Oriole, Bluebird, Chestnut-sided Warbler, Indigo Bunting, Blue-winged Warbler, Common Yellowthroat

•Wetland margins: Brown Thrasher, Chestnut-sided Warbler, Eastern Towhee, Grey Catbird, Common Yellowthroat, Indigo Bunting, Common Grackle, Yellow Warbler

•Hedgerows: Grey Catbird, Yellow Warbler, American Goldfinch, Song Sparrow, Common Yellowthroat, Eastern Kingbird, Brown-headed Cowbird.

Unlike grassland birds, shrubland birds do not seem to require especially large habitat patches. This makes evolutionary sense in that they probably evolved in part to exploit small patches of edge habitat.

The fate of both grassland and shrubland birds in our region is tied to that of agriculture, because farming is largely responsible for creating suitable habitat. However, both on and off farms, certain types of open-land management are more or less conducive to these birds. Below, we will discuss some management ideas, but before we discuss specific management techniques, it's important to consider context.

We have taken a the-cup-is-half-full perspective on farming and nature conservation. Not all farming benefits nature, but by emphasizing the positive, we highlight possibilities. Those possibilities will not be fully realized until we, the public, begin to appreciate, in a social and economic sense, the key role that farmers play in creating the "rural character" that figures prominently in so many regional strategic plans; and as farmers become willing to see an explicit ecological role not as an insult to their paramount food-producing role or as a dangerous slide towards becoming landscapers but rather as an evolution of their unique place in society. While the ecological management recommendations below focus on what a farmer might do, this is not because the farmer per se is uniquely responsible for the fate of these birds. Rather, it is because farmers still control much of the open land, and it is easier to talk about ecological management than the socioeconomic changes we've mentioned.

*We think that if we are to have a conscious will towards the land then it should derive from breathing the land, from listening to it, from reading it.*

With that preamble and at the risk of sounding self-serving, we believe the first step in management is to understand what one has on a given farm. This doesn't mean knowing all the birds, but learning a few can make any thoughts of bird-related management more practical. Just as a good farmer tries to understand what the cropland needs before applying fertilizer, so too the first step in bird management is knowing which birds are where.

When grassland or shrubland birds are on one's land, it indicates that, from the birds' perspective at least, something is being done right. The question then becomes not: How do I create the right habitat? but rather: How do I assure these birds breed successfully? By learning which birds are where, you can put effort (or inconvenience) where it is most likely to be effective.

A key example of applying observation involves hayfields. The distributions of many birds tend to be patchy. For example, of the 40 or so hayfields we surveyed around Hawthorne Valley, only a quarter had many Bobolinks. As we discussed last week, cutting hayfields prior to fledging is a factor causing the decline of grassland birds. Thus, if at all possible, shunting bird-rich fields farther back in the cutting rotation can be very helpful. You can find out if birds have fledged by walking a field. Parental birds are usually very busy and fairly conspicuous; recently fledged birds are often noisy and a bit clumsy in flight. With a little practice, one can get a fairly good idea of when birds have fledged. This takes you only as long as walking (or even driving) your fields.

ONCE YOU KNOW where they are, several other management ideas may be useful for grassland species. There is little remedy if mowing is done long before fledging. However, there is a period when fledglings can fly, but are hesitant or unable to fly far. During this period, a reverse mowing pattern in which hay cutting begins at the field center and spirals outwards may help push such birds out of harm's way rather than concentrating them at the field center which will, ultimately, be mowed.

Meadowlarks and Bobolinks, the two most common hayfield nesting birds in our region, tend to prefer mature hayfields that, while regularly cut and not woody, also are more diverse than recently-planted and relatively uniform fields. Therefore, letting some fields go for several years without reseeding can be beneficial.

Strawberry fields or potato patches aren't usually what one envisions as interesting bird habitat. Nonetheless, certain of our rarer grassland birds—Horned Lark and Vesper Sparrow—apparently may use such areas (reports of sightings would be appreciated!). These birds are reported to seek areas with ample open ground and a smattering of vegetation No- or low-till approaches appear to be most conducive because cultivating tends to destroy nests. Admittedly, this may not be compatible with weed control in organic crops.

Few people manage for shrubland. Rather, this habitat "manages for itself," springing up where management is least intense. Because it is an incidental habitat, it is more a product of overall farm management than specific production plans. Shrubby pastures seem ideal if one can afford it. Unfortunately, one can't just forget about a field and hope it will stay as shrubland; left unattended, it will eventually grow up to woodland. This is true even if occasional cattle grazing occurs. Hence, periodic brush-hogging (preferably after the nesting season) or visits by browsers (e.g., goats or Highland cattle) may be useful.

In order to maintain shrubland birds, some sort of rotational clearing may be best. That is, one clears only part of the shrubland in any one year, rotating through all such areas every 5 to 10 years.

Maintaining streamside/riverside areas, aside from reducing nutrient runoff and erosion, can also support shrubland birds. As we have already noted, the natural habitat for many of these species is just such places. Maintaining wet meadows, especially when they are brushy, can also provide good shrubland bird habitat.

The work of others indicates that reducing the use of herbicides and, especially, pesticides may help birds. Reducing herbicides can increase ground cover, and this can help some birds. Reducing pesticides likely increases foods available for insectivorous species. Pesticides can also be directly poisonous. Bird deaths from pesticide poisoning have been reported from our area (Dutchess, Columbia and Rensselaer counties). Birds of prey and other meat eaters (such as crows) appear to be the most commonly affected. However, any effects on young birds, which are almost always fed insects, are far less easy to detect. We have no direct observations bearing on the effects of herbicides and pesticides, and consideration of chemical effects has to be in the context of the associated land use. For example, in our area at least, organic dairy farming is apt to be based upon rotational grazing, whereas conventional dairy farming is often corn based. Separating differences in the bird fauna due to agrochemicals from those due to land use is difficult.

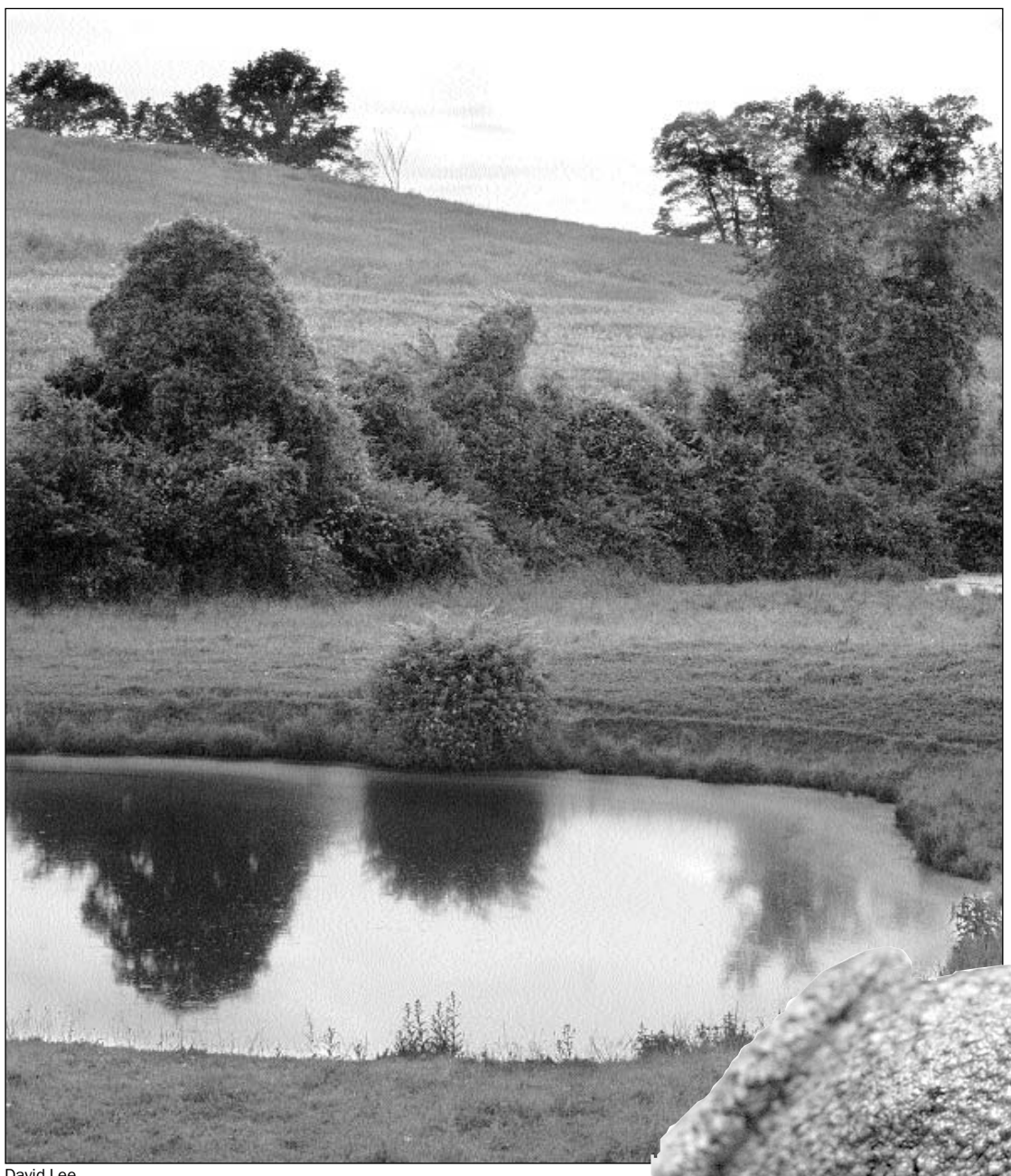
Image contributed
**Baltimore oriole**

| Species | Natural Habitat |
|---|---|
| American Goldfinch | Flood plains, early forest |
| American Woodcock | Forest openings, shrubby wetland |
| Baltimore Oriole | Forest edge, riparian forest |
| Blue-winged Warbler | Wetland and forest edge, savannah |
| Black-billed Cuckoo | Wooded wetlands |
| Brown-headed Cowbird | Prairie, prairie/forest edge |
| Brown Thrasher | Wetlands |
| Chestnut-sided Warbler | Areas of natural disaster, beaver meadows, stream banks |
| Common Yellowthroat | Woody wetlands, brushy burns |
| Eastern Bluebird | Barrens, savannahs, wetlands, open forest |
| Eastern Kingbird | Wetlands, natural disturbances |
| Eastern Towhee | Edges, have found around wetlands |
| Grey Catbird | Early successional areas and wetlands |
| Indigo Bunting | Tree falls and wetlands |
| Northern Bobwhite | Early woody regrowth, brushlands |
| Northern Mockingbird | Forest edge |
| Prairie Warbler | Forest-prairie or water edges; savannahs, barrens |
| Yellow Warbler | Wet thickets |

HISTORICAL STATISTICS are wonderous fodder for the imagination. We still remember when we first came upon the crumbling census sheets that detailed the activities of each 1855 household in Columbia County. The numbers could paint a thousand pictures. Yet, at the same time, juxtaposing those individual statistics with the county summaries highlighted how time coldly calculates the net effects of all the little, day-to-day decisions that make up our lives and spits out the trends and patterns that will be our legacy.

Shaping that legacy is a matter of technique and will. We have discussed aspects of technique above. At its base, we think that if we are to have a conscious will towards the land then it should derive from breathing the land, from listening to it, from reading it, not in some metaphysical sense, but in the very real sounds of crickets, frogs and other night creatures outside our open windows; in the smell of manure on fields; in the cascading fluorescent flashes of fireflies over ponds; and in the self-absorbed and starkly functional ardour of bobolinks.

*Copies of this and related information are available on the Farmscape Ecology Program website, www.hawthornevalleyfarm.org/fep/fep.htm. If you have questions, comments, or would like a free, digital copy of the full report, please contact Conrad at 672-7500 ext 254 or fep@taconic.net.*



David Lee

# WHAT FROGS TELL US

## OVERLOOKED AMPHIBIANS SERVE AS SENTINELS OF FARMLAND HEALTH

**By CONRAD VISPO and CLAUDIA KNAB-VISPO**

*This is the fifth in a multi-week series of excerpts from "The Flora and Fauna of Columbia County Farms: Their Diversity, History and Management" by Conrad Vispo and Claudia Knab-Vispo of the Farmscape Ecology Program at Hawthorne Valley Farm. The study looks at seven farms around Columbia County, examining the history of farming, plant life, wildlife and streams.*

THERE IS A PULSE and flow between our woods and waters. Each spring, certain frogs and salamanders move from the forests, where they spent the winter, down to the ponds where they and many of their ancestors have bred. They come early, pushed by an instinctive fear of drying pools, trying to squeeze in mating, egg laying, development and metamorphosis before spring rains turn to parched summer.

Few sights are odder than watching Spotted Salamanders slip and slide across April pond ice, or seeing a Wood Frog seated in snow. Later, their legged young will return to the forest, to forage during what remains of the summer, and then to find shelter for the winter. Hence do animals follow the flow of water and then defy it.

Other amphibians (i.e., frogs, toads, and salamanders) hardly stray at all, lurking even as adults along the banks of ponds, feeding at these concentrations of life, and seeking refuge in the water. The Green Frogs and Bullfrogs are such species and are the sporting companions of many a youth.

Finally, some species stray but then return, "realizing" that there are advantages to pond life, but that the young must go forth to explore in case old ponds disappear and new ones appear. The Red Efts that are so common along certain woodland trails are the gaudy, wandering "teenagers" of the Red-Spotted Newts who, as adults, are residents in many of our ponds.

Ponds and other wetlands collect and reflect our actions on the land. The water that drains our hills carries with it traces of the land it crosses. Two ponds may look identical, but surround one with forest and the other with parking lot, and you will, in fact, have two very different ponds. Pond quality is thus, in some ways, a summation of the quality of the surrounding land. Amphibians, in turn, are of especial interest to us because they are considered especially sensitive to water quality. They are thus useful "biometers" of aquatic and, hence, landscape health.

A worldwide decline in frog numbers has been widely reported. Although the exact causes of this decline are debated and may be multiple, habitat loss and water pollution have been shown to have at least localized affects on amphibian populations. The exceptionally permeable skins of amphibians and their sometimes intricate life-cycles (depending, for example, upon both healthy upland and wetland habitats and including ontogenetically complex metamorphosis) appear to make them particularly vulnerable to habitat alterations and hence particularly good indicators.

So, who's the cast and what are they up to? Below, we briefly profile each of the species, which we have found on farms in Columbia County. (Rather than trying to describe what each species looks like, we invite you to download illustrated descriptions of county frogs from our web page, www.hawthornevalleyfarm.org/fep/frogs.htm)

Photos contributed

Above and here, the abundant Grey Treefrog.

*Amphibians are of especial interest to us because they are considered especially sensitive to water quality. They are thus useful "bio-meters" of aquatic and, hence, landscape health.*

•The sonorous *Bullfrog* is a widespread resident of larger ponds. Its tadpoles overwinter once or twice before becoming frogs, thus they can survive only in permanent ponds. There is debate about the original native range of Bullfrogs, and they are classified as an invasive species in some parts of the United States. However, it seems likely that they have long been native to this area; early travelers mention their dramatic calls and earlier scientific work mentions them as residents. Their populations bear watching because they are likely favored by the deeper and larger ponds that are now the fashion. They are eager carnivores and can reduce the populations of other amphibians that try to share their habitats.

•The widespread occurrence of *Green Frogs* on Columbia County farms is not surprising, because this is a generalist species that seems relatively resilient to modern onslaughts. Their tadpoles frequently overwinter at least once before changing to frogs. As a result, both Green Frogs and Bullfrogs can breed late into the year, and these two species are the main ones that are still calling as you read this.

•We were surprised by the relative abundance and widespread nature of the masked *Wood Frogs*. Wood Frogs are normally conspicuous only during their brief spring breeding period, and so are easy to overlook. As their name implies, they are forest frogs as adults and pass the winter well frozen in some woodland retreat.

•The tiny *Spring Peeper* is one of our most ubiquitous frogs. That so common and loud a frog could be so small and hard to find was a great puzzlement when we were young.

•Breeding by *American Toads* was detected more rarely than we had expected, given the frequency with which one happens upon them away from breeding ponds. Their breeding period seems short in any one location, but yet relatively long when considered across locations.

•The *Gray Treefrog* is our third most common frog (after Peepers and Green Frogs). As with Peepers, it is surprising that a frog that is so common when congregating at its breeding ponds can "melt into the woodwork" so easily during the rest of the year. No doubt their exquisite camouflage deserves at least part of the credit.

•*Pickerel Frogs* are widespread but never abundant at any given pond. They are early breeders, and we found their eggs together with those of Wood Frogs.

•We found *Leopard Frogs* on only one farm. This is a frog of wet meadows, and we discovered them in shallow puddles in a moist pasture. Records suggest that they were previously more common in the state, when the timing of their arousal in spring resulted in their being dubbed "Shad Frogs."

•The *Spotted Salamander's* large (up to 6" or so) black body with bold yellow spots is striking and

unmistakable. This is our most common salamander of seasonal (or vernal) pools. We also found it in several shallow, but permanent farm ponds. We surveyed frogs by listening for their calls, but salamanders do not call. Therefore, we looked for their distinctive eggs. One other salamander, the Jefferson (or its hybrids) occurs in our area. We found it at several wooded vernal pools, and may have seen a few of its smaller clusters of eggs in farm ponds.

•Lastly, the *Red-spotted Newt* appears to be a relatively resilient and widespread species. This relatively slim, greenish, 2-3" long salamander is often seen floating spread-legged near the edges of ponds. Because it is aquatic as an adult, it was found only in permanent ponds where its slightly poisonous skin seems to help protect it from fish and Bullfrogs.

ONE SIMPLE but important conclusion from these observations is that farms are home to an array of local amphibians. Some of our liveliest pools were cattle ponds. In discussing these results with other researchers, we found corroboration of our conclusion that at least some farm ponds can be valuable habitat for our frogs and salamanders. That tentative conclusion spurred our current year's study of ponds throughout the County.

However, to make the case that farmland ponds are important for conservation, it is also important that we establish population trends. Can we, as we did with the birds, link historical landscape changes to with changes in amphibian populations?

Because they *don't* cause nasty bites, afflict crops or provide an important raw material, and because they *are* generally small and retiring, amphibians have largely gone unnoticed in history. However, our efforts at historical research are favored by the fact that between about 1830 and 1850, New York, Massachusetts and Vermont all decided to survey their faunas (and floras). While these works were rudimentary by modern standards, they were important first steps towards understanding the species of our region. Conveniently, these surveys occurred when agriculture was at or near its maximum extent. Thus, they tell us about which species were affected by early agriculture, and they give us a point of comparison from which to judge changes.

These works suggest that some species have long fared well: Green Frog, Gray Treefrog, Spring Peeper, American Toad and Red-spotted Newt have been and continue to be fairly common. The dynamics of a few other species is less certain: the statuses of Pickerel Frog and Bullfrog are simply not clear; those of Spotted Salamander and Wood Frog suggest that there may have been recent declines (although their status at the peak of farming is also uncertain). Lastly, Leopard Frog and Cricket Frog may have benefited from the open wet meadows of farms and have almost surely declined substantially since then.

Several factors are probably responsible for these patterns. We have chronicled the general clearing and reforestation of our landscape in previous installments. Concurrent with that were certain activities affecting wetlands.

For most of the 19th century, unirrigated grains were our main agricultural product; corn has continued that tradition. For these crops, drainage that makes rich bottomland soils available for farming has been popular. Drainage became particularly common once clay tiles were introduced around 1850. The result has been an estimated 60% decline in wetlands in the state since 1790. The sheep craze around 1820 may have necessitated some watering spots, but these animals probably ranged widely and often made do with what they could find. As dairy awoke in the last quarter of the 1800s, the need for watering holes probably became more immediate, especially given that rotational grazing prevailed and indoor plumbing was lacking; however, the backhoe had yet to be invented. Although agricultural extent was declining by the mid 1900s, there was a bout of government-funded farm pond construction in the 1960s.

It is residential development rather than farming that is probably most affecting our area's amphibians today. First, there has been the pond-building boom. Our analysis of aerial photographs of a roughly 1 square mile area around Hawthorne Valley showed that detectable ponds went from roughly 2 to 24 between 1948 and 2001. Much of this may be related to current tastes in landscaping. While these ponds may be a boon for some amphibians, certain species suffer when the ponds are dug in former vernal pools, when landscaping results in closely cropped margins, or when ponds are stocked with fish. Second, houses are being built higher up on hills. While vernal pools can occur on lowlands, most of our remaining ones may be nestled in the dips of historically less-accessible ridges. As houses move into these areas, they may be destroying or damaging the pools and their surroundings. Lastly, those high houses require long entry roads—n our little aerial study, road length increased about 250% between 1948 and 2001. Many animals are killed in spring as they cross roads on their way to ponds. In this context, farmland ponds can actually be refuges of sort for amphibians, especially those favoring lightly worked but open land.

Photos contributed

**The Red-Spotted Newt in various stages of its life-cycle.**

Photo contributed

**Above, the Spotted Salamander can be found on at least four of the Columbia County farms studied.**

TO UNDERSTAND a little about how ponds can be best managed for frogs and salamanders, it helps to think about what characteristics of ponds are most important to amphibians.

From a frog or salamander's point of view, not all ponds are created equal. We have already alluded to one important distinction: vernal vs. permanent ponds. Obviously, drying out puts pressure on those species (e.g., Wood Frogs and Spotted Salamanders) whose young develop in vernal pools. And yet, that same drying out is what protects them from predaceous fish and Bullfrogs. Indeed, permanent ponds that happen not to have many fish or Bullfrogs can be good habitat for "vernal pool" amphibians. When vernal pools are dug out for ponds that are then stocked with bass, few amphibians can persist. Unfortunately, vernal pools often look like no more than large puddles in spring and muddy depressions later in the year. As such, they are often ignored and destroyed when land is developed.

As anybody who has searched for frogs can tell you, vegetation such as cattails or aquatic plants, can help hide amphibians and their young from predators. Shallow areas can also provide refuges. Clearing pond margins of rushes and controlling aquatic plants with carp or other means can further diminish habitat quality for frogs and salamanders.

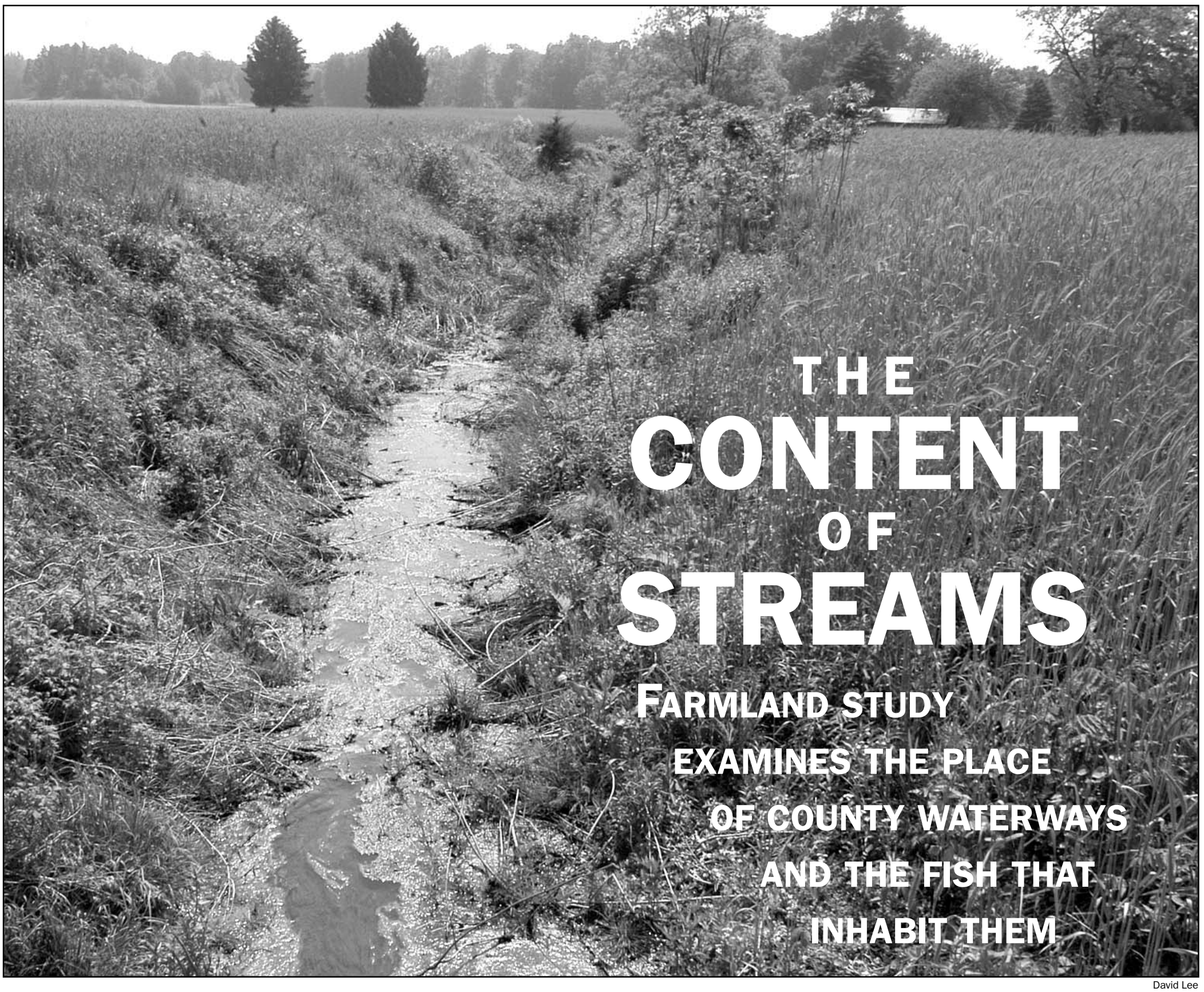
*Where* a pond is in the landscape can be just as important as what it looks like. Those amphibians that pass the non-breeding season in forested areas are able to travel 500 to 1500' between pond and suitable forest. Isolate a pond too far from forest and no matter what its intrinsic quality, it'll be worthless for some amphibians. Furthermore, even if forest is within reach, the nature of the habitat that must be traversed is important: a pond surrounded by grassland or shrub land is likely better than one surrounded by parking lot or, worse yet, roadway. In an interesting insight into salamander psychology, researchers found that salamanders forced to cross pavement to reach their breeding ponds had higher levels of stress hormones in their blood. Locating ponds near healthy woodlands can thus increase their suitability for amphibians.

Finally, as we mentioned early on, ponds collect what we scatter on the land around them. Amphibians breathe and drink through their skins and are thus particularly exposed to water chemistry. While we had no first-hand basis for evaluating agrochemical impacts, the reports of others suggest that farming or gardening techniques that reduce the use of at least certain herbicides, pesticides and fertilizers (e.g. ammonium nitrate) use can benefit amphibians.

Aside from these habitat management considerations, a few of the more recent threats to amphibians are tied to more general societal practices: acid rain, invasive species and climate change have all been implicated in the declines of some species and have broad regional effects that will need to be approached with similarly scaled solutions.

ON MANY EVENINGS this spring, we have been out at ponds listening for frogs. Some ponds do truly pulse, a full chorus of Gray Treefrogs rises and ebbs with rhythmic regularity. But some ponds are strangely quiet, and these are the ponds that preoccupy us most. To a certain degree, our worry stems less from the fate of the individual pond than from the fact that the owners are so often unaware of its dumb state. That frogs and other amphibians are slipping from our landscape is dismaying; that we are so far removed from that landscape that we don't even contemplate their funerals is profoundly troubling. These animals are, after all, one of the vital signs of the landscape we all share.

*Copies of this and related information are available on the Farmscape Ecology Program website, www.hawthornevalleyfarm.org/fep/fep.htm. If you have questions, comments, or would like a free, digital copy of the full report, please contact Conrad at 672-7500 ext 254 or fep@taconic.net.*



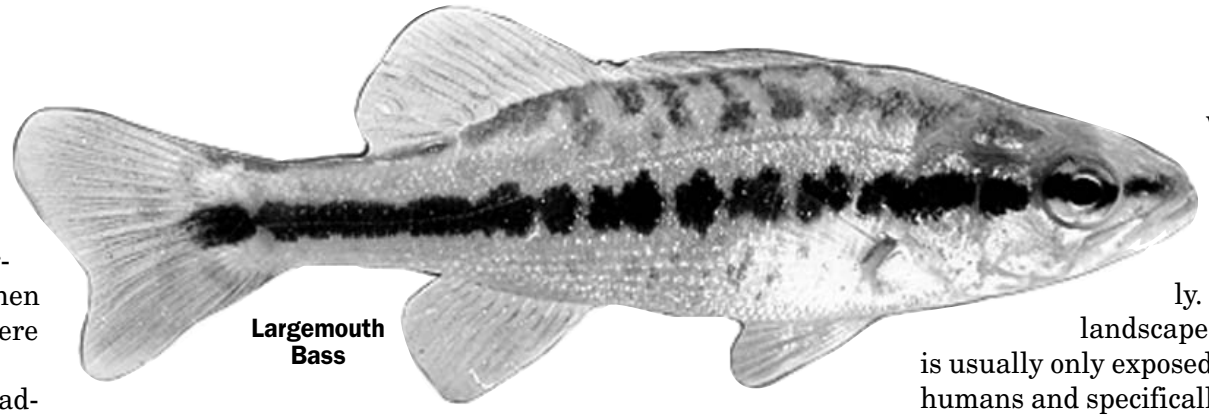
# THE CONTENT OF STREAMS

## FARMLAND STUDY EXAMINES THE PLACE OF COUNTY WATERWAYS AND THE FISH THAT INHABIT THEM

David Lee

**By CONRAD VISPO and CLAUDIA KNAB-VISPO**

*This is the sixth in a multi-week series of excerpts from "The Flora and Fauna of Columbia County Farms: Their Diversity, History and Management" by Conrad Vispo and Claudia Knab-Vispo of the Farmscape Ecology Program at Hawthorne Valley Farm. The study looks at seven farms around Columbia County, examining the history of farming, plant life, wildlife and streams.*



**Largemouth Bass**

SOME OF OUR BEST novels can be read on at least two levels: as stories and as comments on contemporary conditions. Often one can enjoy them as tales, without understanding their relevance to the time when and place where they were written. There is nothing wrong with enjoying a book solely as a tale, but you're not really reading all that the author had to say. In some ways, streams are the same way. We can enjoy a stretch of stream without understanding where it's coming from or flowing to, or how it has and is evolving. Yet, to miss the second layer of understanding is perhaps to overlook part of what the stream can tell us. And streams have a lot to tell.

Drive west in Columbia County and, for the most part, you're traveling downhill, following the flow of water to the Hudson. You're traveling from gurgling streams to slower, lazier creeks (except where they fall over faults). You cross eroded valleys where, oddly enough, older rock erodes down to newer. You go from acidic to basic and back to acidic again. You travel over soils where agricultural quality is in large part measured (inversely) as degree of slope. You bridge waters whose rounded pebbles hale not from the hillsides around you but from cliffs many miles to the north. You travel by mill ponds and cow ponds; by iron mines and gravel quarries.

This scenery both forms our streams and reflects them. Hydrologists talk about stream "order," a ranking that follows a given flow of water from its mouth on the ocean back to a wet trickle over a mossy rock. Each stage in the path has its own characteristics. While the exact number of orders will depend upon the particular stream, in general, the higher the order (i.e., the farther it is from the flow's mouth), the quicker and rougher the flow. The closer to a stream's headwaters, the cooler the water and, being both cool and aerated by rapids, the more oxygen dissolved in the flow.

What the stream flows over shapes it also–limestone rocks dissolve their natural antacids into the water; sandy stretches plug the little nooks and crannies that house many of the small aquatic insects the fish eat and that even hide some small fish from bigger, hungry brethren.

As if the complexity of this physical groundwork were not enough, for at least the past 200 years and probably longer, humans have been muddying the waters both literally and figuratively. Mud is not a sign of a stable landscape; mud is eroded soil, and soil is usually only exposed to erosion by turmoil. Often, humans and specifically the plow have been the source of that turmoil.

Mud reforms valleys and remakes streams. Early farming, which paid relatively little heed to the problem of soil erosion, remade many streams and valleys. The muddy flow was punctuated by dams that controlled and harnessed flow, caught suspended sediments and altered fish movements. The pace and regularity of that flow was affected not only by dams, but by how spongy the land was—a forest of thirsty trees sucks up water for its own ends and the roots can physically hold it. Get rid of the trees, and the water runs off the hills much like rain off a shirtless back.

We have also sullied the stream chemically, dirtying the rain and/or the inflow with various compounds not natural to our waters.

Finally, we have played with the fauna itself. It is very difficult to know the original distributions of fish in New York state, for we have spread fish far and wide by stocking game fish, releasing

unused bait fish and liberating pets.

If that, in short, is a summary of the context for the stream's story, then the question becomes how is that context reflected in what see before us? We'll look at fish, not because they're the only characters, but because they are perhaps the easiest to appreciate.

IT WOULD BE INTRIGUING to have an account of the changes in our fish fauna over the past, say, 300 years. However, for the most part this is impossible. Even a fish as palatable as a brook trout has little written history in our area prior to 1900. Works of the 19th century often focus on identification and give only a rudimentary idea of distribution and abundance. The New York state biological surveys of the 1930s and '40s were the first attempt to systematically describe the distributions of our more "obscure" stream fish.

So, if we want to begin gauging our interactions with stream fish, we are left to look at current geographic patterns and suggest their causes. This approach has been formalized in what scientists call the Index of Biological Integrity. The idea is somewhat similar to what we have already touched upon with plants, birds and butterflies: one asks first which species are most sensitive and then judges a habitat's quality by how many of the sensitive species one finds there. In deriving the index, researchers correlated the presence or absence of fish with water and aquatic habitat quality. They found, for example, that a brook trout is a pretty sensitive creature, requiring fresh, cool, oxygenated waters; a creek chub, on the other hand, seems a sturdier beast.

With this in mind, let's travel down our imaginary creek and see whom we meet where. We assembled the data to do this thanks to the help of Bob Daniels and Douglas Carlson of the State Museum and state Department of Environmental Conservation, respectively. Having made our list of the stream fish we found on different farms, we used their information to explore how these species were distributed in the county. We divided our fish into four groups based upon their distributions: *Upland Species, Foot- hill Species, Lowland Species* and *Ubiquitous Species*. There are additional fish in county ponds, lakes and streams that we simply never caught.

The rapid headwaters where we might start our trip are home to what we dubbed the *Upland Species.* If you look at a map of the county, you'll see the Taconic rubble roiling along the eastern edge and slowly smoothing out into the Ghent flats and similar portions of the county near the Hudson. Our Upland Species are the ones confined mainly to these hills (see table). The brown trout is not a native species; it has and is widely stocked as a game fish. The brook trout and slimy sculpin, often accompanied by the ubiquitous eastern blacknosed dace, are the main fish of these smaller, higher waters; they provide an interesting contrast in body shapes.

The brook trout is a strong swimmer that lurks in the water column rather than on the bottom. As every fly fisher knows, it will quickly rise to the surface to catch hapless insects and will also take creatures swimming in the water. The sculpin and dace are, in contrast, flatter and their front fins are relatively large. These, especially the sculpin, are fish of creek bottoms, where they feed upon the aquatic larvae of insects such as mayflies and midges. Many of these insects huddle under stream rocks, and the body form of the sculpin is one that lets it hug those rocks in a stiff current with some of the same physical principles that race cars use to glue themselves to a speedway. Except for the dace, these are all considered sensitive fish, which disappear if a stream is too altered.

*Lowland Species* are the converse to the uplanders in terms of their distributions. These are the species you find mainly in the slower, warmer valley creeks. Some of these, such as sunfish and bass, are fish that one would most associate with ponds. However, a cozy, slow stream can ecologically resemble a pond in certain ways. Both bluegill sunfish and large-mouth bass, while native to North America, probably are not native to our creeks, although they prospered in our area once introduced. Some of the other species, such as fallfish, the shiners, and the darter seem to be fish that are physiologically adapted to these warmer waterways. As one can imagine, slower larger streams are warmer and accumulate more nutrients than mountain rivulets. As a result, certain life styles that exploit the microscopic animals (zooplankton) and plants (phytoplankton) that live suspended in the water or, like algae, grow on the rocks, become more viable. The big-eyed golden shiner, for example, cruises the waters looking for those little animals, while something like a darter (and its common companion, the ubiquitous white sucker), can haunt the bottoms. More individual fish and more kinds of fish seem to occur in our lowlands.

Of the remaining two groups, the *Ubiquitous* and the *Foothill* species, the former have generalist lifestyles, being confirmed omnivores, although they may gather that food from the bottom like the white sucker. The foothill fish are perhaps a more mixed group and we shall try to interpret their occurrence below.

A key assumption as we try to interpret these distribution patterns is that most of our land uses intensify on the flatter ground of the county. This is because population densities are higher (the population density of flatter Kinderhook is, for example, at least four times that of hillier Austerlitz), and many activities, such as farming, are most common on flatter valley land.

How do we relate this to our fish distributions? The common lowland and ubiquitous species would, by implication, appear to have a relatively high tolerance for the human disturbance that has influenced much of larger valley bottoms.

Upland distributions might logically belong to former ubiquitous species that were not so tolerant of disturbance and/or species that require the headwater environmental conditions found in the higher hills. In fact, the Upland species are all sensitive coldwater sorts, and they may never have been especially common in the larger, warmer river valleys. Their distributions may be largely a reflection of natural ecological conditions.

The Foothill species could, likewise, be sensitive lowland species which now only survive on the less-heavily worked margins of those lowlands or species that require environmental conditions specific to the foothills. In contrast to the Upland types, at least two of the Foothill species (the longnose dace and longnose sucker) may have formerly been more widespread. These species are reportedly fond of slower, warmer waters, and yet are sensitive to deteriorations in these larger streams and rivers. Their peripheral distribution may illustrate the relicts of populations that were formerly more widely distributed across the lowlands. Just as we highlighted a farmland butterfly watchlist, we would single out the longnose dace and sucker for a fish list.

SO HOW DOES HUMAN activity influence a stream and how might it be controlled? We can identify at least four ways we influence a waterway:

- By affecting nutrient levels in the water
- By altering physical conditions (e.g., amount of sediments, temperature, current)
- By introducing toxins
- By introducing new organisms (e.g., fecal bacteria, Brown Trout, Large-mouth Bass).

Some of these influences can be understood by considering how farming, for example, can make an "upland" stream a "lowland" one. While a rocky tumble down a steep hillside might never experience such a conversion, a stream in high valley might. Opening the stream bank and muddying the stream warms it and covers the rocky bottom. Warmer temperatures and fewer tumbles mean less dissolved oxygen. Similarly, the farther downstream one goes, the more natural nutrients tend to accumulate; agricultural run-off or septic tank leakage can have the same enrichment effects. In other words, you change an upland creek to a lowland one and, as a result, you go from upland to lowland (and ubiquitous) fish fauna. Many of the changes we profiled above result in this general ecological transition.

Subtle poisoning is more difficult to detect. Dramatic fish kills are obvious but thankfully rare events. However, chronic poisoning is as difficult to detect in fish as in humans. The 1930s DEC fish surveys make frequent mention of the impacts of raw sewage contamination of streams and of toxic industrial effluent. It's difficult to quantify these historical effects and estimate the consequences of more modern inputs such as runoff from roadways and lawns and the soup of new chemicals that arrive with rain and sewage. Not surprisingly, recent analyses of surface waters read like an inventory of the chemicals found in our personal and pet's medical cabinets and our cleaning cupboards. Meanwhile, state advisories caution against eating fish from many of our waters.

We are probably doing a better job of at least planning to alleviate agricultural impacts than we are for many of the other influences. Agricultural run-off has been widely recognized as an issue. A variety of actions such as the institution of CAFO (Confined Animal Feedlot Operation) regulations for large animal farms and the spread of organic or low-input farming in our landscape are probably having important effects. On farms, perhaps the most important

*Continued on page 22*

## SPECIES DISTRIBUTION PATTERNS

Species in *italic*/**bold** type have been categorized as "sensitive" in the literature.

Species in *italic*/regular type have been classified as "semi-sensitive," while those in standard black type were described as "tolerant."

**Ubiquitous:**

*Common Shiner*
Creek Chub
Eastern Blacknose Dace
White Sucker

**Lowland:**

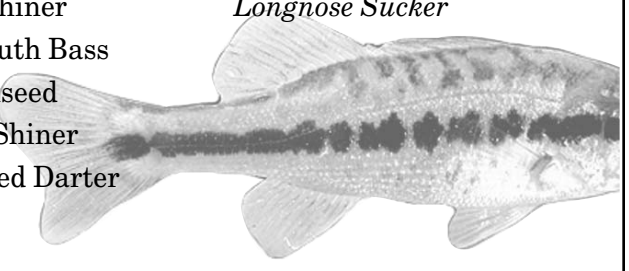
***Bluegill***
***Fallfish***
Golden Shiner
Largemouth Bass
Pumpkinseed
Spottail Shiner
Tessellated Darter

**Upland:**

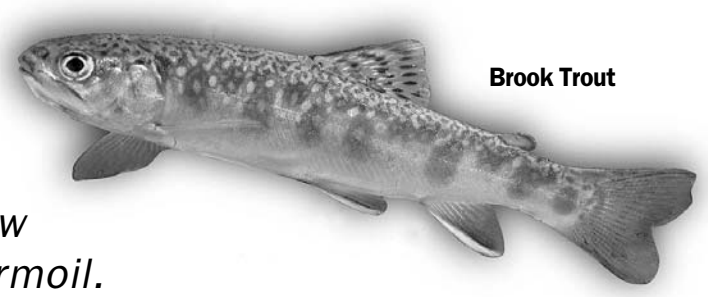
***Brook Trout***
***Brown Trout***
***Slimy Sculpin***

**Foothill:**

Bluntnose Minnow
Fathead Minnow
*Longnose Dace*
*Longnose Sucker*



*Mud is not a sign of a stable landscape; mud is eroded soil, and soil is usually only exposed to erosion by turmoil. Often, humans and specifically the plow have been the source of that turmoil.*



Brook Trout

# Content of streams

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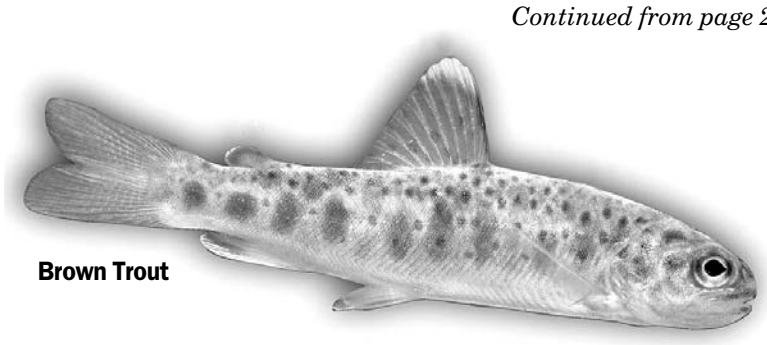


**Brown Trout**

management actions have been controlling soil erosion, treating animal waste, and re-vegetating of stream banks. Better municipal water treatment has likewise probably improved water quality or, at least, mitigated the damage.

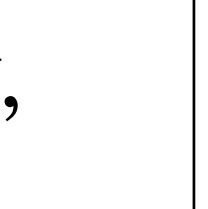
And yet, the rain falls, our septic tanks seep, our vehicles drive the roads, and, if the current bottled-water boom is to be believed, our main response appears not to be trying to shut our doors. In other words, rather than investing in cleaning up our waters, we invest primarily in personally avoiding the problem. It would be as if our primary response to air pollution were to filter the air coming into our homes, rather than try to clean up what is outside (a response which a quick search of the Internet will confirm is already well underway).

The main problem with this response is the people and other organisms who can't defend themselves in this way.

In addition to fish, another group of organisms frequently used to study such questions are the aquatic young of such insects as dragonflies, mayflies and midges. Like fish, some of these species are particularly sensitive to how we treat our waters and can serve as useful indicators. Much work has done with these critters and anybody who's interested in getting their feet wet should contact Hudson Basin River Watch (www.hudsonbasin.org), a volunteer network dedicated to monitoring water quality in our area largely through this technique. Perhaps by understanding the health of these organisms, we better understand what we are doing to ourselves or, at least, our neighbors.

Among the first extensive publications on our fish was De Kay's 1842 contribution to the *The Natural History of New York*. Inside the copy we happen to have on our shelf is, in a modest hand, the name John R. Greeley. The name meant little to us until we delved into the DEC's 1930s survey of our watershed alluded to earlier: it was John Greeley who, as state ichthyologist, described the fish of our watersheds some 75 years ago. One of his successors, C. Lavett Smith, published the current benchmark on our state's freshwater fish, *The Inland Fish of New York State*, in 1985. It is dedicated, in part, to John Greeley. Like Dickens, Pasternak or Vonnegut, each of these authors reflected their own times. By their focus and commentaries they alluded to the world around them. As our bookshelf attests, they read who had written before them, and tried to understand what they could see. Our landscape is also a story, one that we should read both for the beauty of its tale, and for the significance of its portents.

*Copies of this and related information are available on the Farmscape Ecology Program website, www.hawthornevalleyfarm.org/fep/fep.htm. If you have questions, comments, or would like a free, digital copy of the full report, please contact Conrad at 672-7500 ext 254 or fep@taconic.net.*

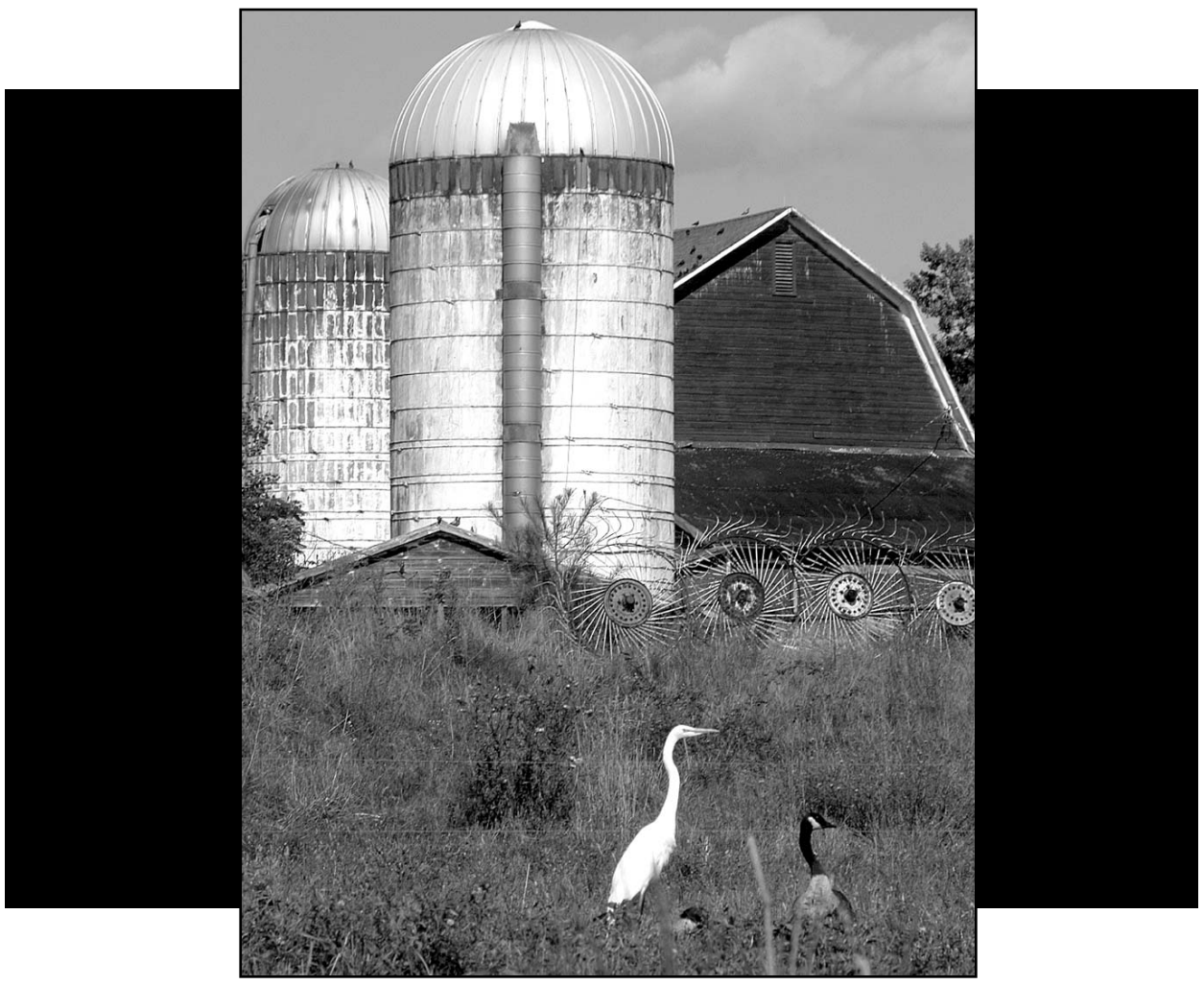




# REFLECTIONS FROM A FARMSCAPE

## WHAT DOES IT MEAN THAT OUR FARMLAND IS DWINDLING ALONG WITH THE NATURAL HABITAT IT PROVIDES?

**By CONRAD VISPO and CLAUDIA KNAB-VISPO**



*This is the seventh and final excerpt from "The Flora and Fauna of Columbia County Farms: Their Diversity, History and Management" by Conrad Vispo and Claudia Knab-Vispo of the Farmscape Ecology Program at Hawthorne Valley Farm. The study looks at seven farms around Columbia County, examining the history of farming, plant life, wildlife and streams.*

NATURE IS THE ULTIMATE honest witness. As our rationales for and means of existence change, nature's rationales and means are largely immobile. Nature follows no fashion, is convinced by no fad, subscribes to no party. It is likely that the red-winged blackbirds and spring peepers colonial farmers heard were little different from those we hear today and that the sulfur butterflies that sought salts at horse dung along muddy roads were essentially the same as those now loitering near tractor ruts. Through our actions we have encouraged some species and discouraged others, but, in most cases, what each species was looking for in terms of habitat has hardly changed. In other words, they "judge" the doings of each generation by the same criteria. Nature is both honest and consistent.

Our focus these past few weeks, albeit occasionally distracted, has been on how nature "evaluates" our farmland. To do this, we have tried to follow the history of humans and of nature. While there are caveats, our conclusions have been that our farmland can play a positive role in nature conservation. We will close our series by summarizing our arguments.

TO DOCUMENT that farmland has a value for nature conservation, we need to meet at least three conditions:

- On-farm habitats contain significant numbers of species of conservation interest
- These on-farm habitats are declining, and hence worth highlighting
- Active farms account for an appreciable proportion of these habitats in the county.

Below, we present an assessment of each of these points.

### Do on-farm habitats contain significant numbers of species of conservation interest?

Certain native species are declining, with rare or otherwise species thought to be at risk. The status of some of these organisms is directly due to human-induced habitat loss, while others have long been rare; but the potential for habitat loss threatens to make their situation critical. Here, we compare the ability of on-farm habitats to host such species of plants, birds and butterflies (see Table 1).

While the criteria for evaluating species differ among groups and while certain data need to be refined, it is apparent that the percentages of species of conservation interest found in wet meadows (or other open wetland), grassland or shrubland are at least comparable to the proportions found in woodlots. In terms of absolute numbers of declining species, the non-forested habitats together hold at least as many as the forest itself. Our point is to document that certain agriculturally created or preserved habitats have the potential to be of similar conservation value as wilder habitats (i.e., forests), at least in terms of species of conservation interest.

*The viability of our food production and of our nature is being challenged.*

Because the studied farms are not a representative sample of all county farms, these data document the potential for the given habitats to host certain species, rather than offer proof that these species often or even usually are present on farms. It is also worth noting that the valid comparison is not always with "wilder" habitats: these days, when farms go out of production, development rather than reforestation is frequently the alternative.

### Are these on-farm habitats declining?

In parallel with the overall decline of land in farms, the extent of each of these habitats on farms has declined in Columbia County over the past 150 years (see Table 2). On average, each cover type has declined by at least 2/3 since its maximum extent. Permanent pasture has declined most dramatically because of its large extent during the sheep boom and because of the advent of silage-based dairy herds.

The ecological effects of these declines in extent have probably been exacerbated by a trend towards increasing intensification of use. Depending upon the crop, yield has increased from 200 to 600% since 1910. As a consequence, total agricultural production in the county did not begin to tail-off until around 1970.

**Table 2. The current extent of land in farms and of on-farm habitats as a percent of their historically recorded maxima.**

| | | Current Extent as % of Maximum |
|---|---|---|
| | Land in Farms | 29 |
| On-Farm | Land in Crops | 17 |
| On-Farm | Permanent Pasture | 6 |
| On-Farm | Hayfield | 31 |
| On-Farm | Fallow | 32 |
| On-Farm | Woods | 42 |
| On-Farm | Oldfield, etc. | 37 |

**Table 1. The number of native plants, birds and butterflies found exclusively or predominantly in the given on-farm cover-type habitat and the % of those species which are declining or otherwise of conservation interest.**

| | PLANTS[1] | | BIRDS[2] | | BUTTERFLIES[3] | | Average |
|---|---|---|---|---|---|---|---|
| | Species | % Decline | Species | % Decline | Species | % Decline | % Decline |
| Woodlots | 114 | 21% | 38 | 32% | 5 | 40% | 31% |
| Wet Meadows, etc. | 48 | 40% | no data | 37% | 5 | 60% | 46% |
| Shrubland | 13 | 85% | 18 | 61% | 9 | 25% | 57% |
| Grassland | 15 | 45% | 13 | 92% | 26 | 20% | 52% |
| Cropland | 5 | 20% | few | ? | ? | low | low |

1-"Species" refers to those plants found in our study to be exclusive to given habitat. "%Decline" refers to % of those of those species that are of conservation interest.
2-"Species" refers to the number of county species primarily associated with given habitat. "%Decline" refers to % county's species showing significant national decreases (BBS); wetland data refer to % of national species.
3-"Species" refers to those plants found in our study to be exclusive to given habitat. "%Decline" refers to % of county species with reported national/regional declines.

| | 1993 | | |
|---|---|---|---|
| | County-wide remote sensing (acres) | On-Farm census data (acres) | % of Total on Farms |
| Woods | 285,970 | 27,000 | 9% |
| Grassland (hayfield & pasture) | 67,330[A] | 42,511 | 63% |
| Shrubland | 7,520 | 9,215[B] | 70% |
| Wetland | 5,620 | | |

**Table 3. A comparison of estimated on-farm extent of various habitats in comparison with county totals.**

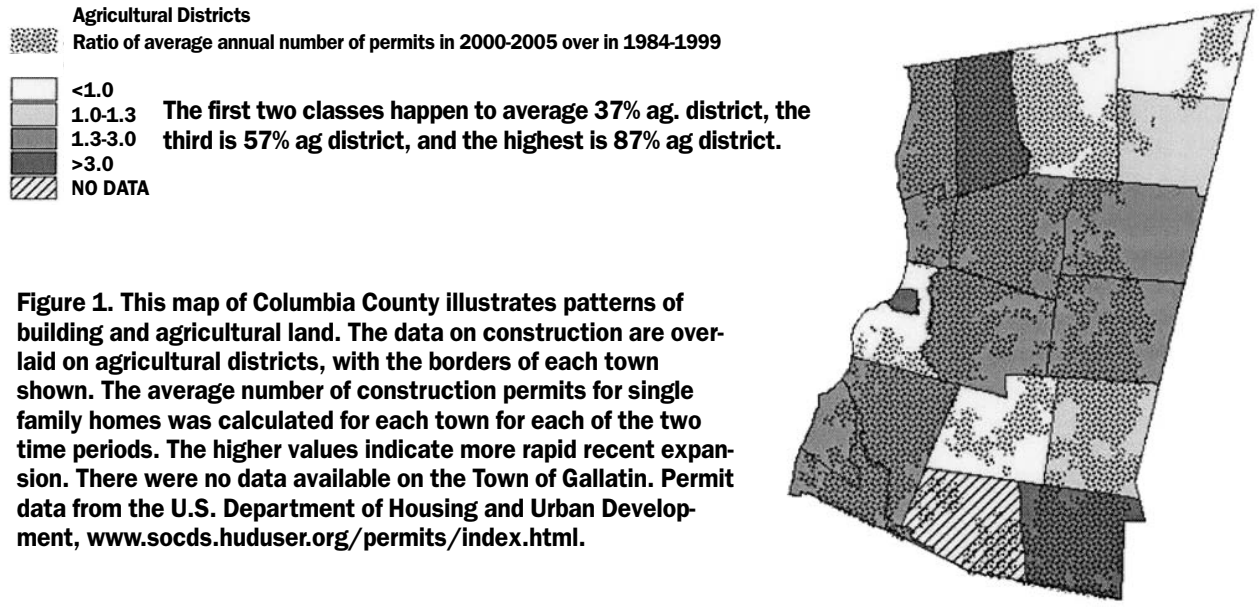



**Figure 1. This map of Columbia County illustrates patterns of building and agricultural land. The data on construction are overlaid on agricultural districts, with the borders of each town shown. The average number of construction permits for single family homes was calculated for each town for each of the two time periods. The higher values indicate more rapid recent expansion. There were no data available on the Town of Gallatin. Permit data from the U.S. Department of Housing and Urban Development, www.socds.huduser.org/permits/index.html.**

## Do active farms account for an appreciable proportion of these habitats in the county?

Having established that certain on-farm habitats contain appreciable numbers of species of conservation interest and that these habitats have declined substantially, it remains for us to demonstrate that active farms are important sources of these habitats. For example, if, as we have pre-supposed, on-farm woodlots only account for a relatively small proportion of the forest in the county, then one can hardly argue that preserving farms helps conserve forests (although such woodlots might represent some of the most continuously forested lowland sites).

To explore this question, in Table 3 we compare estimates of habitat extents in the entire county (derived from a Cornell analysis of a 1993 aerial photograph) to estimates of the extents of these habitats on county farms (derived from a roughly concurrent agricultural census).

We estimate that more than 60% of the county's grasslands were found on farms in 1993. Shrubland and wetland were distinguished in aerial photo analysis, but not in the agricultural censuses. We assume that these two habitats are the major component of the agricultural census category denoted as "unimproved, unwooded." We believe that farms probably account for at least 50%, and possibly as much as 70%, of the combined shrubland/wetland cover type.

Based upon the above considerations, we conclude the following:

- Farm habitats can harbor numerous species of conservation interest
- These on-farm habitats are all declining
- While these habitats are not exclusive to farms, farms are a major source for them.

***Thus, preservation of farms has the potential to assist regional nature conservation in important ways.***

HOW WE REACT to our reflections in the mirror is determined as much by how we feel about ourselves as by the characteristics of the reflection itself. Likewise, taken alone, the above conclusions mean little for local farming. Often when we present these data, the response is: What does it matter, farming is already dead in the county? We have neither the space nor the expertise to argue this point extensively: Suffice it to say that *some* types of farming definitely live on to some degree; one need only visit a local farmers market or search for Columbia County CSAs (community supported agriculture) groups to realize that. The competition between farming and development, illustrated by Figure 1, hints at a troubled future for our farmland. Similarly, maps showing a distinctly stratified distribution of wealth in our county (the average per capita income of our poorest town is half that of our richest), coupled with a proliferation of posted signs and a sad dearth of public lands, hints at a bleak future for environmental justice and, ultimately, nature conservation in the county.

The viability of our food production and of our nature is being challenged. We believe that these are allied causes, but that the alliance must be consciously nourished by the general public and by farmers. Nature cannot tell us what to do, but when we fail to recognize that the health of the land around us is central to our physical and mental sustenance then there is a clear call for re-thinking our ways, for heeding our honest witness.

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