

2018 BOTANICAL STUDY REPORT OF  
569 ACRES OF THE THOURON ESTATE

CHESTER COUNTY  
Lower Oxford Township  
West Nottingham Township

LANCASTER COUNTY  
Little Britain Township

Conducted by:  
Janet Ebert and Jack Holt Botanical Consultants  
1611 Smith Bridge Road, Chadds Ford, PA 19317

A 726 acre portion of the Thouron Estate was inventoried between April and December, 2018. A total of 552 vascular plant species were recorded for the study area, including five PA Species of Special Concern (two of which are on the PECO ROW) and 179 aliens. The most significant habitats are the steep wooded slopes facing the Octoraro Creek and other older forests elsewhere on the property. Most of the upland agricultural fields have been converted to CREP meadows and much of the floodplain has been planted with trees or remade into wetlands. Floodplain edges and younger woodlands grown up on land let go earlier are overwhelmed by invasive species. The plant communities on the Thouron Estate lands are a testimony to the geological and agricultural heritage of southwestern Chester County and to recent stewardship and restoration efforts.

## BACKGROUND AND METHODS

This study was undertaken at the request of John Goodall of the Brandywine Conservancy to inventory and evaluate the plants and plant communities on the Thouron estate along Octoraro Creek in southeastern Pennsylvania. The study included 569.00 acres in Lower Oxford and West Nottingham Townships, Chester County and 156.57 acres in Little Britain Township, Lancaster County. Excluded were 227.11 acres of the main house and barn complex, mostly agricultural land in Lower Oxford and East Nottingham Townships on the east edge of the property, and the house and barn complex in Little Britain Township.

A total of 49 field hours were spent in the study area in 15 trips between April 14 and December 24, 2018. Earlier visits were used to become familiarized with the topography and habitats; later visits focused on revisiting less disturbed and higher quality areas, although ruderal areas were not ignored.

To better focus the field work the property was divided into nine sections and separate plant lists were kept for each section. The section boundaries were based on past and present land use as well as clearly defined features such as roads and streams. Each section generally included more than one type of habitat but all were chiefly composed of either wooded ground or open/successional habitats. The species list only indicates the presence of a species in a given section (a single plant of garlic mustard counts the same as a million) but the lists by section provides some idea of distribution and abundance. To simplify the final comprehensive plant list the five mostly wooded sections north of Christine Road (Rt. 272) were combined into one column = Wo and the two upland sections made up of CREP fields and lawn, and hedgerow are likewise combined = Fi. All of the property south of Christine Road (= So) and all the property in Lancaster County (= La), were treated as individual sections, resulting in a final species list (Table #3) composed of four columns (see Map # 1 for outline of these sections).

Map resources for the study were:

Existing Conditions & Alternative Uses Report for the Thouron Estate by Ray Ott & Associates, 2007  
www.pennpilot.psu.edu

## THE FLORA

A total of 552 species were tallied during the survey, including 192 aliens and non-natives (see Table #3 for the Plant List). The alien count includes highly invasive species such as stilt-grass (*Microstegium vimineum*) and bittersweet *Celastrus orbiculatus*), disturbance or ruderal species such as dandelion (*Taraxacum officinale*) and crab grass (*Digitaria spp.*) that are not a threat to intact native communities, and species native elsewhere in the state that have escaped from plantings or were introduced via habitat restoration.

	Total	Native	Alien/Intro.	% Alien
Aquatics	5	4	1	17%
Ferns	27	27	-	-
Forbs	291	176	110/5	38 %
Graminoids	101	71	27/3	26 %
Shrubs	37	23	13/1	35 %
Trees	61	40	17/4	28 %
Vines, herbaceous	18	12	6	33 %
Vines, woody	12	7	5	42 %
TOTAL	552	360	179/13	33 %

The percentage of alien species of the flora is typical for surveys of comparably sized properties in the county, indicating that despite the invasives and heavy long-term agricultural history of the property, there are still a considerable number of natives present, chiefly due to large tracts of steep forested ground along the Octoraro. A useful measurement of the floristic quality of the property as a whole is mean native CC or Coefficient of Conservatism, which is the average CC for all of the native species seen on the property (see the end of Table # 3 - the Plant List for an explanation of the CC or Coefficient of Conservatism for individual species). The mean native CC is 3.46 is outstanding for Chester County and indicates that native plant communities containing high-quality

species are still present. However the mean native CC is also based on presence rather than abundance, and 20 % of the native species were only seen in one section and the average CC for these natives is 4.1. Some of these species occurrences are very small and are one accident away from disappearing from the study area.

## **THE SETTING**

### **DRAINAGE**

The study area is located on either side of the Octoraro Creek about four miles north of the Maryland border. Octoraro Creek, draining a total of 208 square miles of mostly rural land in Chester, Lancaster, and Cecil Counties, is part of the Susquehanna River drainage, entering that river just south of Conowingo Dam in Maryland. Much of the lower Octoraro is deeply embedded into the landscape, with many torturous meanders, steep slopes, and a rocky stream bed. The floodplain on the east bank of the creek is often narrow to nonexistent and frequently abuts steep wooded slopes with numerous rock outcrops. The Lancaster County side has a broader mostly open floodplain, with a pair of created flood control wetlands in the southeast. Blackburn Run drains the center of the Chester County side of the study area; several unnamed streams, one south of Christine Road, a smaller one near the far north end, and one draining the center of the Latham Farm tract in Lancaster County, also flow into the Octoraro from or through the property.

### **GEOLOGY**

The property is entirely underlain by Peters Creek schist, a micaceous quartz-rich metasedimentary rock formation of late Cambrian to Ordovician age. The complex folding the original sediments were subjected to in deep time are visible on many of the outcrops on the steeper slopes above the Octoraro Creek. On gentler slopes the outcrops and loose boulders tend to be more rounded and mossy, rendering the folding less observable.

### **LAND USE**

The landscape around Glenroy is quite rural and agriculture is still the dominant land use. The property has been a working farm for many generations and the human footprint is inescapable. Christine Road (Rt. 272), a well-travelled two-lane road, unequally divides the Chester County portion of the study area and forms the southern boundary of the Lancaster County parcel; Glenroy Road, a local road that dead-ends in the north of the property, forms much of the eastern boundary of the study area north of Christine Road. Other visible signs of man's influence on the land include numerous farm lanes crisscrossing the property, a number of houses and farm buildings, mostly disused or in ruins, several farm ponds (all but two dug after 1971), planted stands of bamboo and evergreens (spruce and white pine), and a 1960's era powerline cut in the far south. Currently most of the open ground is in enrolled in the Conservation Reserve Enhancement Program (CREP). The upland portions have been largely been planted in warm-season grasses and cover crop forbs whereas trees have been planted on the open floodplains of the Chester County side, and flood control ponds have been carved out of the floodplain of the Latham Farm. Wooded areas vary from blocks of mature forest visible on a 1937 aerial photograph (courtesy of PennPilot) to successional woodlands grown up on abandoned farmland, mostly within the last 50 years. These younger woodlands have been heavily impacted by invasive species and deer.

## **HABITATS**

### **MATURE FORESTS**

An aerial photograph from 1937 (Map #2) clearly shows that most of the property was under cultivation at the time. With the exception of a slice of dry woods taken out by construction of the PECO powerline (likely in the 1960's) all of the forests present 81 years ago still exist, and with the abandonment of marginal cropland are frequently now encased within thick envelopes of scrubby weedy alien-dominated younger woodland. In the field the older woodlands can be easily distinguished by the presence of hardwood canopies as well as suites of forest forbs, ferns and low shrubs intolerant of significant soil disturbance.

#### **Hemlock rocky slope forest**

This is a significant if restricted habitat on the lower portions of the steepest slopes along the Octoraro. Hemlocks mixed with oaks and the occasional red maple comprises the canopy and understory; mountain laurel is frequent to common below, sometimes mixed with spicebush (*Lindera benzoin*). Numerous rock outcrops that break up the monotony of slippery duff, bare soil and occasional sedges and grasses are home to several species of

ferns, mainly rock-cap (*Polypodium virginianum*) and intermediate wood fern (*Dryopteris intermedia*), occasionally joined in the far south by the county rarity mountain spleenwort (*Asplenium montanum*) on larger outcrops closer to the creek. Several moist steep-sided gullies cutting into the slopes are home to a sparse collection of herbs and ferns including Canada mayflower (*Maianthemum canadense*), Indian cucumber (*Medeola virginiana*), and violets (*Viola spp.*). This habitat is confined to the far northern and southern ends of the property, with the best example just north of the utility cut. Standing and fallen rotting trunks of hemlock higher up the slope in both areas indicate that this habitat was once more widespread than it is now.

#### Oak-mountain laurel forest

This community is mostly found on north or northwest-facing slopes and ridges where the soil is thin. The canopy is dominated by oaks, especially black and scarlet oak (*Quercus velutina*, *Q. coccinea*), mixed with white and red oak (*Q. alba*, *Q. rubra*), hickories (*Carya spp.*), black gum (*Nyssa sylvatica*), and stands of cherry birch (*Betula lenta*) shading a sparse understory of red maple (*Acer rubrum*), black cherry (*Prunus serotina*), and black gum. Mountain laurel (*Kalmia latifolia*), the signature shrub, is often dominant but the stands vary from thick and healthy to sparse and dying. Deer have heavily impacted this community and many shrubs and ground covers such as blueberries (*Vaccinium spp.*), pinxter flower (*Rhododendron periclymenioides*), partridge-berry (*Mitchella repens*), and sedges (*Carex spp.*) that would typically fill the often duff-free gaps between stands of *Kalmia* are scarce and small.

#### Oak-mix forest

Where the ground is more level and the soil is thicker and more mesic the oak-mountain laurel community grades into a more diverse forest of oaks, hickories, and the occasional beech (*Fagus grandifolia*), although beech is uncommon, possibly due to a past fire regime. Red maple, black gum, cherry birch, and black cherry can be locally common, especially in canopy gaps. Native shrub density is quite variable with witch-hazel (*Hamamelis virginiana*), maple-leaved viburnum (*Viburnum acerifolium*), and blackberries patchily distributed; hay-scented fern (*Dennstaedtia punctilobula*) is a frequent dominant ground cover, with New York fern (*Parathelypteris noveboracensis*) local in moister ground. A thick layer of duff inhibits the growth of other ground covers except where wind or tree tip-ups expose patches of bare soil that sustain scattered sedges (*Carex spp.*) and native grasses. Invasives, mostly autumn olive (*Elaeagnus umbellata*), multiflora rose (*Rosa multiflora*), Amur honeysuckle (*Lonicera maackii*), bittersweet (*Celastrus orbiculatus*), and stilt-grass are making inroads, especially on edges and canopy gaps. A rocky slope north of Blackburn Run is home to a single specimen of the state-listed fringe-tree (*Chionanthus americanus*, state rank of PT (Threatened)).

#### Rich mixed forest slope

This forest type, younger and more mesic than the oak or hemlock-dominated forests with more deeper soils, is found on gentler slopes with occasional rounded rock outcrops or boulder piles. Hickories, especially mockernut hickory (*Carya tomentosa*) in this habitat are significant canopy trees, mixed with oaks, the occasional tulip, and stands of cherry birch. Tree saplings, including red maple, are frequent; the shrub layer is a varying mixture of natives, mainly spicebush, and aliens, including autumn olive, Amur honeysuckle, barberry (*Berberis thunbergii*) and multiflora rose. The ground flora is often weedy with chickweed (*Stellaria media*) ivy-leaved speedwell (*Veronica hederifolia*) and stilt-grass, but it also includes a rich mixture of natives including horsebalm (*Collinsonia canadensis*), bedstraws (*Galium spp.*) white wild lettuces (*Prenanthes spp.*) wild geranium (*Geranium maculatum*), violets, sedges (*Carex spp.*), lopseed (*Phryma leptostachya*), black cohosh (*Actaea racemosa*), False solomon's-seal (*Maianthemum racemosum*), may-apple (*Podophyllum peltatum*) and the spring ephemerals spring beauty (*Claytonia virginiana*) and cut-leaved toothwort (*Cardamine concatenata*). The state-listed plant Lion's-foot (*Prenanthes serpentina*, state rank of PT) grows in this habitat. The most outstanding example of this habitat occurs on the wooded slope south of the studio; other examples occur on the slope south of the woodland bridge over Blackburn Run and just north of Christine Road on the Lancaster County side.

### SUCCESSIONAL WOODLANDS

#### Floodplain woodland

There are virtually no mature forests on the Octoraro floodplain but there are usually a rim of older trees, mostly black walnut (*Juglans nigra*), sycamore (*Platanus occidentalis*), ash (*Fraxinus spp.*), and box elder (*Acer negundo*) growing on the stream banks, shading a mix of saplings, spicebush, multiflora rose, and briars (*Rubus spp.*). The ground flora is not diverse and almost entirely non-native, consisting of species such as stinging nettle

(*Urtica dioica*), mugwort (*Artemisia vulgaris*), day-lily (*Hemerocallis fulva*), ground-ivy (*Glechoma hederacea*), stilt-grass (*Microstegium vimineum*), and long-bristled-smartweed (*Persicaria longiseta*). Lesser celandine (*Ficaria verna*), mile-a-minute (*Persicaria perfoliata*), and Japanese knotweed (*Fallopia japonica*) are starting to make inroads in this habitat. Wood nettle (*Laportea canadensis*), clearweed (*Pilea pumila*) and white avens (*Geum canadense*) are some of the more common natives. A remnant of older floodplain woods with canopy tulips and lower-growing natives including spring ephemerals occurs in the very far north on a strip of slightly higher ground backed by a swale along the Octoraro.

#### Upland successional woods

These younger woodlands have grown up on older abandoned farm land in many places on the property. These often sizable stands of poor-quality habitat are easily distinguished from mature forest by the frequently thick growth of non-native shrubbery beneath and the almost complete absence of forest forbs. Red maple, black cherry, white ash (*Fraxinus americana*), tulip (*Liriodendron tulipifer*), and some black locust (*Robinia pseudo-acacia*) in general form the canopy; alien invasive shrubs, including multiflora rose, Amur honeysuckle, autumn olive, and in moister areas wineberry (*Rubus phoenicolasius*), compose most of the shrubbery; and hardy natives, invasives, and colonizing ferns such as white avens, field garlic (*Allium vineale*), Star-of-bethlehem (*Ornithogalum umbellatum*) stilt-grass, intermediate wood-fern, and Christmas fern (*Polystichum acrostichoides*) are common ground covers, the last especially on steep shaded banks. Lianas, including bittersweet, grapes (*Vitis spp.*), and Japanese honeysuckle (*Lonicera japonica*) are common, especially along edges. Hardwoods, mainly sapling oaks, occasionally occur, and spicebush (*Lindera benzoin*) is often frequent; but generally this habitat is low in native diversity and richness. An interesting variation on this habitat occurs in the upper eastern slopes of the east woods near Glenroy Road, where Osage orange (*Maclura pomifera*) comprises the canopy, although without any significant difference (or improvement) in the flora below. These woodlands seem unlikely to succeed to oak-hickory forest.

#### Successional thickets and hedgerows

There are few successional thickets still present at Glenroy, most of those once present having succeeded to woodlands. The most notable occurs in the far north, where a dense stand of black cherry (*Prunus serotina*) has taken over a corner of a CREP field; a dying remnant on the slope south of the stream below Christine Road has a few straggling deer-browsed state-listed Tawny Ironweeds (*Vernonia glauca*, PE (Endangered)). Hedgerows between fields are more common, many having grown up along ridgetop farm roads between fields. Black locust (*Robinia pseudo-acacia*) box elder, black walnut, and black cherry are common trees in this habitat, mixed with the occasional large silver maple (*Acer saccharinum*); the shrub layer is mostly non-native, with Amur honeysuckle, autumn olive, wineberry, and other brambles the chief components; the ground flora is similar to that found in the upland successional woods. Vines, mainly bittersweet and grape, are common throughout.

#### Other Notable Successional Communities

Two small successional native-dominated communities were found during the study. The first, a section less than 100 feet long on a small low rise by the road to the studio under an abandoned utility line, has so far escaped the crush of invasives, possibly because it is very well drained with sandy soil. Under a sparse canopy of sassafras and black cherry and a thin shrub layer of spicebush and maleberry (*Lyonia ligustrina*) is a rich mostly native ground cover of ferns, the sedge *Carex pensylvanica*, and wood rush (*Luzula echinata*). The roadside was open in 1937, had a narrow band of trees growing along it in 1957, a broader hedgerow in 1971, and by 2018 had grown up into successional woodland.

The second notable micro-community did not develop from human disturbance but from the efforts of hungry beavers on a dry rocky knoll perched above the Octoraro just north of Blackburn Run. The knoll is one of the few sites on the property where hemlock grew right down to the water's-edge and the beavers took down enough of them to open up the canopy, encouraging a concentration of grasses, sedges, and native shrubs and understory trees including lowbush blueberry and serviceberry (*Amelanchier arborea*).

### RUDERAL AND ANTHROPOGENIC

#### Roadsides

Roadsides are usually dominated by non-native species that are tolerant of mowing, salt, and poor water quality. In open areas they are lined with hardy disturbance species including knotweed (*Polygonum aviculare*), annual grasses, and other weeds; in wooded areas the flora resembles that found in successional woodlands, thickets,

and hedgerows. Christine Road, a well-used important connector road, divides the Chester County parcel and is the southern border of the Lancaster county parcel. It has the typical weedy flora and litter.

#### Evergreen plantations and hedgerows

Evergreens have been planted on the edges of some of the CREP fields, around the central pond complex, and south of Christine Road. There are also occasional stands of planted white pine in younger woodlands. Dense shade and thick mats of needles and fallen branches suppress most undergrowth in intact stands; invasives have come in underneath where stands have fallen victim to disease, including a stand of hemlocks east of the shed complex.

#### Bamboo thickets

There are several thickets of the 25 ft. tall plus variety of bamboo on the property - east of the studio in the far north, on the south side of the central pond, at the edge of a CREP field toward Glenroy Road, and in a gully next to Christine Road in Lancaster Co. These dense extremely shady monotypic stands have little undergrowth except for the occasional invasive such as stilt-grass. None appear to be spreading into woodlands; however they are trying to advance into CREP fields, where so far mowing suppressed their growth.

#### Lawns and hayfields

Much of the ground around the surviving standing buildings is in lawn. Extensive lawns or frequently mown ground occur through much of the property, especially on the steep slopes on either side of the central pond.

Several hayfields are still present, the most notable being the level ground under the utility cut in the far south, a moist field on the north side of the unnamed stream south of Christine Road, the 'question-mark' hayfield west of the shed complex, and the grassy fields east and west of the CREP wetlands on the Latham Farm. Many other hayfields and cropfields have been or are being converted to CREP fields. Their vegetation almost completely consists of non-native cool-season grasses including fescue (*Schedonorus arudinacea*) and orchard-grass (*Dactylis glomerata*) and hardy weeds such as Canada thistle (*Cirsium arvense*) and horse-nettle (*Solanum carolinense*)

#### PECO powerline ROW (Not owned or managed by Thouron estate)

The steep open dry slope of the ROW was cut through a mature woods before 1971. Its lower slopes are now blanketed by a dense growth of plume grass (*Miscanthus sinensis*) which has also taken over most of an adjacent CREP field and is also creeping into the adjacent woods. Blackberries and sapling trees seem able to compete with the tall invasive, but only along the edges of the forest on either side and along the winding access road do herbaceous natives persist in any significant quantity, including a surprising amount of bloodroot. Somehow a small population of wild bean (*Strophostyles umbellata*, Pennsylvania Endangered)) and a single plant of Hairy-leaved thoroughwort (*Eupatorium rotundifolium* v. *ovatum*, TU (Tentatively Undetermined)) still eke out an existence here.

#### CREP fields

CREP fields are farmland withdrawn from cultivation and planted with native grassland species. Most are now dominated by varying mixes of warm-season grasses such as *Andropogon gerardii*, *Panicum virgatum*, and *Sorghastrum nutans*, but some have large patches of blackberries, goldenrods (*Solidago spp*), and other forbs such as white snakeroot (*Ageratina altissima*) and tick trefoil (*Desmodium perplexum*). They are mowed occasionally to control woody succession but some have areas where invasive vines such as bittersweet and Japanese honeysuckle abound. Diversity is not high but these meadows improve water retention and quality and support a more complex and more native plant community than does cultivated ground. Several upland CREP fields east of Glenroy Road are still under cultivation, while others closer to Christine Road have not yet been planted with restoration mixes.

#### CREP Floodplain restoration habitats

Active habitat restoration has been implemented on both sides of the Octoraro in the open portions of the floodplain. On the east side two long strips of grasses and forbs north of Christine Road have been extensively planted with trees, mainly green ash (*Fraxinus pennsylvanica*), sycamore, and river birch (*Betula nigra*). The green ash has done well and in the north has formed extensive thickets shading weedy vegetation and a low swale. The southern strip was planted more recently, with the saplings still within tubes. On the Lancaster side two triangular wetlands / flood retention basins were carved into a floodplain hayfield. The vegetation of these 'ponds', whose water levels are quite variable, are a mosaic of cattail, bulrushes, smartweeds, rice cut-grass, sedges, other native forbs, stilt grass, reed canary grass (*Phalaris arundinacea*), mudflats, and open water. All of the vegetation of the

basins was most likely planted but at this time only a few species still seem out of place and those are few in number.

#### Blackburn Run wet meadow

A unique habitat on the property is a created moist meadow, on the north side of Blackburn Run that was probably pastured in the past. Although the species mix present (including a considerable amount of blue vervain (*Verbena hastata*)) indicates that it was created fairly recently, the flora of the meadow is diverse and mostly native.

### WETLAND AND RIPARIAN HABITATS

#### Octoraro sand and gravel bars

The meandering Octoraro has generated several sizable sand and gravel bars. The older portions have sycamore shading masses of reed canary grass and Japanese hops (*Humulus japonica*), while the younger more disturbed bars are mostly coarse gravel and cobbles with little fine sediment able to support herbaceous vegetation. No aquatic or shoreline drawdown species were seen or looked for in the summer of 2018 because of consistently high water levels and several floods.

#### Naturally occurring wetlands

A significant habitat mostly lacking on the property are naturally occurring wetlands. Those present are mostly confined to occasional narrow strips along Blackburn Run and a few spring seeps at the base of wooded slopes. Past and present land use of the surrounding terrain is a likely culprit; stretches of floodplain woods and thickets along Blackburn Run and the Octoraro dotted with skunk cabbage (*Symplocarpus foetidus*), including one north of Christine Road on the west bank of the Octoraro, hint at former streamside wetlands now buried under legacy sediments. Others may have been drowned when the ponds were created.

#### Upland Ponds and their edges

There are several upland ponds on the property of varying ages, sizes, and conditions. Most are relatively steep-sided, with only scattered wetland vegetation except for green films of duckweed (*Lemna minor*) and water meal (*Wolffia brasiliensis*). The northernmost and smallest pond, near the abandoned studio, looks raw and recent. It has little shade and is mostly surrounded by a thick growth of stilt-grass and mile-a-minute draped over multiflora rose and wineberry. A small island in its middle was not visited due to high water.

A larger more established pond south of Christine Road is partly shaded and has a broad delta in the east covered with stilt grass, the grass *Arthraxon hispidus*, rice-cut-grass (*Leersia oryzoides*), false nettle (*Boehmeria cylindrica*), and redroot flatsedge (*Cyperus erythrorhizos*). The less common southern arrowhead (*Sagittaria australis*) intermittently lines its north shore.

A central pond complex in the narrow valley of Blackburn Run, separated from that stream by a grassy berm, has a more complicated history. The oldest part, in the far east, is now mostly a shallow partly shaded delta dominated by rice-cut grass, sedges, and soft rush (*Juncus effusus*). The larger and younger western portion of this pond is open water. In the far west a small overflow pond has been dug below the main dam. Other than a drawdown zone in the overflow pond that disappeared during the wet summer there was no significant native vegetation seen in the pond complex.

### RARE PLANTS

During the course of the survey five PA Species of Special Concern were found. Two of them, fringe tree and lion's-foot, grow in older forest, tawny ironweed was found at the edge of successional woodland, and pink wild bean and hairy-leaved thoroughwort were discovered growing in the powerline ROW. DCNR report forms were completed for these species.

#### *Chionanthus virginicus* – Fringe Tree – Threatened

A single young tree about 5' high was observed growing on a steep wooded slope by a rock outcrop north of Blackburn Run. Fringe tree is a southern species that is mostly found in PA in southern Chester and Lancaster counties. This small tree is also planted extensively but the specimen found here is typical of the native populations along the lower Octoraro.

*Prenanthes serpentaria* - Lion's-foot - Threatened

A scattered population of Lion's-foot was seen in rich dry medium-aged hickory-dominated wooded slopes south of the studio area. It is another southern species that does well in southwestern Chester County.

*Vernonia glauca* – Tawny ironweed – Endangered

A half dozen or so mostly deer-browsed plants of this southern species are growing in thickety open woods along the farm lane leading to the pond on the south side of Christine Road. The site is threatened by woodland succession, invasives and deer.

*Strophostyles umbellata* – Pink wild bean – Endangered

A small population of several plants was observed growing along the edge of powerline ROW access road about two-thirds down the slope to the Octoraro Creek, twining around stems of plume-grass.

*Eupatorium rotundifolium* v. *ovatum* – Hairy-leaved thoroughwort – Undetermined, needs fieldwork

A single plant of this perennial herb was found along the utility ROW access road not far from the Octoraro, amidst a thick growth of Plume-grass.

In addition three Pennsylvania Watchlist species were observed on the property. The Watchlist includes species in the state whose distribution and abundance is uncertain, uncommon species with taxonomic questions, species that are host plants for rare insects, and species with disease problems and/or insect stresses.

*Carex tonsa*- a sedge found in dry rocky woods - often overlooked

*Cyperus erythrorhizos* – Redroot flatsedge A wetland sedge, found at the edge of the southern pond and the created wetlands in Lancaster Co. – range uncertain, overlooked and possibly expanding its range

*Juglans cinerea* – Butternut. On the watchlist because it is threatened by disease. A single tree was seen growing along the open bank of the Octoraro on the Lancaster County side near the created wetlands.

Two other listed species seen on the property, *Magnolia tripetala* – Umbrella magnolia and *Quercus phellos* – willow oak, were not counted as rare plant occurrences since both only occurred as saplings or seedlings obviously escaped from planted trees. Umbrella magnolia can be invasively aggressive.

In 1994 Nature Conservancy contract botanists, while conducting a comprehensive survey for rare and endangered plants, found populations of the then Rare (now Watchlist) species *Podostemum ceratophyllum* (Riverweed) growing on rocks in riffles in the Octoraro near Glenroy. Persistent high water due to exceptionally high rainfall throughout 2018 prevented the surveyors from searching for aquatic flora in the creek, but as neither the habitat nor the local land use has changed significantly, this species is likely still present in the creek.

All of the state-listed species found on the property are at the northern end of their range in southeastern PA and are not considered rare farther south. However there are also several species that are not rare in Pennsylvania but are noteworthy in the southeastern part of the state. Hemlock, the state tree, is uncommon in the extreme southeastern corner of the state, only growing on steep cool north-facing slopes above larger streams. The two stands in the study area appear to be shrinking in size but there are some young trees and seedlings present, especially in the southern stand. Mountain spleenwort, which grows in the crevasses of acidic rocks, is here at the outer edge of its more montane range; the only area that it occurs in Chester County is along the Octoraro.

Notable is the absence of many woodland and wetland species common both east and west of the property. These include many wetland and spring seep species such as Tussock sedge (*Carex stricta*) and Golden saxifrage (*Chrysosplenium americanum*); the wet meadow herbs blue lobelia (*Lobelia siphilitica*) and Ironweed (*Vernonia noveboracensis*); the rich woodland plants solomon's-seal (*Polygonatum biflorum*), pagoda dogwood (*Cornus alternifolia*), and black snakeroot (*Sanicula odorata*); and most notably a whole host of floodplain forest specialists windflower (*Anemone quinquefolia*), bottlebrush grass (*Elymus hystrix*), waterleaf (*Hydrophyllum virginianum*), bladdernut (*Staphylea trifolia*), and slippery elm (*Ulmus rubra*). Several dry open edge species such as spotted wintergreen (*Chimaphila maculata*) and Pussetoes (*Antennaria* spp.) were also not seen. Many of these missing

species are found in habitats that might once have been present but have been degraded by farming, deer, and invasives. Others may simply have never been present in the Octoraro drainage.

Table #1 lists all of the species seen in the study that have a PA state status and some notable species that are uncommon. The five listed species sites are located on Map # 3, a topographic map (Kirkwood quad).

### ALIENS AND INVASIVES

Although a third of the species recorded in the study area are alien or not native to the area the majority are ruderals that, although often considered noxious weeds by farmers, grow in heavily disturbed or man-made habitats and do not readily invade less disturbed native habitats. Table # 2, excerpted from the main list, lists most of the invasive species found in the study area and their distribution by section. Most of the species at the top of the list are abundant, and control would be impossible except in small areas. Unfortunately relatively recent arrivals such as *Arthraxon hispidus*, lesser celandine, and mile-a-minute, have also become too wide-spread to eliminate. A few invasives only seen in one place, although there may well be more populations on site, should be sought out and eliminated before they spread further (marked in **bold** in the table). The lower Octoraro is still farm country and far enough from urban centers that suburban invasives such as Callery pear (*Pyrus calleryana*), Higan cherry (*Prunus subhirtella*), and the horticultural viburnums (*Viburnum spp.*) have not arrived – yet. No giant reed (*Phragmites australis*) was seen. One notable invasive is Japanese plumegrass (*Miscanthus sinensis*) which in western Chester County usually occurs as isolated plants or small clusters. It has completely overwhelmed the ROW and a CREP field north of the ROW and is infiltrating into the edges of the nearby forest.

### MANAGEMENT CONCERNS

Deer Deer are probably responsible for the sparseness of the shrub and ground layers in the mature forests. Hunting is the most effective method of control and should be allowed to continue on the Thouron estate lands.

Invasive Plants Efforts to control invasives should concentrate on recent arrivals that have not yet become widespread and in the higher quality areas and habitats. There is no point in trying to ‘restore’ younger woodlands that are dominated by invasives. Removing deliberate introductions such as bamboo and planted conifers would be a lower priority. (See Table #2 and for possible target invasives)

Rare Plants The only rare plant that will disappear without management is the tawny ironweed which needs to be freed from invasives but also protected from deer. (See Map #3 for location)

CREP Fields The CREP fields need to be mowed and monitored for invasive encroachment. Areas of cool-season grasses that are currently being hayed or maintenance-mowed should continue to be managed in that way to prevent them from succeeding into alien dominated thickets. A long-term, lower priority project would be to convert these areas, and some of the lawn, into more diverse meadows. The CREP field that straddles Christine Road appears to be recently abandoned and not successfully seeded.

Trail Network There is an existing system of dirt farm lanes that that could be simplified and converted to a trail network. Many of these lanes are still driveable but some have sections on steeper slopes that are deeply rutted or washed out. Some are muddy after heavy rain. The most endangered lane is the old road leading to the southern pond, which during heavy rains channels runoff into a steep erosion gully which is eating its way into the roadbed.

Erosion Gullies The CREP fields have certainly reduced the amount of surface runoff from the uplands, but erosion gullies caused by past farming practices remain, often hidden by invasives thickets and successional woodlands. These should be filled up and watched for future erosion.



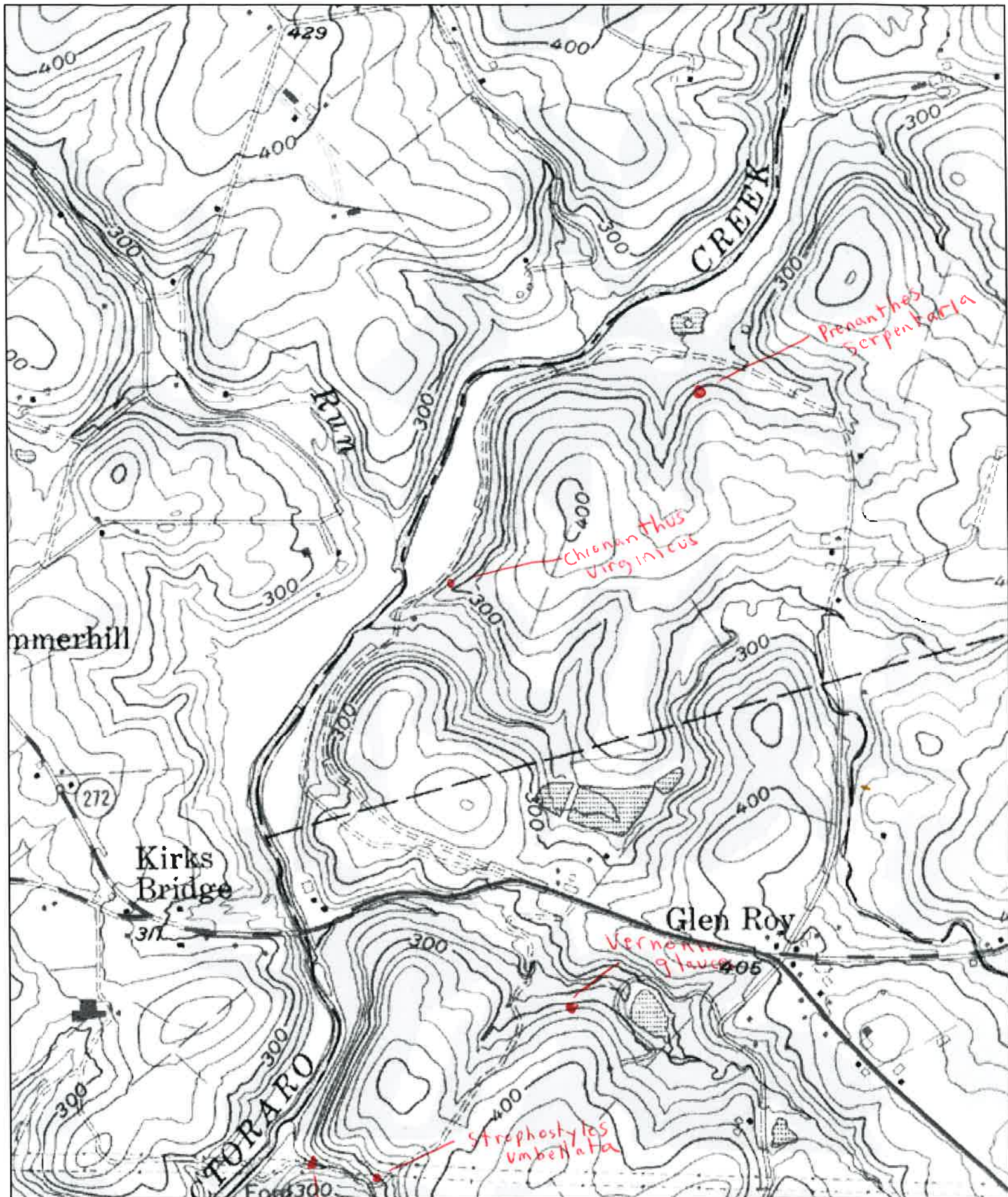
M O P #2

9-10-37

1. AHK - 34-52

THOURON ESTATE STUDY AREA - SEPTEMBER 1937





Name: KIRKWOOD  
 Date: 1/30/2019  
 Scale: 1 inch equals 1000 feet

*Eupatorium  
 rotundifolium*

Location: 039.7747716° N 076.0574102° W  
 Caption: Thouron Estate Rare Species  
 2018

MAP # 3

TABLE # 1

## THOURON ESTATE RARE AND UNCOMMON SPECIES

HABIT	SCINAME	CC	PA RANK	COMMON NAME	Wo	Fi	So	La	HABITATS
Ferns	<i>Adiantum pedatum</i>	6		Maidenhair fern	2			1	Rich rocky wooded slopes, small patches
Ferns	<i>Asplenium montanum</i>	10		Mountain spleenwort				1	Shaded rock faces along Octoraro, very local
Ferns	<i>Dryopteris cristata</i>	6		Crested fern				1	Lower side earth dam of center pond in shade
Ferns	<i>Huperzia lucidula</i>	6		Shining clubmoss	1				Dry rocky oak wooded slope, along moist outcrop
Ferns	<i>Phegopteris hexagonoptera</i>	6		Broad beech fern	2				Rich wooded slopes, local
Ferns	<i>Polypodium virginianum</i>	8		Polypody	3			1	Rocky wooded slopes on boulders
Forbs	<i>Aquilegia canadensis</i>	7		American columbine	1				Wooded rock outcrop near Blackburn Run
Forbs	<i>Arisaema dracontium</i>	7		Green dragon				1	Moist wooded floodplain N of ROW
Forbs	<i>Epigaea repens</i>	7		Trailing arbutus	1			1	Dry rocky acidic woods, rock outcrop
Forbs	<i>Eupatorium rotundifolium</i>	4	TU	Hairy-leaved thoroughwort	1			1	Dry thickety edge powerline cut access Rd, one
Forbs	<i>Goodyera pubescens</i>	6		Downy rattlesnake-plantain	1				Dry rocky oak wooded slope with heaths, few
Forbs	<i>Hieracium venosum</i>	6		Rattlesnake-weed				1	Dry oak woods, one plant
Forbs	<i>Krigia virginica</i>	6		Dwarf dandelion				1	Dry disturbed soil, schisty farm road roadbank
Forbs	<i>Maianthemum canadense</i>	6		Canada mayflower	1			1	Steep moist ravine under Tsuga, by beaver knoll
Forbs	<i>Melampyrum lineare</i>	7		Cow-wheat	1				Dry wooded slope, local opening above rocks
Forbs	<i>Micranthes virginiensis</i>	6		Early saxifrage	1				Steep upper edge shaded roadbank, rare
Forbs	<i>Prenanthes serpentina</i>	7	PT	Lion's-foot	1				Rich weedy upper wooded slope, very local
Forbs	<i>Prenanthes trifoliolatus</i>	7		Gall-of-the-earth	2			1	Dry acidic wooded slope, local
Forbs	<i>Silene stellata</i>	6		Starry campion	1				Rich weedy upper wooded slope, very local
Forbs	<i>Solidago patula</i>	6		Rough-leaved goldenrod	1				Wooded streambank, hanging edge, small plant
Forbs	<i>Thalictrum dioicum</i>	6		Early meadow rue	1				Dry woods road bank, few
Forbs	<i>Veratrum viride</i>	6		False hellebore	2			1	Moist wooded ravine bottoms, local
Forbs	<i>Vernonia glauca</i>	7	PE	Tawny ironweed				1	Thickety edge of path
Forbs	<i>Viola fimbriatula</i>	7		Northern downy violet	1				Dry acidic wooded slope, few
Graminoids	<i>Carex emmonsii</i>	7		A sedge	1			1	Dry wooded slopes, local
Graminoids	<i>Carex gynandra</i>	7		A sedge	1			1	Shaded streambanks, ditches, local
Graminoids	<i>Carex tonsa</i>	7	W	A sedge	1				Dry acidic wooded slope, few
Graminoids	<i>Carex vestita</i>	7	W	Woolly-fruit sedge	1			1	Dry wooded slopes, sterile small colonies
Graminoids	<i>Cyperus erythrorhizos</i>	3	W	Redroot flatsedge				1	Pond delta, Impoundments
Graminoids	<i>Dichanthelium microcarpon</i>	7		A panic-grass	1				Beaver knoll by Octoraro
Graminoids	<i>Trichophorum planifolium</i>	6		Woodland club-rush	3			1	Dry rich wooded slopes, occasional
Graminoids	<i>Glyceria septentrionalis</i>	6		Eastern manna-grass	1				Lower Blackburn Run, few
Shrubs	<i>Gaylussacia baccata</i>	6		Black huckleberry	1			1	Dry woods, local
Shrubs	<i>Lyonia ligustrina</i>	7		Maleberry	1				Phone cut glade N of farm lane, local
Shrubs	<i>Vaccinium stamineum</i>	7		Deerberry	2			1	Dry acidic wooded slopes, local
Trees	<i>Chionanthus virginicus</i>	7	PT	Fringe-tree	1				Wooded slope below rock outcrop, one tree
Trees	<i>Fagus grandifolia</i>	6		American beech	1			1	Moist wooded lower slopes, few, Octoraro
Trees	<i>Juglans cinerea</i>	3	W	Butternut				1	Thickety edge Octoraro Creek S of impoundmts
Trees	<i>Pinus virginiana</i>	6		Scrub pine				1	Dry upper wooded slope, local
Trees	<i>Quercus montana</i>	6		Chestnut oak				1	Dry ridgetop woods & slopes, locally common
Trees	<i>Tsuga canadensis</i>	6		Eastern hemlock	3			1	Rocky steep wooded slopes, cliffs
Vines	<i>Strophostyles umbellata</i>	8	PE	Pink wild bean				1	Dry thickety edge powerline cut access Rd, few

TABLE # 2

## THOURON ESTATE INVASIVE SPECIES

Count	SCINAME	COMMON NAME	Wo	Fi	So	La	HABITATS
9	Alliaria petiolata	Garlic mustard	5	2	1	1	Moist woods, thickets
9	Celastrus orbiculatus	Oriental bittersweet	5	2	1	1	Woods, edges, thickets, dry to moist
9	Elaeagnus umbellata	Autumn olive	5	2	1	1	Thickets, open woods, often abundant
9	Glechoma hederacea	Ground ivy	5	2	1	1	Moist thickets, lawns
9	Lonicera japonica	Japanese honeysuckle	5	2	1	1	Thickets, moist woods, edges
9	Microstegium vimineum	Japanese stilt-grass	5	2	1	1	Floodplains, moist fields, lawns
9	Rosa multiflora	Multiflora rose	5	2	1	1	Edges, thickets, open woods
9	Rubus phoenicolasius	Wineberry	5	2	1	1	Moist woods, stream corridors
9	Veronica hederaefolia	Ivy-leaved speedwell	5	2	1	1	Moist disturbed thickets, upper slopes
8	Artemisia vulgaris	Mugwort	4	2	1	1	Floodplain meadows, field edges
8	Lonicera maackii	Amur bush-honeysuckle	4	2	1	1	Thickets, woods, often common
8	Persicaria longiseta	Long-bristled smartweed	5	1	1	1	Moist weedy woods, meadows
8	Persicaria perfoliata	Mile-a-minute	4	2	1	1	Moist disturbed soil, edges
8	Potentilla indica	Indian strawberry	4	2	1	1	Moist soil, thickets, edges
8	Urtica dioica	Stinging nettle	4	2	1	1	Floodplain habitats, moist hedgerows
7	Ailanthus altissima	Tree-of-heaven	4	1	1	1	Thickety woods edges, local
7	Arthraxon hispidus	A grass	3	2	1	1	Impoundments, streambanks, wet meadows, loc abu
7	Ficaria verna	Lesser celandine	4	1	1	1	Floodplain woods and meadows, scattered
7	Hemerocallis fulva	Orange daylily	4	1	1	1	Floodplain meadows, woods
7	Phalaris arundinacea	Reed-canary grass	3	2	1	1	Floodplain habitats, ponds
6	Acer platanoides	Norway maple	4	1	1	1	Wooded banks, local
6	Malus species	Crabapple	4	1	1	1	Thickets, edges, local
6	Miscanthus sinensis	Japanese plumegrass	1	2	1	1	Dry open soil, abundant in ROW
5	Berberis thunbergii	Japanese barberry	4	1	1	1	Moist woods, local
5	Humulus japonicus	Japanese hops	2	1	1	1	Gravel bars and meadows, Octoraro
5	Robinia pseudo-acacia	Black locust	3	1	1	1	Dry wooded slopes and thickets, locally frequent
5	Securigera varia	Crown vetch	1	2	1	1	Floodplain meadows, field edges, roadsides, few
4	Cirsium arvense	Canada thistle	2	2	1	1	Fields, edges
4	Fallopia japonica	Japanese knotweed	3	1	1	1	Moist wooded ravines and streambanks
3	Buddleja davidi	Butterfly-bush	1	1	1	1	Dry disturbed soil, roadbank near center pond
3	Cardamine impatiens	Cut-leaved bittercress	2	1	1	1	Floodplain woods, few
3	Euonymus alatus	Winged burning-bush	3	1	1	1	Moist woods, rich woods, local
3	Phyllostachys sp.	Giant bamboo	2	1	1	1	Pond edges, woodland edges
3	Thlaspi alliaceum	Stinking penny-cress	1	1	1	1	Floodplain gravel bars, disturbed soil
2	Lonicera morrowii	Morrow's bush-honeysuckle	1	1	1	1	Utility Cut, thickety edges
2	Paulownia tomentosa	Princess-tree	1	1	1	1	Top of thickety slope in farm, weedy slopes, few
1	Ampelopsis glandulosa v. brevipedunculata	Porcelain-berry	1	1	1	1	Woodland edge by bulls-eye CREP Field, local
1	Aralia elata	Asian hercules-club	1	1	1	1	Young wooded slope S of center pond
1	Ligustrum obtusifolium	Broad-leaved privet	1	1	1	1	Weedy woods, thickets, floodplain
1	Ludwigia peploides	Primrose-willow	1	1	1	1	Impoundments Lancaster Side, as yet few
1	Lythrum salicaria	Purple loosestrife	1	1	1	1	Wet meadow N of Blackburn Run, local
1	Wisteria floribunda	Japanese wisteria	1	1	1	1	Roadside by old house establishing

**Bold = invasives that might still be controlled or eliminated**

**TABLE # 3 THOURON ESTATE STUDY PLANT LIST 2018**

Scientific name	Status	Common Name	List	Wo	Fi	So	La	
<b>Aquatics</b>								
Callitriche heterophylla	5	Water starwort		1	1			Small woodland streams, local
Callitriche stagnalis	A	Water-starwort		2	1			Flowing water, pond delta, local
Lemna minor	2	Duckweed			1	1		Impoundments and rivulets
Spirodela polyrhiza	3	Greater duckweed		1	1	1		Ponds, Impoundments, local
Wolffia brasiliensis	3	Pointed water-meal		2	1	1		Ponds, locally abundant
<b>Ferns</b>								
Adiantum pedatum	6	Maidenhair fern		2		1		Rich rocky wooded slopes, very local
Asplenium montanum	10	Mountain spleenwort				1		Shaded rocky faces along Octoraro, very local
Asplenium platyneuron	3	Ebony spleenwort		1	2			Shaded roadbanks, thickets, old walls, rare
Athyrium filix-femina v. angustum	3	Lady fern		3	1			Moist woods, local
Athyrium filix-femina v. asplenioides	3	Southern lady fern				1		Moist rocky wooded slope base, very local
Botrypus virginianus	5	Rattlesnake fern		1	1			Moist weedy woods, local
Cystopteris tenuis	4	Fragile fern		2		1		Moist shaded rocks and old walls, local
Dendrolycopodium obscurum	5	Tree clubmoss				1		Dry open oak mid toe-slope, very local
Dennstaedtia punctilobula	2	Hay-scented fern		5	1			Dry woods, locally abundant
Deparia acrostichoides	4	Silvery spleenwort		3	1	1		Moist woods and shaded banks, locally common
Diphasiastrum digitatum	5	Ground-cedar			1			Dry gravelly scoop lower ROW, pine woods
Dryopteris carthusiana	4	Spinulose woodfern		4	1			Moist wooded slopes, few
Dryopteris cristata	6	Crested fern			1			Lower side earth dam of center pond in shade
Dryopteris intermedia	4	Intermediate woodfern		3	1	1		Moist wooded slopes, rocks
Dryopteris marginalis	5	Marginal woodfern		3	1			Rocky woods near Octoraro, local
Dryopteris x bootii	4	Boott's woodfern				1		Moist rocky wooded slope near bridge, few
Equisetum arvense	1	Field horsetail		1	1			Floodplain meadows, streambanks
Huperzia lucidula	6	Shining clubmoss		1				Dry rocky oak wooded slope, along moist outcro
Lycopodioides apodum	4	Creeping spikemoss		1	1			Moist fields, clayey soil, locally abundant
Onoclea sensibilis	1	Sensitive fern		3	1	1		Moist soil, local
Osmunda claytoniana	5	Interrupted fern		4				Moist rich weedy woods, local
Osmundastrum cinnamomeum	5	Cinnamon Fern		2	1			Acid seeps, wet woods
Parathelypteris noveboracensis	4	New York fern		5	1			Rich dry woods, locally abundant
Phegopteris hexagonoptera	6	Broad beech fern		2				Rich wooded slope, local
Polypodium virginianum	8	Polypody		3	1			Rocky wooded slopes on boulders
Polystichum acrostichoides	3	Christmas fern		5	2	1	1	Moist wooded slopes, streambanks
Thelypteris palustris	5	Marsh fern				1		Marshy east edge Pond delta, local
<b>Forbs</b>								
Abutilon theophrastii	A	Velvet-leaf				1		Disturbed soil, few
Acalypha gracilens	3	Slender 3-seeded mercury				1		Bare soil in fields, local
Acalypha rhomboidea	0	Three-seeded mercury		2	2	1	1	Roadsides, cropfield edges, paths
Acalypha virginica	2	Three-seeded mercury				1		Dry disturbed soil, powerline cut
Achillea millefolium	0	Yarrow		1	1	1		Dry fields, edges
Actaea racemosa	5	Black cohosh		3	1			Rich to dry woods, local
Agastache nepetoides	4	Yellow giant hyssop		1	1			Woodland edges CREP Field, local
Ageratina altissima v. altissima	2	White snakeroot		3	2	1	1	Weedy moist thickets, edges
Agrimonia parviflora	2	Small-flowered agrimony				1		Moist open streambanks, few
Agrimonia sp.	4	An agrimony		1				Rich weedy wooded slope, very local
Alisma subcordatum	4	Water plantain					1	Impoundments
Alliaria petiolata	A*	Garlic mustard		5	2	1	1	Moist woods, thickets
Allium canadense	4	Meadow onion		3	1	1		Floodplain woods, few
Allium vineale	A	Field garlic		5	2	1	1	Fields, lawns
Amaranthus hybridus	A	Green amaranth					1	Roadsides, cropfields
Ambrosia artemisiifolia	0	Common ragweed		2	2	1	1	Floodplain meadows, roadsides, ROW
Ambrosia trifida	1	Great ragweed		1	2	1		Thickets, moist edges, roadsides

Scientific name	Status	Common Name	List	Wo	Fl	So	La	
<b>Forbs</b>								
Anemone americana	5	Round-lobed hepatica		1				Moist wooded slopes, very local
Anthemis arvensis	A	Corn camomile					1	Dry disturbed soil below farm, local
Apocynum cannabinum	1	Indian hemp, dogbane			2	1	1	Fields, Floodplain meadows
Apocynum x medium	2	Intermediate dogbane					1	Dry CREP field near powerline, tentative ID
Aquilegia canadensis	7	American columbine		1				Rock outcrop upper Blackburn Run, one, intro?
Arabidopsis thaliana	A	Mouse-ear cress		2	2	1	1	Disturbed open soil
Arctium minus	A	Common burdock			2	1	1	Disturbed open soil, trail edges
Arenaria serpyllifolia	A	Thyme-leaved sandwort		1	1		1	Gravelly waste ground, schisty farm roadbank
Arisaema dracontium	7	Green dragon					1	Moist wooded swale betw trail & berm N of UC
Arisaema triphyllum	3	Jack-in-the-pulpit		5			1	Moist wooded slopes
Artemisia vulgaris	A*	Mugwort		4	2	1	1	Floodplain meadows, field edges
Asarum canadense	4	Wild ginger		2			1	Rich wooded slopes, locally abundant
Asclepias incarnata v. pulchra	4	Hairy swamp milkweed					1	Pond bank N side South pond, few
Asclepias syriaca	1	Common milkweed		2	2	1	1	Floodplain meadows, fields, ROW, occ.
Barbarea verna	A	Spring cress			1		1	Dry CREP field far north, ROW, local
Barbarea vulgaris	A	Wintercress		3	2	1	1	Moist lawns, edges, pondbanks
Bidens bipinnata	2	Spanish needles					1	Dry roadsides near buildings, disturbed soil
Bidens cernua	4	Bur-marigold					1	Gravelly open streambank, impoundmt W side
Bidens connata	3	Beggar's-ticks					1	Moist edges, streambanks
Bidens frondosa	1	Beggar's-ticks		2			1	Floodplain woods, streambanks, local
Bidens species	3	A beggar's-ticks					1	South pond delta, locally abundant
Boehmeria cylindrica v. cylindrica	3	False nettle		5	2		1	Pond banks, streambanks, wet fields
Buglossoides arvensis	A	Corn gromwell					1	Disturbed roadbank near Octoraro, few
Callitriche terrestris	2	Terrestrial water-starwort		1				Mud puddle in floodplain path, very local
Capsella bursa-pastoris	A	Shepherd's purse					1	Floodplain meadows, few
Cardamine concatenata	5	Cut-leaved toothwort		2			1	Moist wooded slopes, very local
Cardamine hirsuta	A	Hairy bittercress		4	2	1	1	Moist lawns, edges, disturbed soil
Cardamine impatiens	A*	Cut-leaved bittercress		2			1	Floodplain woods, few
Cardamine pennsylvanica	5	Pennsylvania bittercress		2			1	Shaded to open streambanks
Carduus nutans	A	Nodding thistle			1	1	1	Hayfields, upper ROW
Cerastium fontanum	A	Mouse-eared chickweed		1	2		1	Dry fields, edges, open paths
Cerastium glomeratum	A	Mouse-ear chickweed		3	2	1	1	Moist lawns, edges, thickets, disturbed soil
Cerastium pumilum	A	Small mouse-ear chickweed		1			1	Dry gravelly disturbed waste ground
Chamaecrista fasciculata	1	Partridge-pea					2	Dry disturbed soil, schisty farm road roadbank
Chamaecrista nictitans	4	Wild sensitive plant					1	Dry disturbed soil, ROW
Chelidonium majus	A	Celandine		1				Wooded bank of Octoraro near house, few
Chenopodium album	A	Lamb's-quarters		1	1	1	1	Dry disturbed soil, powerline cut, driveways
Cicuta maculata	5	Water hemlock					1	Wet Impoundment roadbank larger impoundmen
Circaea canadensis subsp canadensis	2	Enchanter's-nightshade		3	1		1	Moist wooded slopes, thickets
Cirsium arvense	A*	Canada thistle					2	Fields, edges
Cirsium discolor	2	Field thistle		1	2		1	Dry fields, thicket edges
Cirsium vulgare	A	Bull thistle					1	Fields, roadsides, few
Claytonia virginica	3	Spring beauty		5	1	1	1	Moist woods, occasional, locally abundant
Clinopodium vulgare	1	Wild basil					1	Dry grassy edge lower powerline access road
Collinsonia canadensis	5	Horse-balm		2			1	Rich wooded slopes, locally frequent
Commelina communis	A	Asiatic dayflower		4	2	1	1	Moist weedy banks, roadsides, thickets
Conium maculatum	A	Poison hemlock		3	2	1	1	Floodplain meadows, pondbanks, cropland edge
Conyza canadensis	0	Horseweed		3	2	1	1	Disturbed soil, field edges
Corydalis flavula	3	Yellow corydalis					1	Wooded bank of Octoraro near house, few
Cryptotaenia canadensis	2	Honewort		5	2	1	1	Moist edges, local
Datura stramonium	A	Jimsonweed					1	Croplands, roadsides
Daucus carota	A	Wild carrot		2	1	1	1	Fields
Desmodium perplexum	3	Tick-trefoil		1	2			Shaded farm lane, mowed edge field, few
Dianthus armeria	A	Deptford pink			1	1	1	Disturbed soil, ROW, dry lawns. Fields

Scientific name	Status	Common Name	List	Wo	Fl	So	La	
<b>Forbs</b>								
Dysphania ambrosioides	A	Mexican tea					1	Weedy open floodplain by bridge, one plant
Epigaea repens	7	Trailing arbutus		1	1			Dry rocky acidic woods, rock outcrop, lycopodium
Epilobium coloratum	2	Willow herb		2	1	1		Floodplain meadows, pondbanks
Eranthis hyemalis	A	Winter aconite		1				Moist weedy wooded roadbank, local
Erechtites hieraciifolius	0	Pilewort		4	2	1	1	Weedy open floodplains, streambanks, dist. Soil
Erigeron annuus	0	Daisy fleabane		2	2	1	1	Floodplain meadows, fields, roadbanks
Erigeron philadelphicus	1	Common fleabane		3	2	1	1	Moist lawns, edges, open paths
Erigeron strigosus	0	Fleabane			1	1	1	Dry fields, roadsides
Erythronium americanum	4	Trout lily		5	1	1	1	Lower wooded slopes near Octoraro
Eupatorium perfoliatum	3	Boneset		2	1	1		Moist ground, streambanks, pond delta
Eupatorium rotundifolium v. ovatum	4TU	Hairy-leaved thoroughwort		1	1			Dry thickety edge powerline cut access Rd, one
Euphorbia maculata	0	Milk purslane			1			Disturbed soil around buildings, local
Euphorbia nutans	1	Eyebane		1	1			Dry grassy mowed field in powerline, roadsides
Eurybia divaricata	3	White wood aster		5	1			Wooded slopes and banks
Euthamia graminifolia	3	Grass-leaved goldenrod		3	2	1	1	Floodplain meadows, streambanks
Eutrochium fistulosum	3	Hollow joe-pye weed		1	1	1		Open streambanks, few
Eutrochium purpureum	5	Woodland joe-pye weed		1				Rich weedy wooded slope, local
Fallopia japonica	A*	Japanese knotweed		3	1			Moist wooded ravine bottoms and streambanks
Ficaria verna	A*	Lesser celandine		4	1	1	1	Floodplain woods and meadows, as yet scattered
Floerkea proserpinacoides	4	False mermaid-weed		1				Moist floodplain woods, locally common
Galinsoga quadriradiata	A	Galinsoga					1	Roadsides
Galium aparine	1	Cleavers		3	1	1	1	Moist lawns, edges, weedy thickets
Galium circaezans v. circaezans	5	Wild white licorice		3	1			Rich woods, occasional
Galium tinctorium	4	Swamp three-petaled bedstraw				1		Marshy pond edges near delta of south pond
Galium triflorum	3	Sweet bedstraw		2	1			Moist rich woods and shaded banks
Geranium carolinianum	1	Carolina cranesbill			1	1		Dry disturbed soil along field edges, local
Geranium maculatum	4	Wild geranium		1				Moist rich wooded slopes, local
Geum canadense	1	White avens		5	2	1	1	Moist thickets, edges
Glechoma hederacea	A*	Ground ivy		5	2	1	1	Moist thickets, lawns
Goodyera pubescens	6	Downy rattlesnake-plantain		1				Dry rocky oak wooded slope with heaths, few
Gratiola neglecta	3	Clammy hedge-hyssop		1				Mud puddles in forested trail, local
Hackelia virginiana	2	Beggar's-lice		3	2	1		Thickets, moist weedy woods
Helianthus decapetalus	3	Thin-leaved sunflower		2	1	1		Floodplain woods, ROW
Hemerocallis fulva	A*	Orange daylily		4	1	1	1	Floodplain meadows, woods
Heracleum maximum	3	Cow parsnip				1		Floodplain woods, local
Hesperis matronalis	A	Dame's rocket		1	1			Floodplain woods, rare
Hieracium venosum	6	Rattlesnake-weed				1		Dry oak woods, one plant
Hosta ventricosa	A	Plantain-lily		2				Lawns, persistent plantings, banks Octoraro
Houstonia caerulea	4	Bluets		3	1			Dry open rocky wooded slopes, occasional
Hydrocotyle sibthorpioides	A*	Lawn pennywort		1				Wet mossy farm roads in weedy woods, local
Hylodessmum nudiflorum	5	Naked-flowered tick-trefoil		1				Rich dry wooded slope, local
Hypericum mutilum	2	Dwarf st. john's-wort		1	1			Pondbanks
Hypericum perforatum	A	Common st. john's-wort			2			CREP Field, roadsides
Hypericum punctatum	2	Spotted st. john's-wort		2	2	1	1	Moist meadows, floodplain woods
Impatiens capensis	2	Orange jewelweed		3	2	1	1	Streambanks, floodplain thickets
Iris pseudoacorus	A	Yellow flag					1	Floodplain edge by Octoraro, one plant
Krigia virginica	6	Dwarf dandelion			1			Dry disturbed soil, schisty farm road roadbank
Kummerowia striata	A	Japanese clover			2	1		Dry open soil in fields, edges
Lactuca biennis	1	Tall lettuce		4	1	1		Moist weedy woods, thickets, roadbanks
Lactuca canadensis	1	Yellow smooth wild lettuce				1		Dry grassy edge lower powerline access road
Lactuca serriola	A	Prickly lettuce			1	1		Waste ground, field edges, roadbanks
Lamium purpureum	A	Purple dead-nettle		3	2	1	1	Moist disturbed soil
Laportea canadensis	4	Wood nettle		4	1	1		Floodplain woods, moist wooded slopes
Leonurus cardiaca	A	Motherwort			1			moist weedy enclosed field, few

Scientific name	Status	Common Name	List	Wo	Fl	So	La	
<b>Forbs</b>								
Leonurus marrubiastrum	A	Lesser motherwort		1	1			Dry open disturbed soil, powerline cut, loc freq
Lepidium campestre	A	Cow-cress		1	1			Disturbed soil, ROW
Lepidium densiflorum	A	Wild pepper-grass					1	Waste ground
Lepidium virginicum	0	Poor man's pepper			1			Dry disturbed soil, schisty farm road roadbank
Lespedeza cuneata	A	Sericea		1	1	1		Dry CREP field edge, local
Lespedeza intermedia	4	Wand-like bush-clover				1		Dry Miscanthusy edge powerline access rd, few
Linaria vulgaris	A	Butter-and-eggs			1		1	Fields, roadbanks
Lindernia dubia	3	False pimpernel		1		1	1	Wet meadows, pond delta, locally abundant
Lobelia inflata	0	Indian tobacco		1	2	1		Cropfield edges, disturbed soil CREP field edges
Lobelia spicata	8	Spiked lobelia		1				Wet meadow north of Blackburn Run
Ludwigia alternifolia	4	Seedbox		3	1	1		Seep north edge of ROW, open wetlands
Ludwigia palustris	3	Water purslane		3		1	1	Open muddy streambanks, pond edge
Ludwigia peploides ssp. glabrescens	A*	Primrose-willow					1	Impoundments Lancaster Side, as yet few
Lycopus americanus	4	Cut-leaved water-horehound		1				Wet meadow N of Blackburn Run
Lycopus virginicus	3	Bugleweed		4	1	1		Moist fields, thickets, woodland paths, occ
Lysimachia ciliata	3	Fringed loosestrife		1				Moist woods, streambanks
Lysimachia nummularia	A	Moneywort		1		1	1	Floodplain woods
Lysimachia quadrifolia	5	Whorled loosestrife		2		1		Dry acidic wooded slopes, very local
Lythrum salicaria	A*	Purple loosestrife		1				Wet meadow N of Blackburn Run, local
Maianthemum canadense	6	Canada mayflower		1		1		Steep moist ravine under Tsuga, by beaver knoll
Maianthemum racemosum	5	False solomon's-seal		4		1		Rich woods and wooded slopes
Matricaria discoidea	A	Pineapple-weed					1	Gravel waste ground
Medeola virginiana	5	Indian cucumber-root		1		1		Steep moist ravine slopes, under Tsuga, local
Medicago lupulina	A	Black medick			1		1	Dry disturbed soil, fields
Melampyrum lineare v. americanum	7	Cow-wheat		1				Dry wooded slope, local opening above rocks
Melilotus alba	A	White sweet clover					1	Dry open disturbed soil, powerline cut, common
Micranthes virginiensis	6	Early saxifrage		1				Steep upper edge shaded roadbank, rare
Mimulus ringens	5	Square-stemmed monkeyflower		3		1	1	Ponds, local
Mitchella repens	5	Partridgeberry		4		1		Moist rocky woods and banks, local
Mollugo verticillata	A	Carpetweed			1	1		Moist disturbed soil, ROW, field edges
Monarda didyma	1	Bee-balm		2				Floodplain woods near Octoraro, very local
Monarda fistulosa	1	Wild bergamot					1	Thickety edge upper ROW, CREP edge field-? I
Monotropa uniflora	4	Indian pipe					1	Dry wooded slope S of center pond, local
Myosoton aquaticum	A	Giant chickweed		3	2	1	1	Floodplain woods, moist thickets, edges
Narcissus pseudonarcissus	A	Daffodil		4	1	1	1	Floodplain woods, weedy shaded roadbanks, fe
Nasturtium officinale	A	Watercress					1	Flowing water, small streams, local
Oenothera biennis	1	Evening primrose		3	2		1	Open streambanks, floodplain meadows, waste
Ornithogalum umbellatum	A	Star-of-bethlehem		4	2	1	1	Floodplain woods, fields, weedy moist woods
Osmorhiza longistylis	4	Anise-root		2				Rich woods, thickets, banks
Osmorhiza sp.	4	Sweet cicely		1	1		1	Rich woods, thickets, banks, RE-ID later
Oxalis dillenii	1	Yellow wood-sorrel		4	1	1	1	Lawns, meadows, edges, floodplain woods
Packera aurea	5	Golden ragwort		1				Rich lower wooded slope edge, one patch
Penstemon digitalis	3	White beard-tongue		1	1	1		Moist thickets, edges, meadows
Penthorum sedoides	3	Ditch stonecrop		1			1	Wet meadow N of Blackburn Run, impoundmts
Perilla frutescens	A	Perilla		3	2	1	1	Moist disturbed soil, edges
Persicaria arifolia	5	Halberd-leaved tearthumb		1	1			Shaded streambanks older edges, very local
Persicaria hydropiper	A	Common smartweed					1	Small streambank lower ROW, local
Persicaria lapathifolia	A	Dock-leaved smartweed					1	Roadsides, streambanks
Persicaria longisetata	A*	Long-bristled smartweed		5	1	1	1	Moist weedy woods, meadows
Persicaria maculosa	A	Lady's-thumb		1		1	1	Dry gravelly fill powerline cut, roadsides
Persicaria pensylvanica	1	Pennsylvania smartweed			1		1	Grassy roadsides, moist weedy fields, impound
Persicaria punctata	2	Slender water smartweed		4	1	1	1	Small streambanks, floodplain edge, ponds
Persicaria sagittata	4	Arrow-leaved tearthumb		4	1		1	Pond banks, wetlands, moist low woods
Persicaria virginica	2	Virginia knotweed		5	2	1	1	Moist thickety woods, edges

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<b>Forbs</b>									
Phryma leptostachya	5	Lopseed		1				Rich to weedy woods, locally common	
Physalis heterophylla	2	Clammy ground-cherry				1		Thickety edge along path N side center Pond	
Physalis subglabrata	2	Smooth ground-cherry		1	1	1		Dry fields, roadsides, few	
Phytolacca americana	0	Pokeweed		5	2	1	1	Disturbed soil, open woods	
Pilea pumila	1	Clearweed		3	1	1	1	Streambanks, wetlands, moist soil	
Plantago aristata	A	Bristly plantain				1		Dry disturbed soil, schisty farm road roadbank	
Plantago lanceolata	A	English plantain		1	2	1	1	Lawns, fields	
Plantago major	A	Common plantain				1		Disturbed ground, fields	
Plantago rugelii	0	Pale plantain		2	2	1	1	Lawns, fields, woodland trails	
Plantago virginica	2	Hoary plantain				1		Dry disturbed soil along edge, few	
Podophyllum peltatum	5	Mayapple		5	1	1	1	Moist to dry woods and slopes	
Polygonatum biflorum v. biflorum	5	Solomon's-seal		5		1	1	Rich woods and shaded roadbanks	
Polygonum aviculare	A	Knotweed		1	1			Dry disturbed soil, schisty farm road roadbank	
Polygonum erectum	4	Erect knotweed				1	1	Farm lanes, local	
Pontederia cordata	1	Pickernelweed					1	Impoundment Lancaster Side, few, planted	
Portulaca oleracea	A	Purslane				1		Disturbed soil around old buildings, local	
Potentilla canadensis	2	Dwarf cinquefoil		2	1	1		Dry edges, open woods, powerline cut	
Potentilla indica	A*	Indian strawberry		4	2	1	1	Moist soil, thickets, edges	
Potentilla norvegica	A	Rough cinquefoil		1	1	1	1	Disturbed moist to dry soil	
Potentilla recta	A	Rough-fruited cinquefoil		1			1	Dry fields, waste ground	
Potentilla reptans	A	Creeping cinquefoil		2				moist lawns, floodplain meadows	
Potentilla simplex	2	Common cinquefoil		2	1	1		Moist fields, meadows, edges, ROW	
Prenanthes altissimus	4	Tall white wild lettuce		2				Dry wooded slopes, local	
Prenanthes serpentarius	7PT	Lion's-foot		1				Rich weedy upper wooded slope, very local	
Prenanthes trifoliolatus	7	Gall-of-the-earth		2		1		Dry acidic wooded slope, local	
Prunella vulgaris	2	Heal-all		2	2			Moist paths, local	
Pseudognaphalium obtusifolium	2	Sweet everlasting		2	2	1		Beaver knoll by Octoraro, CREP fields	
Pycnanthemum virginianum	4	Virginia mountain-mint		1		1		Small CREP Field in S, Blackburn Run meadow,	
Ranunculus abortivus	2	Kidneyleaf buttercup		3	2	1	1	Moist woods, banks, woodland trails	
Ranunculus bulbosus	A	Bulbous buttercup		2	2	1	1	Lawns, fields, open path edges	
Ranunculus recurvatus	3	Hooked buttercup		1			1	Moist woods, wet woods roads, few	
Rorippa palustris	2	Yellow marsh cress		1				Wet meadow north of Blackburn Run	
Rorippa sylvestris	A	Creeping yellow cress		1				Floodplain meadow road puddle edges, local	
Rudbeckia laciniata	5	Green-headed coneflower				1	1	Open grassy streamside ROW, Floodpl wds, few	
Rumex acetosella	A	Sheep sorrel				1	1	Dry edges, powerlines, schisty farm road bank	
Rumex crispus	A	Curly dock		1	2	1	1	Lawns, path edges, moist edges	
Rumex obtusifolius	A	Broad dock		4	2	1	1	Moist edges, floodplain habitats	
Rumex patientia	A	Patience Dock					1	Waste ground, highly disturbed soil	
Sagittaria australis	5	Southern arrowhead				1		Marshy pond edges, south pond delta, local	
Sanguinaria canadensis	3	Bloodroot		3		1	1	Moist woods, ROW banks	
Sanicula canadensis	3	Black snakeroot		3	1	1		Moist to dry woods, thickets	
Saponaria officinalis	A	Soapwort				1	1	Floodplain meadows, few	
Scilla sibirica	A	Squill		1				Moist weedy wooded roadbank, local	
Scleranthus annuus	A	Knawel					1	Gravelly waste ground by farm	
Scrophularia lanceolata	6	Lanceleaf figwort		1		1		Thickety rich bank above road, utility cut, local	
Scrophularia marilandica	1	Carpenter's-square				1		Woodland edge CREP field far N, few	
Scutellaria lateriflora	4	Mad-dog skullcap		1				Shaded wetlands, streambanks, local	
Securigera varia	A*	Crown vetch		1	2	1	1	Floodplain meadows, field edges, roadsides, few	
Senecio vulgaris	A	Common groundsel		1	1			Disturbed soil, old farm lane, few	
Sida spinosa	A	Prickly mallow				1		Roadsides, cropfields	
Silene antirrhina	1	Sleepy catchfly				1	1	Dry disturbed soil, ROW	
Silene latifolia	A	White campion				2	1	1	Dry disturbed soil along field edges, local
Silene stellata	6	Starry campion		1				Rich weedy upper wooded slope, very local	
Sisyrinchium angustifolium	3	Blue-eyed grass		3	1	1	1	Woodland trails, field edges, occasional	

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<b>Forbs</b>								
<i>Solanum carolinense</i>	A	Horse-nettle		2	2	1	1	Hayfields, cropfield edges, locally common
<i>Solanum pycnanthum</i>	A	Black nightshade			1	1		Disturbed soil, powerline cut, few
<i>Solidago caesia</i>	5	Blue-stemmed goldenrod		3				Rich wooded slopes, rich woods along Octoraro
<i>Solidago canadensis</i>	1	Canada goldenrod		4	2	1	1	Fields, floodplain woods, locally common
<i>Solidago gigantea</i>	4	Late goldenrod		3	1		1	Low moist ground, streambanks, pondbanks
<i>Solidago nemoralis</i>	4	Gray goldenrod			1			Dry grassy lawn near schisty farm road bank
<i>Solidago patula</i>	6	Rough-leaved goldenrod		1				Wooded streambank, hanging edge, small plant
<i>Solidago rugosa</i>	3	Rough-stemmed goldenrod		4	2	1	1	Fields, floodplain woods, enclosed hedged field
<i>Sonchus asper</i>	A	Spiny-leaved sow thistle				1		Pond delta
<i>Stellaria longifolia</i>	4	Long-leaved stitchwort				1		Moist low fields, woodland edges, streambanks
<i>Stellaria media</i>	A	Common chickweed		5	2	1	1	Lawns, moist edges, thickets
<i>Symphotrichum lanceolatum</i>	2	Panicled aster		2	2	1	1	Moist thickets, edges, roadsides, pond banks
<i>Symphotrichum lateriflorum</i>	2	Calico aster		2				Fields, edges, open woods
<i>Symphotrichum pilosum v pilosum</i>	2	Heath aster		1	1		1	Roadsides, fields, pastures
<i>Symphotrichum puniceum</i>	3	Purple-stemmed aster		2				Wet meadows, streambanks, local
<i>Symplocarpus foetidus</i>	3	Skunk cabbage		5	1	1	1	Woodland seeps, streambanks
<i>Taraxacum officinale</i>	A	Dandelion		2	2	1	1	Lawns, disturbed soil, walls
<i>Teucrium canadense v. canadense</i>	3	Germander		4	1	1	1	Floodplain meadows, woods
<i>Thalictrum dioicum</i>	6	Early meadow rue		1				Dry woods road bank, few
<i>Thalictrum pubescens</i>	3	Tall meadow rue		4		1		Moist wooded ravine bottoms, streamsides, local
<i>Thalictrum thalictroides</i>	6	Rue anemone		2				Rich wooded slopes, very local
<i>Thlaspi alliaceum</i>	A*	Stinking penny-cress		1		1	1	Floodplain gravel bars, disturbed soil
<i>Thlaspi arvense</i>	A	Field pennycress		1	2		1	Floodplain meadows, cropfields, moist open soil
<i>Tradescantia virginiana</i>	4	Spiderwort		1				Rich weedy upper wooded slope, very local
<i>Tragopogon dubius</i>	A	Larger goat's-beard			1			CREP field, few
<i>Trifolium campestre</i>	A	Low hop clover			1		1	Dry fields and banks
<i>Trifolium dubium</i>	A	Least hop clover					1	Dry disturbed soil below farm, local
<i>Trifolium pratense</i>	A	Red clover				1	1	Fields, few
<i>Trifolium repens</i>	A	White clover		3	2	1	1	Lawns, fields
<i>Triodanis perfoliata</i>	0	Venus' looking-glass		1	1	1	1	Disturbed soil in fields, local
<i>Typha latifolia</i>	1	Cattail		1	1		1	Ponds, created impoundments
<i>Urtica dioica</i>	A*	Stinging nettle		4	2	1	1	Floodplain habitats, moist hedgerows
<i>Uvularia perfoliata</i>	6	Perfoliate bellwort		2				Rich woods
<i>Uvularia sessilifolia</i>	6	Sessile bellwort		2		1		Dry to moist acidic wooded slopes
<i>Valerianella locusta</i>	A	Corn-salad		1				Wooded bank of Octoraro near house, few
<i>Veratrum viride</i>	6	False hellebore		2		1	1	Moist wooded ravine bottoms, local
<i>Verbascum blattaria</i>	A	Moth-mullein				1		Field edge, disturbed soil
<i>Verbascum thapsus</i>	A	Common mullein		1	1	1	1	Dry disturbed soil, roadsides, few
<i>Verbena hastata</i>	4	Blue vervain		1	1		1	Impoundments, pond banks, wet meadows
<i>Verbena urticifolia</i>	1	White vervain		3	1	1	1	Floodplain banks, edges
<i>Vernonia glauca</i>	7PE	Tawny ironweed				1		Thickety edge of path, one plant
<i>Veronica americana</i>	5	American brooklime				1		Flowing water, stream at ROW
<i>Veronica arvensis</i>	A	Corn speedwell			2	1	1	Field edges, pastures, waste ground
<i>Veronica hederifolia</i>	A*	Ivy-leaved speedwell		5	2	1	1	Moist disturbed thickets, upper slopes
<i>Veronica peregrina</i>	0	Purslane speedwell		2		1		Flowing water, stream at ROW, pond banks
<i>Veronica persica</i>	A	Bird's-eye speedwell			1	1		Moist disturbed soil
<i>Veronica serpyllifolia</i>	A	Thyme-leaved speedwell		2	1	1	1	Lawns, moist fields
<i>Viola affinis</i>	4	Leconte's violet		3		1		Rich wooded slopes, trail edges, local
<i>Viola arvensis</i>	A	Wild pansy			1		1	Cropfield edges, few
<i>Viola blanda</i>	5	Sweet white violet				1		Steep wooded slope under Tsuga, few
<i>Viola eriocarpa (pub. v. scabriuscula)</i>	6	Smooth yellow violet		4	2		1	Moist thickety woods, locally frequent
<i>Viola fimbriatula</i>	7	Northern downy violet		1				Dry acidic wooded slope, few
<i>Viola hirsutula</i>	5	Southern wood violet		1		1		Dry wooded slopes and along trail, few
<i>Viola labradorica</i>	5	Dog violet		2				Rich open floodplain slopes, very local

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<b>Forbs</b>								
<i>Viola primulifolia</i>	6	Primrose-leaved violet		2				Moist shaded woodland roadbanks, local
<i>Viola sororia</i>	1	Common blue violet		5	2	1	1	Lawns, woods, thickets
<i>Viola sororia</i> cv. <i>priceana</i>	A	Confederate violet			1			Field south of east woods, local
<i>Xanthium strumarium</i>	A	Cocklebur		1			1	Impoundments, streambanks
<b>Graminoids</b>								
<i>Agrostis perennans</i>	2	Upland bent-grass		2				Wooded slopes
<i>Agrostis scabra</i>	4	Hairgrass		3				Dry wooded slopes, beaver knoll
<i>Agrostis stolonifera</i>	A*	Creeping bentgrass			2	1		Wet fields, lawny edges
<i>Andropogon gerardii</i>	1	Big bluestem		1	2	1	1	CREP fields, planted and establishing
<i>Andropogon virginicus</i>	2	Broomsedge		1	2	1	1	Dry fields, edges, powerline
<i>Anthoxanthum odoratum</i>	A	Sweet vernal grass		1	2	1	1	Fields, meadows
<i>Arthraxon hispidus</i>	A*	A grass		3	2	1	1	Impoundments, streambanks, wet meadows, loc
<i>Bromus commutatus</i>	A	Hairy chess			1	1	1	Fields, thickets, edges
<i>Bromus inermis</i>	A*	Awnless brome-grass		1	2	1	1	Fields, pastures, grassy roadsides
<i>Bromus sterilis</i>	A	Barren brome			1	1	1	Roadsides, disturbed edges, local
<i>Bromus tectorum</i>	A	Hairy chess					1	Dry disturbed soil, local
<i>Carex aggregata</i>	3	Glomerate sedge		1			1	Moist woods, thickets, shaded roadsides
<i>Carex albicans</i>	3	A sedge		3		1	1	Dry woods
<i>Carex amphibola</i>	2	A sedge		2	1	1	1	Moist woods, thickets, edges
<i>Carex blanda</i>	2	A sedge		1	1	1	1	Fields, thickets, woods
<i>Carex cephalophora</i>	3	A sedge		1				Open thickety edges, local
<i>Carex digitalis</i>	4	A sedge		3		1		Rich dry woods, slopes, frequent
<i>Carex emmonsii</i>	7	A sedge		1		1	1	Dry wooded slopes, local
<i>Carex festucacea</i>	4	A sedge		1				Beaver knoll by Octoraro
<i>Carex frankii</i>	3	Frank's sedge		1			1	Impoundments, floodplain meadows, local
<i>Carex glaucoidea</i>	3	Glaucous sedge		1				Banks woodland trail, local
<i>Carex gracilescens</i>	4	A sedge		1		1		Rich floodplain woods, moist fields, loc. Abund
<i>Carex gracillima</i>	5	A sedge		1				Rich floodplain woods, lower slopes
<i>Carex gynandra</i>	7	A sedge		1		1		Shaded streambanks, ditches, local
<i>Carex laevivaginata</i>	4	A sedge		1			1	Shaded ditches, streambanks, wetlands
<i>Carex laxiculmis</i>	5	A sedge		4		1	1	Wooded slopes, local
<i>Carex laxiflora</i>	4	A sedge		1				Rich wooded slopes, local
<i>Carex lurida</i>	1	Sallow sedge		2	1	1		Pond banks, wetlands, wet fields
<i>Carex muehlenbergii</i>	5	Muhlenberg's sedge			1			Dry grassy CREP field, local
<i>Carex normalis</i>	3	A sedge			1			Wet corner CREP field
<i>Carex pensylvanica</i>	5	Pennsylvania sedge		5		1		Dry woods and slopes
<i>Carex radiata</i>	2	A sedge		2	1	1		Woods, thickets, edges
<i>Carex rosea</i>	3	A sedge		1				Rich weedy upper wooded slopes, very local
<i>Carex swanii</i>	3	A sedge		2		1		Dry woods, woodland paths, locally common
<i>Carex tonsa</i>	7W	A sedge		1				Dry acidic wooded slope, few
<i>Carex tribuloides</i>	2	A sedge		1			1	Moist meadows, open woods, local
<i>Carex umbellata</i>	5	A sedge		1				Dry rich open woods, few
<i>Carex vestita</i>	7	Woolly-fruit sedge		1		1		Dry wooded slopes, sterile small colonies
<i>Carex virescens</i>	4	A sedge		1				Dry open wooded slopes, local
<i>Carex vulpinoidea</i>	2	A sedge				1		Moist fields, wet meadows
<i>Cinna arundinacea</i>	3	Wood reed-grass		3		1		Moist woods, streambanks, fields
<i>Coleataenia anceps</i>	4	A panic-grass		2	1	1		Dry grassy fields, ROW, local
<i>Cyperus erythrorhizos</i>	3W	Redroot flatsedge				1	1	Pond delta, impoundments, local
<i>Cyperus flavescens</i>	1	Umbrella-sedge					1	South pond delta, local
<i>Cyperus lupulinus</i> v. <i>macilentus</i>	3	A flatsedge				1		Dry grassy lawn near schisty farm road bank
<i>Cyperus strigosus</i>	2	A flatsedge		1	2	1	1	Fields, pond banks, wet meadows
<i>Dactylis glomerata</i>	A	Orchard grass		2	2	1	1	Fields, lawns, roadsides
<i>Danthonia spicata</i>	2	Wild oat-grass		4		1		Dry woods, bases of trees

Scientific name	Status	Common Name	List	Wo	Fl	So	La	
<b>Graminoids</b>								
Dichanthelium acuminatum v. fasciculatum	5	A panic-grass		1	1			Beaver knoll , dry schisty rdbk
Dichanthelium boscii	5	A panic-grass		1		1		Dry open wooded slopes under hickory, local
Dichanthelium clandestinum	2	Deer-tongue grass		5	2	1	1	Edges, fields, floodplains, local
Dichanthelium dichotomum	2	A panic-grass		2		1		Dry acidic wooded slopes, local
Dichanthelium microcarpon	7	A panic-grass		1				Beaver knoll by Octoraro
Digitaria ciliaris	A	Southern crabgrass		1		1	1	Dry disturbed soil, lawns, roadsides
Digitaria ischaemum	A	Crabgrass				1		Dry disturbed soil, lawns
Digitaria sanguinalis	A	Crabgrass		1	1	1	1	Fields, lawns
Echinochloa crus-galli	A	Barnyard grass			1	1	1	Pond delta, moist fields, roadsides
Echinochloa muricata	3	Barnyard grass		1				Wet floodplain weedy meadows, local
Eleocharis obtusa	2	Blunt spike-rush				1	1	Pond delta, Impoundments, local
Eleocharis tenuis	2	Slender spike-rush		1				Wet mowed edge meadow N of Blackburn Run
Eleusine indica	A	Goose-grass			1	1		Roadsides, paths
Elymus canadensis v. canadensis	6	Canada wild-rye					1	CREP field Lancaster side, very local
Elymus repens	A*	Witch grass					1	Upper floodplain meadow, ROW
Elymus riparius	3	Riverbank wild-rye		1		1		Floodplain of Octoraro, open woods, ROW
Elymus virginicus	3	Virginia wild-rye					1	Floodplain woods
Eragrostis pectinacea	0	Carolina lovegrass				1		Gravel road near buildings
Festuca subverticillata	3	Woodland fescue		3		1	1	Floodplain woods, moist wooded slopes
Glyceria septentrionalis	6	Eastern manna-grass		1				Lower Blackburn Run, few
Glyceria striata	3	Fowl manna-grass		2		1		Shaded streambanks, wetlands
Holcus lanatus	A	Velvet grass				1		Moist fields, local
Juncus acuminatus	4	A rush				1		Wet meadowy farm road below impoundment to
Juncus effusus	2	Soft rush		3	2	1	1	Streambanks, pondbanks, wet or dist. Soil
Juncus marginatus	3	A rush			1	1		Small streambank lower ROW, few
Juncus tenuis	1	Path rush		3	1	1	1	Grassy paths, fields, open wetland edges
Leersia oryzoides	2	Rice cut-grass			1	1	1	Pond edges, delta, locally abundant
Leersia virginica	2	White grass		4	1	1	1	Moist woods, woodland paths
Luzula echinata	3	Wood rush		3	1	1		Wooded banks
Microstegium vimineum	A*	Japanese stilt-grass		5	2	1	1	Floodplains, moist fields, lawns, edges
Miscanthus sinensis	A*	Japanese plumegrass		1	2	1	1	Dry open soil, abundant in ROW, open wds
Muhlenbergia frondosa	1	Leafy muhly				1		Wet corner CREP Field, local
Muhlenbergia schreberi	0	Nimblewill		2	2	1	1	Dry fields, roadsides, lawns, grassy paths
Panicum dichotomiflorum	0	A panic-grass		1	1	1	1	Roadsides, disturbed soil
Panicum virgatum	1	Switch-grass				2	1	Impoundments, streambanks, CREP fields
Paspalum laeve	3	Bead-grass					1	Grassy fields, few
Phalaris arundinacea	A*	Reed-canary grass		2	2	1	1	Floodplain habitats, ponds
Phleum pratense	A	Timothy				1	1	Hayfields, CREP fields
Poa annua	A	Annual bluegrass		1	1	1	1	Lawns, moist trails
Poa pratensis	A	Kentucky bluegrass		2	2	1	1	Lawns, fields, open path edges
Poa trivialis	A	Rough-stemmed bluegrass		3	1		1	Moist woods, shaded weedy floodplains
Saccharum ravennae	A	Ravenna-grass				1	1	Dry grassy slopes, pond banks, local
Schedonorus arundinaceus	A*	Meadow fescue		2	1	1	1	Fields, lawns
Schoenoplectus tabernaemontanae	5	Great bulrush		1			1	Pond banks, Impoundments
Scirpus cyperinus	4	Woolgrass				1	1	Impoundments
Scirpus polyphyllus	4	Leafy bulrush		1	1	1		Wooded streambanks, local
Setaria faberi	A	Giant foxtail grass		1	2	1	1	Disturbed dry soil, roadsides
Setaria parviflora	3	Slender foxtail grass					1	Dry grassy meadowy edge upper powerline cut
Setaria pumila	A	Yellow foxtail		1	1	1	1	Dry lawns, grassy edges, roadsides
Setaria viridis	A	Green foxtail		1		1	1	Open disturbed soil, powerline cut
Sorghastrum nutans	5	Indian grass			2	1	1	CREP Fields
Trichophorum planifolium	6	Woodland club-rush		3		1		Dry rich wooded slopes, occasional
Tridens flavus	1	Purpletop		2	2	1	1	Fields, roadsides, grassy pond banks

Scientific name	Status	Common Name	List	Wo	F	So	La	
<b>Shrubs</b>								
<i>Alnus serrulata</i>	4	Common alder		1				High streambank by phone cut N of old rd, one
<i>Berberis thunbergii</i>	A*	Japanese barberry		4	1			Moist woods, local
<i>Buddleja davidi</i>	A*	Butterfly-bush		1	1	1		Dry disturbed soil, schisty farm road roadbank
<i>Cercis canadensis</i>	1	Redbud		1				Rich weedy woods, few, persistent ?
<i>Cornus amomum</i>	3	Swamp dogwood		1				Moist wooded streambank Blackburn Run, few
<i>Corylus americana</i>	5	American hazelnut		1				Open woods towards ridge, very local
<i>Elaeagnus umbellata</i>	A*	Autumn olive		5	2	1	1	Thickets, open woods, often abundant
<i>Euonymus alatus</i>	A*	Winged burning-bush		3				Moist woods, rich woods, local
<i>Forsythia sp.</i>	A	Forsythia		1	1			Old home sites, persistent
<i>Gaylussacia baccata</i>	6	Black huckleberry		1	1			Dry woods, local
<i>Hamamelis virginiana</i>	6	Witch-hazel		4	1			Dry wooded slopes
<i>Ilex verticillata</i>	4	Winterberry		1	1	1		Steep moist wooded slopes, few
<i>Kalmia latifolia</i>	6	Mountain laurel		3	1			Dry woods, wooded slopes, often abundant
<i>Ligustrum obtusifolium</i>	A*	Broad-leaved privet		1				Weedy woods, thickets, floodplain
<i>Lindera benzoin</i>	2	Spicebush		5	2	1	1	Moist woods, slopes
<i>Lonicera maackii</i>	A*	Amur bush-honeysuckle		4	2	1	1	Thickets, woods, often common
<i>Lonicera morrowii</i>	A*	Morrow's bush-honeysuckle		1	1			ROW, thickety edges
<i>Lyonia ligustrina</i>	7	Maleberry		1				Phone cut glade N of farm lane, local
<i>Phyllostachys sp.</i>	A*	Giant bamboo		2		1		Center pond edges, woodland edges
<i>Prunus americana</i>	5	American wild plum				1		Thickety CREP field edge N of Rt. 272, one
<i>Rhododendron periclymenioides</i>	5	Pinxter flower		3	1			Dry wooded slopes and banks
<i>Rhus copallina</i>	4	Shining sumac			1			Dry slopes powerline cut, frequent
<i>Rhus glabra</i>	3	Smooth sumac		1	1			Dry slopes powerline cut, roadsides, few
<i>Rosa multiflora</i>	A*	Multiflora rose		5	2	1	1	Edges, thickets, open woods
<i>Rubus allegheniensis</i>	1	Blackberry		4	2	1	1	Edges, thickets, open woods, ROW
<i>Rubus flagellaris</i>	1	Dewberry		4	1	1		Thickets, dry woods, edges
<i>Rubus occidentalis</i>	1	Thimbleberry		3	2	1	1	Moist woods, edges, local
<i>Rubus phoenicolasius</i>	A*	Wineberry		5	2	1	1	Moist woods, stream corridors
<i>Sambucus canadensis</i>	3	Elderberry		4	1			Moist to dry wooded slopes, streambanks, local
<i>Symphoricarpos orbiculatus</i>	A	Coralberry			1	1		Thickety edges between fields, paths, local
<i>Vaccinium corymbosum</i>	5	Highbush blueberry		2				Dry oak woods lower slopes, local along Octorar
<i>Vaccinium pallidum</i>	6	Lowbush blueberry		2	1			Dry open woods, beaver knoll, local
<i>Vaccinium stamineum</i>	7	Deerberry		2	1			Dry acidic wooded slopes, local
<i>Viburnum acerifolium</i>	5	Maple-leaved viburnum		4		1		Dry wooded slopes and banks
<i>Viburnum dentatum</i>	3	Southern arrowwood viburnum		4	1	1		Rich to moist woods and slopes
<i>Viburnum opulus</i>	A*	Guelder-rose		1				Thickety edges near old house near 272
<i>Viburnum prunifolium</i>	2	Black-haw		5	2	1	1	Moist to dry wooded slopes, hedgerows
<b>Trees</b>								
<i>Acer negundo</i>	2	Box elder		5	2	1	1	Floodplain woods, weedy moist thickets
<i>Acer platanoides</i>	A*	Norway maple		4	1	1		Wooded banks, local
<i>Acer rubrum</i>	1	Red maple		5	2	1	1	Woods, seedlings in CREP fields
<i>Acer saccharinum</i>	3	Silver maple		1	2	1	1	Moist hedgerows, large trees, along Octorar
<i>Acer saccharum</i>	5	Sugar maple		1				Moist wooded slopes by stream, understory
<i>Ailanthus altissima</i>	A*	Tree-of-heaven		4	1	1	1	Thickety woods edges, local
<i>Amelanchier arborea</i>	5	Tree shadbush		5	1	1		Dry wooded slopes, banks, beaver knoll
<i>Aralia elata</i>	A*	Asian horculcus-club		1				Young wooded slope S of center pond
<i>Betula lenta</i>	4	Cherry birch		4	1	1		Dry woods, wooded slopes, locally abundant
<i>Betula nigra</i>	1	River birch		1	1			Floodplain meadows, old CREP plantings
<i>Betula populifolia</i>	2	Gray birch		1	2			Thickety edges, CREP field edges, very local
<i>Carpinus caroliniana ssp. virginiana</i>	5	Ironwood		4	1			Moist woods, rich wooded slopes
<i>Carya cordiformis</i>	3	Bitternut hickory		2		1		Floodplain woods
<i>Carya glabra</i>	4	Pignut hickory		2	1			Dry woods
<i>Carya tomentosa</i>	5	Mockernut hickory		5	1	1		Dry woods, rich woods

Scientific name	Status	Common Name	List	Wo	Fl	So	La	
<b>Trees</b>								
Castanea dentata	5	American chestnut		1				Rich wooded slopes, few, one 45" DBH
Castanea mollissima	A	Chinese chestnut				1		Edge of grassy field N of stream, planted tree
Celtis occidentalis	2	Hackberry			1			Inside abandoned old stone building, sapling
Chionanthus virginicus	7PT	Fringe-tree		1				Wooded slope below rock outcrop, one tree
Cornus florida	5	Flowering dogwood		5	2	1		Woods, thicket edges, occ., locally freq
Crataegus species	4	Hawthorn		1				Rich dry woods, few
Diospyros virginiana	5	Persimmon		1				Bank of north pond
Fagus grandifolia	6	American beech		1		1		Moist wooded lower slopes, few, Octoraro
Fraxinus americana	1	White ash		3	1		1	Weedy woods, floodplain edges
Fraxinus pennsylvanica	3	Green ash		1				Wet floodplain meadows, planted (?), saplings
Gleditsia triacanthos	A	Honey locust					1	Floodplain meadows, planting escape?
Gymnocladus dioicus	A	Kentucky coffee-tree				1		Dry roadsides near buildings, disturbed soil
Ilex opaca	5	American holly		5		1	1	Dry woods, mostly saplings
Juglans cinerea	3W	Butternut					1	Thicket edge Octoraro Creek S of impoundmts
Juglans nigra	2	Black walnut		5	2	1	1	Floodplain woods, moist thickets
Juniperus virginiana	2	Red cedar		2	2	1	1	Dry thickets, edges, upper ROW
Koeleruteria paniculata	A	Goldenrain tree				1		Large tree near buildings, escaping
Liriodendron tulipifera	2	Tulip-tree		4	2	1	1	Moist woods, slopes
Maclura pomifera	A	Osage orange		3	2		1	Thicket woods, floodplain woods
Magnolia tripetala	IPR	Umbrella magnolia		1				Old farm lane east of abandoned house, persiste
Malus pumila	A	Apple				1		Thicket woods, old orchards
Malus species	A*	Crabapple		4	1	1		Thickets, edges, local
Morus alba	A	White mulberry		1	1	1	1	Thicket woods along paths, local
Nyssa sylvatica	4	Black gum		5		1		Woods, occasional
Paulownia tomentosa	A*	Princess-tree		1			1	Top of thickety slope in farm, weedy slopes, few
Picea abies	A	Norway spruce		2	1	1		Moist soil, persistent from plantings
Pinus strobus	1	White pine		2		1		Moist wooded slopes, older persistent trees
Pinus virginiana	6	Scrub pine				1		Dry upper wooded slope, local
Platanus occidentalis	3	Sycamore		5	2	1	1	Floodplain woods, moist stream corridors
Populus grandidentata	3	Bigtooth aspen		1	1	1		Thicket woods, very local
Prunus avium	A	Sweet cherry		1			1	Rich woods, occasional
Prunus serotina	1	Black cherry		4	2	1	1	Woods, hedgerows
Pyrus communis	A	Pear		1				Thicket woods, few, older trees
Quercus alba	4	White oak		5		1	1	Rich woods, dry woods
Quercus coccinea	4	Scarlet oak		4		1		Dry ridgetop woods and slopes
Quercus montana	6	Chestnut oak				1		Dry ridgetop woods & slopes, locally common
Quercus palustris	3	Pin oak		1				Floodplain woods, large tree near house in N
Quercus phellos	1PE	Willow oak		1				Phone cut glade N of farm lane, seedling
Quercus rubra	4	Red oak		3		1		Woods
Quercus velutina	4	Black oak		4	1	1	1	Dry woods, thickets (as saplings)
Rhus hirta	1	Staghorn sumac				1		Thicket edges, utility cut
Robinia pseudo-acacia	A*	Black locust		3	1		1	Dry wooded slopes and thickets, locally frequent
Salix babylonica	A	Weeping willow		1				Open streambanks, few
Salix nigra	2	Black willow		1	1	1	1	Pond banks, streambanks, local
Sassafras albidum	1	Sassafras		4	1	1	1	Dry woods, roadside hedgerows
Tsuga canadensis	6	Eastern hemlock		3		1		Rocky steep wooded slopes, cliffs
<b>Vines, herbaceous</b>								
Amphicarpaea bracteata	4	Hog peanut		5	1	1	1	Rich woods, floodplain woods
Calystegia sepium	0	Hedge bindweed		1	1	1	1	Fields, hedgerows
Clematis virginiana	4	Virgin's-bower		2		1	1	Weedy thickets, edges, meadows, floodplain
Cuscuta gronovii	3	Dodder		1		1		Semi-open streambanks. Powerline cut, few
Dioscorea batatas	A	Cinnamon-vine					1	Floodplain meadow near Octoraro, very local
Dioscorea villosa	4	Wild yam		3		1		Rich to weedy woods, ROW edges, local

<b>Scientific name</b>	<b>Status</b>	<b>Common Name</b>	<b>List</b>	<b>Wo</b>	<b>Fl</b>	<b>So</b>	<b>La</b>	
<b><u>Vines, herbaceous</u></b>								
Fallopia scandens	1	Climbing false buckwheat		4	2	1	1	Dry edges, fields, roadbanks
Humulus japonicus	A*	Japanese hops		2	1	1	1	Gravel bars and meadows, Octoraro
Ipomoea hederacea	A	Ivy-leaved morning-glory		1				Roadsides Rt. 272, local
Ipomoea pandurata	4	Wild potato-vine				1		Dry thickety edge powerline, CREP field, local
Ipomoea purpurea	A	Common morning-glory		1				Roadsides Rt. 272, local
Menispermum canadense	4	Canada moonseed				1		Woodland edge by stream in ROW, midslope
Persicaria perfoliata	A*	Mile-a-minute		4	2	1	1	Moist disturbed soil, edges, often abundant
Sicyos angulatus	2	Bur-cucumber		5	1	1	1	Floodplain woods, edges
Smilax herbacea	5	Carion-flower		1	1			Dry oak woods, rich weedy wooded slope, rare
Smilax pulverulenta	5	Hairy carion-flower		2	1			Rich weedy wooded slope, locally frequent
Strophostyles umbellata	8PE	Pink wild bean				1		Dry thickety edge powerline cut access Rd, few
Vicia sativa (angustifolia)	A	Common vetch		1		1		Floodplain meadows, moist fields
<b><u>Vines, woody</u></b>								
Ampelopsis glandulosa v. brevipedunculat	A*	Porcelain-berry		1				Woodland edge by bulls-eye CREP Field, local
Celastrus orbiculatus	A*	Oriental bittersweet		5	2	1	1	Woods, edges, thickets, dry to moist
Lonicera japonica	A*	Japanese honeysuckle		5	2	1	1	Thickets, moist woods, edges
Parthenocissus quinquefolia	1	Virginia creeper		4	1	1	1	Woods, thickets
Smilax glauca	3	Glaucous greenbrier		4	1	1	1	Dry woods and banks
Smilax rotundifolia	3	Round-leaved greenbrier		5	1	1	1	Streambanks, moist to dry rocky woods, edges
Toxicodendron radicans	1	Poison ivy		4	1	1	1	Moist woods, slopes
Vinca minor	A	Periwinkle		2		1		Moist weedy wooded roadbank, local
Vitis aestivalis	4	Summer grape		1	1			Dry woods, thickets
Vitis labrusca	4	Fox grape		2	2	1	1	Open streambanks, impoundment banks,ROW
Vitis vulpina	1	Frost grape		3	1	1	1	Woods, thickets, edges
Wisteria floribunda	A*	Japanese wisteria		1				Roadside by old house on 272, establishing

Scientific name	Status	Common Name	List	Wo	Fi	So	La
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552 SPECIES			35% ALIEN			192	ALIEN SPECIES
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Status: A=Alien, A\* = Invasive alien I=Introduced native  
 PE= PA Endangered, PT=PA Threatened, PR=PA Rare  
 PV=PA Vulnerable, TU=PA Undetermined, W= PA Watchlist

Number for native species is Coefficient of Conservatism:

- 0 to 3 = Plants with a high range of ecological tolerances / found in a variety of communities
- 4 to 6 = Plants with an intermediate range of ecological tolerances / associated with a specific plant community
- 7 to 8 = Plants with a poor range of ecological tolerances / associated with an advanced stage of succession
- 9 to 10 = Plants with a high degree of fidelity to a narrow range of habitats

Nomenclature follows Rhoads and Block - Plants of Pennsylvania, 2nd edition, 2007 with some more recent changes

Wo=Five wooded sections	Fi=Two CREP and disturbance sections
So= South of Christine Road	La= Lancaster County

Native Mean CC = 3.48	Floristic Quality Index = 65.99 (Native Mean CC x square root of no. of native species)
Total Mean CC = 2.27	Plant Stewardship Index = 43.03 (Total Mean CC x square root of no. of native species)