Natural Lands Trust

Mt. Bradford Preserve

Natural Areas Stewardship Report

APRIL 2010

Location: East Bradford Township, Chester County

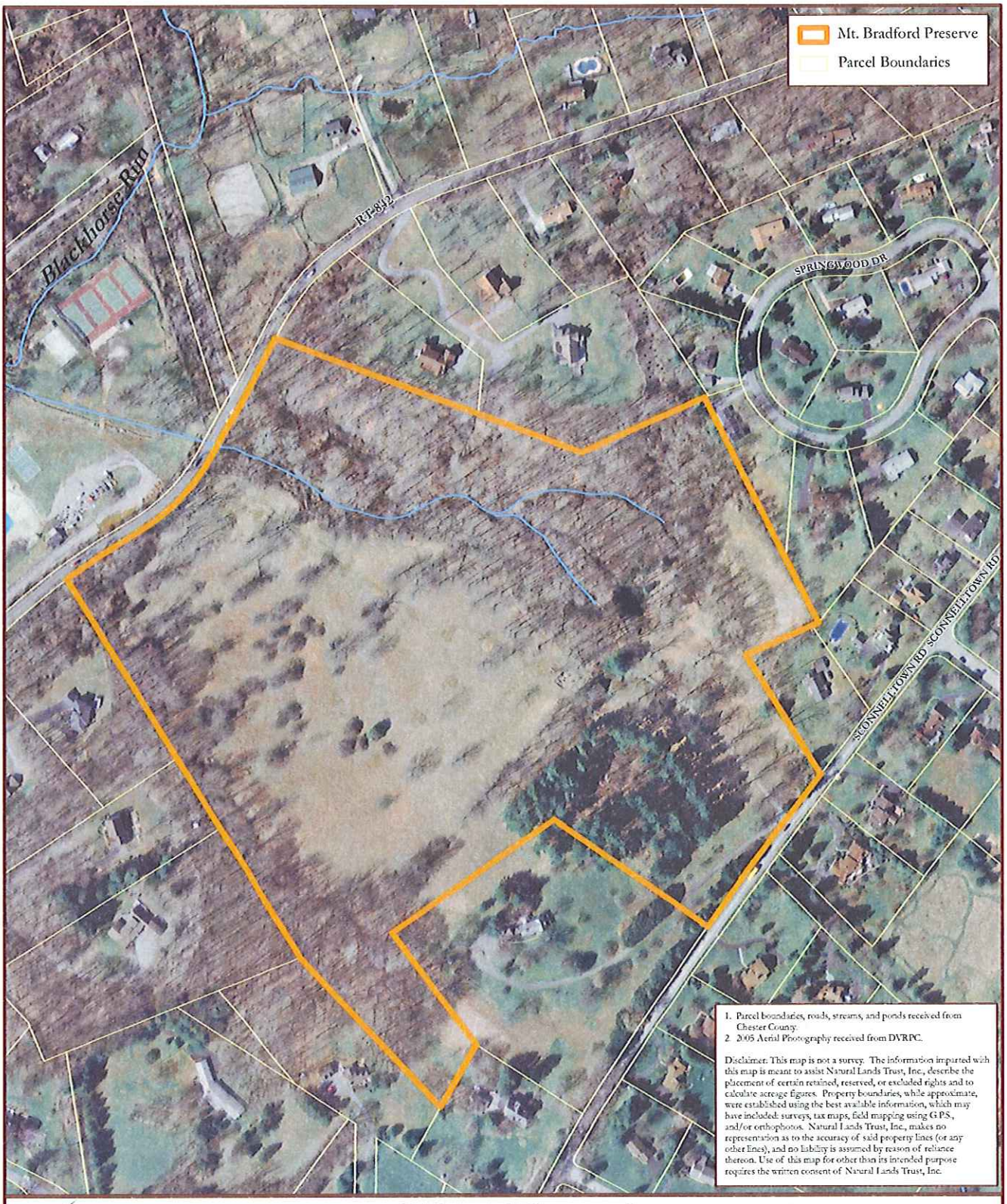
Size: ~39 acres

General Description of Natural Areas

The Mt. Bradford Preserve extends between Miner Street (Route 842) and Sconnelltown Road, with a small parking area located at 921 Sconnelltown Road in East Bradford Township (see **2005 Aerial Photography** showing property boundaries, *page 2*). The property was acquired by East Bradford Township in November, 2008. David Steckel and Andrea Stevens of Natural Lands Trust conducted a field inspection of the approximately 39-acre parcel on March 11, 2010 and were accompanied by Mandie Cantlin, Assistant Township Manager, and Mark Lucas, Township Engineer. Photographs of the natural features on the site were taken at that time.

A forested area covering the northeastern third of the property harbors several headwater tributaries—fed by springs and stormwater runoff—of the Blackhorse Run. A terrestrial meadow with invading autumn-olive and Eastern red-cedar, old hedgerows, and a former pine plantation covers much of the remaining acreage on the property. The topography of the site ranges from about 250 feet to 415 feet, with a long north-facing slope extending from a private inholding (the former estate) on Sconnelltown Road to the creek bed and southwest- and west-facing slopes on the far side of the creek (see **Environmental Features** map, *page 3*). We accessed the property from a small parking area on Sconnelltown Road that connects to the former driveway on the site.

View of meadow from top of slope



1. Parcel boundaries, roads, streams, and ponds received from Chester County.
2. 2005 Aerial Photography received from DVRPC.

Disclaimer: This map is not a survey. The information imparted with this map is meant to assist Natural Lands Trust, Inc., describe the placement of certain retained, reserved, or excluded rights and to calculate acreage figures. Property boundaries, while approximate, were established using the best available information, which may have included: surveys, tax maps, field mapping using G.P.S., and/or orthophotos. Natural Lands Trust, Inc., makes no representation as to the accuracy of said property lines (or any other lines), and no liability is assumed by reason of reliance thereon. Use of this map for other than its intended purpose requires the written consent of Natural Lands Trust, Inc.

Natural Lands Trust
1031 Palmers Mill Road, Media, PA 19063
610-353-5587 ~ www.natlands.org

2005 Aerial Photography

MT. BRADFORD PRESERVE

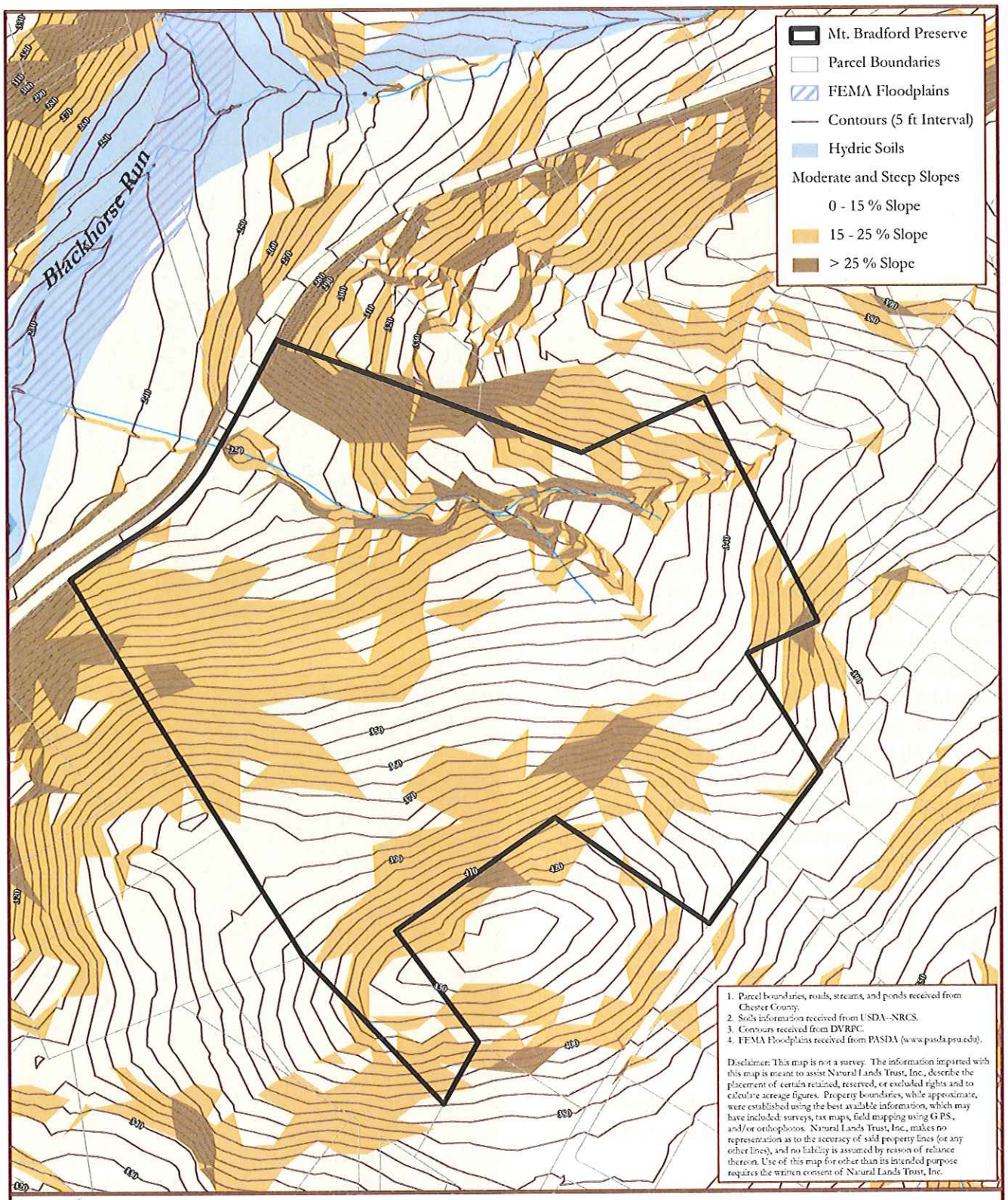
+/- 39 Acres

East Bradford Township, Chester County, Pennsylvania

N

0 150 300 Feet

Compiled By: MTM 04/20/10


Mt. Bradford Preserve
Parcel Boundaries
FEMA Floodplains
Contours (5 ft Interval)
Hydric Soils
Moderate and Steep Slopes
0 - 15 % Slope
15 - 25 % Slope
> 25 % Slope
Blackhorse Run
1. Parcel boundaries, roads, streams, and ponds received from Chester County.
2. Soils information received from USDA--NRCS.
3. Contours received from DVRPC.
4. FEMA Floodplains received from PASDA (www.pasda.psu.edu).
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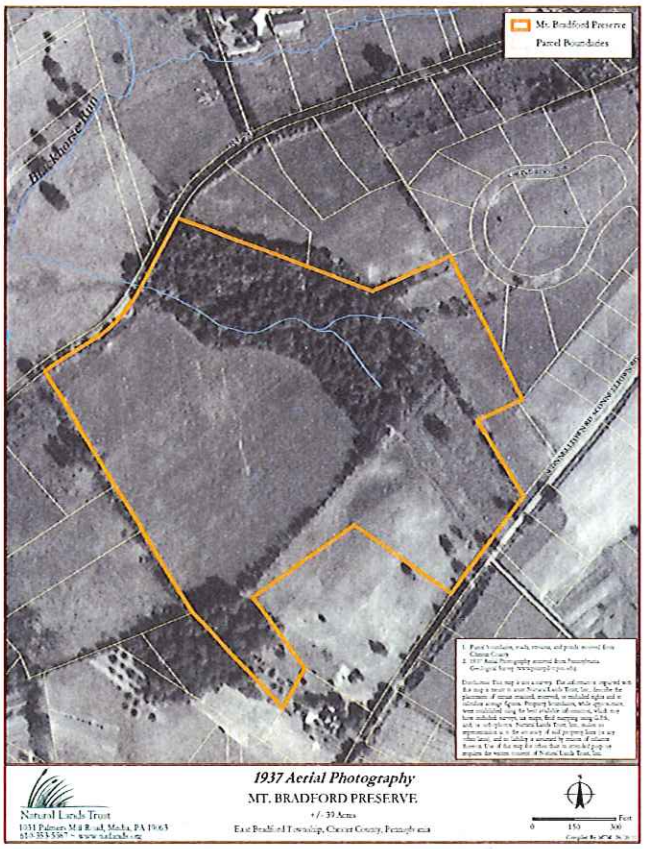
Old quarry in forested area of property

The Mt. Bradford Preserve is located within a landscape of residential subdivisions with occasional agricultural uses. Historical aerial photography of the area indicates widespread agricultural uses in the 1930's with the pine plantation on the property established by 1971. In the mid-1900's, the property served as an estate for the dwelling (now subdivided under private ownership) on Sconnelltown Road at the crest of the hill and south of what is now township property. A small quarry in the forest near the northern property boundary probably provided stone for the residence and the walls and dam of the pond which was constructed in the mid 1900's. The forest buffering the creeks—tributaries of Blackhorse Run—has been a consistent feature on the site since at least 1900 (see **1937** and **1971 Aerial Photography**).

Plant Resources

The general plant communities on the property are described below. Invasive non-native species are indicated in **bold**.

A maturing to mature forest occurs on higher grounds surrounding the headwater tributaries in the northeastern third of the property. This forest is best described as an intermediate form between two forest community types and is referred to here as a



Red oak-mixed hardwood/tuliptree-beech-maple forest

red oak–mixed hardwood/tuliptree–beech–maple forest. Dominant canopy species in this forest include red and white oaks (*Quercus rubra*, *Q. alba*), tuliptree (*Liriodendron tulipifera*), and American beech (*Fagus grandifolia*). Subdominant species include sugar maple (*Acer saccharum*), black cherry (*Prunus serotina*), pignut hickory (*Carya glabra*), white ash (*Fraxinus americana*), blackgum (*Nyssa sylvatica*), ironwood (*Carpinus caroliniana*), and **sweet cherry (*Prunus avium*). Japanese barberry (*Berberis thunbergii*)** and spicebush (*Lindera benzoin*) are frequent in the shrub layer. The groundcover was scarce at the time of our dormant season site visit, with the exception of numerous basal rosettes of **garlic mustard (*Alliaria petiolata*)**.

As the creek approaches Miner Street, the floodplain widens and supports a one-acre ***sycamore–box-elder floodplain forest*** dominated by American sycamore (*Platanus occidentalis*), box-

Sycamore–box-elder floodplain forest

Seep with emerging skunk cabbage

Pond at edge of forest

elder (*Acer negundo*), red ash (*Fraxinus pennsylvanica*), and black walnut (*Juglans nigra*). Spicebush continues to be prominent in the shrub layer. **Garlic mustard** and **lesser celandine (*Ranunculus ficaria*)** are common on the forest floor of this community. A patch of **Japanese knotweed (*Fallopia japonica*)** occurs along Miner Street near the edge of the floodplain forest. At the northeastern end of the floodplain, a ***seep***, dominated by skunk-cabbage (*Symplocarpus foetidus*), emerges at the base of the slope that climbs toward the north.

A manmade ***pond***—at the source of one of the headwater tributaries near the southeastern edge of the forest—is part of a formal landscape area that was likely created at the time the property served as a residential estate. A dam and spillway maintain the pond's water level. A four-foot high stone wall with steps parallels the pond to the southeast. Although somewhat shaded with mixed hardwood cover and rosebay (*Rhododendron maximum*, likely planted), algae and duckweed (*Lemna* sp.) are prominent on the surface of the open water.

A ***pine plantation*** near the Sconnelltown Road access was established on the property sometime before 1971 (see **1971 Aerial Photography**) and may have been planted to screen the view from the estate to a neighboring subdivision along Sconnelltown Road to the northeast. Planted species include white pine (*Pinus strobus*), Norway spruce (*Picea abies*), and Douglas-fir (*Pseudotsuga menziesii*).

Much of the acreage on the western half of the property includes a ***terrestrial meadow*** bounded by ***hedgerows***. The meadow is succeeding to a shrubland with widespread invasions of **autumn-olive (*Elaeagnus umbellata*)** and young Eastern red-cedar (*Juniperus virginiana*). The meadow includes

Pine plantation

Terrestrial meadow with encroaching autumn-olive and young Eastern red-cedar

Old driveway lined with oak trees

both native and non-native grasses and forbs. The hedgerows and woody islands within the meadow are dominated by red ash and some honey-locust (*Gleditsia triacanthos*), often entangled with invasive vines. Field-forest edges are highly impacted by invasive shrubs (**multiflora rose**) and vines, including **oriental bittersweet (*Celastrus orbiculatus*)**, **Japanese honeysuckle (*Lonicera japonica*)**, and grape (*Vitis* sp.). **Japanese stiltgrass (*Microstegium vimineum*)** is often seen in disturbed areas bordering foot paths and deer trails.

The driveway from Sconnelltown Road to the pond borders an open area (to the north) and is lined with large white oak trees. A particularly large sycamore tree was noted in this open area near the pond. American holly (*Ilex opaca*) is occasional south of the driveway.

Water Resources

The Mt. Bradford Preserve falls within the Blackhorse Run Watershed. Blackhorse Run is classified by the Pennsylvania Department of Environmental Protection as a trout-stocking fishery with migratory fishes. Water resources and wetland habitats on the Preserve include the pond, springs, and seeps associated with the tributaries to Blackhorse Run in the northern forested area.

Current Use and Stewardship

The Mt. Bradford Preserve was set aside as a natural area with trails and access points to encourage passive recreational use by the residents of the township and the general public. Few improvements have been made to the property in the short time since township acquisition and there is only limited public use (10–12 regular visitors) by dog walkers and paintball players. Stewardship priorities for the site include protecting and enhancing wildlife habitat and providing passive recreational opportunities (hiking, biking) along existing trails and a potential loop trail that would improve access to the forest and the field areas.

Stewardship Issues, Opportunities and Recommendations

The following stewardship issues and opportunities were observed during the site visit to the Mt. Bradford Preserve on March 11, 2010. They are described in the context of two overall stewardship goals for the natural areas:

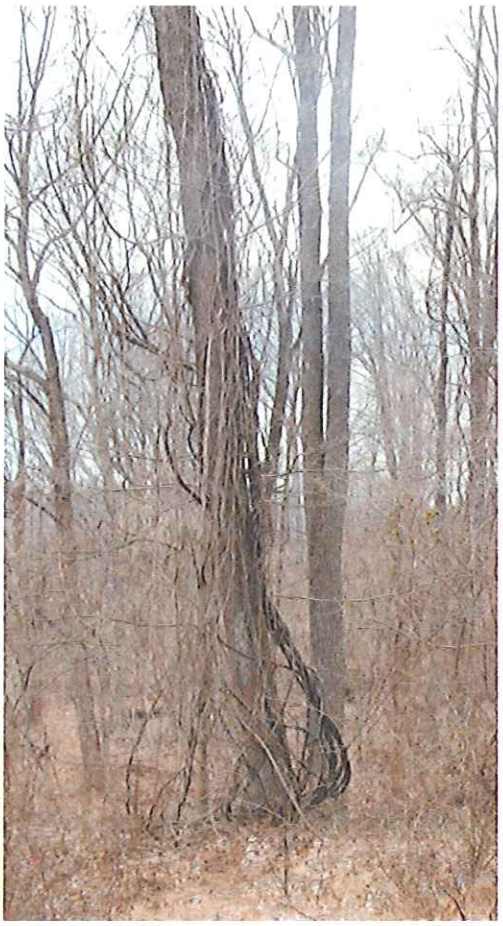
1. to provide a safe and enjoyable environment for passive recreation; and
2. to protect and enhance plant communities to support resident and migratory wildlife.

We have provided a summary of issues and opportunities for stewardship on the site that are followed by general recommendations to address the issue or fulfill the opportunity.

Headwater tributary of Blackhorse Run winding through the red oak-mixed hardwood/tuliptree-beech-maple forest

Invasive Plants

A ubiquitous problem encountered in the stewardship of natural lands in southeastern Pennsylvania—and increasingly recognized as a threat worldwide—is the presence of invasive plant species. An invasive species is one that rapidly spreads and outcompetes multiple native species, chiefly because of the absence of predators, pathogens, and herbivores that keep it in check in its native range. Most invasive plants are particularly well adapted to colonize disturbed areas. In southeastern Pennsylvania, disturbance from human activities, particularly sprawl, coupled with the rich horticultural history of the southeastern counties, has afforded numerous invasive species the opportunity to become well established throughout the region. Even though the occasional immigration of new species into plant communities is a normal process, the current high rate of introduction—fueled by the planting of exotic (non-native) species for horticulture, wildlife management, and erosion control—is threatening the integrity of native plant communities and lowering native biodiversity. Not only do invasive plants alter the makeup of



Old hedgerows and islands of trees and shrubs provide edge habitats for invasive plants

Vines climbing into canopy trees

the plant communities on a site, but they also may affect soil chemistry and hydrology and are usually less beneficial to wildlife than the native plants they replace, contributing further to the loss of biodiversity.

The terrestrial meadow and the forest-meadow edges on the Mt. Bradford Preserve are most impacted by invasive plants because of the higher availability of light and a history of soil and vegetation disturbance. The most problematic invasive species on the site at this time is **autumn-olive** which is becoming well established in the terrestrial meadow. Other common invasive shrubs include **multiflora rose** and **wineberry (*Rubus phoenicolasius*)** in edge and open habitats and **Japanese barberry** in the shrub layer of the forest. Vines (**Japanese honeysuckle, oriental bittersweet** and grape) are commonly seen climbing into canopy and understory trees of edge habitats. Aggressive vines can greatly raise a tree's vulnerability to blowdown through the increased weight (that elevates the tree's center of gravity) and by the vast increase in surface area (that acts to collect wind, ice, and snow). Vines can also smother tree seedlings and prevent them from reaching the canopy to replace trees felled by old age, windthrow, or pathogens.

Herbaceous invasives are also present. **Japanese stiltgrass** is common along the trails in open areas and **garlic mustard** grows across much of the forest floor.

Since the diversity of native species in a system is vital to providing suitable habitat for resident and migratory wildlife, as well as providing an enjoyable environment for community residents, we suggest the following measures to control invasive plant species on the Mt. Bradford Preserve. In general, it is best to address invasive plant control with a top-down (starting in the canopy and working down through understory, shrub, and groundcover layers), least-first strategy (starting in the least impacted areas). The "Invasive Vegetation Management" section of the Natural Lands Trust *Stewardship Handbook for Natural Lands in Southeastern Pennsylvania (2008)* provides guidelines for monitoring and controlling invasive plants typical of the southeastern Pennsylvania landscape.

When considering invasive plant control, it is important to keep in mind that *effective control of invasive plants, especially in the understory, shrub, and groundcover layers of the forests, will only be possible if implemented in conjunction with a deer management program* (see "Forest Regeneration" section below). It is also important to note that the extensive edge area and seed sources in the region and the prolific nature of these plants guarantee that even with complete eradication on the Mt. Bradford Preserve, invasive species can quickly reestablish themselves as a serious stewardship problem if not monitored and addressed on a regular basis.

RECOMMENDATIONS

The following invasive control recommendations for the Mt. Bradford Preserve are listed in order of priority:

1) Cut vines on canopy trees, starting in the interior of the mature forest and moving to the forest-meadow edges. **Oriental bittersweet** vines should be cut and the cut stump treated with a systemic herbicide, if possible. Care should be taken not to cut poison ivy vines on the property. This is a native species that benefits wildlife and rarely becomes large enough to compromise canopy trees. Because grape vines are beneficial for native wildlife, only cut these vines when they are compromising the structural integrity of native trees. Cut stumps of grape vines can be left to resprout. Control **Japanese honeysuckle** in the forest using a foliar treatment of glyphosate herbicide. This is particularly effective on warm days in the late fall and winter months when the leaves of this species remain green and nearby native (non-target) species are dormant and will not be affected by the treatment.

2) Control the **Japanese knotweed** along Miner Street by cutting stems and treating resprouts with a foliar application of 2% Rodeo with 0.5% non-ionic surfactant.

3) Improve the integrity of the forests and the terrestrial meadow (see below for additional recommendations) on the property by managing invasive shrubs, particularly the **autumn-olive, multiflora rose**, and **Japanese barberry**. These invasive shrubs can be cut to the stump and a glyphosate herbicide applied to the cut stump. Alternatively, after cutting, the shrub can be left to resprout and the young foliage treated with a glyphosate herbicide. **Japanese barberry** can be sprayed with a glyphosate herbicide when it leafs out in the spring. If herbicide is not used, these invasive shrubs can be excavated and pulled out, although soil disturbance should be kept to a minimum to prevent conditions favorable for future invasions.

4) In gaps where invasive shrubs and trees have been removed, replant with native species to improve wildlife value and protect exposed slopes from erosion. Consult the "Native Plant Materials" section of the Natural Lands Trust *Stewardship Handbook for Natural Lands in Southeastern Pennsylvania (2008)* for a list of native species that are appropriate for the natural communities on the site.

5) Control **garlic mustard** on the forest floor by pulling, bagging, and removing plants from the site

Japanese knotweed along Miner Street boundary

before seed set in the spring. This is a good spring activity for volunteers of all ages and should be started as soon as possible to prevent further spread.

6) Control **Japanese stiltgrass** along trail edges by hand-pulling or weed-whipping before flowering and seed set in August and September. This should be repeated for several years to deplete the seed bank of this persistent annual grass.

Any volunteer or contractor used for invasive plant control should be able to distinguish native species from invasive species (e.g., **Japanese stiltgrass** from native grasses, **oriental bittersweet** from native vines). Application of herbicides should only be undertaken by someone with a pesticide applicator's license. In sensitive wetland areas such as near the creek or close to seeps, only herbicides approved for aquatic use (e.g., Rodeo) should be applied.

Forest Regeneration

Deer overabundance is a problem that affects most natural areas in our region. The habitat value of forests is greatest where there is an extensive unbroken canopy of mature trees with a diversity of native understory species that includes shrubs and herbaceous plants. Deer impact forest health by consuming seeds (particularly acorns) and browsing on seedlings, shrubs, and herbaceous plants. As population density increases, this activity can adversely affect populations of other wildlife species, especially songbirds, through a decrease in plant species and structural diversity within the forest.

Currently, deer overbrowsing is significantly affecting regeneration in the forest on the Mt. Bradford Preserve. Shrub and groundcover layers are well browsed and spicebush is the dominant shrub (deer generally avoid spicebush). We also noted heavily browsed twigs of **multiflora rose**, an invasive shrub generally avoided by deer.

The recommended deer density to allow for adequate tree regeneration is 20 deer per forested square mile (one deer per 32 acres). However, to perpetuate a healthy native forest with a diversity of native shrubs and wildflowers, the recommended deer density is 10 deer per forested square mile (one deer per 64 acres). With less than 20 acres of forest cover, the Mt. Bradford Preserve can sustainably support only one deer for only part of the year.

The overabundance of deer is not only a threat to forest sustainability, but also to human health. Deer are a host to black-legged ticks, the primary vector of Lyme's Disease. During the site visit, Natural Lands Trust staff removed dozens of black-legged ticks from their clothing. Deer also pose a hazard to vehicles on public roads. For these reasons, the township should continue its effort—the township currently works

Lack of regeneration in red oak-mixed hardwood/ tuliptree-beech-maple forest

Multiflora rose heavily browsed by deer

with an archery club that hunts the Mt. Bradford Preserve and other township lands—to reduce deer overabundance.

Our recommendations for addressing the impact of deer overbrowsing are provided below. Additional information about Natural Lands Trust's deer management program and deer management opportunities are included in the "Wildlife Management" section of the Natural Lands Trust *Stewardship Handbook for Natural Lands in Southeastern Pennsylvania (2008)*.

RECOMMENDATIONS

- Encourage hunters to preferentially remove does to lower and maintain a reasonable deer density on the Mt. Bradford Preserve.
- To prevent adjacent properties from becoming sanctuaries during the hunting season, work with neighbors when coordinating the hunting program.
- In order to avoid potential conflicts with users, post signs during the hunting season to make visitors aware of the use of the preserve by hunters and to take appropriate precautions. Signs should also explain why hunting is important to maintaining forest health and the importance of checking for ticks during and after visiting natural areas.
- The ongoing education of the public about the effects of overabundant deer will be critical to the success of a more effective deer management program. One option to visually demonstrate deer browsing impact is the installation of small (10 meters square) exclosures. The growth of vegetation within these exclosures is often dramatically different than in surrounding areas with unrestricted access by deer. Ideally, exclosures (with accompanying interpretive signage to educate the public about the importance of reducing the deer population to maintain forest health) should be erected in several different parts of a forest on relatively flat ground and near public trails. The setup and monitoring of deer exclosures is a valuable educational exercise that could be undertaken by local schools and colleges.

Native Meadow Restoration

Native meadows are characterized by a diverse structure and composition of short and tall grasses and native wildflowers that provide feeding and nesting habitat for declining grassland birds (e.g., Eastern Meadowlark, Bobolink) and small mammals, as well as nectar sources for numerous butterflies and other insects. Native meadow species are naturally adapted to the soils and climate of our region and can, if necessary, survive on very little rain (and no irrigation). Once established, native meadows usually require just one mowing each year to limit encroachment by trees and shrubs. Occasional spot herbicide treatments are often necessary to manage invasive species.

The terrestrial meadow on the Mt. Bradford Preserve offers a good opportunity for native meadow restoration. Although it is moderately impacted by exotic shrubs and native trees, it has a diverse herbaceous flora that includes Elliott's bluestem (*Andropogon gyrans*), a Pennsylvania rare species (S3 or "vulnerable" ranking with 21 to 100 occurrences), and is highly visible to visitors.

RECOMMENDATIONS

- Remove islands of trees and shrubs in the terrestrial meadow and smooth edges of adjacent forest and hedgerows. This will (a) provide more continuity to the meadow habitats to encourage use by grassland birds that prefer uninterrupted open landscapes, (b) reduce the amount of edge for invasive plants, and (c) facilitate future mowing of the meadow. Hedgerows rarely improve the habitat value of a property because they provide havens for invasive plants and predators (hawks, foxes, raccoons) of grassland birds. Large trees in these areas should be cut flush to the ground and a systemic herbicide painted on the stump to discourage resprouting. A hydro-ax can be used to chop up the residual shrubs and small trees in these edge habitats and throughout the meadow.
- To enhance the wildlife habitat value of the terrestrial meadow and favor native warm-season grasses, mow the meadow on a once-yearly schedule in March. Mowing at this time of year minimizes impact on the nesting and foraging

activities of native wildlife (birds, small mammals, butterflies) and often allows for easy equipment access if the ground is still frozen. After initial clearing of trees and shrubs from the meadow, spot-spraying of new sprouts will be necessary to prevent reestablishment of trees (e.g., Eastern red-cedar) and shrubs, especially the pervasive **autumn-olive**. Monitor the newly-managed meadow for several years and catalog changes in species composition. If, after that time, most of the species are native, continue to mow annually and add plugs to enhance native species composition, if desired. If most of the species are invasive or otherwise undesirable, consider eliminating the existing vegetation using herbicides and replanting with native meadow species. Under this second alternative, meadows can be seeded with desirable species using a no-till drill once the existing vegetation is eliminated. For more information about establishing native meadows, see the "Meadow Management" section of the Natural Lands Trust *Stewardship Handbook for Natural Lands in Southeastern Pennsylvania (2008)*.

- Mow paths through the terrestrial meadow to enhance visitor experiences and environmental education. Mowing a trail around the outside edges of the meadow will help to limit further woody and invasive encroachment.
- Consider using prescribed fire to control invasive and woody species encroachment into the terrestrial meadow. Prescribed fire should only be used by trained staff or contractors because it requires safe application and the proper equipment to protect participants and neighboring properties.

Water Quality and Pond Management

The pond on the property experiences sufficient light exposure during the summer to encourage the proliferation of algae and duckweed across its surface and elevate water temperatures. The increase in temperature results in degraded water quality for aquatic animals in the pond and downstream. The pond could be enhanced for native wildlife by lowering the water level and creating a shallower wetland habitat with a more varied topography that would enrich the diversity of wetland plant species, insects, birds, and amphibians. See attached Natural Lands Trust publication *Land Stewardship Case Study: Shallow Wetland Basin – Converting a Farm Pond* for more information about how a wetland basin can be excavated with pits and mounds in this way. With additional plantings of native species (assuming successful deer control), this area (including the stone wall) could be an attractive location to demonstrate use of native plants in a formal landscape.

The creek banks on the property are actively eroding in the source area as a result of runoff from the field upslope. This erosion should be stabilized by reducing surface runoff from the field to protect water quality and aquatic habitat downstream. Another area of streambank erosion exists near Miner Street where an old stone stream crossing is collapsing. It appears that the associated culvert is unable to handle high water events resulting in scouring of the streambank to the northeast.

RECOMMENDATIONS

- Contact the Natural Resources Conservation Service (Travis Thomason, NRCS Chester County Field Office, West Chester, phone: 610-696-0398) about specifications (design and engineering) and permitting requirements for converting the pond to a shallow wetland basin.
- Contact the Department of Environmental Protection's Wetland Replacement Program (Shelby Reisinger, Bureau of Watershed Management, Division of Waterways, Wetlands, and Stormwater Management, phone: 717-783-2408) to explore funding opportunities for a pond conversion.
- As an alternative to maintaining the pond as a wetland habitat, remove the dam and spillway and allow the pond to revert to its original creek bed. This would eliminate an attractive nuisance and future repair and replacement costs.
- Manage the field upslope from the pond as a meadow to slow surface runoff and increase infiltration.

Dam and spillway at pond

Actively eroding area in source area of creek

- Contact the Chester County Conservation District for guidance about managing the active erosion at the source of the creek. It may be necessary to "armor" the base of this eroding area with large rocks or a combination of rocks and bioengineering techniques. Alternatively, a series of low berms—two or three staggered down the slope of the field—could be installed to slow and filter surface water runoff into the streambed.
- Remove old stream crossing and damaged culvert in the area of the floodplain forest to prevent further streambank erosion.

Sloping field (with large sycamore) leading down to source area of creek

Damaged culvert under old road bed

Wildlife Enhancement

Additional opportunities for enhancing wildlife habitat on the Mt. Bradford Preserve are listed below.

RECOMMENDATIONS

- Consider installing bluebird nesting boxes in the terrestrial meadow. See attached Natural Lands Trust publication *Bluebird Nesting Boxes* for tips about placement and maintenance of these structures.

Potential hazard trees along Miner Street

Potential hazard tree along Sconnelltown Road

- Consider constructing and installing American kestrel boxes in open areas and along woodland edges of the property. American kestrels nest in tree cavities, but in the absence of these natural niches, kestrels readily adopt nest boxes to raise their young and reduce competition for cavities with the introduced European starling. See Pennsylvania Wildlife Fact Sheet No. 13 *Managing Habitat for American Kestrels* for more information about these structures.

Hazards

There is a potential for hazard trees along the boundary of the Mt. Bradford Preserve with both Sconnelltown Road and Miner Street. As a landowner, the township is responsible for preventing trees and branches from falling into the adjacent right of way through the monitoring and removal of hazard trees (trees that due to structural defects could fall in part or whole on a "target" such as a road, residence, or person). Furthermore, when considering installing or improving trails, new potential hazard tree situations (e.g., benches near trees) should be regularly monitored. See the "Hazard Tree Monitoring Program" section in the Natural Lands Trust *Stewardship Handbook for Natural Lands in Southeastern Pennsylvania (2008)* for information about procedures for hazard tree monitoring. Other potential hazards on the property include the pond and a small accessory building near the pond. The

Accessory building near pond

township should determine if there is any historic significance or potential use of these structures. If not, the township should consider removing the structures to eliminate these attractive nuisances.

RECOMMENDATIONS

- Monitor high use areas for hazard trees by foot once each year and following severe storms. Ideally, a certified arborist should be hired to complete this task and address any identified hazards through pruning or removal.
- Develop a plan for using or removing the pond and accessory building. In the short-term, consider lowering the water level to create a wetland habitat (see "Water Quality and Pond Management" section above), securing the accessory building and removing the remnant farm equipment on the property to provide a safe environment for visitors, particularly "free-range" children.

Boundaries and Public Access

Proper maintenance of boundaries, access points, and trails is an important stewardship priority on properties with public access.

RECOMMENDATIONS

- The boundaries of the Mt. Bradford Preserve should be posted to prevent encroachment issues (e.g., dumping of yard waste) by neighbors and to inform passing motorists along Miner Street and Sconnelltown Road about the location of the public open space. Signs could be small (3 ¾" x 3 ¾", 0.12 gauge aluminum diamond shape signs can be purchased through Voss signs: **www.vosssigns.com**) and should indicate township ownership. Posting every 50–100 feet is adequate and particularly important where the property abuts private land. In open fields, nest boxes placed on posts can serve as convenient reminders of the boundary.
- Develop a trail plan for the property and identify trail routes and construction techniques that are compatible with the topography of the landscape. Connect trails on the preserve to nearby trail routes, if feasible, to enhance and extend visitor experiences across the landscape.
- Repair and improve the gate/chain barrier at the Sconnelltown Road driveway (below the parking area) and the Miner Street access.

Down chain (above) at Miner Street no longer restricts vehicle access to the property resulting in ruts (below) in wet areas of the field

- Develop a plan for improving the parking area at the Sconnelltown Road access. Consider installing a kiosk at this location to display a trail map, photos of wildlife that may be seen during particular seasons, and upcoming volunteer events.

Environmental Education

The terrestrial meadow and the upland and floodplain forest on the Mt. Bradford Preserve provide a diversity of natural communities that are readily accessible to the public. The stewardship of these communities offers many opportunities to connect visitors with their natural surroundings and provide meaningful environmental education experiences. Several approaches to enhance these opportunities are described below.

RECOMMENDATIONS

- Install interpretive signs in key areas where the restoration of natural habitats (invasive species management, native species planting) is ongoing. It is important to inform the public about changes that are occurring in the natural habitats and how the restored habitats benefit both wildlife and people.
- Consider installing a native plant demonstration garden near the parking area at Sconnelltown

Potential site for native plant demonstration garden near the Sconnelltown Road access

Road. This is an area that is highly visible to visitors and presents an opportunity to educate residents about the advantages of planting native species in their landscape. An alternative site for a native plant demonstration garden would be the former formal landscape area around the pond.

- Invite residents to participate in natural areas restoration projects including removing invasive plants and replanting with native species. Schedule "workdays" on environmentally friendly days such as Earth Day or Arbor Day. Encourage local boy scout troops to implement stewardship projects such as building and installing bluebird boxes, removing invasive plants (e.g., cutting vines with pruners or handsaws and pulling **garlic mustard**) and planting native shrubs and trees.
- Label healthy examples of native trees along trails with scientific and common names.
- Encourage local schools, environmental groups, and birding groups to schedule walks in the parks.

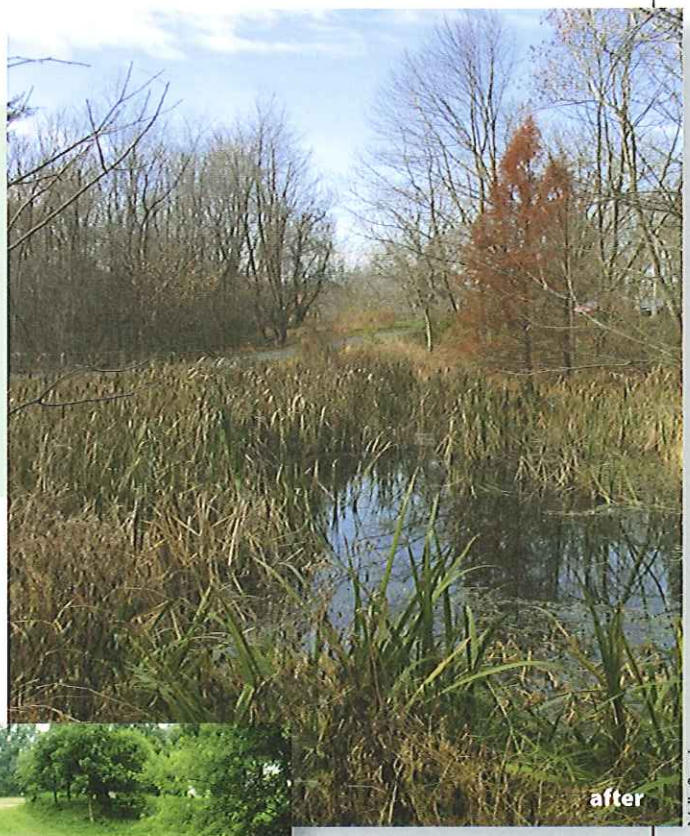
Natural Lands Trust

Hildacy Farm ~ 1031 Palmers Mill Road ~ Media, PA 19063
610-353-5587 ~ www.natlands.org

This Natural Areas Stewardship Report was funded by the Environmental Education Grants Program, Pennsylvania Department of Environmental Protection.

Shallow Wetland Basin

Converting a farm pond



Molly Smyrl

Project Goals

1. To improve water quality and wetland habitat for wildlife.
2. To filter stormwater runoff and manage excess sediment and nutrient input into nearby Crum Creek.
3. To provide a living model demonstrating the wildlife habitat potential of a functioning stormwater management basin.

Site

Hildacy Farm Preserve, *owned by Natural Lands Trust*
Marple Township, Delaware County, PA

Site History and Installation

Harry Carl

The 8,000-square foot spring-fed pond below the farmhouse at the Hildacy Preserve was created approximately 40 years ago as a farm pond and, like most ponds in the area at the time, provided a water source for livestock and fire control. The pond drains into nearby Martin's Run and Crum Creek. By 2002, the pond had become a sink for nutrient- and sediment-rich stormwater from surrounding slopes. During the warmer summer months, excess nutrient loads contributed to elevated algae and bacteria levels in the stagnant pond water, compromising water quality and habitat value not only in the pond, but also downstream in the watershed. Canada geese congregated on the mowed banks of the pond and their droppings further deteriorated the pond water.

To enhance and diversify wildlife habitat and to improve water quality in the pond and the Crum Creek watershed, Natural Lands Trust (NLT) made plans to convert the pond into a wetland basin. The restored wetland would provide shallow and deep water niches for a variety of native plants and animals and also serve as a more effective stormwater drainage basin for NLT's expanded headquarters.

In the fall of 2002, the pond was drained and bottom sediment was excavated and replaced by dry soil that was better suited for contouring of the wetland basin. A sediment forebay (a small depression) was excavated just upslope of the wetland as a settling filter for sediments and potential pollutants draining into the basin from impervious surfaces. Shelves, small sinks, and gentle slopes were excavated in the basin to create a varied topography typical of a natural wetland habitat. Shallow mounds and slopes would support wetland herbs (pickerel weed, arrowhead) and shrubs (buttonbush, red-osier dogwood) while small depres-

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sions would provide pools for mallards or wood ducks. We also positioned a log across the basin to attract basking turtles.

Natural Lands Trust staff planted the wetland basin and surrounding uplands in the spring of 2003 with wetland herbs and shrubs native to the immediate area including duck potato, joe-pye weed, winterberry, elderberry, and trees such as red maple, red ash, and black gum that provide much-needed shade. Thanks to ideal growing conditions during that first summer, the entire wetland conversion at Hildacy Preserve took place over a period of only one year.

Water drains from the wetlands through a pipe at the bottom of the basin that is connected to a water control structure. This structure was installed to allow for periodic adjustment of water levels to mimic the hydrological conditions of a natural wetland.

Maintenance and Monitoring

We were fortunate that the wet spring and summer of 2003 provided optimal conditions during the first growing season after installation. Some restored wetland basins may need watering as plants become established in their new habitat. In severe conditions, it may be necessary to replant areas that become too dry.

In any soil disturbance or habitat restoration project, there is always a concern that invasive plant species will become established and outcompete the native (planted) species. In newly created wetlands, it is therefore important to monitor occurrences of invasive plants such as Phragmites or purple loosestrife and to control these species as soon as they appear.

Results

In the years since the wetland basin was installed, we regularly observe damselflies and dragonflies, kingfishers, red-winged blackbirds, and the occasional mallard duck or green heron in our restored habitat. The near shrill chorus of the spring peepers in the basin alerts us to the end of winter each year. We also know that cooler and cleaner water is entering the Crum Creek and improving aquatic habitat in the watershed.

Estimated Project Cost

Installation Cost:

~$30,000 for excavation, water control structure, plants, signage, NLT staff time.

Yearly Maintenance Cost:

<$500 for invasive plant control and maintenance of water control structure.

Funding

The wetland conversion at Hildacy Preserve was funded by a Growing Greener Grant from the Pennsylvania Department of Environmental Protection. Partners for Wildlife Program of the US Fish and Wildlife Service provided technical guidance in the design of the wetland basin.

David Stockel (all)

Case studies describe stewardship projects completed by Natural Lands Trust in its 50-year history of managing natural areas. We hope these case studies inspire landowners to consider opportunities for land stewardship on their own properties.

The Center for Conservation Landowners was established to share Natural Lands Trust's knowledge and experience in land stewardship by offering educational outreach and consulting services to landowners.

For more information, contact:

Natural Lands Trust
Center for Conservation Landowners
1031 Palmers Mill Road
Media, PA 19063
610-353-5587 ~ **www.natlands.org**

Natural Lands Trust

Bluebird Nesting Boxes

INSTALLATION GUIDELINES

Time: It is best to erect the box by the first week of March. Male bluebirds will begin box selection as early as mid-March.

Location: Open mowed fields
120 feet from wooded edge
Boxes 100 yards apart
One box per acre

Placement: Face hole away from prevailing wind
Entrance hole 4–6 feet above the ground
Place within 50 feet of a perch (natural or manmade)

POTENTIAL COMPETITORS

Several other bird species may attempt to utilize your bluebird nesting box. The following will assist you in identifying the species.

Tree Swallow
nesting material: dry grass with feathers
eggs: pure white

Chickadee
nesting material: moss and hair
eggs: dull white with brown spots

House Wren
nesting material: small twigs
eggs: red and brown spots

House Sparrow
nesting material: dried plants with feathers
eggs: dull white with olive spots

NESTING INFORMATION

Dry grasses are the materials most commonly used by bluebirds. Although when made near evergreens, pine needles may be used. Nest building begins in early April. It takes five to fourteen days for bluebirds to complete a nest.

A single egg is laid each day. The eggs are approximately ¾" by ⅔" and are normally clear blue. The female incubates the eggs for about 14 days. After hatching, the young will leave the nest in approximately 17 days.

After the young have fledged, remove the used nesting material. Bluebirds nest two to three times a season, building a new nest each time.

Monitor the nesting boxes once a week, between early April and late August.

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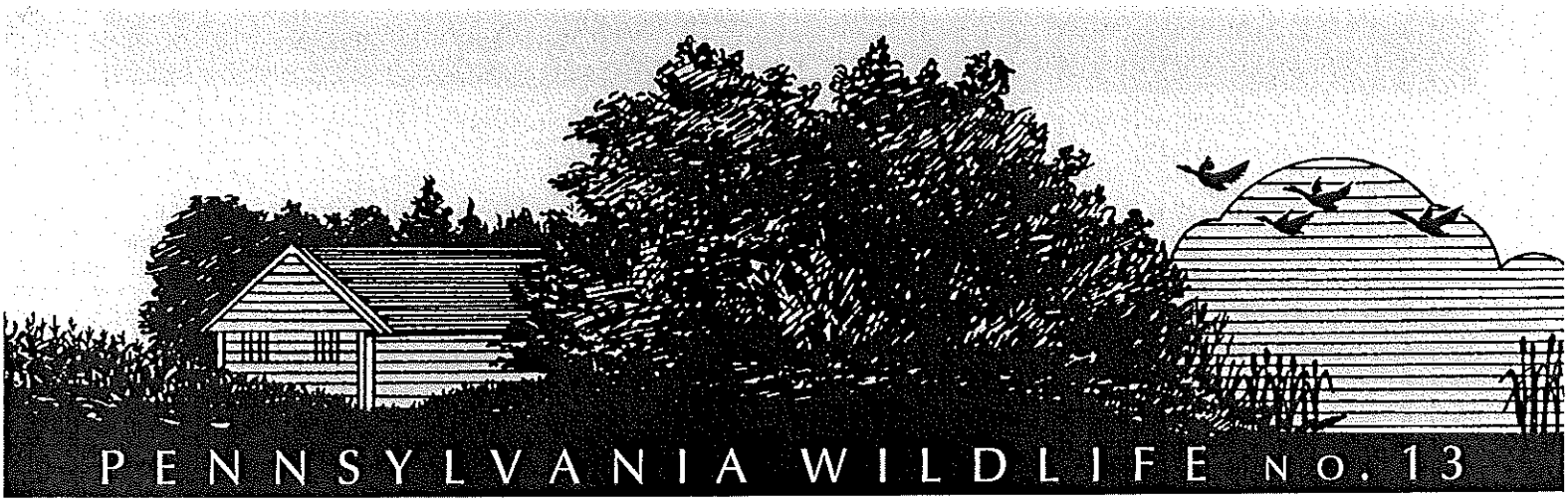


PENNSYLVANIA WILDLIFE NO. 13

Managing Habitat for American Kestrels

American kestrels are small, swift, powerful birds of prey, with brilliant coloring. Formally known as sparrow hawks, these hunters are one of Pennsylvania's most common raptors, and many are year-round residents.

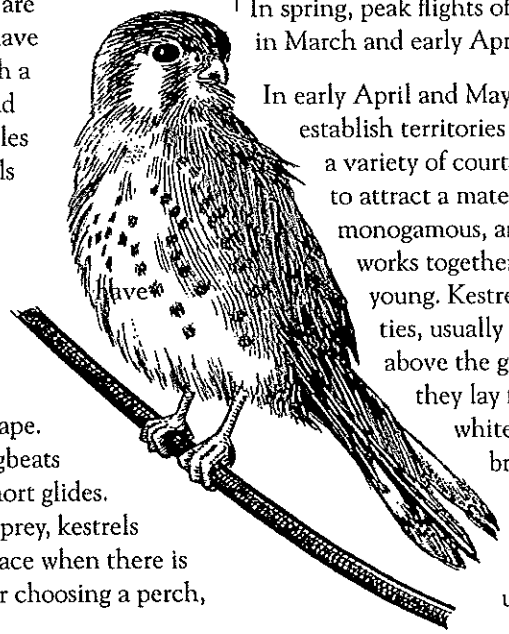
Kestrels are easily identified. Once you become familiar with their size, blue and rusty coloring, and hunting habits, you'll recognize their forms as they hover over fields in search of prey.

Given the right habitat, American kestrels can co-exist with humans, and landowners will find that these birds always pay the rent. Not only are they enjoyable to watch, but kestrels are effective at catching insects and small mammals that feed on agricultural crops. From their place near the top of the food chain, kestrels are also one of Pennsylvania's best bioindicators of ecological health.

Identification

Kestrels are about the size of a blue jay. Their backs and tails are a reddish brown or rusty color with dark spotting or bar patterns. The bird's underside is a lighter, tawny color with some darker streaking. Its face features two dark, moustache-like stripes against a white background. A kestrel also sports two dark "eye spot" markings on the back of the head. These markings may help prevent strikes from kestrel predators, which include larger birds of prey and even crows.

Females are slightly larger than males, but color variation is the easiest way to determine the sex of a kestrel. Males have blue gray or slate-colored wings, while females' wings are rust colored. Males have rust-colored tails with a prominent black band across the end. Females have rust-colored tails with numerous thin black bars.



In flight, kestrels a notably streamlined appearance, their slender wings curved in a sickle shape. Their fluttering wingbeats are punctuated by short glides. While searching for prey, kestrels may also hover in place when there is adequate wind. After choosing a perch, kestrels perform a characteristic series of tail bobs. A high-pitched "klee, klee, klee, klee, klee, klee" or "killy, killy, killy," whether the bird is perched or in flight, is a giveaway that the bird you're observing is an American kestrel.

General Biology

American kestrels are found throughout Pennsylvania. They require open habitat, so they are rare in the heavily forested regions of the north and central parts of the state. Some kestrels are year-round residents in Pennsylvania. Others breed here and winter to our south, while still others breed north of us and winter in the Commonwealth. In fall, migrating kestrels pass through the state in September and early October. In spring, peak flights of migrants occur in March and early April.

In early April and May, male kestrels establish territories and conduct a variety of courtship displays to attract a mate. Kestrels are monogamous, and the pair works together to raise the young. Kestrels nest in cavities, usually 10 to 30 feet above the ground, where they lay four to five eggs, white to pale with brown speckling. In the northeastern United States, kestrels usually raise only

one brood per year. After 27 to 31 days of incubation, the young hatch in their nest cavity, where they will remain for a month before fledging. The male brings his nest-tending mate food until a week or two after the young hatch, when feeding becomes a shared task between the parents.

After leaving the nest cavity, the young stay nearby and are fed by their parents for another month. The young kestrels leave the nesting area as fall approaches, ready for life on their own. Many kestrels migrate to the southern United States, Mexico, and Central America, while others remain in Pennsylvania. Many young kestrels succumb to accidents or predation by snakes, raccoons, and raptors, but those surviving that first difficult year usually have a life span of at least three years.

Habitat Requirements

When choosing their home range, kestrels look for an area with open spaces for hunting and cavities for nesting. Pastures, agricultural fields, and forest clearings usually meet their needs, although some individuals have been found to colonize golf courses, reclaimed strip mines, drained wetlands, and even small urban areas. A pair of kestrels may defend a breeding area as large as 250 acres.

Cover and Nesting Sites
Kestrels do not construct nests; they search for cavities where they can lay their eggs and rear their young, safe from predators and the elements. These nesting sites can be natural tree cavities, abandoned woodpecker holes, cavities in human-made structures, and nest boxes. Forest edges and tree lines often provide the cover they seek. Kestrels also use trees or telephone poles as hunting perches.

Food
A kestrel's summer diet is largely made up of insects, especially grasshoppers, moths, caterpillars, beetles, and crickets. The birds can take their prey while in flight, but they make most of their larger kills on the ground. In winter, they are more reliant on small birds and mammals, upon which they dive with their talons, then use their hooked bills to break their prey's neck. Kestrels are also known to feed on lizards, carrion, amphibians, bats, earthworms, and spiders, striving daily to consume the 20 to 25 percent of their body weight they need to survive.

Water
There is little information on drinking and the use of water by kestrels. Kestrels can obtain most or all of the water they need from their food. However, they probably still benefit from available water either directly by using it for bathing or indirectly because of the variety of potential prey species the water attracts.

Management Practices

To attract and keep American kestrels in your area, your land management plan should support open, vegetated fields for kestrels to use as hunting grounds. Kestrels also require nesting cavities and perching locations. Adding nest boxes often makes previously unsuitable habitat suitable.

Maintain Open Areas
Kestrels generally hunt in open fields where they can detect the mice, voles, insects, and small birds that they prefer to dine on. Agricultural fields, forest clearings, pastures, or abandoned meadows on your property would all suit this need.

Maintain Forest Edges
Keeping any forested-field edge intact provides kestrels with natural perches from which they can hunt. Forested edges can also supply nesting cavities, and scattered trees within a clearing or field make excellent perch locations.

Add Perches to Open Areas
Fields lacking trees or other natural perches leave kestrels without a place to

survey their hunting grounds. While the birds will hunt by hovering when wind conditions are right, installing artificial perches in open areas increases the likelihood they will choose your field or clearing for catching their prey. One plan for constructing perches calls for installing a ½-inch-diameter PVC pipe, 12 to 15 feet in length, upright in the ground. A foot-long piece of pipe should be affixed to the top of the longer piece, forming a "T-shaped" perch.

Install Nest Boxes
While kestrels can adapt to hunting in suburban and agricultural areas, these places often do not offer enough natural cavities to make them suitable habitats. In the absence of natural cavities, kestrels readily adopt nest boxes to rear their young. Providing boxes also helps lessen competition between kestrels and an introduced competitor, the European starling, for nesting cavities.

Making a nest box is a project that even beginning woodworkers can complete. One plan for constructing a kestrel box appears at right. Detailed construction plans and information on box installation are available from the Pennsylvania Game Commission and Hawk Mountain Sanctuary (see Sources of Additional Information).

Nest boxes can be placed in open areas as well as woodland edges, and mounted on posts or trees. Mount boxes 15 to 30 feet above the ground. Some people suggest including two or three inches of wood shavings in the box each year before the nesting season.

Depending on the location, other animal species such as screech owls, Northern saw-whet owls, squirrels, and bluebirds may use kestrel nest boxes. If you observe European starlings or house sparrows using the box, you may remove their nests since they are nonnative species not protected by law. All other species are protected and may not be disturbed if they are using the box.

Kestrel Box Design

A nest box needs to provide a safe, quality environment for parents and young alike. Consider the following suggestions for the nest box you construct or purchase.

Material: Use untreated wood, preferably pine or cedar, which weathers well. Box walls should be at least ¾ inch thick for temperature insulation. Do not paint or treat the box with a wood preservative.

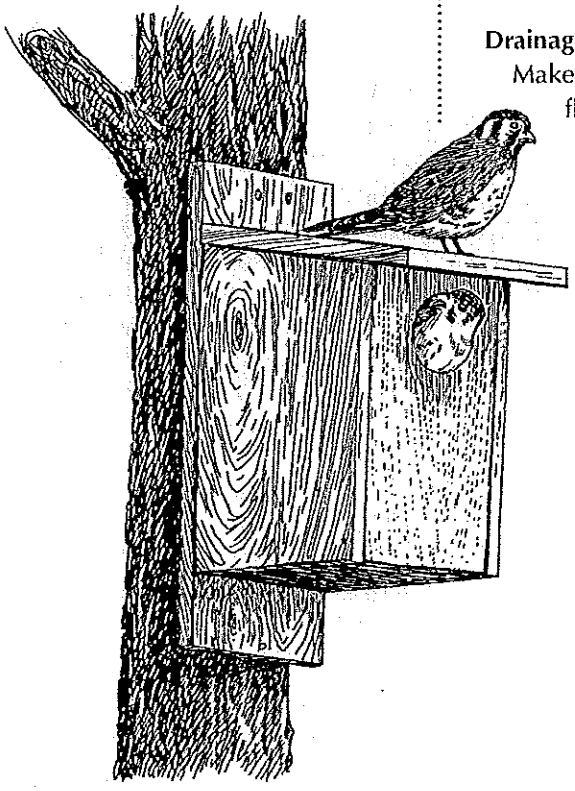
Construction: Use galvanized screws or nails. An extended back panel can be included to help with the mounting process. Avoid using outside perches; they may attract unwanted species.

Access: A door with hinges should be included in one side of the box to allow for cleaning and monitoring. You can use a scaffold nail to keep the door closed.

Dimensions: Total box height should be 14 to 16 inches, and the entry hole should be 3 inches in diameter. The height of the entry hole should be 10 to 12 inches above the floor. Floor dimensions should measure approximately 9 by 9 inches to 10 by 10 inches.

Roof: The roof should be sloped with the lower side at front and should be extended past the box entrance to protect the fledglings from predators and the elements.

Interior: Walls should be rough or scored on the inside to provide fledglings with a foothold as they leave the nest. You may also place a small interior perch about 3 inches below the entrance.



Drainage and ventilation: Make drainage holes at the floor corners, and add a small ventilation space between each side wall and the roof. You can seal these ventilation gaps with weatherstripping during the winter months, but you will need to remove it when the weather grows warmer.

Floor: The floor must be recessed and covered by walls on all sides to prevent eggs from getting wet. (See Sources of Additional Information to obtain actual box designs.)

Maintain Cavity Trees
Cavity trees contain natural cavities where a branch has broken off or woodpeckers have drilled holes. These trees provide nest sites for kestrels and other wildlife. They also serve as hunting perches.

Restore Grassland Conditions on Idle Land
Consider planting grasses on fallow agricultural fields or other unused portions of your property. Grassy areas provide excellent habitat for kestrel prey species and an assortment of other grassland birds.

Minimize Pesticide Use
American kestrels have been affected by compounds like DDT and other agricultural and home lawn chemicals that can cause reproductive failures. Pesticides also affect smaller birds that kestrels may prey upon. Minimize or eliminate the use of pesticides in your kestrel habitat, especially in the vicinity of nest boxes and known cavities. Alternative pest control methods combined in an integrated pest management (IPM) plan can reduce pesticide needs.

Maintain Good Conservation Practices
If your property includes agricultural areas, practicing good soil and water conservation will have a positive effect on your kestrel habitat. Conservation tillage, planting cover crops, and installing buffer strips, to name just a few practices, benefit all kinds of wildlife species.

Support Kestrels from Afar
Even if your property is not suitable for kestrels, you can easily support kestrel programs in other locations. For instance, Hawk Mountain Sanctuary in Kempton, Pennsylvania, is known worldwide for its research on raptor biology and habitat needs. Hawk Mountain maintains over 200 kestrel nest boxes where researchers study kestrel nesting success and the ecology of kestrels wintering in the area. People from around the world can sponsor these birds through Hawk Mountain's Adopt a Kestrel Nestbox program. (For more on this program, see Sources of Additional Information.)

Sources of Additional Information

For additional information about American kestrel biology and habitat management, as well as details on the Adopt a Kestrel Nestbox program, contact Hawk Mountain Sanctuary or explore their web site, which also offers live images taken from kestrel nest box cameras. Hawk Mountain Sanctuary, 1700 Hawk Mountain Road, Kempton, PA 19529-9449; 610-756-6961; www.hawkmountain.org

To obtain a copy of the Pennsylvania Game Commission's guide, *Woodcrafting for Wildlife*, send $6.00 to the Pennsylvania Game Commission, Department MS, 2001 Elmerton Avenue, Harrisburg, PA 17110. This book includes 26 different plans for nest boxes and other nesting structures (including kestrel boxes), plus information on proper installation procedures and how to choose the correct sites for boxes. Downloadable at www.pgc.state.pa.us/pgc/cwp/browse.asp?A=3.

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