



*preserving and maintaining open  
space for over 20 years*

## **Field Management Plan**

Prepared for

### **Harding Land Trust**

P.O. Box 576

New Vernon, NJ 07976

### **Dear Property**

Property location

**Block 9 Lots 2.01 and 2.02**

**Blue Mill Road  
Harding Township  
Morris County**

Total acreage: ~ 10.60 acres  
Field/wetland acreage: ~10.60

Planning period: 5 years  
Plan prepared for 2016-2020

**October 2016**

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**Property Location:**

The Harding Land Trust Pine Brook Property is located along Blue Mill Road. The Harding Land Trust Dear Property can be reached from Route 287 South by taking exit 33 onto Harter Road and proceeding about 0.2 miles. Turn right onto New Harter Road for 0.4 miles. Turn right onto James Street for 1.1 miles. Turn left onto Blue Mill Road proceed 1.0 mile and the property is on the right side across from Red Gate Road.

**Property Description:**

This property consists of approximately 10.6 acres. The large majority of the property is hayfield while the area adjacent to Great Brook is riparian area and herbaceous wetland.

**Boundary Delineation:**

The property boundaries are not clearly marked. The property has been surveyed and the markers will be maintained throughout the planning period. Clearly delineated boundaries are a critical requirement to actively manage the land. This parcel is open for passive recreation and clearly marked boundaries would reduce the number of visitors from infringing on private property in the middle of this tract. In compliance with NJ Green Acres regulations a Green Acres provided sign, which identifies the property as a Green Acres funded site, will be installed and maintained by Harding Township in a prominent place on the property. Harding Land Trust will also install and maintain easement boundary markers where necessary.

**Landowner Profile:**

The land is owned by Harding Township with Harding Land Trust holding a conservation easement over the town owned parcels. Harding Land Trust is a nonprofit organization dedicated to preserving the farmland, woodlands and natural areas that give Harding its distinctive quality of life. Harding Land Trust works to safeguard our natural resources and preserve the rural character of our community for current and future generations. Field management activities will be completed by the

landowner and farmers, in cooperation with the consultant. The Land Trust has been and will continue to be enthusiastic about managing these agricultural fields and the adjacent Koven property while continuing to be an active steward of the land.

### **Landowner Objectives:**

The management objectives for the Harding Land Trust Dear property are to:

1. Improve regeneration of native plant species while removing invasive species.
2. Manage this land for multiple wildlife species.
3. Attempt to restore ecologic balance to the site.
4. Apply for funding where possible to complete the recommended activities.
5. Conserve soil and water resources by incorporating Best Management Practices.

### **Soil Descriptions:**

#### **Ellington loamy substratum variant fine sandy loam, 3 to 8 percent slopes (EkhhB) soils –**

This soil is slightly sloped and moderately well drained. Depth to water table is about 6 to 43 inches. There is no threat of ponding or flooding. Available water capacity is moderate. This soil is prime farmland soil.

#### **Penn channery silt loam, 3 to 8 percent slopes (PeoB) soils -**

This moderately sloped soil is well drained. Available water capacity is low. The depth to water table is more than 80 inches. There is no flooding or ponding frequency. This soil is prime farmland soil.

#### **Penn channery silt loam, 8 to 15 percent slopes (PeoC) soils -**

This moderately sloped soil is well drained. Available water capacity is low. The depth to water table is more than 80 inches. There is no flooding or ponding frequency. This soil is farmland of statewide importance.

#### **Reaville deep variant channery silt loam, 0 to 6 percent slopes (RerB7) soils –**

This flat soil is somewhat poorly drained. The depth to water table is 0 to 12 inches. Available water capacity is moderate. This soil is farmland of statewide importance.

**Whippany silt loam, 3 to 8% slopes (WhpB) soils –**

This slightly sloped soil is somewhat poorly drained. The depth to water table is 6 to 18 inches. Available water capacity is high. The frequency of flooding is rare, while the threat of ponding is listed as none. This soil is prime farmland soil.

<b>Soil Symbol</b>	<b>Trail Erosion Hazard</b>	<b>Erosion Hazard</b>	<b>Mechanical Site Prep</b>	<b>Seedling Mortality</b>	<b>Hay Rating (tons)</b>	<b>Site index</b>
<b>EkhhB</b>	Moderate	Slight	Well suited	Low	4.5	80 Tulip Poplar 70 Red Oak
<b>PeoB</b>	Moderate	Slight	Well suited	Low	3.5	67 Red Oak 75 Tulip poplar
<b>PeoC</b>	Severe	Slight	Well suited	Low	3.0	67 Red Oak 75 Tulip poplar
<b>RerB7</b>	Moderate	Slight	Well suited	High	3.5	75 Red Oak 80 Tulip Poplar 90 White Ash
<b>WhpB</b>	Moderate	Slight	Well suited	High	4.0	70 Red Oak 70 White Oak

**Table 1. Soil Information**

**Site Index (SI)**

The collective influence of soil factors will determine the site index for a particular tree species on a given soil area. Site index is the total height to which dominant trees of a given species will grow on a given site at some index age, usually 50 years in the Northeast. Dominant trees are the tallest trees in the Stand. If it is stated that an area has a site index for Sugar Maple of 70 feet at 50 years, then we expect Sugar Maple seedlings planted on that area today to be 70 feet tall in 50 years. Index age and tree species must be stated when referring to site index because the site index of one species will be different from the site index of another species growing on the same area.

The following factors have a major impact on forest soil productivity and site index:

**Topsoil Depth.** The depth of the uppermost soil layer is a critical factor affecting tree growth. Topsoil is highest in organic matter and nutrients, is usually well aerated and drained, and allows maximum root growth and root penetration.

**Soil Texture.** The proportion of sand, silt and clay in the topsoil and subsoil layers is called texture. Sandy soils are normally very well drained and often lack nutrients due to constant leaching loss. At the other end of the spectrum are the pure clay soils comprised of very small, fine soil particles.

**Subsoil Consistence Class.** Consistency of the subsoil layer is another important factor in forest soil productivity. The combination of soil-sized particles and the physical and chemical properties of each individual particle type in a given soil determine the soil's consistence class.

**Limiting Layers.** A layer which restricts the downward penetration of a tree's root system will reduce tree growth in direct relation to the depth of layer. In rare instances, a limiting layer may increase site productivity, such as below sandy soils where the layer may retard leaching of nutrients and increase available moisture.

**Fertility.** Fertilization is normally not recommended early in the rotation except in the case of a critical deficiency of a major nutrient such as phosphorus. A soil test prior to site preparation will alert a landowner to critical deficiencies.

Research has shown conflicting results in forest tree response to nitrogen fertilization, particularly early on. Growth may be suppressed if the fertilizer increases the growth of competing weeds. Best planting success results from early fertilizer use arise in combination with herbicide or mechanical control of competing vegetation. Fertilization will not be required for reforestation efforts on this property.

**Internal Drainage.** Few tree species can grow in soils which are constantly wet. Drainage can be improved in some cases by tilling, ditching, or adding bedding as a site preparation method.

Measuring Site Index can be determined by two methods: One method is to locate on the area in question several dominant trees of the species of interest or a species with a known conversion factor to the species of interest. Using accurate age and height measurements, read the site index from a graph showing height over age curves for that species.

Site quality index listed in Table 1 above can be represented as Poor, Fair, Good, Very Good and Excellent as follows:

< 50	Poor
51-60	Fair
61-70	Good
71-80	Very Good
>81	Excellent

**Field Descriptions:**

**Field 1**

Field 1 is found on Reaville deep variant channery silt loam, 0 to 6 percent slopes (RerB7) soils, Penn channery silt loam, 8 to 15 percent slopes (PeoC) soils, Penn channery silt loam, 3 to 8 percent slopes (PeoB) soils, Whippany silt loam, 3 to 8% slopes (WhpB) soils and Ellington loamy substratum variant fine sandy loam, 3 to 8 percent slopes (EkhhB) soils. The RerB7 soils have a site index of 90 for White Ash, 80 for Tulip Poplar and 75 for Red Oak. PeoC soils have a site index of 67 for Red Oak and 75 for Tulip Poplar and EkhhB soils have a site index of 70 for Red Oak and 80 for Tulip Poplar. WhpB soils have a site index of 70 for White Oak and Red Oak. This field is located on the western portion of the Dear Property and has a slight to moderate western aspect.

This portion of the property is mowed twice per year. The hay is cut and left at this time. Several options should be reviewed further for this area. The field could be cut once per year. This would benefit any bird species that may be nesting in the field by allowing young to fledge. It would also prevent the invasion of the area by woody vegetation. Mowing once per year may also benefit pollinators by allowing the current vegetation to flower and seed.

The Land Trust may also attempt to find a farmer to cut and remove the hay once per year. This could lead to someone cutting the area for free depending on the proximity of farmers within the Township.

Another option if funding can be accessed through NRCS would be to create pollinator or butterfly habitat in this area utilizing native grasses and flowers. It could be piloted on a small sale to start and then expanded to the entire 5.5 acres with the exception of the area discussed below. Some

options for restoration could be warm season grasses or native wildflowers for pollinators including milkweed, joe pye weed, cardinal flower in the more wet areas.

The area should be inspected annually and remove any invasive species moving into the field. If caught early small invasive species population can be hand pulled and controlled easily. Allowing invasive species to perpetuate compounds the problems and the cost for removal.

The area nearest the Great Brook should be restored with wetland plants and woody vegetation. The restoration area could be fifty feet from the stream. This would help moderate stream temperatures, reduce nutrient flows from the agricultural fields and provide bank stability reducing erosion. If a restoration option it may be possible to fund the project through NRCS funding to help offset the cost of the project. Native species would be planted which will provide forage and habitat for native animal species and improve wildlife habitat.

Any dead trees should be removed from this area if they present a hazard. Standing dead trees can provide habitat for Indiana and Northern long-eared Bats which are both listed species in New Jersey. Any invasive species should be removed from this area. A few Ailanthus trees were noted in this area as were some Multiflora Rose shrubs.



This area is also ideal for the installation of bluebird and or tree swallow boxes which can be installed away from the road or behind trees to prevent any aesthetic issues.



Site quality is very good to excellent in this area. Deer populations must be closely monitored, as they can alter the forest ecosystem and affect habitat for other wildlife species. High populations will impede future tree growth of native species and facilitate invasive species spread. The land trust should develop a deer management plan for this property which along with invasive species control will facilitate the regeneration of native tree, shrub and herb species.

### *Field 1 Management Recommendations*

1. Current management practices shall continue until a direction is chosen.
2. Contact NRCS to determine if this property is eligible for funding.
3. Develop a planting plan to restore native wildflowers for pollinators and butterflies.
4. Restore the stream bank with native woody species.
5. Install bird boxes in this area without creating an aesthetic problem.

### **Field 2**

Field 2 is located on eastern portion of the property on 5.11 acres. This stand is located on the north central portion of the Harding Land Trust Pine Brook Property. Field 2 is found on Penn channery silt loam, 3 to 8 percent slopes (PeoB) soils, Penn channery silt loam, 8 to 15 percent slopes (PeoC) soils and Ellington loamy substratum variant fine sandy loam, 3 to 8 percent slopes (EkhhB) soils. PeoB and PeoC soils have a site index of 67 for Red Oak and 75 for Tulip Poplar and EkhhB soils have a site index of 70 for Red Oak and 80 for Tulip Poplar. Field 2 is has a slight southeastern aspect.

It is really important to locate the boundaries and lay out the management responsibilities. There was a large number of young Ailanthus trees growing in this area. They should be removed early in this process.

This portion of the property is mowed twice per year. The hay is cut and left at this time. Several options should be reviewed further for this area. The field could be cut once per year. This would benefit any bird species that may be nesting in the field by allowing young to fledge. It would also prevent the invasion of the area by woody vegetation. Mowing once per year may also benefit pollinators by allowing the current vegetation to flower and seed.



The Land Trust may also attempt to find a farmer to cut and remove the hay once per year. This could lead to someone cutting the area for free depending on the proximity of farmers within the Township.

Another option if funding can be accessed through NRCS would be to create pollinator or butterfly habitat in this area utilizing native grasses and flowers. It could be piloted on a small sale to start and then expanded to the entire 5.5 acres with the exception of the area discussed below. Some options for restoration could be warm season grasses or native wildflowers for pollinators including milkweed and other native flowers.

The area should be inspected annually and remove any invasive species moving into the field. If caught early small invasive species population can be hand pulled and controlled easily. Allowing invasive species to perpetuate compounds the problems and the cost for removal.

Tree cover in the southern portion of this area may be too dense to plant sun loving wildflowers. Any dead trees should be removed from this area if they present a hazard and may fall on or near a structure. Standing dead trees can provide habitat for Indiana and Northern long-eared Bats which are both listed species in New Jersey. Any invasive species should be removed from this area. Numerous Ailanthus trees were noted in this area as were some Multiflora Rose shrubs.



This area is also ideal for the installation of bluebird and or tree swallow boxes which can be installed away from the road or behind trees to prevent any aesthetic issues.

Site quality is very good to excellent in this area. Deer populations must be closely monitored, as they can alter the forest ecosystem and affect habitat for other wildlife species. High populations will impede future tree growth of native species and facilitate invasive species spread. The land trust should develop a deer management plan for this property which along with invasive species control will facilitate the regeneration of native tree, shrub and herb species.

#### *Field 2 Management Recommendations*

1. Current management practices shall continue until a direction is chosen.
2. Contact NRCS to determine if this property is eligible for funding.

3. Develop a planting plan to restore native wildflowers for pollinators and butterflies.
4. Locate the corner markers for this parcel.
5. Remove any hazard trees that are found to be on the Land Trust Easement.
6. Install bird boxes in this area without creating an aesthetic problem.

## Tree Health Issues

Given the makeup of this property, there are potential forest health problems, including but not limited to the problems discussed below. These insect or disease outbreaks may be hastened by trees under stress due to competition, age and drought. This property should be inspected yearly to gauge forest health. Any decline in tree health should be immediately brought to the attention of the Forester.

### *Emerald Ash Borer*

The Emerald Ash Borer, *Agrilus planipennis*, is native to Asia and is found in China and Korea. In North America this species has only attacked all species of Ash trees including Green, White and Black Ash. First discovered in southeastern Michigan and Windsor Ontario, it has been found in the states and provinces denoted in green on the adjacent map.



This species has been detected in New Jersey as close as Somerset County. It has been found in all the contiguous states and it is only a matter of time before it reaches here. Adult beetles are slender, elongate and 7.5 to 13.5 mm in length. Males are smaller than females. Adults are usually bronze, golden or reddish green overall with emerald green wing covers.



Beetle activity peaks in mid-June into August. Adult beetle feed on Ash leaves and eggs are laid individually in bark crevices or under bark flaps. Larvae, chew through the bark and feed in the phloem layer for several weeks in serpentine galleries under the bark. Larvae overwinter in shallow chambers emerge from D shaped holes in the bark.



Symptoms are difficult to detect as the trees display very few external symptoms. The D shaped exit wholes are one sign while as insect densities build, foliage will begin to wilt, branches will die and the tree canopy becomes increasingly thin. In heavy infestations trees die within 3 to 4 years. Infected trees have been as large as 55 inches in diameter and as small as 1 inch in diameter.

## **Wildlife**

Although few species were noted during the inventory, with proper management, this property holds the potential to provide suitable habitat for many wildlife species particularly, butterflies and neo-tropical birds.

This mosaic of land use provides ideal habitat for the White-tailed Deer, while the proximity to residential development may limit hunting opportunities. White tailed Deer are the biggest concern when restoring native ecosystems. White-tailed Deer have become one of the greatest threats to forest restoration and growth and to species and vertical diversity. Extremely high deer populations are altering the vitality and composition of the future forest in many areas of New Jersey.

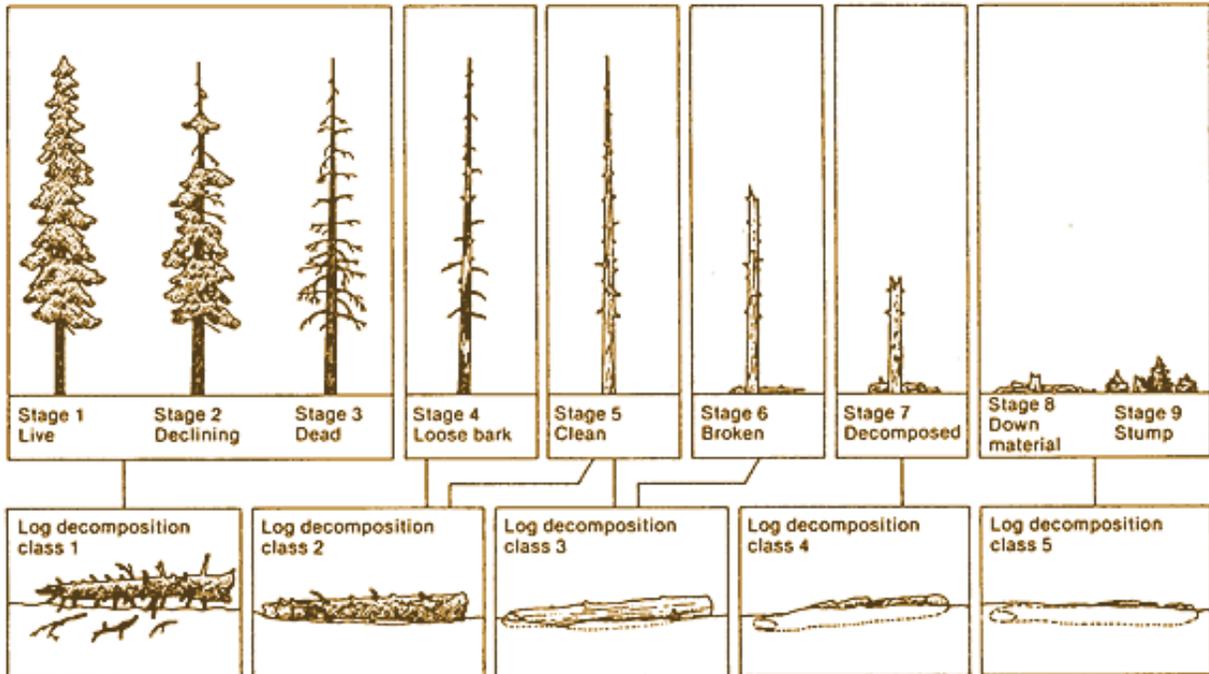
Deer need to be taken into account in every facet of land management to assure the attainment of management goals and restoration of native herb and shrub species. Browse levels should continue to be closely monitored as time goes on.

### *Snags*

Snags (a snag is a standing dead or dying tree) provide essential habitat for at least 35 species in the northeast that use cavities for nesting, shelter, roosting perching and foraging sites. Trees can be killed by a variety of factors including lightning, storms, fire, disease or insect outbreaks.

Large snags (>12" dbh) tend to be more valuable than small snags, as they can be used by a wider variety of species. Small clumps of snags scattered throughout the forest are best, as they provide

nesting and foraging sites in one location. Large groups of snags are not usually used by more than one pair of the same species, due to territorial behavior.



Oaks, Hickories and Ash tend to be harder woods than Maples, Poplars and Pines and would provide habitat for a longer period of time. A snag near a structure or high traffic trail is a hazardous tree that should be removed.

### *Vernal Pools*

A vernal pool is a wetland that holds water for 2-3 months a year in spring and early summer. A vernal pool is a contained basin depression lacking a permanent above-ground outlet for water. They fill with water with the rising water tables of fall and winter and with melt-water and runoff from winter and spring snow and rain. Vernal pools are critical breeding habitat for numerous species of frogs and salamanders. The drying of these pools is critically important to these species, because the pools cannot support fish that would feed upon frog and salamander eggs and young stages of these species. By late summer, vernal pools are generally (but not always) dry. Breeding of these species typically occurs immediately after snow melt.

No vernal pools were noted on this property during the inventory.

## Threatened and Endangered Species

As part of the Forest Stewardship Program, a search of the Natural Heritage Database was conducted. Five Endangered, Threatened or Species of Concern were found to potentially reside on or near the Dear property. This search includes both documented sightings and potential habitats as described by the Landscape Project.

Below find a discussion about each of these species:

### *Barred Owl*

The Barred Owl, *Strix varia*, is a State Threatened Species in New Jersey. Barred Owls nest in dense coniferous and mixed forests, wooded swamps and river valleys. Nests are 20-50 feet from



the ground, typically in cavities but abandoned hawk and squirrel nests may be used. Nest sites in northern New Jersey were over 1600 feet from the nearest residence and had little or no forest clearings or trails. Typical home ranges are from 213-914 acres. These owls feed on mice and other rodents.

The Barred Owl is 21 inches tall with brown upper parts with buffy white barring. The tail has alternating bands of brown and gray. The throat is white and the head has no ear tufts. The facial disk is grayish white with a brown outline. Feet and toes are feathered. Eyes are dark brown and the hooked bill is buff yellow. The song “who cooks for you, who cooks for you all” is most likely heard February to April. Barred Owls prefer flat lowland terrain and avoid rocky slopes and hillsides.

Management practices in this plan will have no effect on the Barred Owl. This species would not nest on this property but may forage on the property.

### *Bog Turtle*

The bog turtle, *Clemmys muhlenbergii*, was federally listed as a threatened species in 1997.

At only about 4 inches long, the bog turtle is one of North America's smallest turtles. This species typically shows a bright yellow, orange, or red blotch on each side of the head. The nearly parallel sides of the upper shell (carapace) give bog turtles an oblong appearance when viewed from above. These small, semi-aquatic turtles consume a varied diet including insects, snails, worms, seeds, and carrion.



Bog turtles usually occur in small, discrete populations, generally occupying open-canopy, herbaceous sedge meadows and fens bordered by wooded areas. These wetlands are a mosaic of micro-habitats that include dry pockets, saturated areas, and areas that are periodically flooded. Bog turtles depend upon this diversity of micro-habitats for foraging, nesting, basking, hibernating, and sheltering. Unfragmented riparian (river) systems that are sufficiently dynamic to allow the natural creation of open habitat are needed to compensate for ecological succession. Beaver, deer, and cattle may be instrumental in maintaining the open-canopy wetlands essential for this species' survival.

Bog turtles inhabit open, unpolluted emergent and scrub/shrub wetlands such as shallow spring fed fens, sphagnum bogs, swamps, marshy meadows, and wet pastures. These habitats are characterized by soft muddy bottoms, interspersed wet and dry pockets, vegetation dominated by low grasses and sedges, and a low volume of standing or slow-moving water which often forms a network of shallow pools and rivulets. Bog turtles prefer areas with ample sunlight, high evaporation rates, high humidity in the near-ground microclimate, and perennial saturation of portions of the ground. Eggs are often laid in elevated areas, such as the tops of tussocks. Bog turtles generally retreat into more densely vegetated areas to hibernate from mid-September through mid-April.

The greatest threats to the bog turtle are the loss, degradation, and fragmentation of its habitat from wetland alteration, development, pollution, invasive species, and natural vegetational succession. The species is also threatened by collection for illegal wildlife trade.

The Bog Turtle is an unlikely inhabitant of this property where the wetland habitat may provide suitable habitat along the stream. Further research should be completed prior to planting woody vegetation to create a stream buffer.

### *Great Blue Heron*

The Great Blue Heron, *Ardea herodias*, is the largest of North American herons and is a stable species in New Jersey, whose breeding colonies are protected. The Great Blue Heron stands four feet tall and has a wingspan of six feet; despite this the bird only weighs 6.5 pounds. The body is dark blue-gray, which contrasts with a white streaked black breast and abdomen. It has a long gray neck with a white crown, cheek and throat. Two long black occipital crests rise from the crown stripe in adults. The Great Blue Heron has very long legs, a long neck and a sharp bill.



The Great Blue Heron's diet consists mainly of fish, which it swallows head first, as well as frogs, snakes, salamanders, rodents and sometimes insects. The Heron will wade through water and freeze briefly before striking at its prey with its bill. The Heron breeds in localized colonies called rookeries and may fly 15-20 miles to feeding locations. Mating occurs in March or April, with the male heron building the nest usually high in living trees but occasionally in dead trees. Herons lay three to seven eggs and have a 28 day gestation period, and both parents care for the eggs and young. Usually one or two survive. Chicks fledge in about 60 days.

In the late 19<sup>th</sup> and 20<sup>th</sup> centuries, Great Blue Herons were shot in large numbers for their plumage for the millinery industry. Although they have adapted well to the presence of humans and shoreline development, their nesting colonies remain vulnerable.

No rookeries were noted on this property. This species is a likely visitor to this property due to the presence of the stream to forage. Activities will have no effect on this species, as there are no rookeries noted on this property and potential foraging areas will not be impacted.

### *Red-shouldered Hawk*

The Red-shouldered Hawk, *Buteo lineatus*, is listed as an Endangered Breeder but threatened population. The Red-shouldered Hawk is 19" in length and has a wingspan of 40". This bird has reddish shoulders with white barring. From below reddish wing linings can be noted. This bird is found in moist mixed woodlands often near streams and feeds on mice, snakes, frogs, crayfish and sometimes young birds. This bird nests 20-60 feet above the ground in deciduous trees near water. Nests are constructed near the trunk (typically in a crotch) of loose sticks, twigs and dead leaves. This species will occasionally use old nests of crows, other hawks or squirrels.



During the forest inventory and subsequent visits, no such nests were noted on the property. The Red-shouldered Hawk may still use this property as a nesting or foraging site given the appropriate habitat requirements found on the property and adjacent properties. An article in the Bergen Record (week of July 5, 2004) noted a Red-shouldered Hawk nesting in a residential neighborhood in Bergen County. Decline in this species has been due to the bioaccumulation of PCB's and habitat destruction.

Management activities will not impact this species.

### *Wood Turtle*

The wood turtle, *Clemmys insculpta*, is a state threatened species. The wood turtle is 5-9" in length, with a brown carapace with irregular pyramids rising from concentric ridges. The wood turtle breeds in vernal ponds or along clean streams and moves some distance from these breeding areas especially after spring and summer rains.



The Dear Property seems to provide suitable habitat for this species. The fragmentation of the forest may have impaired the long term viability of this species. During any time on the property special attention will be paid to looking out for the species. Any management activities involving motorized equipment will be completed

during the winter months while this species is dormant. Large woody debris should be left on the ground for shelter for this species. Snags will provide beneficial habitat for this species when woody debris is added to the forest floor. Downed woody debris is limited at this time.

Management activities could improve habitat by removing invasive shrubs and by restoring woody vegetation along the stream and improving water quality by reducing sedimentation from the adjacent fields.

### **Federally Threatened and Endangered Species for Harding Township**

#### *Bog Turtle*

See above

#### *Indiana Bat*

The Indiana Bat, *Myotis sodalis*, is a State and Federally Endangered Species. This bat's body ranges from 1-5/8 to 1-7/8 inches in length. This species has a strongly keeled calcar, a foot spur of cartilage that supports the membrane between the foot and tail. It has small hind feet. The chest and belly fur is lighter than the dull pinkish-brown fur on the back. The skull is marked by a small sagittal crest.

This species hibernates in limestone caves and open abandoned mine shafts from October through April. Ideal winter conditions are between 37<sup>o</sup> and 43<sup>o</sup> F and 87% relative humidity. During the summer females occupy maternity roosts of up to 100 females in riparian and floodplain forests under the loose bark of dead or dying trees or under loose bark of living trees. These roosts are often selected in areas that are heated by the sun. Male roost alone. These bats often forage over open water.

Eighty-five percent of the population hibernated at seven sites when listed in 1973. Human disturbance is a serious problem and number declined from 120,000 to 20,000 at these seven sites. Another problem more recently has been



the onset of white nose syndrome which is affecting large number of bats throughout the east.

This property is a possibly forage and maternity area for this species. There are few if any possible roosting trees for this species on this property. Trees with peeling bark should only be removed from November to April to prevent disrupting roost sites. No activities in this plan will reduce habitat for this species and any removal of trees should be done in winter. Creating snags would also improve habitat opportunities for this species where they would not present a hazard.

## **Invasive Species**

Invasive plant and animal species are one of the biggest threats to biodiversity. Invasive plants and animals out-compete and eventually replace native species. During the inventory, the list of non-native plant species distributed to Consulting Foresters was also surveyed. Numerous non-native and invasive species noted on this property during the forest inventory particularly in the shrub and subcanopy layers. Descriptions of species found here can be found below. These species should be remove early in the planning period where practical.

### ***Multiflora Rose***

Multiflora Rose, *Rosa multiflora*, is a perennial deciduous shrub up to 16 feet and as wide with long arching branches. It reproduces by seeds, sprouts and layering, when long branches touch the ground and root. Leaved are alternate, pinnately compound with 5-11 elliptical leaflets. Stems are flexible, green-red with rigid curved thorns with a wide base. Multiflora Rose was introduced in 1886 from Asia and promoted in the 1930's and 40's as a living fence, soils stabilizer and wildlife food and cover. It can be found in forest canopy gaps, roadsides, streambanks, pastures and mature forests. It may serve as nest sites for birds and rabbits. Repeated herbivory is lethal. There are at least 3 cultivars.

### **Threats**

Multiflora rose can produce dense, impenetrable monocultures that exclude indigenous plants and restrict the movement of some animals (Eckardt 1987). It is a strong competitor for below-ground resources, inhibiting the growth of indigenous plant species and also commercial crops in adjacent agricultural fields (Eckardt 1987). It is tolerant of some shade, and of a range of moisture conditions,

enabling it to invade a variety of natural plant communities. It significantly alters natural plant community structures and reduces overall biological diversity.

### **Control**

Repeated mowing or cutting can be used to control the spread of small populations, but will not eradicate them (Eckardt 1987) since multiflora rose can resprout from stumps. Small plants can be dug out, provided the entire root is removed (Virginia NHP 1998). Plant growth regulators have been used effectively to prevent plantings from spreading, and herbicides can be used to kill plants (Eckardt 1987). Herbicides should be used with caution, as they could harm indigenous plants. Several potential biological control agents are under investigation (Eckardt 1987).

### ***Norway Maple***

Norway maple is a deciduous tree that averages 90 feet tall. The leaves have five sharply pointed lobes, similar to sugar maple leaves. Norway maple can be distinguished from all native species of maples occurring in New Jersey by the milky sap present when the leaf petiole is broken off from a branch. The leaves are 4-7 inches long and are arranged opposite along the stem. The tree produces small greenish yellow flowers in April, and the seeds are held in wind-dispersed samaras that are 1½ - 2 inches long. Leaves turn yellow in late autumn.

Norway maple readily establishes on disturbed sites, such as road and railroad embankments, vacant lots, and fallow fields. It also invades and establishes in natural plant communities. It is particularly successful on alluvial soils in floodplain forests and along riverbanks. It also occurs in woodlands and forests where it invades through cleared edges or blow-downs within the interior. Tolerant of air pollution, drought and salt spray, it is commonly used as a street tree in cities and coastal communities.

### **Threats**

Norway maple is an aggressive colonizer able to survive under a range of habitat conditions. The dense shade produced by the canopy decreases understory plant diversity, but does not affect establishment of its own seedlings.

## **Control**

Norway maple can be controlled mechanically or with herbicides. In some situations, the use of herbicides could harm native plants. Seedlings and saplings can be hand-pulled or dug out. They will resprout if all the roots are not removed.

## ***Ailanthus***

Tree-of-heaven is a deciduous tree that can reach 90 feet tall. The bark is gray and relatively smooth. Leaves are alternate and compound with 11-30 lance-shaped leaflets. Most leaflets have 1-3 coarse teeth at the base of the leaflet. Leaves can be distinguished from sumac (*Rhus hirta*) by 1-4 small round glands on the leaflet's underside. When the leaves are crushed, they give off a distinctive ill scent of burnt peanut butter. Trees bloom in late spring, forming small green flowers at the ends of new shoots. Flowers develop into clusters of samaras, papery winged fruits with a flattened seed in the center. The seeds are wind dispersed. While seedlings are highly shade intolerant, saplings appear to be more tolerant of varying light conditions. Tree-of-heaven can also reproduce asexually by sprouting from stumps or roots.

Tree-of-heaven readily establishes on disturbed sites including vacant lots, roadsides, and railroad embankments. It can tolerate poor soils, drought and rocky conditions. Early New Jersey collections largely have been made from roadsides, thickets along creeks, and old house sites. It can establish in old growth forests when disturbances caused by storms or insect outbreaks create gaps in the canopy. Tree-of-heaven is indigenous to central China. It reached the East Coast in the late 1700s as an ornamental plant, and was widely planted in urban areas because of its tolerance to pollution and drought.

## **Threats**

Tree-of-heaven can disperse rapidly due to its prolific seed production. A single tree can produce 325,000 seeds in a year. It can outcompete indigenous plants for underground resources with its long taproot. Trees keep native vegetation from establishing by producing a toxin that accumulates in the soil. Because of its rapid growth, it quickly and significantly alters plant community structure and disrupts the process of natural plant succession.

## **Control**

Seedlings can be hand-pulled before the taproot becomes established. Once trees are established, they are very difficult to remove. Cutting trees repeatedly over several years will stress the trees and prevent seed production. Herbicides are especially effective when applied late in the growing season because the herbicide is then taken into the root system. Herbicides could harm non-targeted native vegetation, so careful application is necessary.

## ***Winged Euonymus***

Winged spindletree grows as a deciduous shrub or small tree to around 12 feet tall. It has inconspicuous yellow-green flowers in the spring. Corky ridges form along the green twigs, giving the branches a winged appearance. The leaves are opposite and are elliptical in shape with toothed margins. It is also called burning bush because its leaves turn bright red to purplish red in the fall, and the seeds are contained in red or purple fruits. The fruits are dispersed by birds. Winged spindletree is frequent in rich woodlands over trap rock, shale, and limestone. It also grows in alluvial soils in flood plain forests and along stream banks. Winged spindletree is indigenous to northeastern Asia, and was introduced to the United States in the mid 1800s as an ornamental plant. It now occurs primarily in the northeastern states, but there are occurrences south to Louisiana and west to Arkansas and Montana.

## **Threats**

Winged spindletree replaces native shrubs in some woodland habitats and alters the structure of natural plant communities. Open woodlands and flood plain forests are particularly vulnerable, but upland forests are also invaded.

## **Control**

Plants can be cut and the stumps painted with herbicide, or foliar spray can be applied in early summer for large populations.

## **Access**

Access to this property for management activities is good at this time. Access will be completed from the driveway on Blue Mill Road. In order to actively manage this property, access will have to be maintained.

## **Recreation**

Recreation is a priority for this property as it is open for passive recreation. This property will continue to provide good opportunities for wildlife viewing and a bridle trail for horse riding. The trail is being used and maintained by the Harding Township/Green Village Bridle Path Association under the supervision of Harding Land Trust. Given the diversity of forest and field ecosystem and these habitats found in a relatively short distances and the presence of water. Clearly marked boundaries will prevent people from wandering off the easement portion of this property.

## **Soil Protection**

Soil protection is a critical part of this plan and will be completed by implementing Best Management Practices. If hazard trees are removed via mechanized vehicles on fields, skidding should be completed during the winter when soils are frozen and less susceptible to disturbance.

## **Water Quality**

This property is located in the Upper Passaic River Watershed and the Great Brook sub-watershed. Through the implementation of Forest Management Best Management Practices and trail maintenance, water quality will not be affected by the practices implemented during this planning period.

Rain that is infiltrated into the soil rather than allowed to runoff replenishes groundwater, which feeds streams and aquifers. This water is important for its availability for both wildlife and human use. Heaviest runoff can be expected in the spring immediately after snow melt and prior to leaf out.

## **Cultural Resources**

Cultural resources include rock walls, old foundations or other historical or potentially historic artifacts. A rock wall was noted on the southern end of the property. Management recommendations in this plan will have no impact on cultural resources.

## **Freshwater Wetlands Protection Act (FWPA)**

All activities occurring within wetlands or their buffers will be governed under the FWPA will be conducted in conformance with this management plan.

No stumps shall be removed from the freshwater wetlands or open waters or wetland transition areas. These areas currently in forest cover will not be permitted to undergo land use change unless a FWPA permit is attained prior to the activity.

No new roads will be constructed in the areas under jurisdiction of the FWPA.

## **Recommended Management and Implementation Schedule:**

- 2016 Clearly delineate all the easement boundaries on this property.  
Continue current management practices of mowing twice per year.  
Determine whether NRCS funding can be utilized to complete management activities on this property.  
Develop a recreation strategy.
- 2017 Determine the management objectives from the options discussed above.  
Apply for NRCS funding to complete the practices.  
Remove any woody invasive trees from the property.  
Implement the new mowing regime, potentially one time per year.  
Install bluebird/tree swallow boxes on the property outside of view of the roadway.  
Remove any hazard trees from the easement area.

Conduct a single late season mowing to prevent the growth of woody vegetation.

2018 Remark the easement boundaries.

Remove any resprouting invasive plants

Replant the stream buffer utilizing NRCS funding.

Restore the fields with native wildflowers in field 2.

Conduct a late season mowing to prevent the growth of woody vegetation in field 1.

2019 Restore field 1 with native herb species for pollinators.

Monitor the riparian/streambank restoration and the plantings in field 1.

Remark the property easement boundaries.

Remove any sprouting non-native species.

Conduct a late season mowing of field 2 to prevent the growth of woody vegetation.

2020 Monitor all plantings and remove any invasive species noted.

Relocated and remark the easement boundaries.

Conduct a late season mowing of fields 1 and 2 to prevent woody vegetation development.

Inventory the property and prepare a new management plan.