



2011

Botanical Inventory of the Morris Property

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Conducted for the French and Pickering Creeks Conservation Trust

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Botanical Inventory of the Morris Property

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Conducted for the French and Pickering Creeks Conservation Trust

Botanical Inventory of the Morris Property

Conducted for the French and Pickering Creeks Conservation Trust



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August 2011

Table of Contents

Size and Location	5
Geology and Soils	6
Cultural Features	7
Ecological Significance and Critical Features	7
Vegetation	7
Agricultural Uses	9
Invasive Plants.....	9
Management Recommendations.....	10
References Cited.....	12
Appendix A. Plant List	15
Appendix B. Descriptions of Plant Communities.....	25
Appendix C. Photographs	29

List of Figures

Figure 1. Location of Morris Property	5
Figure 2. Bedrock Geology of Morris Property	6
Figure 3. Morris Property Features of Special Interest	8
Figure 4. 1937 Aerial Photography of the Morris Property	10

Site Name: Morris Property
Address: 2501 Pottstown Pike, Pottstown, Pennsylvania 19465
Townships: South Coventry and East Nantmeal

County: Chester

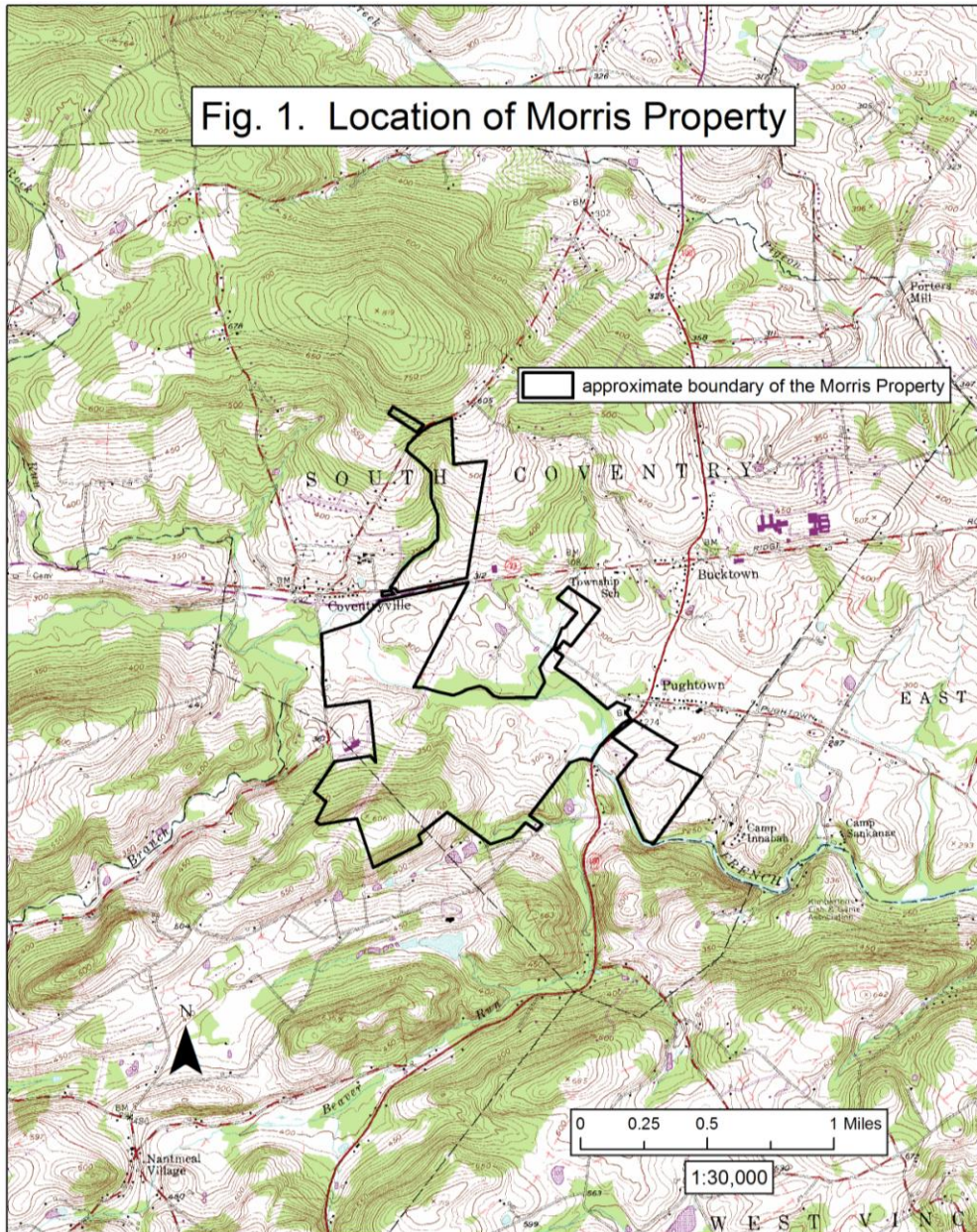
Quad map: Pottstown

Date of field survey: 8/11-12/2011

Surveyors: Timothy A. Block and Ann F. Rhoads accompanied by Nancy Long

Size and Location

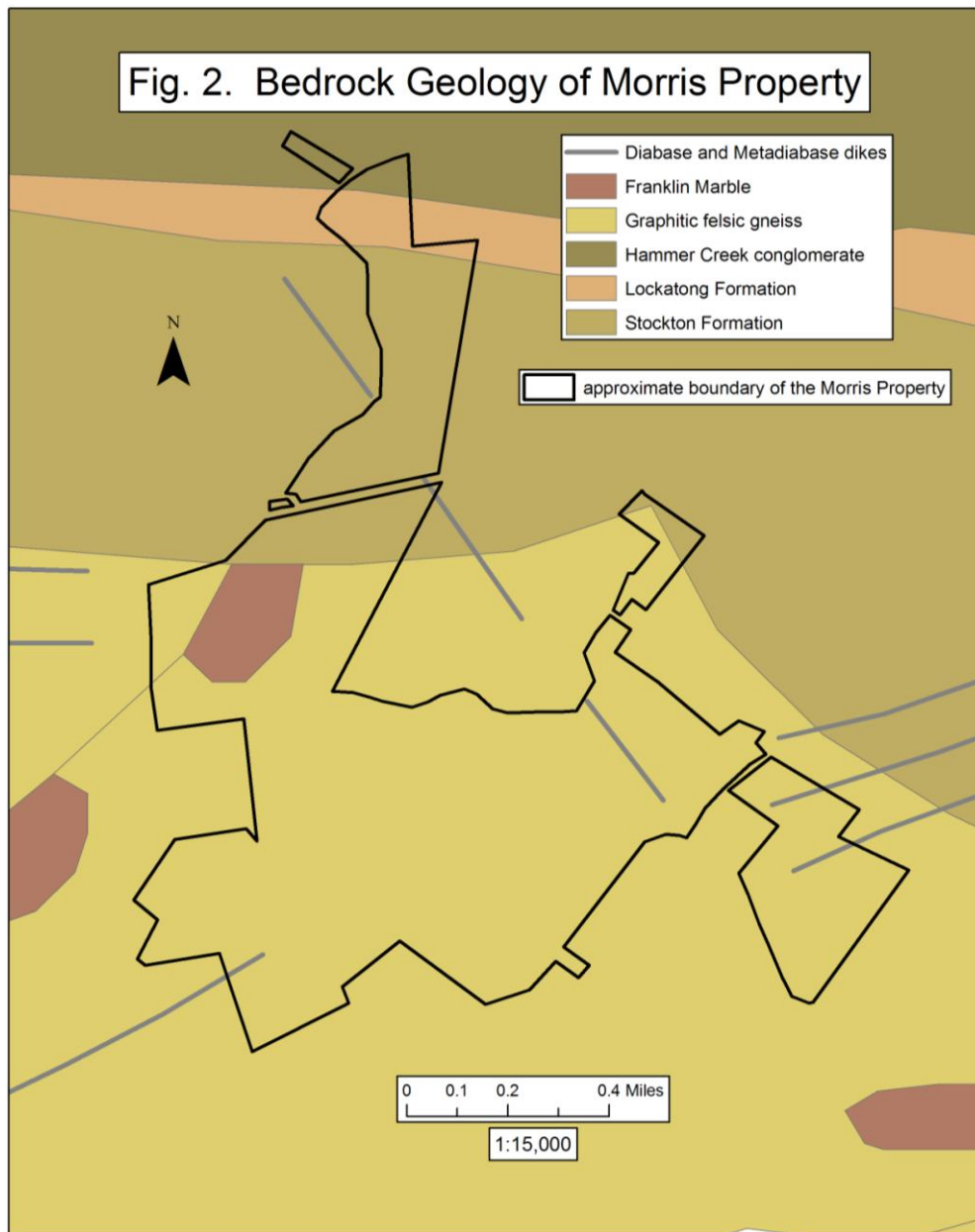
This property occupies nearly 600 acres and extends north and south of Route 23 immediately east of the village of Coventryville. The site includes a 2.25 km stretch of French Creek and portions of several tributaries. Forested slopes cover 225 acres and agricultural fields including row crops, hayfields, and pasture cover approximately 343 acres.



A powerline right-of-way which extends from Route 23 to the southern border, bisecting the property, covers 12.2 acres (Figure 1). The Horseshoe Trail, a public hiking trail maintained by the Horseshoe Trail Association, crosses the southern end of the property.

Geology and Soils

The underlying geology includes bands of the following formations, in order from north to south: Hammer Creek Formation conglomerate, Lockatong Formation shale and argillite, Stockton Formation sandstone and conglomerate, and Graphitic gneiss. A small area of Franklin Marble is mapped along French Creek on the western side of the property and several diabase dikes are also present (Figure 2) (PASDA; Geyer and Wilshusen 1982).



The soils comprise two series, the Penn-Croton-Bucks Association north of Route 23 and the Glenelg-Manor-Chester Association to the south (SCS 1959).

Cultural Features

The property includes two farmhouses and associated barns and outbuildings. The houses are occupied and the barns are in use in connection with farming activity on the site. A small cabin on the bank of French Creek is in poor condition.

The land on the east side of Route 100 includes what appears to be an oval horse track. Approximately 1 km in length, it was not visible on a 1951 aerial photograph, but is apparent on photographs from 1971 (Penn Pilot 2011). The construction of the track involved massive grading to create a level surface. The area enclosed by the track is a cultivated field; a farm machinery shed is located at the south end.

There is a small 19th century family cemetery imbedded in the woods in the strip of land on the northwest side of Coventryville Road. We saw three headstones; the date of death on the only one that was legible was 1885. The surname was Thomas.

Ecological Significance and Critical Features

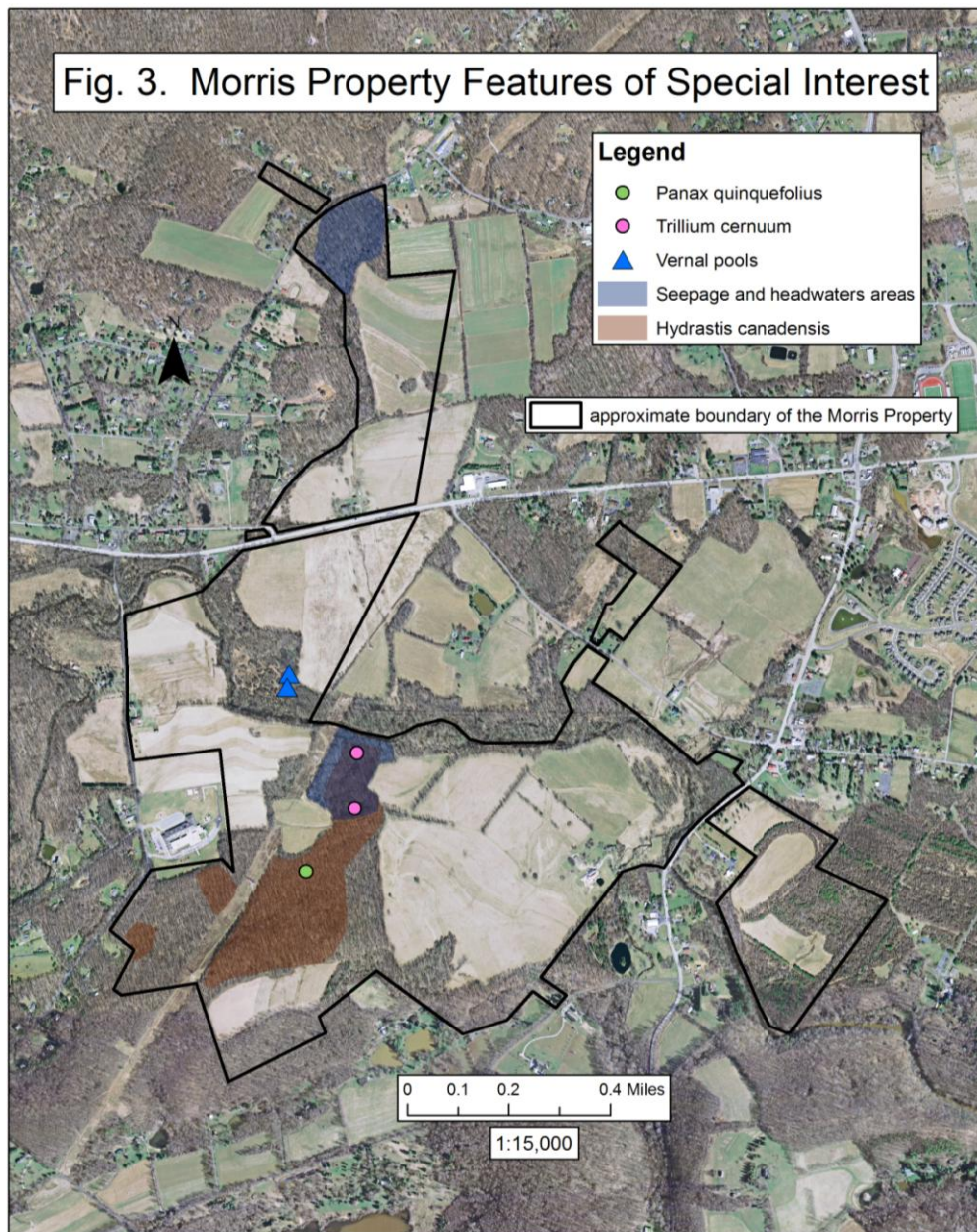
The upper stretch of French Creek is classified as an exceptional value (EV) stream (Pennsylvania Code 93 § 93.9f). In addition to the riparian corridor along the stream the property includes two extensive areas of springs and seeps that flow directly into French Creek, or into an unnamed tributary of the creek. The riparian corridor also includes at least two vernal pools, which are important amphibian breeding habitat.

Forested slopes in the southern portion of the property contain red oak – mixed hardwood forest with diverse understory, shrub, and herbaceous layers. The most abundant plant in the herbaceous layer is goldenseal (*Hydrastis canadensis*) which is classified as vulnerable (PV) by the Pennsylvania Natural Heritage Program (PNHP 2011). Small populations of ginseng (*Panax quinquefolius*), which is also classified as vulnerable, and nodding trillium (*Trillium cernuum*), proposed for listing as threatened (PNHP 2011), are also present. Locations of critical features are shown in Figure 3.

Vegetation

Areas of natural vegetation were surveyed on August 11, 12, and 23, 2011. Species lists were compiled and specimens collected of selected plants for preservation in the Morris Arboretum Herbarium. Plant identification references included *The Plants of Pennsylvania* (Rhoads and Block 2007) and *Flora of North America, Vol. 2* (Flora of North America Editorial Committee 1993).

We compiled a list of 297 species of which 64 (22 percent) are not native Pennsylvania plants (Appendix A). The plant list included in this report is necessarily incomplete as it was compiled during late summer visits to the site. We were not able to account for spring ephemeral species or sedges (especially *Carex* species) which were either not visible at all or not in identifiable condition at the time. Additional visits to the property at other seasons would undoubtedly add many more species.



In addition to individual plant species, we also noted the presence of plant communities as described by Fike (1999) including the following which are described in Appendix B.:

- **red oak – mixed hardwood forest**
- **sycamore – river birch – box-elder floodplain forest**
- **bottomland oak – hardwood palustrine forest**
- **skunk cabbage – golden saxifrage forest seep**
- **mixed forb marsh**

Aerial photography from 1937 and 1958 (Penn Pilot) reveals a landscape that was cleared for agriculture on all but the steepest slopes and wetlands such as the extensive seepage area on the south side of French Creek. The 1937 photographs also show evidence of a timber harvest on the north-facing at the south end of the property. Successional forests, which are not treated in Fike (1999), have developed on lands that were formerly cleared or timbered.

Agricultural Uses

More than half of the property (343.4 acres) is in active agriculture including pasture for beef cattle and dairy goats, hayfields, row crops, and a Community Supported Agriculture operation.

Our observation that land in the riparian corridor along French Creek appeared to have been used as pasture in the past was confirmed by family members. The visible remains of earlier barbed wire fences along the creek bank and aerial photography from 1937 and 1951 (Penn Pilot) confirm that pastures extended to the creek bank (Figure 4). In recent years pastures have been pulled back to allow riparian buffers to develop in the floodplains.

Invasive Plants

Although not all of the non-native plants present on the site are problems, a few are seriously invasive. Mile-a-minute (*Persicaria perfoliata*) is the most troublesome of these. It is abundant in the floodplain meadow along French Creek east of Route 100. It has also spread along the powerline right-of-way and forms a curtain along the forest edge. The fruits of this annual plant are bird- or water-disseminated, but fortunately, the plant is not shade tolerant which limits its ability to invade intact forest.

Multiflora rose (*Rosa multiflora*), Japanese honeysuckle (*Lonicera japonica*), autumn olive (*Elaeagnus umbellata*), wineberry (*Rubus phoenicolasius*), Japanese barberry (*Berberis thunbergii*), and Oriental bittersweet (*Celastrus orbiculatus*) form an impenetrable thicket along the creek in areas that were formerly used as pasture.

Small amounts of purple loosestrife (*Lythrum salicaria*) are present along a tributary of French Creek and in one of the wetland sites.

Forested upper slopes, successional forest, and forest edges have been invaded by Norway maple (*Acer platanoides*), winged euonymus (*Euonymus alatus*), Japanese barberry (*Berberis thunbergii*), wineberry (*Rubus phoenicolasius*), Oriental bittersweet (*Celastrus orbiculatus*), Japanese honeysuckle (*Lonicera japonica*), garlic mustard (*Alliaria petiolata*), and mile-a-minute (*Persicaria perfoliata*).

Periwinkle (*Vinca minor*) covers the forest floor in the strip of land northwest of Coventryville Road. It was likely planted in the small cemetery at the site. A naturalized population of sweetshrub (*Calycanthus floridus*) at the same location probably had a similar origin.



Figure 4. 1937 aerial photograph of the Morris property with current property boundary overlain. note the cleared areas along French Creek. Photograph from Penn Pilot.

Management Recommendations

Riparian buffers - Riparian buffers are essential for the maintenance of water quality and healthy aquatic habitat in streams. Requirements for the protection riparian buffers along exceptional value (EV) streams in Pennsylvania specify buffers extending 150 feet out from the top of the bank on both side of the stream (Pennsylvania Code 25 § 102.14). (Note: This is a requirement for a special permit to disturb existing buffers within the 300 foot-wide riparian corridor; it is not a requirement that landowners establish riparian buffers.)

Buffers that meet the 150 foot standard are present along the north side of French Creek, but on the south side, the forested buffer is lacking or minimal. Although there is no legal requirement to do so, we suggest a program to establish or expand forested buffers

along the French Creek corridor where they do not meet this standard. The first step, pulling pasture fences out of the riparian corridor, has already been taken.

Invasive plants - Most of the invasive species present on the site are well established and beyond the stage where active attempts at control would be practical. One exception that we would suggest is the girdling of Norway maple trees that have invaded forested areas. Norway maple is highly shade tolerant and fully capable of invading intact forest, studies of heavily invaded forests in New Jersey reveal reduced diversity of native herbaceous species results (Webb and Kaunzinger 1993).

Controlling tree-of-heaven would also be highly desirable, however girdling alone does not kill tree-of-heaven as it sprouts from the roots.

There are some hopeful signs in the form of biological control agents that are spreading naturally:

- Rose rosette disease, caused by a virus-like pathogen that is spread by eriophyid mites, is attacking multiflora rose and killing it (Lehman 1999). We saw evidence of this pathogen at work on the property in the form of reddish, tufted growth on multiflora rose branches.
- A weevil (*Rhinocominus latipes*) has been identified that attacks mile-a-minute; it has been introduced at selected sites and is spreading (University of Delaware 2011).

Forest management practices that open up the canopy or increase light permeability of the forest edge should be avoided. Most invasive plants need high light levels to grow well, maintaining canopy cover and dense edge growth limits light reaching the forest floor and minimizes growth of invasive species. Due to multiple seed sources and bird dispersal of many species there is a constant “seed rain”. These seeds will respond quickly when a canopy opening develops.

Deer – Deer overabundance threatens the health of native vegetation throughout Pennsylvania and adjacent states. Excessive numbers of deer cause loss of forest structure and plant diversity as deer consume herbaceous species, shrubs, and seedling trees. Loss of native shrub and herbaceous layers opens up the forest to invasion by non-native invasive plants which are generally not preferred by deer.

We observed a range of conditions on the Morris property from low to moderate deer impact to sites that are severely over browsed. North-facing slopes at the south end of the property are covered by forest with well-developed canopy, understory, shrub, and herbaceous layers indicating low deer impact. However, close inspection of this area reveals that deer are feeding selectively on highly preferred plants. Several shrubs and understory trees that are being browsed heavily and are present only as suppressed plants, typically less than a foot tall, include winterberry (*Ilex verticillata*), alternate-leaved

dogwood (*Cornus alternifolia*), pinxter-flower (*Rhododendron periclymenoides*), and bladdernut (*Staphylea trifolia*). The very sparse occurrence of nodding trillium and ginseng suggest deer have also impacted population size of these highly preferred herbaceous plants. A survey in the spring would likely reveal additional impacts.

We observed other areas with severe deer impact, especially in the forested valley of a tributary stream along Prizer Road. At this location shrub and understory layers were non-existent and the herbaceous layer of the forest was severely depleted.

We recommend that the level of hunting currently taking place be increased, to maintain or restore forest structure, protect species diversity, and allow severely impacted species to recover.

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Appendix A. Plant List

		N/I	PNHP status	red oak mxd hdw forest	flood-plain forest	bottoml and oak forest	seeps	mixed forb marsh	succes-sional forest	open and edges
<i>Acer negundo</i>	box-elder	N	N		x					
<i>Acer palmatum</i>	Japanese maple	N	N	x						
<i>Acer platanoides</i>	Norway maple	I	N	x	x				x	x
<i>Acer rubrum</i>	red maple	N	N	x	x	x		x		
<i>Acer saccharinum</i>	silver maple	N	N		x					
<i>Acer saccharum</i>	sugar maple	N	N	x						
<i>Achillea millefolium</i>	yarrow	I	N							x
<i>Acorus calamus</i>	sweet flag	I	N					x		
<i>Actaea racemosa</i>	black cohosh	N	N	x			x			
<i>Adiantum pedatum</i>	maidenhair fern	N	N	x						
<i>Ageratina altissima</i>	white snakeroot	N	N		x	x				
<i>Agrimonia striata</i>	roadside agrimony	N	N	x						
<i>Agrostis gigantea</i>	redtop	I	N							x
<i>Agrostis perennans</i>	autumn bent	N	N	x	x				x	
<i>Ailanthus altissima</i>	tree-of-heaven	I	N							x
<i>Albizia julibrissin</i>	mimosa	I	N							x
<i>Alisma subcordatum</i>	water-plantain	N	N			x				
<i>Alliaria petiolata</i>	garlic mustard	I	N	x						
<i>Ambrosia artemisiifolia</i>	ragweed	I	N							x
<i>Ambrosia trifida</i>	giant ragweed	N	N							x
<i>Amphicarpa bracteata</i>	hog-peanut	N	N	x				x		
<i>Anemone americana</i>	hepatica	N	N	x						
<i>Apocynum cannabinum</i>	dogbane	N	N							x
<i>Aralia nudicaulis</i>	wild sarsaparilla	N	N	x						
<i>Arctium minus</i>	burdock	I	N							x
<i>Arisaema triphyllum</i>	jack-in-the-pulpit	N	N			x	x		x	
<i>Artemisia vulgaris</i>	mugwort	I	N							x
<i>Asarum canadense</i>	wild ginger	N	N	x			x			
<i>Asclepias syriaca</i>	common milkweed	N	N							x

		N/I	PNHP status	red oak mxd hdw forest	flood-plain forest	bottoml and oak forest	seeps	mixed forb marsh	successional forest	open and edges
<i>Athyrium filix-femina</i>	lady fern	N	N				x			
<i>Berberis thunbergii</i>	Japanese barberry	I	N	x	x		x		x	
<i>Betula lenta</i>	black birch	N	N	x			x		x	
<i>Betula nigra</i>	river birch	N	N		x					
<i>Boehmeria cylindrica</i>	false nettle	N	N		x	x		x		x
<i>Botrychium dissectum</i>	cut-leaved grape fern	N	N	x			x			
<i>Botrychium virginianum</i>	rattlesnake fern	N	N				x			
<i>Brachyelytrum erectum</i>	short husk grass	N	N	x						
<i>Calycanthus florida</i>	sweetshrub	I	N						x	
<i>Carex crinita</i>	a sedge	N	N			x				
<i>Carex grayii</i>	a sedge	N	N		x					
<i>Carex intumescens</i>	a sedge	N	N			x				
<i>Carex laxiculmis var. laxiculmis</i>	a sedge	N	N		x		x			
<i>Carex lupulina</i>	a sedge	N	N			x				
<i>Carex lurida</i>	a sedge	N	N					x		
<i>Carex pensylvanica</i>	Pennsylvania sedge	N	N	x			x			
<i>Carex prasina</i>	a sedge	N	N				x			
<i>Carex scabrata</i>	a sedge	N	N				x			
<i>Carex squarrosa</i>	a sedge	N	N			x				
<i>Carex stipata</i>	a sedge	N	N			x		x		
<i>Carex stricta</i>	tussock sedge	N	N			x		x		
<i>Carex tribuloides</i>	a sedge	N	N							x
<i>Carex trichocarpa</i>	a sedge	N	N					x		
<i>Carpinus caroliniana</i>	hornbeam	N	N	x	x		x			
<i>Carya cordiformis</i>	bitternut hickory	N	N	x			x			
<i>Carya glabra</i>	pignut hickory	N	N	x						
<i>Carya ovata</i>	shagbark hickory	N	N	x	x					
<i>Carya tomentosa</i>	mockernut hickory	N	N	x						
<i>Catalpa sp.</i>	catalpa	I	N		x					
<i>Celastrus orbiculatus</i>	Oriental bittersweet	N	N	x	x				x	
<i>Celtis occidentalis</i>	hackberry	N	N		x				x	

		N/I	PNHP status	red oak mxd hdw forest	flood-plain forest	bottoml and oak forest	seeps	mixed forb marsh	successional forest	open and edges
<i>Cephalanthus occidentalis</i>	buttonbush	N	N					x		
<i>Chamaecrista fasciculata</i>	partridge-pea	N	N							x
<i>Chimaphila maculata</i>	pipsissewa	N	N	x						
<i>Chrysosplenium americanum</i>	golden saxifrage	N	N				x	x		
<i>Cichorium intybus</i>	blue chicory	I	N							x
<i>Cinna arundinacea</i>	wood reedgrass	N	N	x	x	x	x	x		
<i>Circaea canadensis</i>	enchanter's-nightshade	N	N	x			x			
<i>Cirsium canadense</i>	Canada thistle	I	N							x
<i>Clematis virginiana</i>	virgin's-bower	N	N		x					x
<i>Cleome hasslerana</i>	spider-flower	I	N		x					
<i>Collinsonia canadensis</i>	horse-balm	N	N	x			x			
<i>Commelina communis</i>	Asiatic dayflower	N	N							x
<i>Conopholis americana</i>	squawroot	N	N	x						
<i>Conyza canadensis</i>	horseweed	N	N							x
<i>Cornus alternifolia</i>	alternate-leaved dogwood	N	N	x						
<i>Cornus amomum</i>	silky dogwood	N	N		x			x		
<i>Cornus florida</i>	flowering dogwood	N	N	x	x				x	
<i>Cornus racemosa</i>	gray dogwood	N	N							x
<i>Crataegus crusgalli</i>	cockspur hawthorn	N	N						x	
<i>Crataegus macrosperma</i>	large-seed hawthorn	N	N	x			x			
<i>Crataegus phaenopyrum</i>	Washington hawthorn	I	N							
<i>Cryptotaenia canadensis</i>	honestwort	N	N	x			x			
<i>Cuscuta gronovii</i>	dodder	N	N					x		
<i>Cyperus strigosus</i>	false nutsedge	N	N							x
<i>Dactylis glomerata</i>	orchard grass	N	N							x
<i>Daucus carota</i>	Queen Anne's-lace	I	N							x
<i>Dennstaedtia punctilobula</i>	hay-scented fern	N	N	x						
<i>Deparia acrostichoides</i>	silvery glade fern	N	N				x			
<i>Desmodium nudiflorum</i>	naked-flowered tick-trefoil	N	N	x			x			
<i>Desmodium paniculatum</i>	tick-trefoil	N	N							x
<i>Dianthus armeria</i>	Deptford pink	I	N							x

		N/I	PNHP status	red oak mxd hdw forest	flood-plain forest	bottoml and oak forest	seeps	mixed forb marsh	successional forest	open and edges
<i>Dichantheium clandestinum</i>	deer-tongue grass	N	N							x
<i>Digitaria ischaemum</i>	smooth crabgrass	I	N							x
<i>Dioscorea villosa</i>	wild yam	N	N	x			x			
<i>Diospyros virginiana</i>	persimmon	N	N							x
<i>Dryopteris carthusiana</i>	spinulose wood fern	N	N				x			
<i>Dryopteris cristata</i>	crested wood fern	N	N					x		
<i>Dryopteris goldiana</i>	Goldie's wood fern	N	N				x			
<i>Dryopteris intermedia</i>	evergreen wood fern	N	N				x			
<i>Dryopteris marginalis</i>	marginal wood fern	N	N	x						
<i>Duchesnea indica</i>	Indian strawberry	I	N		x		x			
<i>Echinochloa crusgalli</i>	barnyard-grass	I	N							x
<i>Elaeagnus umbellata</i>	autumn-olive	I	N		x				x	x
<i>Eleusine indica</i>	goosegrass	I	N							x
<i>Elymus hystrix</i>	bottlebrush grass	N	N		x					
<i>Elymus riparius</i>	riverbank rye	N	N		x					
<i>Epifagus virginiana</i>	beechdrops	N	N				x			
<i>Epilobium coloratum</i>	purple-leaved willow-herb	N	N					x		
<i>Eragrostis spectabilis</i>	purple lovegrass	N	N							x
<i>Erechtites hieraciifolia</i>	fireweed	N	N							x
<i>Euonymus alatus</i>	winged euonymus	I	N		x				x	
<i>Euonymus fortunei</i>	wintercreeper	I	N		x					
<i>Eupatorium perfoliatum</i>	boneset	N	N							x
<i>Eurybia divaricata</i>	white wood aster	N	N	x						
<i>Eurybia macrophylla</i>	bigleaf aster	N	N				x			
<i>Eurybia schreberi</i>	Schreber's aster	N	N	x						
<i>Euthamia graminifolia</i>	grass-leaved goldenrod	N	N					x		x
<i>Eutrochium fistulosum</i>	joe-pye-weed	N	N							x
<i>Eutrochium purpureum</i>	sweet joe-pye-weed	N	N	x						
<i>Fagus grandifolia</i>	American beech	N	N	x			x			
<i>Festuca obtusa</i>	nodding fescue	N	N	x						
<i>Fraxinus americana</i>	white ash	N	N	x	x	x		x	x	

		N/I	PNHP status	red oak mxd hdw forest	flood-plain forest	bottoml and oak forest	seeps	mixed forb marsh	successional forest	open and edges
<i>Galium circaezans</i>	wild-licorice	N	N	x			x			
<i>Galium lanceolatum</i>	wild-licorice	N	N	x						
<i>Gallium mollugo</i>	white bedstraw	I	N							x
<i>Geranium maculatum</i>	wood geranium	N	N				x			
<i>Geranium thunbergii</i>	Thunberg's geranium	I	N							x
<i>Geum canadense</i>	white avens	N	N		x				x	
<i>Glechoma hederacea</i>	ground-ivy	I	N		x					x
<i>Gleditsia triacanthos</i>	honey-locust	N	N		x					
<i>Glyceria septentrionalis</i>	floating mannagrass	N	N			x				
<i>Glyceria striata</i>	fowl mannagrass	N	N				x			
<i>Hackelia virginiana</i>	beggar's-lice	N	N		x				x	
<i>Hamamelis virginiana</i>	witch-hazel	N	N	x			x			
<i>Hedera helix</i>	English ivy	I	N		x					
<i>Heliopsis helianthoides</i>	ox-eye	N	N							x
<i>Hesperis matronalis</i>	dame's rocket	I	N		x					
<i>Hydrastis canadensis</i>	goldenseal	N	PV	x			x		x	
<i>Ilex opaca</i>	American holly	I	N**						x	
<i>Ilex verticillata</i>	winterberry holly	N	N				x			
<i>Impatiens capensis</i>	jewelweed	N	N			x	x	x		
<i>Impatiens pallida</i>	pale jewelweed	N	N		x					
<i>Iris pseudacorus</i>	yellow iris	I	N		x					
<i>Juglans nigra</i>	black walnut	N	N					x	x	
<i>Juncus effusus</i>	soft rush	N	N					x		x
<i>Juncus tenuis</i>	path rush	N	N							x
<i>Laportea canadensis</i>	wood nettle	N	N		x		x			
<i>Larix kaempferi</i>	Japanese larch	I	N							x
<i>Leersia oryzoides</i>	rice cutgrass	N	N					x		
<i>Leersia virginica</i>	whitegrass	N	N		x					
<i>Ligustrum obtusifolium</i>	obtuse-leaved privet	I	N	x						
<i>Linaria vulgaris</i>	butter-and-eggs	I	N							x
<i>Lindera benzoin</i>	spicebush	N	N	x	x		x		x	

		N/I	PNHP status	red oak mxd hdw forest	flood-plain forest	bottoml and oak forest	seeps	mixed forb marsh	successional forest	open and edges
<i>Lindernia dubia</i>	false pimpernel	N	N		x					
<i>Liriodendron tulipifera</i>	tuliptree	N	N	x	x		x		x	
<i>Lobelia inflata</i>	Indian-tobacco	N	N		x					
<i>Lobelia siphilitica</i>	great blue lobelia	N	N							x
<i>Lonicera japonica</i>	Japanese honeysuckle	I	N	x	x				x	
<i>Lonicera maackii</i>	Amur honeysuckle	I	N							x
<i>Lonicera morrowii</i>	Morrow's honeysuckle	I	N							x
<i>Ludwigia alternifolia</i>	seedbox	N	N					x		
<i>Ludwigia palustris</i>	marsh purslane	N	N			x				
<i>Lycopodium dendroideum</i>	round-branched ground-pine	N	N				x			
<i>Lycopus americanus</i>	water-horehound	N	N					x		
<i>Lycopus virginicus</i>	bugleweed	N	N		x					
<i>Lysimachia ciliata</i>	fringed loosestrife	N	N				x			
<i>Lysimachia nummularia</i>	moneywort	I	N			x				
<i>Lythrum salicaria</i>	purple loosestrife	I	N		x					
<i>Maclura pomifera</i>	osage-orange	I	N						x	
<i>Maianthemum canadense</i>	Canada mayflower	N	N	x						
<i>Maianthemum racemosum</i>	false Solomon's-seal	N	N	x			x			
<i>Menispermum canadense</i>	moonseed	N	N				x			
<i>Microstegium vimineum</i>	Japanese stiltgrass	I	N	x	x				x	x
<i>Mimulus ringens</i>	monkey-flower	N	N					x		
<i>Mitchella repens</i>	partridgeberry	N	N	x			x			
<i>Mitella diphylla</i>	bishop's-cap	N	N	x						
<i>Mollugo verticillata</i>	carpetweed	I	N							x
<i>Monotropa uniflora</i>	Indian -pipe	N	N	x			x			
<i>Morus alba</i>	white mulberry	I	N		x					x
<i>Muhlenbergia frondosa x schreberi</i>	muhly	N	N							x
<i>Myosoton aquaticum</i>	giant chickweed	N	N		x					
<i>Nuphar advena</i>	spatterdock	N	N		x					
<i>Nyssa sylvatica</i>	blackgum	N	N	x			x			
<i>Onoclea sensibilis</i>	sensitive fern	N	N				x			

		N/I	PNHP status	red oak mxd hdw forest	flood-plain forest	bottoml and oak forest	seeps	mixed forb marsh	successional forest	open and edges
<i>Osmorhiza claytonii</i>	sweet-cicely	N	N	x			x			
<i>Oxalis stricta</i>	common yellow wood-sorrel	N	N	x					x	x
<i>Panax quinquefolius</i>	ginseng	N	PV	x						
<i>Panicum anceps</i>	panic grass	N	N							x
<i>Panicum dichotomiflorum</i>	smooth panic grass	N	N	x						
<i>Parthenocissus quinquefolia</i>	Virginia creeper	N	N	x	x		x			
<i>Paulownia tomentosa</i>	empress-tree	N	N							x
<i>Pedicularis canadensis</i>	Canada lousewort	N	N				x			
<i>Penstemon digitalis</i>	beard-tongue	N	N							x
<i>Penthorum sedoides</i>	ditch stonecrop	N	N					x		
<i>Perilla frutescens</i>	perilla	I	N							x
<i>Persicaria arifolia</i>	halberd-leaved tearthumb	N	N			x				
<i>Persicaria longiseta</i>	low smartweed	I	N	x	x					
<i>Persicaria pensylvanica</i>	pinkweed	N	N							x
<i>Persicaria perfoliata</i>	mile-a-minute	I	N					x		x
<i>Persicaria punctata</i>	dotted smartweed	N	N					x		x
<i>Persicaria sagittata</i>	tearthumb	N	N					x		
<i>Persicaria virginiana</i>	jumpseed	N	N	x	x				x	
<i>Phalaris arundinacea</i>	reed canary grass	I	N			x		x		
<i>Phegopteris hexagonoptera</i>	broad beech fern	N	N	x			x			
<i>Phryma leptostachya</i>	lopseed	N	N	x			x			
<i>Phytolacca americana</i>	pokeweed	N	N							x
<i>Pilea pumila</i>	clearweed	N	N		x		x			
<i>Pinus strobus</i>	white pine	N	N						x	
<i>Platanus occidentalis</i>	sycamore	N	N		x	x			x	
<i>Podophyllum peltatum</i>	mayapple	N	N				x			
<i>Polygonatum pubescens</i>	Solomon's-seal	N	N	x			x			
<i>Polypodium virginianum</i>	Christmas fern	N	N	x						
<i>Polystichum acrostichoides</i>	Christmas fern	N	N	x	x					
<i>Prenanthes sp.</i>	rattlesnake-root	N	N	x			x			
<i>Prunus avium</i>	European bird cherry	I	N	x						

		N/I	PNHP status	red oak mxd hdw forest	flood-plain forest	bottoml and oak forest	seeps	mixed forb marsh	successional forest	open and edges
<i>Prunus serotina</i>	wild black cherry	N	N	x						
<i>Pycnanthemum virginianum</i>	mountain-mint	N	N					x		x
<i>Pyrola elliptica</i>	shinleaf	N	N	x			x			
<i>Pyrus calleryana</i>	callery pear	I	N							x
<i>Quercus alba</i>	white oak	N	N	x						
<i>Quercus bicolor</i>	swamp white oak	N	N			x				
<i>Quercus coccinea</i>	scarlet oak	N	N	x						
<i>Quercus montana</i>	chestnut oak	N	N	x						
<i>Quercus palustris</i>	pin oak	N	N		x	x				
<i>Quercus rubra</i>	red oak	N	N	x	x					
<i>Quercus velutina</i>	black oak	N	N	x						
<i>Ranunculus ficaria</i>	lesser celandine	I	N		x					
<i>Ranunculus hispidus</i> var. <i>caricetorum</i>	northern swamp buttercup	N	N				x			
<i>Rhododendron periclymenoides</i>	pinxter-flower	N	N	x			x			
<i>Robinia pseudoacacia</i>	black locust	N	N	x						x
<i>Rorippa palustris</i>	yellow watercress	N	N		x					
<i>Rosa carolina</i>	pasture rose	N	N	x						
<i>Rosa multiflora</i>	multiflora rose	I	N	x	x			x	x	
<i>Rosa palustris</i>	swamp rose	N	N					x		
<i>Rubus allegheniensis</i>	blackberry	N	N	x						x
<i>Rubus occidentalis</i>	black raspberry	N	N	x						x
<i>Rubus phoenicolasius</i>	wineberry	I	N	x	x				x	x
<i>Rubus pubescens</i>	dwarf raspberry	N	N	x						
<i>Rudbeckia laciniata</i>	cutleaf coneflower	N	N					x		
<i>Sagittaria latifolia</i>	arrowhead	N	N					x		
<i>Salix fragilis</i>	crack willow	I	N		x			x		
<i>Salix nigra</i>	black willow	N	N					x		
<i>Sambucus canadensis</i>	black elderberry	N	N					x		x
<i>Sanguinaria canadensis</i>	bloodroot	N	N	x						
<i>Sanicula odorata</i>	yellow-flowered sanicle	N	N	x			x			
<i>Sassafras albidum</i>	sassafras	N	N	x						x

		N/I	PNHP status	red oak mxd hdw forest	flood-plain forest	bottoml and oak forest	seeps	mixed forb marsh	successional forest	open and edges
<i>Scirpus cyperinus</i>	wool-grass	N	N							x
<i>Scirpus georgianus</i>	bulrush	N	N			x				
<i>Scrophularia marilandica</i>	eastern figwort	N	N							x
<i>Scutellaria lateriflora</i>	mad-dog skullcap	N	N			x				
<i>Setaria faberi</i>	giant foxtail	I	N							x
<i>Setaria viridis</i> var. <i>viridis</i>	green foxtail	I	N							x
<i>Sicyos angulatus</i>	bur cucumber	N	N		x					
<i>Sida spinosa</i>	prickly sida	I	N							x
<i>Silene latifolia</i>	white campion	I	N							x
<i>Smilax herbacea</i>	carrion-flower	N	N	x						
<i>Smilax rotundifolia</i>	greenbrier	N	N	x						
<i>Solanum carolinense</i>	horse-nettle	N	N							x
<i>Solidago altissima</i>	late goldenrod	N	N					x		
<i>Solidago caesia</i>	wreath goldenrod	N	N	x			x			
<i>Solidago canadensis</i>	Canada goldenrod	N	N					x		x
<i>Solidago flexicaulis</i>	zigzag goldenrod	N	N				x			
<i>Solidago gigantea</i>	smooth goldenrod	N	N							x
<i>Staphylea trifolia</i>	bladdernut	N	N				x			
<i>Stellaria media</i>	common chickweed	I	N				x			
<i>Symphyotrichum prenanthoides</i>	zigzag aster	N	N				x			
<i>Symphyotrichum puniceum</i>	purple-stemmed aster	N	N					x		
<i>Symplocarpus foetidus</i>	skunk-cabbage	N	N				x	x		
<i>Thelypteris noveboracensis</i>	New York fern	N	N				x			
<i>Thelypteris palustris</i>	marsh fern	N	N					x		
<i>Tilia americana</i>	basswood	N	N		x					
<i>Toxicodendron radicans</i>	poison-ivy	N	N	x	x				x	
<i>Tridens flavus</i>	purpletop	N	N							x
<i>Trifolium pratense</i>	red clover	I	N							x
<i>Trillium cernuum</i>	nodding trillium	N	N/PT				x			
<i>Typha latifolia</i>	common cat-tail	N	N					x		
<i>Ulmus americana</i>	American elm	N	N	x						

		N/I	PNHP status	red oak mxd hdw forest	flood-plain forest	bottoml and oak forest	seeps	mixed forb marsh	successional forest	open and edges
<i>Ulmus rubra</i>	slippery elm	N	N	x						
<i>Uvularia perfoliata</i>	perfoliate-leaved bellwort	N	N	x			x			
<i>Uvularia sessilifolia</i>	sessile-leaved bellwort	N	N				x			
<i>Vaccinium pallidum</i>	lowbush blueberry	N	N	x						
<i>Verbascum thapsus</i>	common mullein	I	N							x
<i>Verbena hastata</i>	blue vervain	N	N					x		
<i>Verbena urticifolia</i>	white vervain	N	N							x
<i>Vernonia noveboracensis</i>	New York ironweed	N	N					x		
<i>Viburnum acerifolium</i>	maple-leaved viburnum	N	N	x			x			
<i>Viburnum dentatum</i>	southern arrow-wood	N	N	x						
<i>Viburnum prunifolium</i>	blackhaw	N	N	x	x				x	
<i>Vinca minor</i>	periwinkle	I	N	x						
<i>Viola labradorica</i>	dog violet	N	N				x			
<i>Viola pubescens</i>	common yellow violet	N	N	x			x			
<i>Viola sororia</i>	common blue violet	N	N	x						
<i>Vitis labrusca</i>	fox grape	N	N		x					x
<i>Vitis riparia</i>	frost grape	N	N						x	
<i>Vitis vulpina</i>	frost grape	N	N		x					
<i>Xanthium strumarium</i>	cocklebur	I	N							x

Appendix B. Plant Community Descriptions

Red Oak – Mixed Hardwood Forest

This mature forest type occurs primarily on the north-facing slopes at the south end of the property where the underlying geology is graphitic gneiss. Dominant trees included tuliptree, red oak, white oak, black oak, black birch and several species of hickory; understory species included flowering dogwood, witch-hazel, and blackhaw. A dense shrub layer of maple-leaved viburnum was present. The herbaceous layer, also dense, at the time of our survey, was dominated by goldenseal, horse-balm, white wood aster, hog-peanut, and Virginia creeper.

The structural integrity of the forest was remarkable, indicating low to moderate browsing impact by deer. While some invasive species were present, they were scattered and mostly associated with forest edges except on the uppermost slope and ridge top where Norway maple, wineberry and garlic mustard were abundant.

A smaller and heavily browsed example of red oak – mixed hardwood forest was present bordering the tributary stream along Prizer Road, also on gneiss. At this site a well developed canopy was present, but understory, shrub, and herbaceous layers were very sparse.

An additional, somewhat more disturbed, area of red oak – mixed hardwood forest was present on slopes in the headwaters of the unnamed tributary of French Creek at the northern end of the property. The underlying geology at this location is Hammer Creek and Lockatong Formations. In addition to the species listed above, hickory (*Carya* spp.) was a more prominent component than in the forests on gneiss.

Sycamore – River Birch – Box-elder Floodplain Forest

The stream floodplain forest along French Creek includes several tree species not seen elsewhere on the property including sycamore, river birch, box-elder, honey-locust, basswood, and hackberry. These floodplain forests, most of which have developed on lands that were formerly pastured, are heavily impacted by non-native invasive shrubs and vines such as multiflora rose, Oriental bittersweet, wineberry, Japanese barberry, and Japanese honeysuckle.

Native herbaceous species include sedges such as *Carex grayii*, wood reedgrass, wood nettle, jack-in-the-pulpit, white avens, and bottlebrush grass. Floodplains are especially vulnerable to colonization by invasive species due to the constant disturbance caused by flooding and the influx of seeds and propagules carried by the water.

Bottomland Oak – Hardwood Palustrine Forest

This forest community type occurs in the riparian corridor along French Creek, however it is distinct from the floodplain forest described above. Pin oak is the dominant tree and the ground layer is dominated by reed canary grass. There is some evidence of berms or

low dikes, perhaps part of an earlier effort to restrict the extent of flooding. The berms may be partially responsible for the presence of several vernal pools, which provide breeding habitat for frogs and salamanders.

Skunk-cabbage – Golden Saxifrage Forest Seep

Extensive areas of springs and seeps occur at three locations on the Morris property, at the headwaters of an unnamed tributary of French Creek that originates in the northern end of the property, on the south side of French Creek just east of the powerline right-of-way, and in the stream valley along Prizer Road. We found a population of Goldie's wood fern, an uncommon plant, in the northern seeps. All seepage areas should be searched in early June for the possible presence of bog bluegrass (*Poa paludigena*), a Pennsylvania endangered plant that is known from several nearby locations.

In addition to providing habitat for rare plants, seeps (and the springs that supply them with water) are a vital part of the French Creek exceptional value watershed and important habitat for salamanders.

Mixed Forb Marsh

This open wetland community is found on the floodplain of French Creek at several locations, immediately north of Route 23, just south of Route 23, and on the north side of French Creek just west of Route 100. It is characterized by a hummocky surface separated by pools and channels of standing water. Dominant species include arrowhead, reed canary grass, several sedges, rice cutgrass, and several goldenrods. Scattered trees and shrubs including pin oak, willows, gray dogwood, and at one location buttonbush, are also present. Purple loosestrife has invaded the site on the north side of Route 23.

Successional Forest

Successional forest occurs on lands that were farmed or timbered in the past and have been allowed to revegetate naturally. Ash and tuliptree are prominent in the canopy. Red maple, sassafras, and black locust are frequent associates, and the invasive, non-native Norway maple is often present. East of Route 100, white pine is a prominent component. Some, or all, of it may have been planted originally in a reforestation effort.

The shrub layer is strongly impacted by non-native invasive plants such as multiflora rose, autumn olive, Japanese barberry, winged euonymus, and wineberry; non-native vines, Japanese honeysuckle and Oriental bittersweet are also abundant.

Successional forest occurs on lower slopes bordering the floodplain and in the southern end of the property on lands east of Route 100 that were formerly pastured.

Disturbed Open Areas, Hedgerows, and Edges

This category includes the powerline right-of-way, as well as meadows, fallow fields, hedgerows, and edge habitat throughout. It includes large areas dominated by invasive, non-native species such as red canary grass, mile-a-minute, Oriental bittersweet, autumn olive, and wineberry as well as some native plants. Much of the upland area is dominated by giant foxtail, orchard grass, goldenrods, and common mullein. In low areas species such as joe-pye-weed, ox-eye, boneset, wool-grass, virgin's-bower, and Japanese stiltgrass are prominent.

The hedgerows also include native tree species including wild persimmon and escaped ornamental trees such as mimosa (*Albizia julibrissin*) as well as autumn olive, multiflora rose, Oriental bittersweet, and wineberry.

Appendix C. Photographs



View of French Creek



Cabin along French Creek



Mixed forb marsh along French Creek south of Route 23



Vernal pool on the floodplain along French Creek



Top left: ginseng; top right: nodding trillium with fruit; bottom: goldenseal



Red oak – mixed hardwood forest on north-facing slope, note dense herbaceous and shrub layers



Red oak mixed hardwood forest along Prizer Road showing the effects of overbrowsing by deer, note sparse shrub and herbaceous layers.



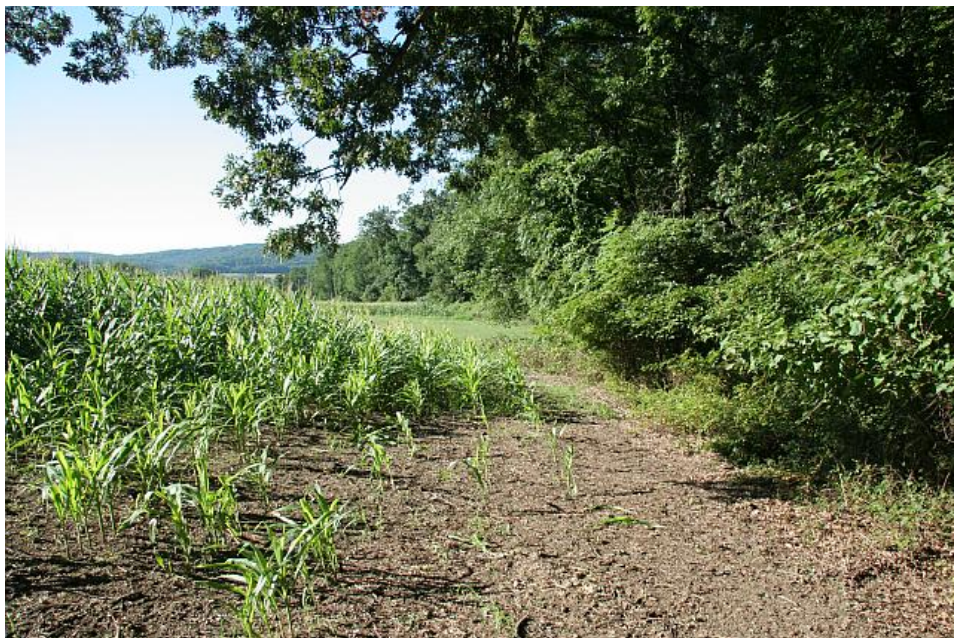
Skunk-cabbage – golden saxifrage forest seep



*Powerline right-of-way,
view north from the forested slope at the southern end of the property*



Joe-pye-weed in the powerline right-of-way near French Creek



View south from the northern end of the property, forested slope in the background is the southern extent.



Headstone in a cemetery imbedded in the forested strip northwest of Coventryville Road at the northern end of the property

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