CURRENT STATUS

OF THE

NATURAL COMMUNITIES AND

RARE PLANT SPECIES

OF

MILAN ARMY AMMUNITION PLANT

Roger McCoy and Todd Crabtree
Tennessee Division of Natural Areas

2007

In Partial Fulfillment of Contract

RV-07-01905-00

Between
Tennessee Department of Environment and Conservation
And
American Ordnance, LLC, Milan Army Ammunition Plant

List of Tables

Introduction

The development of what is now the Milan Army Ammunition Plant (MAAP) was conducted at breakneck speed. In the fall of 1940, members of the U.S. Army's Ordinance Department met with representatives of Proctor and Gamble Corporation to discuss munitions assembly for the U.S. Army. By December 1940 construction contracts were awarded for the development of what was then known as the Wolf Creek Ordinance Plant and Milan Ordinance Depot, and construction began in early 1941. At the height of construction activities, 15,000 workers were involved and a total of 1,500 existing farm structures were demolished; seven months after construction began, the first munitions loading line started production (Anonymous 1953, Culp and Ross 1961, Frank 1988).

Today, MAAP occupies 22,436 acres (approximately 35 square miles) of the West Tennessee Coastal Plain Physiographic Province in Gibson and Carroll Counties, primarily within the Atwood and Spring Creek Quadrangles. MAAP is located just east of the town of Milan and access is from State Highway 104 on the north end and U.S. Highway 45E on the west. Most of the area is contained within the South Fork Obion Watershed, while a small section at the southern end is drained by Dry Branch and Dry Creek within the North Fork Forked Deer Watershed. The streams on MAAP flow seasonally and are eroded with high banks. Even those streams indicated as intermittent on USGS topographic maps can be difficult to cross due to steep, high banks, and their unconsolidated sandy-bottomed stream beds. The only perennial flowing stream observed throughout this project is Rutherford Fork of the Obion River bordering the northern boundary of MAAP.

Due to the intense and rapid development of the ordinance plant and depot, agriculture and grazing, and past logging, the natural vegetation of MAAP is highly altered. However, natural (or semi-natural) communities are still present. Much of the upland regenerating hardwood forests are

classified as Western Mesophytic, and are dominated by a variety of oaks (*Quercus* spp.) and hickories (*Carya* spp.) with some mesophytic species such as tulip poplar (*Liriodendron tulipifera*) (Wolfe 1993). Wetland sites, particularly on the north end along Rutherford Fork, contain bottomland hardwoods such as overcup oak (*Quercus lyrata*), green ash (*Fraxinus pensylvanica*), and water tupelo (*Nyssa aquatica*) in the wettest of areas. Also present on the north end is a stand of bald cypress (*Taxodium distichum*) that was planted in 1979.

According to the geographic information systems (GIS) layer provided by natural resources staff[1], approximately 8,100 acres of MAAP are in crops or pasture, approximately 8,000 acres are hardwood forest, and 1,650 acres are coniferous forest. The coniferous forests consist of current or former pine plantations and successional habitat currently dominated by eastern red cedar (*Juniperus virginiana*). There are a total of 251 miles of roads (not including railroads) that dissect a variety of habitats. Based on an average width of 25 feet, approximately 760 acres of road surface exist at MAAP, most of which is paved.

Table 1 lists the soil series at MAAP. Most of the soils are loess derived and consist of silt loams with Coastal Plain sediments of sands, clay, and gravel in spots (Cushing 1995, NRCS 1984, NRCS 1994). The greatest area of MAAP consists of Lexington series that comprises nearly 10,000 acres. Within the seven soil types of the Lexington series, those with the lowest slope percent are suitable for crops. Undulating sites, with little or moderate erosion potential, are suitable for pasture or hardwoods. Those sites on hilly uplands, which have the potential to be highly eroded, are best suited for forest.

A number of biological inventories have been completed at MAAP (Wofford 1976, Wolfe 1993, Miller 1995, Cushing 1995) and additional zoological investigations are underway by researchers at the University of Memphis and Austin Peay State University. Wofford's 1976

exploration of the vascular plants at MAAP consisted of a day's outing afield and a review of specimens at the University of Tennessee -Knoxville and Vanderbilt herbaria. However, even with the abbreviated time, he documented nearly 140 species of vascular plants and was the first to document the rare *Silphium laciniatum* (compass plant) at MAAP.

Following Wofford's work, Wolfe's 1993 project at MAAP focused on natural habitats likely to yield rare plant species and he provided plant community descriptions for select areas. Other than compass plant, Wolfe did not locate any rare plant occurrences, and he concluded, based on communication with Wofford and his own searches at Milan, that an initial report of the rare *Agalinis* [*Gerardia*] *auriculata* was erroneous. Wolfe's work also resulted in a list of 172 vascular plant species.

The mission of the Division of Natural Areas (DNA) is to restore and protect the plants, animals, and natural communities that represent the natural biological diversity of Tennessee. The DNA was contracted to conduct additional plant and plant community inventories at MAAP with the goal of providing further information to land managers. More specifically the tasks included the following:

- Conduct additional searches for rare plant species
- Visit and assess sites for high-quality plant communities that may need to be avoided or managed in a specific manner
- Assess the current status of the natural areas delineated by Wolfe (1993)
- Offer specific management recommendations for high-quality plant communities and rare plant species occurrences.

Methods

Prior to field investigations, a review of rare species records in DNA's rare species database (Biotics) was conducted. The Biotics database contains information on specific locations of rare species, their site-specific habitat, directions, the last time the species was encountered, and other

[1] Steve Stephenson indicated that this layer is incomplete, but a review showed that much of the land excluded from the coverage is in developed areas.

observational data. The review aided in determining which species could be encountered at MAAP and provided information as to which habitats, locations, and times of year were best suited for searches. DNA not only reviewed existing records of rare species from MAAP, but also reviewed rare species lists from Gibson and Carroll Counties (Table 2) and the surrounding watersheds.

Topographic maps, aerial images, and soils data also were reviewed in order to find areas or features in need of investigation. Because of the many roads and altered habitats at MAAP, staff targeted the largest forested tracks with the goal of locating sites with the least amount of edge effect, the least amount of disturbance, and therefore the greatest potential to harbor rare plants or high quality plant communities. In addition to database and map reviews, staff consulted previous reports of biological inventories conducted at MAAP and when needed, staff contacted past researchers.

As it was the goal of this project to locate rare species or high quality communities, developed and cultivated areas were not extensively investigated. However, open areas such as roadsides, powerlines, and pastures were targeted where the vegetation consisted of native flora since the rare compass plant or other barrens or prairie flora could occur in such habitats.

No attempt was made for a complete floristic inventory (vouchering all vascular plant species), but all vascular plant species observed in natural communities were recorded and the vascular plant list for Gibson and Carroll Counties (University of Tennessee Herbarium 2007) was consulted for the purpose of collecting previously undocumented species. Contributions to a county's flora allow for a better understanding of the distributions of both rare, common, and exotic plant taxa across the state and region. Collected plant specimens were pressed, dried, and sent to the herbarium at the University of Tennessee, Knoxville. Specimens later determined to be rather common, not to be county records, or those in poor condition were sometimes discarded after identification *ex situ*.

The use of scientific names for plants follows the University of Tennessee Herbarium (2007). A frequency of occurrence designation was used, as found in Murrell (1985) and Allowas (1994), which assigns a frequency to each species based upon the overall impression of abundance of that species in its habitat. The definitions for each designation are as follows:

Very Rare – A single locality, few individuals
Rare – One or two localities, generally small populations
Scarce – Several localities or scattered small populations
Infrequent – Scattered localities throughout
Occasional – Well distributed but nowhere abundant
Frequent – Generally encountered
Common – Characteristic and dominant

Throughout field investigations staff recorded observations from the different habitat types encountered. Information included dominant overstory, understory and groundlayer plant species, size class of trees, successional state, herbaceous diversity, presence of exotic species, and signs of disturbance.

Although no vegetation sampling plots were established, qualitative observations were made within the natural plant communities visited, as well as within open areas such as pastures, roadsides, and powerlines where native species were well represented. Field notes, GPS points, and rare species occurrences were reviewed to develop descriptions of plant communities. Such descriptions should allow resource managers and visitors to recognize the more common plant communities at MAAP.

During a tour given by Steve Stephenson, resource manager at MAAP, the subject of the existing "natural areas" was discussed. Six sites were delineated by Wolfe (1993) and since then MAAP resource managers considered Wolfe's designation to indicate that these areas should be left undisturbed. Upon the first visit to one such area, DNA staff were unable to discern what special features warranted the designation. At that point, staff determined to visit each area and make an assessment as to whether such a designation should remain.

All mapping was done with a Garmin GPSMAP 76S global positioning system (GPS). GPS points were uploaded and converted to an ArcView geographic information system (GIS) shape file. Field notes relating to each GPS point were transcribed into the shape file's attribute table. While in the field the GPS track log (tracing the route taken) was activated and those tracks are included with the GIS data. If any rare species was observed, data were recorded in the field and entered into the Biotics database upon returning to the office.

Digital images were taken throughout the project. All image files were saved in the jpeg format, renamed so users could determine image content, and burned to CD.

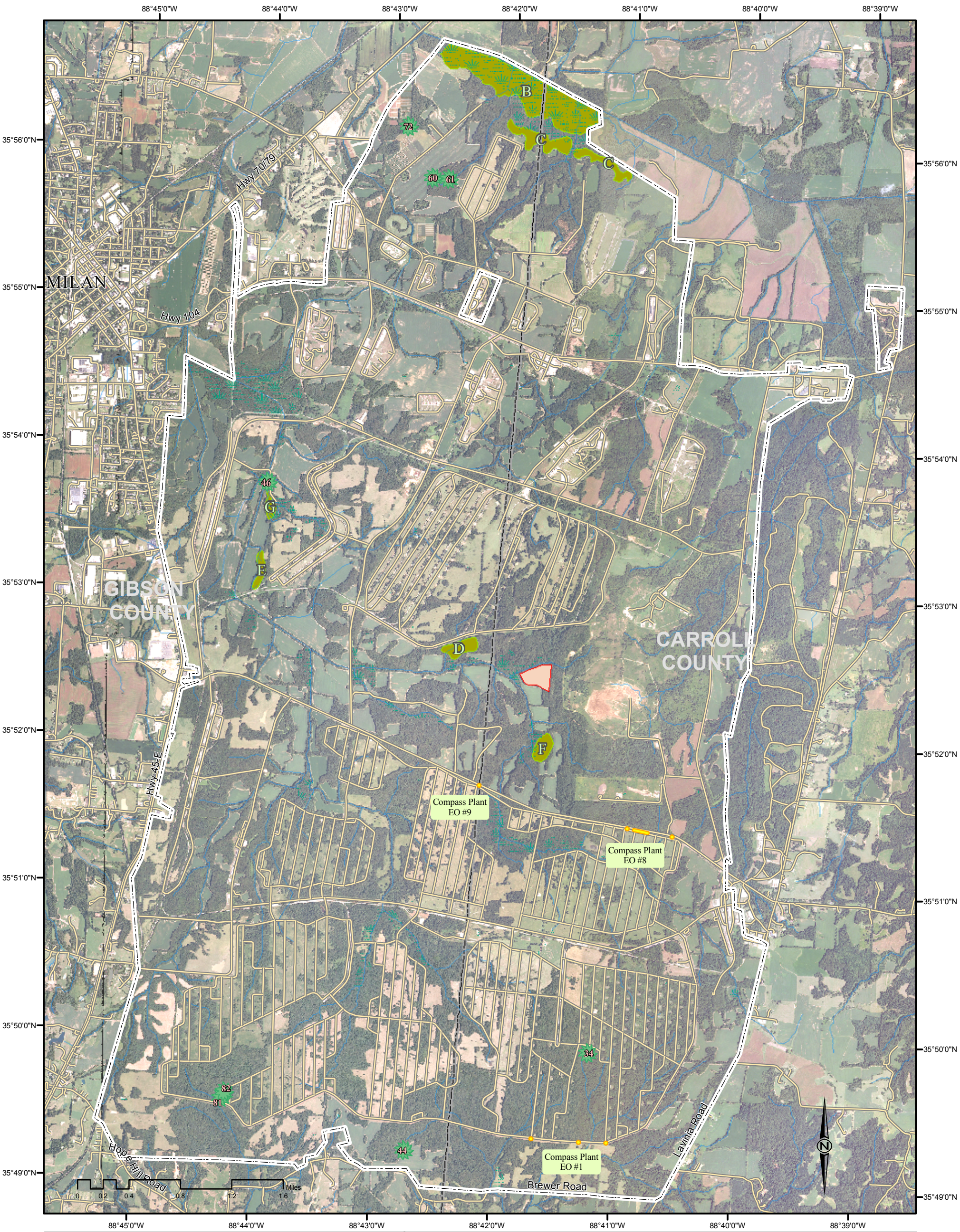
Results

Natural Areas Assessment

Wolfe (1993) selected natural areas as locations to more intensively study the flora but never indicated how these areas were determined. In a recent telephone conversation, he stated that the use of the term was to distinguish areas of natural vegetation rather than "natural areas" (Wolfe, pers. comm. 2007), a designation which is sometimes synonymous with "nature preserves." However, the confusion over the protective status of these areas may have arisen from his report where he recommends "The best example of these natural areas (e.g., Site C at the north end of MAAP) [should] be protected from heavy disturbance thereby allowing successional processes to continue with minimal human influence."

More attention was given to natural areas thought to have greater potential to possess rare species or high quality plant communities. The following assessment of each natural area is based on the plant species and plant communities contained therein, and recommendations from other disciplines (e.g. zoologists, archeologists, soil scientists) should be heeded if the natural areas contain significant features not documented during this investigation. Naming conventions follow Wolfe's

Milan Army Ammunition Plant

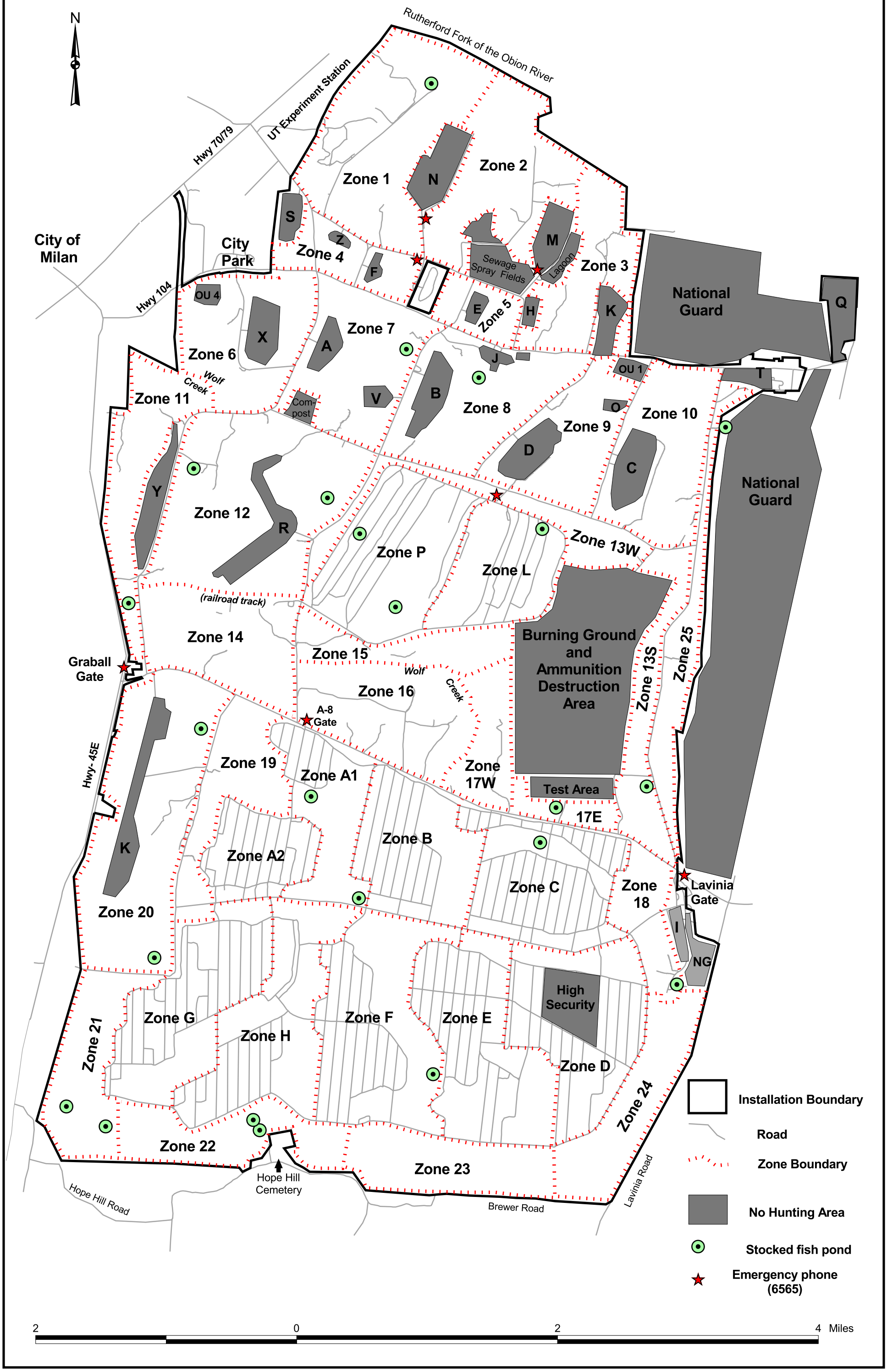


Division of Natural Areas, September 2007
Data Provided by MAAP Natural Resources Staff
and TN Division of Natural Areas
Unless Otherwise Noted in Legend

Legend

- Selected GPS Points
- Compass Plant Locations
- MAAP Boundary
- Teleatlas Roads
- 1:24K NHD Streams
- County Boundaries
- Wetlands
- Area Proposed for Special Designation
- Natural Areas (Wolfe, 1993)

MLAAP DEER & SMALL GAME HUNTING MAP



designation. One additional site, not recognized by Wolfe, but determined by DNA to warrant special designation is presented herein.

Natural Area B
Size: 177 acres

Location: North end of MAAP, just south of Rutherford Fork, within both Zone[2] 1 and 2.

Description: This area is part of the floodplain of Rutherford Fork and appears to have its hydrology influenced by beaver activity. Evidence of this includes gnaw marks at the base of trees and, in spots, the presence of standing dead trees that indicates an increase in the duration of inundation. During the spring, calf-high rubber boots are needed in much of the area, but as 2007 was a drought year in Tennessee, even the wettest sites were dry during the summer. Most of the area is forested with mature bottomland hardwood species, but the moisture regime changes with just a foot or two of elevation and ranges from wet-mesic to wet.

The wet-mesic areas include trees such as willow oak (*Quercus phellos*), water oak (*Quercus nigra*), red maple (*Acer rubrum*), and sweetgum (*Liquidambar styraciflua*). As sweetgum is both a wetland species and an early successional species, it also was found in drier areas within the natural area (and very dry sites in other locations at MAAP). This natural area also contains small elevated patches that support large southern red oak (*Quercus falcata*) trees.

Sites within the natural area that appeared a bit wetter include overstory species such as sycamore (*Platanus occidentalis*), green ash (*Fraxinus pensylvanica*), Drummond red maple (*Acer drummondii*), river birch (*Betula nigra*), overcup oak (*Quercus lyrata*) and a few scattered locations (particularly on the far east end of the natural area) of swamp chestnut oak (*Quercus michauxii*). Many of the trees in this habitat are large, some as large as 80 – 100 cm diameter at breast height (dbh). The understory component includes saplings of overstory species such as oaks, birch, maple and

[2]Names of zones follows that of the Deer and Small Game Hunting Map provided by MAAP resource managers..

ash. Other understory species include black willow (*Salix nigra*) (in more open wet areas), stiff dogwood (*Cornus foemina*), and red buckeye (*Aesculus pavia*) is a common on the east side of the natural area.

The herbaceous component of the wet-mesic forest is difficult to categorize , but there are some distinct trends. Unlike the open swampy habitat, areas under the forest canopy where periodic flooding occurs and the water recedes do not support a dense herb cover and contain spots of bare ground. Areas that are a bit drier, but still show signs of periodic inundation, possess a variety of herbs including horehound (*Lycopus* spp.), clearweed (*Pilea pumila*), sensitive fern (*Onoclea sensibilis*), jack-in-the-pulpit (*Arisaema triphyllum*), false nettle (*Boehmeria cylindrica*), the non-native stinging nettle (*Urtica dioica*), and greater marsh St. Johnswort (*Triadenum walteri*).

The sections of the wet-mesic forest that appeared to rarely, if ever, contain standing water have a markedly different ground layer and are either dominated by non-native Nepalese grass (*Microstegium vimineum*) or poison ivy (*Toxicodendron radicans*). Both species are either dominant or co-dominant and often covered 100% of the ground layer and their densities cannot be overstated. In addition, these habitats contain vines such catbrier (*Smilax* spp.) and blackberry (*Rubus* spp.) which are thick in spots (particularly near Rutherford Fork) and at times make walking difficult.

The wettest sites, located in the central portion of the natural area, have water tupelo (*Nyssa aquatica*) as the dominant overstory species and a few naturally occurring saplings of bald cypress (*Taxodium distichum*) were located. Although plot data were not recorded, observations indicate that this area fits closely with NatureServe's *Nyssa aquatica* Forest Association. In these areas American buckwheat vine (*Brunnichia ovata*) is also common. This species has been documented from every county in West Tennessee, but is absent from other regions of the state, except Middle Tennessee right along the Tennessee River.

As with some other wetlands in the southeastern U.S., the wettest portions of Natural Area B lack the dominance of exotic species found in adjacent uplands (Pyle 1995). Portions of these wettest areas lack an overstory and some spots contain a thick shrub layer of buttonbush (*Cephalanthus occidentalis*), while some areas are dominated by herbaceous plants such as green arrow arum (*Peltandra virginica*), which covered 100% of the ground in spots. Other Common herbs in the wettest portions include swamp dock (*Rumex verticillatus*) and lizard's tail (*Saururus cernuus*) which also occurs in the transition zone between the wet-mesic forest and the wetter portions with swamp tupelo or buttonbush. The dominance of lizard's tail and green arrow arum is consistent with other swamp forests within the Mississippi River Valley (personal obs.) and swamp tupelo forests in the Tennessee River Valley (Hall 1940). Other herbs present in the wettest portions of Natural Area B include arrowleaf tearthumb (*Polygonum sagittatum*), oneleaf false fiddleleaf (*Hydrolea uniflora*), cattail (*Typha latifolia*) in a few spots, and during the spring, Carolina mosquito fern (*Azolla caroliniana*) is floating in standing water. Throughout all habitats in Natural Area B, sedges (*Carex* spp.) are loosely scattered, sometimes on decaying stumps and logs, and, in the wettest areas robust individuals, of *Carex gigantea* are common.

A heron rookery containing four great blue heron nests was observed high in the tops of sycamore trees within the bottomland hardwood forest along the intermittent stream on the east side of the natural area. A number of black vultures appeared to be raiding the nests of the rookery. Although great blue herons (*Ardea herodias*) are not listed as rare in Tennessee, heron rookeries are tracked by the Division of Natural Areas in the same manner as rare species and thus this occurrence was mapped into the Biotics database.

Recommendations: Although no rare species were encountered, and the herb layer is dominated by the exotic Nepalese grass in spots, Natural Area B contains one of the largest intact forested systems and the largest wetland at MAAP as well as a number of species which do not occur

elsewhere at MAAP. Due to the large forested tract, the area likely supports a number of faunal species[3] and possesses a heron rookery. Therefore, the DNA recommends that the classification of this site as a natural area remain, and that any management consider its ecological integrity. Impacts such as logging or land clearing should be avoided. Should the abandoned roads need to be cleared for walking or even limited auto access during dry weather, downed trees or brush along the abandoned roads/trails could be removed without compromising this area.

Natural Area C

Size: 49 acres.

Location: North-facing slopes and ravines, north end of MAAP, within Zone 2.

Description: Natural Area C is along north-facing, forested, eroded slopes. The natural area is oriented east-west and roughly follows the contour lines from the top of the slope to the base near the floodplain of Rutherford Fork. Along the north-facing slopes of the western portion of the natural area, the dominant overstory trees include black oak (*Quercus velutina*), mockernut hickory (*Carya tomentosa*), red maple (*Acer rubrum*), with some willow oak (*Quercus phellos*), and slippery elm (*Ulmus rubra*). Some spots appear successional with stands of eastern red cedar, and the landuse GIS layer for MAAP shows a small, now-forested area classified as agricultural. The ground layer on the western side primarily consists of vines such as carrion flower (*Smilax herbacea*), wild yam (*Dioscorea villosa*), hog peanut (*Amphicarpaea bracteata*), prostrate/roundleaf tick trefoil (*Desmodium rotundifolium*), and American bittersweet (*Celastrus scandens*). Within this area, there is a patch of daylily (*Hemerocallis fulva*), and as this species is commonly used as an ornamental - yet does not readily spread from cultivation - its presence indicates the likely location of an old house site.

The eastern portion of the natural area has a slope and aspect similar to the western. Towards the base of the slope is a stand of large tulip poplar trees, with shrubs including red

[3] The various zoological studies at MAAP could confirm this.

buckeye (*Aesculus pavia*) and Carolina buckthorn (*Rhamnus caroliniana*). The ground layer is dominated by Nepalese grass (*Microstegium vimineum*) and Japanese honeysuckle (*Lonicera japonica*). Higher upslope the area contains various hardwoods species such as sweetgum (*Liquidambar styraciflua*) and water oak (*Quercus nigra*) with a dense midstory layer of dead and dying cedar trees, again indicating the successional nature of this site. A few native herbs are present including broadbeech fern (*Phegopteris hexagonoptera*), Christmas fern (*Polystichum acrostichoides*), and mayapple (*Podophyllum peltatum*); the latter two are some of the more frequently encountered native herbs at MAAP.

Atop the ridge is a planted loblolly pine stand with little herbaceous diversity and Nepalese grass and poison ivy are dominant. Other portions under the loblolly pine areas have a high density of blackberry (*Rubus* spp.) and Japanese honeysuckle vines.

Recommendations: Although the section with the tulip poplar trees is scenic and contains a mature forest, and broadbeech fern was not commonly encountered at MAAP, Natural Area C does not contain any features, plants, or plant communities unique to MAAP or regionally significant. The DNA recommends that the special designation granted this area be removed and the site be managed in a manner similar to other forested areas at MAAP. When planning resource or timber management, consideration should be given to the potential for further erosion of the moderately steep slopes.

Natural Area D

Size: 17 acres.

Location: North of Wolf Creek in Gibson County, just east of the Carroll County line within Zone 15.

Description: This natural area contains a relatively uniform, mature tulip poplar forest. Most of the natural area is moderately steep. Gaps within the mature forest contain infestations of kudzu (*Pueraria montana* var. *lobata*) and as the natural area is near a railroad track, kudzu is more prevalent along the north side of the natural area. The slopes away from the kudzu patches were visited in the spring in hopes of locating some interesting native spring wildflowers, but aside from mayapple (*Podophyllum peltatum*), and some ferns, few native herbs were found and the ground layer is dominated by Japanese honeysuckle.

Recommendations: Since Natural Area D does not contain any special features, plants, or plant communities, and is infested with kudzu and large patches of Japanese honeysuckle, the DNA recommends that the special designation granted this area be removed and the site be managed in a manner similar to other forested areas at MAAP. Prior to management that increases sunlight to the forest floor, the kudzu infestation should be treated and monitored to avoid the vine's suppression of saplings and seedlings of desired overstory species.

Natural Area E

Size: 9 acres.

Location: West side of MAAP (near Graball Gate), just east of channelized portion of Wolf Creek, south of Natural Area G, within Zone 12.

Description: This natural area occupies a narrow, forested ridge (approximately 100 – 130 yards wide) surrounded by agricultural fields on the west and northwest sides. The far north end of the natural area is mesic to dry-mesic forest of mature red oak (*Quercus rubra*), black oak (*Q. velutina*), white oak (*Q. alba*), and tulip poplar. The ground layer here is one of the "cleaner" sites at MAAP in terms of exotic species or dominance by poison ivy. In spots the ground layer possesses a thick

cover of jumpseed (*Polygonum virginianum*), and green dragon (*Arisaema dracontium*) was frequently encountered in this area.

Moving south within the natural area (near the northern-most pond) the vegetation is noticeably different, likely due to past landuse. There are a few large, open grown oaks surrounded by a thick stand of smaller-sized trees such as sweetgum and American elm as well as paw paw (*Asimina triloba*) shrubs. Some native herbaceous plants such as wood oats (*Chasmanthium latifolium*), wild rye (*Elymus* sp.), pokeweed (*Phytolacca americana*), elephant's foot (*Elephantopus tomentosus*), and white avens (*Geum canadense*) are scattered in this area, but by far the dominant ground cover is poison ivy and Nepalese grass. Kudzu is problematic in spots in the south end (closer to the railroad tracks) and is overtaking some smaller trees and shrubs.

Recommendations: The north end of Natural Area E lacks an abundance of exotic species and possess mature timber, but this area only occupies about 2 acres and is simply a narrow band of woods surrounded by agricultural fields. Most of the natural area is successional and has a serious infestation of Nepalese grass. As a result of its small size, the large amount of field/forest edge in proportion to its size, the presence of exotic species, and lack of any high quality or significant plant communities, the DNA recommends that the special designation granted this area be removed and the site be managed in a manner similar to other forested areas at MAAP. Prior to management that increases sunlight to the forest floor, the kudzu infestation should be treated and monitored to avoid the vine's suppression of saplings and seedlings of desired overstory species.

Natural Area F

Size: 15 acres.

Location: Upslope and east of East Fork Wolf Creek, within Zone 12.

Description: Most of the natural area is a dry, forested slope with a variety of oak species, primarily, southern red (*Qerucus falcata*), and the herbaceous layer is mainly woody vines such as Japanese honeysuckle and poison ivy. Downslope and closer to East Fork Wolf Creek the natural area includes a small portion of creek floodplain. This portion contains an open stand of sweetgum with a low density of saplings or seedlings. This natural area was visited in mid-March before many herbs were visible, but based on other sites along East Fork Wolf Creek, it is expected that the area near the creek possesses a thick stand of Nepalese grass.

Recommendations: As the slope forests of this natural area are well represented in many areas of MAAP, it seems likely that Wolfe (1993) chose this site as an area of representative natural vegetation. Neither he nor the DNA found any significant features or rare plants and thus the DNA recommends that the special designation granted this area be removed and the site be managed in a manner similar to other forested areas at MAAP. Since the natural area slopes and drains into the the floodplain of East Fork Wolf Creek, care should be taken to minimize erosion during management activities.

Natural Area G

Size: 7 acres.

Location: West side of MAAP (near Graball Gate), just east of channelized portion of Wolf Creek, north of Natural Area E, within Zone 12.

Description: According to the GIS soils layer, the border for the Rosebloom series nearly matches the boundary of this wetland natural area. Rosebloom soils are often prone to standing water due to blocked stream channels from sediment, debris, or beaver dams (NRCS 1994). This area was likely too wet for agriculture and thus it is now forested with river birch (many ~30 cm dbh), sycamore, boxelder (*Acer negundo*), black walnut (*Juglans nigra*), and sweetgum. Roundleaf greenbrier (*Smilax*

rotundifolia) and Japanese honeysuckle vines are present both in the groundlayer and twining around trees and shrubs. Shrubs include buttonbush and a few large clumps of the invasive exotic multiflora rose (*Rosa multiflora*). Some seedlings and saplings of overstory species such as overcup oak were observed. In the spring one of the dominant herbs is smallflower baby blue eyes (*Nemophila aphylla*), but later in the season Nepalese grass and poison ivy dominate the ground layer.

Recommendations: Since no rare species were observed within this natural area, and the exotic species are problematic in spots, the DNA recommends that the special designation granted this area be removed. As the site is a wetland, management should be conducted during dry periods to avoid adverse impacts to water quality or increased soil disturbance. The patches of multiflora rose should be treated prior to management activities that may increase sunlight to the forest floor.

Additional Site for Special Designation

Size: ~20 acres

Location: North of Natural Area F, west of Ammunition Destruction Area, north end of Zone 17W.

Description: This site is a dry, or xeric, forested knob with an overstory composition of southern red oak and post oak, which, in spots, appear open-grown and stunted. Other overstory species include red oak and white oak, the latter forming a mature, nearly pure stand. In the understory, two species of *Vaccinium* were found: farkleberry (*Vaccinium arboreum*) and putative deerberry (*V. stamineum*); both normally occur in xeric, or open, dry forests. Neither of these ericaceous shrubs are rare in Tennessee, but were only found in one other location at MAAP. One area of this site was open in the past and contains eastern red cedar. Staff were uncertain if this spot had been cleared in the past, or if it is simply a remnant of a natural woodland opening. In addition to the *Vaccinium*, the shrub layer includes overstory species and hazelnut (*Corylus americana*), winged sumac (*Rhus copallinum*), possum haw (*Ilex decidua*), and shrubby St. Johnswort (*Hypericum prolificum*).

Some of the herbaceous plants are also uncommon or unknown from other areas at MAAP. Poverty oats grass (*Danthonia spicata*) is loosely scattered in the driest areas and other graminoides include nut rush (*Scleria* sp.). Forbs include pencil flower (*Stylosanthes biflora*), St. Andrew's cross (*Hypericum hypericoides*), tick trefoil (*Desmodium* [likely *viridifolium*]), and arrowhead rattlebox (*Crotalaria sagittalis*). In spots, mosses and lichens are common in the ground layer, a feature which differs from most other areas found elsewhere at MAAP. Overall this site lacks the high density of exotic species, but in one small, shallow depression Nepalese grass occurs, and sericea lespedeza (*Lespedeza cuneata*) persists in spots on the east side of the site near the boundary of the ammunition destruction area.

Recommendations: When contrasted with other forests at MAAP, this site contains unique features: a xeric forest (characterized by the presence of *Vaccinium*, stunted post oak trees, and a moss/lichen ground layer), plants found in few or no other locations at MAAP, and a relatively minimal presence of exotic species. Based on these features, the DNA recommends that this site, as delineated in the accompanying map and GIS layer, be considered for special designation as an area to be avoided except for management to enhance the site. This site does not possess any known rare species, or rare plant communities, but when considering all other sites visited, it ranks highly in terms of a forested community in a natural condition.

The site is so dry Nepalese grass is unlikely to spread, but if future management includes controlled fire, the infestation of lespedeza should first be treated as this species may spread after fire. Future visits can assess whether or not the protection status (if any) is still warranted and what management may be needed.

<u>Notes On Other Plant Communities Encountered</u>

The wettest forested communities occur in Natural Area B (see description above), but the other forested wetlands at MAAP lack prolonged inundation. One example is located within Zone

1 along the headwaters of a tributary that flows into the wetland on the north end (Natural Area B) (GPS point #60 & 61). These relatively undisturbed flatwoods have a mature overstory containing overcup oak, cherrybark oak (*Quercus pagoda*), and willow oak (particularly along the wet-weather stream). Hickories and American elm share the canopy in spots and occur in the sub-canopy and understory. Portions of the understory are open but contain some Japanese honeysuckle. Elderberry (*Sambucus canadensis*) occurs in the wetter areas while some of the drier spots have a high density of catbrier. The herb layer is not dense, but species such as sensitive fern, jewelweed (*Impatiens capensis*), cardinal flower, nimblewill grass (*Muhlenbergia schreberi*), and axil flower (*Mecardonia acuminata*) occur along the wet-weather stream. With a slight increase in elevation, the loess-derived soils quickly grade into a postoak, blackoak, and bur oak[4] woodland.

An approximately 100-acre wetland lies within Zone 6. The USGS topographic map shows much of the area open, but today it is indeed forested and most of this area has nearly 100% ground cover of Nepalese grass . Another area where bald cypress may have been planted has some kudzu infestations. The more mature forest at this location has an overstory of sycamore, river birch, and American elm. Shrubs include paw paw and elderberry. The herb layer primarily consists of woody vines of poison ivy and trumpet creeper (*Campsis radicans*).

The other lowland forests are not nearly as large and mainly occur along streams such as East Fork Wolf Creek or in smaller depressions (e.g. Natural Area G). The overstory varies greatly from sweetgum, cherry bark oak (with mixed southern red oak), red maple, and tulip tree. Native herbs are scattered and are listed in Table 4. Nepalese grass is generally dominant in the ground layer.

The mesic to dry-mesic forests at MAAP vary from stands dominated by tulip poplar to those with drier oaks such as southern red oak. As expected, a mix of other species occurs

[4] Some oaks at this site possess characteristics of both bur oak and post oak. These may be hybrids of the two species.

depending on the location, but a clear moisture gradient based on aspect or slope position was not always apparent. Tulip poplar not only occurs in more mesic conditions along slopes and at the base of slopes (see above description of Natural Area C), but as this species has wind-dispersed seeds, nearly pure stands of tulip poplar may be a result of past disturbance.

In spots tulip poplar occurs as a co-dominant with white oak and such sites often contain American beech or sugar maple as understory species. However, no stands or canopy-sized American beech were observed. Where white oak is dominant, it can form nearly pure stands, contain some large tulip trees (mesic sites), or be mixed with southern red oak or post oak (drier sites). Shrubs in white oak stands include hop hornbeam (*Ostrya virginiana*), coral berry (*Symphoricarpos orbiculatus*), hazelnut, and dogwood. The herbaceous diversity is minimal in spots, but some spring wildflowers were observed including Solomon's seal (*Polygonatum biflorum*), false Solomon's seal (*Smilacina racemosa*), wild comfrey (*Cynoglossum virginianum*), and mayapple. Christmas fern is frequent in such areas. Large colonies of mayapple are common in white oak forests at MAAP, even in areas where cattle graze, as the species is toxic and often avoided by herbivores (Rust and Roth 1981).

Southern red oak seems to be the most common overstory tree at MAAP and is often mixed with other oak species such as white oak, black oak, red oak, cherrybark oak, shingle oak (*Quercus imbricaria*), mockernut hickory (*Carya tomentosa*), and both shagbark hickory (*Carya ovata*) and southern shagbark hickory (*Carya carolinae-septentrionalis*). Occasionally shortleaf pine (*Pinus echinata*) is in the canopy. In many areas southern red oak forms nearly pure stands, often with few herbs, but vines such as catbrier, poison ivy, Virginia creeper (*Parthenocissus quinquefolia*) can be abundant. These forest types (and even drier sites) often contain a high density of devil's walking stick (*Aralia spinosa*), some which nearly reached sub-canopy height. Dense stands of paw paw in the understory occur, even in those areas with southern red oak in the overstory (GPS point # 72).

Throughout the uplands of MAAP, various states of forest succession occur. Within successional hardwood stands, sweetgum is common, and black walnut (*Juglans nigra*) occurs especially in lower slopes or near streams. A number of sites (both mesic and dry) are completely dominated by eastern red cedar and these forests have nearly 100% ground cover of Nepalese grass or poison ivy. Some of these sites appear to be abandoned fields, and the cedars are slowly being overtaken by hardwood species. One site within Zone 23 (GPS point # 44) has large loblolly pines (*Pinus taeda*) that may have been left as seed trees after a timber harvest to promote pine regeneration. However, little to no pine recruitment was observed and eastern red cedar formed a dense stand.

Introduced from Asia, the invasive exotic Nepalese grass is an annual that was first documented in North America in Knoxville, Tennessee in the early part of the 20th century (Gibson *et al* 2002) and has since spread throughout much of the eastern United States. Nepalese grass is considered a "severe threat" and such "possess characteristics of invasive species and spread easily into native plant communities and displace native vegetation" (Tennessee Exotic Pest Plant Council 2001). Nepalese grass seems to prefer areas of slight moisture (personal obs).

Wofford (1976) did not include Nepalese grass in his plant list from MAAP, but it was noted by Wolfe (1993) although he did not discuss how frequently the species was encountered, or if it attained dominance in any areas at MAAP. When recently asked, B.E. Wofford (pers. comm. 2007) noted that indeed he did not remember seeing the species. It is possible that Nepalese grass occurred at MAAP during Wofford's 1976 survey, but it seems most unlikely that the species occurred with even a fraction of the abundance as it does today, for he certainly would have noted it as he did other exotic species and some obscure native species. Therefore, it is safe to conclude that Nepalese grass has attained its dominance at MAAP in less than 30 years.

The driest forested sites at MAAP often had the least amount of exotic species. As discussed above a good representation occurs at the north end of Zone 17W and is recommended for consideration as a "set aside" or restricted-management zone. A few other patches of xeric woods occur at MAAP (GPS point # 34, 81, and 83); these are similar to the site described above, but are rather small.

Non-forested areas were searched in hopes of identifying remnant barrens or prairies and although some native species occur in pastures, along the roadsides, field edges, and powerlines (see Table 4), with the exception of the known compass plants locations (discussed below), no additional barrens or prairie communities were documented.

MAAP lies within Braun's (1950) delineation of the Mississippi Embayment Section of the Western Mesophytic Forest and her descriptions of the dominance of southern red oak in the overstory and the "poor herbaceous layer" fit closely with the forests of MAAP. In addition, many of the shrubs she noted are common at MAAP (devil's walking stick, elderberry, hazelnut, coral berry, poison ivy, and Virginia creeper). She also noted the occasional American holly (*Ilex opaca*) which occurs, but is not frequent, at MAAP.

MAAP contains a variety of natural and semi-natural vegetation types that appear to correspond to a moisture gradient, but as the area has experienced past land alteration, environmental and vegetation relationships are difficult to discern. Since competition diminishes after disturbance, species that may be more restricted in pristine environments can attain a widespread range in disturbed landscapes (Franklin and Kupfer 2004). The wettest and the driest sites have a more natural forest canopy, understory, and herb layer compared with other sites. While this may be due to a lack of disturbance in these areas, it may also be due to environmental constraints (e.g. inundation or drought) limiting the amount of exotic or otherwise "weedy" species (Franklin and Kupfer 2004).

Rare Plant Species

Although areas were thoroughly surveyed and plants that could not readily be identified in the field were collected, other than compass plant, no additional rare plant species were located. Other rare plants within an obscure taxonomic group (e.g. *Carex*) could be present, yet it is unlikely that another significant rare species population occurs at MAAP.

Compass Plant (*Silphium laciniatum*)

Wofford (1976) and Wolfe (1993) documented a total of three occurrences of compass plant at MAAP. Although DNA did not locate any new occurrences, all visible flowering stems were counted and the known size and numbers of two of the occurrences has been expanded.

Compass plant is known from the Great Plains east to Pennsylvania and Virginia and as far north as Ontario. Throughout its range, compass plant occurs in prairies, glades, and dry forest openings as well as roadsides and other open areas. The common name refers to the leaves which are oriented with their surfaces facing east and west and their edges north and south (Yatskievych 2006). The species is secure throughout much of its range, but it is tracked as rare by natural heritage programs in Ontario, South Dakota, and Kentucky. In Tennessee it is listed as state-threatened and is considered very rare and imperiled[5] (NatureServe 2007). Currently only nine extant occurrences exist in Tennessee, three of which are at MAAP and five at Ft. Campbell Military Reservation.

As with many other barren or prairie species in the Southeast, management in the form of mowing or burning is needed to prevent woody plant succession. Given the location of compass plant at MAAP (along roadsides in relatively small areas), mowing appears to be the most suitable management tool.

[5] This is based on the non-legal, yet scientifically based state rank of S2.

All occurrences for compass plant were visited on July 23, 2007. Data on each occurrence are presented below and the occurrence number corresponds to the number assigned in DNA's rare species database.

Compass Plant Occurrence #1

Location: This occurrence is located within the gated section containing the bunkers or "igloos," between the east/west running road on the south end and the security fence. The eastern portion of the occurrence is just south of the road and igloo D40. Two additional clumps identified by DNA are located 0.2 and 0.6 mile west of the site south of igloo D40 and these too are located between the road and security fence.

Occurrence Data: The easternmost clump of this occurrence was accidentally mowed prior to DNA's July visit. The plants were mowed after flowering and one flowering stalk was found on the ground. Thirteen plants were counted. More may exist and a more accurate count can be completed in subsequent growing seasons.

Two-tenths of a mile west of this location another patch of compass plant occurs. It is unclear if this (or the other further west) was observed by Wofford in 1976 or Wolfe in 1993. Thirty-three flowering stems were counted and occur in a mix of fescue and *Paspalum* grass. The next patch further west contains seven flowering stems.

Management Recommendations: One clump was mowed too early in the growing season for the plants to set seed, so maintenance crews should be informed of its location to prevent additional premature mowing. With few woody plants encroaching this occurrence, mowing can be done every other year or so, but if roadside maintenance is needed, mowing every year will not hurt the plants. Mowing should be done in the fall or winter to allow the plants to set seed prior to being cut. Herbicide use should be avoided.

Compass Plant Occurrence #8

Location: Along the south roadside of Road 24 (between road and fence) approximately 0.6 mile west of the intersection with Road 23. North of the road was searched, as was further south of the road inside the fenced area, but no plants were located in these areas.

Occurrence Data: This occurrence contains over 240 flowering stems, 230 of which are within a 200-yard strip. Two small patches are present approximately 300 yards east and 90 yards west of this strip. Associated species include whorled rosinweed (*Silphium asteriscus* var. *trifoliatum*), early goldenrod (*Solidago juncea*), narrowleaf mountain mint (*Pycnanthemum tenuifolium*), whorled mountain mint (*Pycnanthemum verticillatum* var. *pilosum*), flowering spurge (*Euphorbia corollata*), passionflower (*Passiflora incarnata*), and black-eyed Susan (*Rudbeckia hirta*) as well as winged sumac and post oak shrubs.

Management Recommendations: In 1993 Wolfe documented approximately 100 plants (34 in flower) occupying a strip about 12 yards long. Given Wolfe's observations, management of this occurrence has been successful in maintaining and even increasing the number of plants.

Mowing had been conducted in the location where the plant was found. Where mowing ends, the density of shrubs is far greater and there are only a few flowering stems of compass plants. DNA recommends continued mowing of the existing strip in late fall or winter and expanding the length of mowing along this entire stretch of roadside (up to 1 mile) which will likely increase the size of the occurrence and number of compass plants. Herbicide use should be avoided.

Compass Plant Occurrence #9

Location: On the south side of Road 24 at the Gibson/Carroll County line.

Occurrence Data: A total of eight plants with two flowering stems occur here. This site is rather shrubby and Japanese honeysuckle is thick in spots.

Management Recommendations: The mowing regime at this site was unclear. It should be mowed in the late fall or winter to decrease the density of woody plants. The site should be casually monitored to determine if Japanese honeysuckle is inhibiting compass plants. If so, it is *possible* that after mowing, a late winter or early spring application of herbicide could kill Japanese honeysuckle (as it is evergreen) without harming compass plants or other desirable species. Should natural resource staff at MAAP decide this is a desirable approach, DNA staff botanists should be consulted.

Overall Management/Monitoring of Compass Plant

Periodically, each compass plant occurrence should be evaluated, but such an evaluation need not consist of intensive monitoring. Simply visiting each occurrence and counting or estimating the number of flowering plants and the size of each patch every three years should be adequate. During this time adjacent areas can be searched to determine if the plants are spreading to other locations.

Each site should be mowed every few years in the late fall or winter after the plants have set seed. If there are sites where fire can safely be used, controlled burning can substitute for mowing, but this should not be done as frequently.

Vascular Plant Observations and Collections

Table 4 lists plant species observed during this project. DNA staff documented 371 vascular plants at MAAP and made herbarium vouchers for 74 species. Forty-eight species or 13% are non-native, but this number would increase if all areas (e.g. pastures, agricultural fields) were surveyed as thoroughly as natural communities. The number of introduced plants does not reflect the dominance attained by Nepalese grass.

With 27 species, *Carex* is the largest genus represented, followed by oaks with fourteen species and two putative hybrids. Only one *Solidago* and no *Aster* species were recorded. This may

be a result of field work being conducted in the spring and summer, and since species in these genera flower later in the year they may have been overlooked. However, neither Wofford (1976) or Wolfe (1993) documented either of these genera.

Based on distribution maps from the University of Tennessee Herbarium, staff vouchered 47 county records. Additional county records were observed, but collection efforts focused on species that could not be identified readily in the field. Most of the county records are from Gibson County. This is a result of past research at Natchez Trace State Forest and other collections in Carroll County (Thompson 1974).

Some species documented by Wofford (1976) and/or Wolfe (1993) were not seen by DNA. Some of the discrepancies may have resulted from differing survey foci. Species generally found in agricultural settings or maintained areas (e.g. *Cynodon dactylon* [Bermuda grass], *Dactylis glomerata* [orchard grass], *Lolium multiflorum* [rye grass]), were not observed as DNA spent little time in such habitats. Concerning discrepancies of species that normally occur in natural habitats, neither Wofford nor Wolfe gave an indication as to how frequently each species was encountered. As such it is difficult to discern if they saw a particular species in just one location that happened to be omitted during this project.

A few of Wofford's and Wolfe's species observations not documented by DNA are worth noting. They both found alder (*Alnus serrulata*) and silver maple (*Acer saccharinum*). As these species are easily identified, DNA would surely have observed them if encountered in the field. A likely explanation is that DNA staff did not visit the spots where these species occur.

Wolfe (1993) noted cut-leaved toothwort (*Dentaria laciniata*) and rue anemone (*Thalictrum/Anemonella thalictroides*), yet these were not seen in 2007. Wolfe observed these species, along with bloody butcher/recurved trillium (*Trillium recurvatum*), as part of the spring herbaceous flora, but did not indicate their frequency. DNA observed Trillium in a single location, and cut-

leaved toothwort and rue anemone would certainly have been seen if they occurred in multiple locations. These species appear to have decreased since Wolfe's investigation, perhaps as a result of a corresponding increase in Nepalese grass. The latter is included Wolfe's floristic list but was not addressed in the text.

DNA observed Canada violet (*Viola canadensis*) at MAAP[6]. No specimen was collected as this species is fairly easy to recognize in the field and just one or two plants were seen in a single location. After reviewing the county distribution map for Canada violet, staff thought this observation was in error since the species has not been vouchered in any West Tennessee counties. However, Wolfe (1993) listed Canada violet too. Wolfe also listed dwarf cinquefoil (*Potentilla canadensis*) (not observed by DNA), another species not yet vouchered from West Tennessee. Without an herbarium specimen of these two species, it is unclear if they do indeed occur at MAAP or if DNA and Wolfe misidentified the species.

Conclusions

DNA staff assessed six natural areas delineated by Wolfe (1993) at MAAP and concluded only one, Natural Area B, warrants protective designation. An additional site with a xeric and dry-mesic forest was identified and is recommended for special designation, based primarily on the minimal amount of exotic plant species and the relatively undisturbed forest community.

The forests at MAAP possess mature trees and a good diversity of woody species, but no regionally or globally rare plant communities were identified. Due to past land use, the herbaceous layer is degraded and possesses an abundance of exotic species, particularly Nepalese grass, which is the most common herbaceous species in the forests of MAAP. The wettest and driest forested sites have the least amount of Nepalese grass.

[6] GPS point #46.

Aside from compass plant, no additional rare plants were identified, but each occurrence of compass plant was evaluated and this information can be used to assess the effects of management of the species. It is unlikely that any additional rare plant species will be found with additional botanical surveys.

Need for Additional Surveys

Areas thought to yield rare species or rare communities were thoroughly searched and neither Wolfe (1993) nor this current project documented additional rare plant species. Additional field research using vegetation sampling plots would provide greater detail of relationships between the forest types and environmental variables. A full floristic inventory (vouchering of all vascular plant species located) would undoubtedly add additional species to the plant list for MAAP and fill gaps in the county distribution maps of Tennessee's flora. However, additional research would not alter the management recommendations contained within this report, and for the goal of managing natural plant communities is not necessary.

By continuing the protection of Natural Area B, adding the above-recommended site as an area of minimal management, and following the recommendations for management of compass plant, staff at MAAP will ensure that the highest quality plant communities and rare plant populations are protected.

Literature Cited

Allowas, Joseph G. 1994. The vascular flora of North White Oak Creek Gorge, Scott and Fentress Counties, Tennessee. M.S. thesis, University of Tennessee, Knoxville.

Anonymous. 1953. From Arsenal in Action, Proctor and Gamble Publication.

Braun, E.L. 1950. Deciduous forests of Eastern North America. Blakinston Co, Pennsylvania. Reprinted in 2001 by Blackburn Press, Caldwell, New Jersey.

Culp, F.M. and Mrs. R.E. Ross. 1961. Gibson County past and present. Gibson County Historical Society.

Cushing, B.S. 1995. The mammal and bird survey of Milan Army Ammunition Plant, Milan, Tennessee. Unpublished report to the Tennessee Chapter of The Nature Conservancy.

Frank. E. 1988. Milan Arsenal. *In* Tennessee encyclopedia of history and culture. Rutledge Hill Press, Nashville.

Franklin, S.B. and J.A. Kuppfer. 2004. Forest communities of Natchez Trace State Forest, Western Tennessee Coastal Plain. Castanea. 69(1): 15 – 29.

Gibson, D.J., G. Spyreas, and J. Benedict. 2002. Life history of *Microstegium vimineum* (Poaceae), an invasive grass in southern Illinois. J. Torrey Botanical Society. 129:207-219.

Gleason, Henry A. and Arthur Cronquist. 1991. Manual of vascular plants of Northeastern United States and adjacent Canada, 2nd ed. The New York Botanical Garden, New York, New York.

Hall, T.F. 1940. The biology of *Saururus cernuus* L. American Midland Naturalist. 24(1):253 – 260.

Miller, B.T. 1995. An investigation and assessment of rare, threatened, and endangered fauna and their habitats of Milan Army Ammunition Plant, Gibson and Carroll Counties, Tennessee. Unpublished report.

Murrell, Z. E. 1985. The vascular flora of Big Frog Mountain, Polk County, Tennessee. M.S. thesis, University of Tennessee, Knoxville.

Natural Resources Conservation Service, United States Department of Agriculture. 1984. Soil survey of Carroll County, Tennessee.

Natural Resources Conservation Service, United States Department of Agriculture. 1994. Soil survey of Gibson County, Tennessee.

NatureServe. 2007. NatureServe Explorer database. http://www.natureserve.org/explorer.

Pyle, L.L. 1995. Effects of disturbance on herbaceous exotic plant species on the floodplain of the Potomac River. American Midland Naturalist. 134(2): 244-253.

Rust, R.W. and R.R. Roth. 1981. Seed production and seedling establishment in the mayapple, *Podophyllum peltatum* L. American Midland Naturalist. 105(1): 51 – 60.

Tennessee Exotic Pest Plant Council. 2001. Invasive Exotic Pest Plants in Tennessee. http://www.exoticspestplantcouncil.org/states/TN/TNIList.html.

Thompson, B.A. 1974. A survey of the vascular flora of Carroll County, Tennessee. M.S. Thesis, Memphis State University.

University of Tennessee Herbarium (TENN). 2007. Home page. http://tenn.bio.utk.edu/vascular/vascular.html.

Wolfe, D.W. 1993. Milan Army Ammunition Plant: an investigation of rare plant occurrences and select natural areas. Unpublished report from The Nature Conservancy, Tennessee Field Office.

Wolfe, D.W. 2007. Personal Communication. Telephone conversation with Roger McCoy regarding 1993 research at Milan Army Ammunition Plant.

Wofford, B.E. 1976. Vascular plant species observed on Milan Army Ammunition Plant, Carroll and Gibson Counties, Tennessee. Unpublished report submitted to Battelle Columbus Laboraties, Durham, NC.

Wofford, B.E. 2007. Personal Communication. E-mail sent to Roger McCoy regarding 1976 vascular plant survey at Milan Army Ammunition Plant.

Yatskievych, G. 2006. Steyermark's Flora of Missouri, Volume 2. Missouri Botanical Garden Press. St. Louis.

Table 1. Soils of MAAP

Soil Series	Area of occupancy at MAAP (acres)	Drainage	Parent Material/Location	Slope %	County of Occurrence*
Calloway	647	Somewhat poorly drained with fragipan	Thick deposits of loess or alluvium on flats or stream terraces	1 - 3	Gibson and Carroll
Center	98	Somewhat poorly drained	Loess covered stream terraces	0 - 3	Gibson
Collins	1896	Moderately well drained	Silty, alluvial deposits along steams and upland drainage ways	< 2	Gibson and Carroll
Falaya	1386	Level, poorly drained soils of floodplains	Loess washed from uplands	< 2	Gibson and Carroll
Grenada	2502	Moderately well drained with fragipan	Formed in thick layers of loess on uplands	2 - 8	Gibson and Carroll
Lexington	9929	Well drained soils in uplands	Formed in moderately deep loess and loamy Coastal Plain sediment	2 – 12	Gibson and Carroll
Loring	1884	Moderately well drained with fragipan	Formed in thick upland loess	2 - 12	Gibson and Carroll
Providence	1563	Moderately well drained with fragipan	Formed in loess and loamy Coastal Plain sediment; in concave uplands	2 - 12	Gibson
Rosebloom	107	Poorly drained	Alluvial deposits from loess	0 - 1	Gibson (wetland on N. end borders Waverly Series in Carroll Co. and w/in Wolfe's Natural Area G)
Routon	704	Poorly drained	Loess-covered stream terraces along streams or upland depressions	0 -2	Gibson
Smithdale	1228	Well drained in upland side slopes and ridges	Formed in thick beds of Coastal Plain sediment	8 - 35	Carroll
Udorthents	77	Soils of borrow and landfill areas	Material excavated for use in construction	2 - 35	Gibson and Carroll
Waverley	357	Poorly drained, level on low floodplains	Alluvial deposits from loess	0 - 2	Carroll (wetland on N. end, borders Rosebloom Series in Gibson Co.),

Modified from NRCS, soil surveys of Carroll and Gibson Counties, Tennessee
*Nomenclature differences occur between the two counties perhaps due to different publication dates. Some of the soils are undoubtedly the same (e.g. Rosebloom and Waverely).

Table 2. Rare Plants Known from Gibson and Carroll Counties, Tennessee

Scientific Name	Common Name	State Rank	Global Rank	State Status
Agalinis auriculata	earleaved false-foxglove	S2	G3	E
Aristida ramosissima	branched three-awn grass	SH	G5	E-P
Carex gravida	heavy sedge	S1	G5	S
Carex reniformis	reniform sedge	S1	G4?	S
Ceratophyllum echinatum	prickly hornwort	S1	G4?	S
Chelone obliqua	red turtlehead	S1	G4	S
Iris fulva	copper iris	S2	G5	T
Juglans cinerea	butternut	S3	G4	T
Magnolia virginiana	sweetbay magnolia	S2	G5	T
Panax quinquefolius	American ginseng	S3S4	G3G4	S-CE
Polygonum arifolium	halberd-leaf tearthumb	S1	G5	T
Silphium laciniatum	compass plant	S2	G5	T
Symplocos tinctoria	horse-sugar	S2	G5	S

Table 3. Definition of Rare Plant Ranks and Statuses

State Rank - The state rank of a species in Tennessee. Like the Global Rank this is a non-legal rank indicating the rarity and vulnerability of a species at the state level.

S1	Extremely rare and critically imperiled in the state with five or fewer occurrences, or very few remaining individuals, or because of some special condition where the species is particularly vulnerable to extinction
S2	Very rare and imperiled within the state, six to twenty occurrences, or few remaining individuals, or because of some factor(s) making it vulnerable to extinction
S3	Rare and uncommon in the state, from 21-100 occurrences
S4	Widespread, abundant, and apparently secure within the state, but with cause for long-term concern
S5	Demonstrably widespread and secure in the state
SH	Of historical occurrence in Tennessee, e.g. formally part of the established biota, with the expectation that it may be rediscovered

Global Rank - The global or world-wide rank of a species which is a non-legal rank indicating the rarity and vulnerability of a species

G1	Extremely rare and critically imperiled in the world with five or fewer occurrences, or very few remaining individuals, or because of some special condition where the species is particularly vulnerable to extinction
G2	Very rare and imperiled within the world, six to twenty occurrences, or few remaining individuals, or because of some factor(s) making it vulnerable to extinction
G3	Rare and uncommon in its range or found locally in a restricted range, generally from 21-100 occurrences
G4	Widespread, abundant, and apparently secure globally, but with cause for long-term concern
G5	Demonstrably widespread and secure globally

State Status -The legal listing in Tennessee

E, Endangered	Any species or subspecies whose prospects of survival or recruitment within the state are in jeopardy or are likely to become so within the foreseeable future
T, Threatened	Any species or subspecies that is likely to become an endangered species within the foreseeable future
S, Special Concern	Any species or subspecies of plant that is uncommon in Tennessee, or has unique or highly specific habitat requirements or scientific value and therefore requires careful monitoring of its status.

Table 5. Vascular Plants Observed at MAAP.

Species	Specimen Deposited	Common Name	Group	Origin	Habitat	Abundance
Acalypha rhomboidea		Virginia threeseed mercury, copperleaf	Dicot	Native	low woods	Scarce
Acalypha virginica		Virginia threeseed mercury, copperleaf	Dicot	Native	woods	Scarce
Acer drummondii	x	Drummond red maple	Dicot	Native	wet woods	Rare
Acer negundo		boxelder, box elder	Dicot	Native	low woods	Infrequent
Acer rubrum		red maple	Dicot	Native	low woods	Occasional
Achillea millefolium		common yarrow	Dicot	Native	fields	Occasional
Aesculus pavia		red buckeye, scarlet buckeye	Dicot	Native	low woods	Scarce
Agrimonia pubescens		soft agrimony	Dicot	Native	woods on slopes	Infrequent
Agrimonia rostellata		beaked agrimony	Dicot	Native	woods	Infrequent
Agrostis scabra	x	rough bent grass	Monocot	Native	woods	Occasional
Alisma subcordatum		American water plantain	Monocot	Native	swamps	Rare
Allium sp.		garlic	Monocot	Native	fields	Very Rare
Allium vineale		wild garlic	Monocot	Introduced	fields	Occasional
Alopecurus carolinianus	x	Carolina foxtail	Monocot	Native	roadsides/disturbed areas	Scarce
Ambrosia artemisiifolia		annual ragweed	Dicot	Native	roadsides/disturbed areas	Frequent
Ambrosia trifida		great ragweed	Dicot	Native	fields/open areas	Frequent
Amphicarpaea bracteata		American hog peanut	Dicot	Native	woods	Scarce
Andropogon virginicus		broomsedge bluestem	Monocot	Native	fields/pastures	Frequent
Apios americana		groundnut	Dicot	Native	wetland edges	Scarce
Aplectrum hyemale		Adam and Eve	Monocot	Native	mesic woods	Very Rare
Aralia spinosa		devil's walking stick	Dicot	Native	woods and edges	Frequent
Arisaema dracontium		green dragon	Monocot	Native	mesic woods	Infrequent
Arisaema triphyllum		Jack in the pulpit	Monocot	Native	mesic woods	Scarce
Arundinaria gigantea ssp. gigantea		giant cane	Monocot	Native	low woods	Frequent
Asclepias tuberosa		butterfly milkweed	Dicot	Native	fields	Infrequent
Asclepias viridiflora		green comet milkweed	Dicot	Native	roadsides/dry open areas	Rare

Species	Specimen Deposited	Common Name	Group	Origin	Habitat	Abundance
Asimina triloba		pawpaw	Dicot	Native	woods	Occasional
Asplenium platyneuron		ebony spleenwort	Pteridophyte	Native	woods	Occasional
Athyrium filix-femina ssp. asplenioides	x	asplenium lady fern	Pteridophyte	Native	mesic woods	Infrequent
Azolla caroliniana		Carolina mosquito fern	Pteridophyte	Native	water in swamps	Scarce
Betula nigra		river birch, black birch	Dicot	Native	near streams/low woods	Scarce
Bidens frondosa	x	devil's beggar tick	Dicot	Native	wet areas	Occasional
Boehmeria cylindrica		smallspike false nettle	Dicot	Native	streamside	Occasional
Botrychium virginianum		rattlesnake fern	Pteridophyte	Native	woods	Infrequent
Brunnichia ovata	x	American buckwheat vine, ladies' eardrops	Dicot	Native	low woods	Scarce
Calystegia sp.		bindweed	Dicot	Native	roadsides	Infrequent
Campsis radicans		trumpet creeper, trumpet vine	Dicot	Native	woods	Occasional
Cardamine hirsuta		hairy bitter cress	Dicot	Introduced	disturbed area/Ag. Fields	Occasional
Carex albolutescens	x	greenwhite sedge	Monocot	Native	trib to Rutherford branch	Scarce
Carex amphibola		eastern narrowleaf sedge	Monocot	Native	moist woods	Scarce
Carex aureolensis	x	(no common name)	Monocot	Native	trib to Rutherford branch	Scarce
Carex basiantha		Willdenow's sedge	Monocot	Native	moist woods	Scarce
Carex blanda	x	eastern woodland sedge	Monocot	Native	moist woods	Scarce
Carex cephalophora	x	oval-leaf sedge	Monocot	Native	trib to Rutherford fork	Scarce
Carex communis		fibrousroot sedge	Monocot	Native	moist woods	Scarce
Carex crebriflora	x	coastalplain sedge	Monocot	Native	moist woods	Scarce
Carex debilis		white edge sedge	Monocot	Native	moist woods	Scarce
Carex flaccosperma	x	thinfruit sedge	Monocot	Native	woods	Rare
Carex gigantea	x	giant sedge	Monocot	Native	low woods	Rare
Carex grayi		Gray's sedge	Monocot	Native	low woods	Scarce
Carex hirsutella	x	fuzzy wuzzy sedge	Monocot	Native	streamside	Rare
Carex kraliana		(no common name)	Monocot	Native	moist woods	Scarce
Carex laxiflora	x	broad looseflower sedge	Monocot	Native	moist woods	Scarce
Carex lupulina	x	hop sedge	Monocot	Native	low woods	Rare

Species	Specimen Deposited	Common Name	Group	Origin	Habitat	Abundance
Carex mesochorea	x	midland sedge	Monocot	Native	moist woods	Scarce
Carex oxylepis var. oxylepis	x	sharpscale sedge	Monocot	Native	moist woods	Scarce
Carex planispicata	x	(no common name)	Monocot	Native	woods	Infrequent
Carex rosea	x	rosy sedge	Monocot	Native	low woods	Infrequent
Carex socialis	x	low woodland sedge	Monocot	Native	woods	Occasional
Carex sp. section ovales			Monocot	Native	open wetlands	
Carex squarrosa	x	squarrose sedge	Monocot	Native	moist woods	Rare
Carex swanii	x	Swan's sedge	Monocot	Native	moist woods	Rare
Carex texensis	x	Texas sedge	Monocot	Native	woods	Infrequent
Carex tribuloides	x	blunt broom sedge	Monocot	Native	woods	Scarce
Carex vulpinoidea		fox sedge	Monocot	Native	low woods	Scarce
Carpinus caroliniana		American hornbeam, blue beech, ironwood	Dicot	Native	white oak woods	Scarce
Carya glabra		pignut hickory, red hickory	Dicot	Native	woods	Occasional
Carya laciniosa		big shellbark hickory, kingnut	Dicot	Native	low woods	Infrequent
Carya ovata var. australis		Carolina hickory	Dicot	Native	woods	Infrequent
Carya ovata var. ovata		shagbark hickory	Dicot	Native	woods	Occasional
Carya tomentosa		mockernut hickory	Dicot	Native	woods	Occasional
Celastrus scandens		American bittersweet	Dicot	Native	woods	Infrequent
Cephalanthus occidentalis		common buttonbush	Dicot	Native	wet woods/open water	Infrequent
Cercis canadensis		eastern redbud	Dicot	Native	woods	Infrequent
Chaerophyllum tainturieri		hairyfruit chervil	Dicot	Native	low woods/ streamsides	Scarce
Chasmanthium latifolium		Indian woodoats	Monocot	Native	low woods/ streamsides	Scarce
Chimaphila maculata		pipsissewa, spotted wintergreen	Dicot	Native	dry woods	Scarce
Cicuta maculata		spotted water hemlock	Dicot	Native	low woods/ streamsides	Infrequent
Cinna arundinacea	x	sweet wood reed	Monocot	Native	low woods/ streamsides	Scarce
Cirsium discolor		field thistle	Dicot	Native	roadsides/open areas	Infrequent
Claytonia virginica		Virginia spring beauty	Dicot	Native	woods	Rare
Commelina communis		Asiatic dayflower	Monocot	Introduced	low woods/ streamsides	Infrequent
Conium maculatum		poison hemlock	Dicot	Introduced	wet roadsides	Scarce

Species	Specimen Deposited	Common Name	Group	Origin	Habitat	Abundance
Conoclinium coelestinum		mistflower	Dicot	Native	wet roadsides	Rare
Coreopsis tinctoria		golden tickseed	Dicot	Native	roadsides/fields	Scarce
Coreopsis tripteris		tall tickseed	Dicot	Native	wet areas	Infrequent
Cornus amomum		silky dogwood	Dicot	Native	low woods	Scarce
Cornus florida		flowering dogwood	Dicot	Native	woods	Infrequent
Cornus foemina	x	stiff dogwood	Dicot	Native	low woods	Scarce
Corydalis flavula		yellow fumewort	Dicot	Native	woods	Scarce
Corylus americana		American hazelnut	Dicot	Native	woods	Infrequent
Crataegus viridis		green hawthorn	Dicot	Native	woods	Scarce
Crotalaria sagittalis	x	arrowhead rattlebox	Dicot	Native	dry openings in woods	Very Rare
Croton capitatus	x	hogwort	Dicot	Native	roadsides	Rare
Croton monanthogynus		prairie tea	Dicot	Native	roadsides/dry open areas	Infrequent
Cryptotaenia canadensis		Canadian honewort	Dicot	Native	mesic woods/low woods	Infrequent
Cynoglossum virginianum		wild comfrey	Dicot	Native	woods	Infrequent
Cyperus echinatus	x	globe flat sedge	Monocot	Native	wet areas	Scarce
Cyperus iria		ricefield flat sedge	Monocot	Introduced	wet areas	Scarce
Cyperus refractus	x	reflexed flat sedge	Monocot	Native	wet areas	Scarce
Cystopteris protrusa	x	lowland bladder fern	Pteridophyte	Native	woods	Infrequent
Danthonia spicata		poverty oat grass	Monocot	Native	roadsides	Infrequent
Daucus carota		Queen Anne's lace	Dicot	Introduced	roadside/distrubed areas	Frequent
Desmodium rotundifolium		prostrate tick trefoil	Dicot	Native	woods	Infrequent
Desmodium spp.			Dicot	Native	dry woods	
Desmodium viridiflorum		velvetleaf tick trefoil	Dicot	Native	fields/roadsides	Scarce
Dichanthelium aciculare		needleleaf rosette grass	Monocot	Native	fields/roadsides	Infrequent
Dichanthelium acuminatum var. lindheimeri	x	Lindheimer panic grass	Monocot	Native	fields/roadsides	Infrequent
Dichanthelium boscii		Bosc's panic grass	Monocot	Native	woods	Infrequent
Dichanthelium commutatum		variable panic grass	Monocot	Native		Infrequent
Dichanthelium scoparium	x	velvet panicum	Monocot	Native	fields/roadsides	Scarce

Species	Specimen Deposited	Common Name	Group	Origin	Habitat	Abundance
Dichanthelium sphaerocarpon var. isophyllum	x	roundseed panic grass	Monocot	Native	fields/roadsides	Infrequent
Dichanthelium villosissimum	x	whitehair rosette grass	Monocot	Native	fields/roadsides	Scarce
Dichanthelium dichotomum var. dichotomum	x	cypress panic grass	Monocot	Native	woods	Infrequent
Digitaria ischaemum		smooth crab grass	Monocot	Introduced	fields/roadsides	Infrequent
Diodia teres		poorjoe	Dicot	Native	fields/roadsides	Infrequent
Dioscorea oppositifolia		Chinese yam	Monocot	Introduced	fields	Infrequent
Dioscorea villosa		wild yam	Monocot	Native	woods	Scarce
Diospyros virginiana		persimmon	Dicot	Native	woods	Infrequent
Draba verna		spring draba	Dicot	Introduced	roadsides	Scarce
Duchesnea indica		Indian strawberry	Dicot	Introduced	successional woods	Infrequent
Dulichium arundinaceum		threeway sedge	Monocot	Native	wet areas	Rare
Echinochloa colona	x	jungle rice	Monocot	Introduced	fields	Scarce
Echinochloa muricata var. muricata		rough barnyard grass	Monocot	Native	fields	Scarce
Eleagnus sp.		olive	Dicot	Introduced	woods	
Eleocharis obtusa	x	blunt spike rush	Monocot	Native	wet areas	Scarce
Elephantopus tomentosus		devil's grandmother	Dicot	Native	open woods	Occasional
Elymus hystrix		eastern bottlebrush grass	Monocot	Native	fields	Infrequent
Eragrostis cilianensis	x	stink grass	Monocot	Introduced	roadsides	Scarce
Erechtites hieraciifolia		American burnweed	Dicot	Native	low woods(Natural area G)	Rare
Erigeron philadelphicus		Philadelphia fleabane	Dicot	Native	woods edge	Infrequent
Euonymus americanus		strawberry bush, heart's a bustin	Dicot	Native	woods	Scarce
Euonymus fortunei		winter creeper	Dicot	Introduced	cemetery/woods	Rare
Eupatorium altissimum		tall thoroughwort	Dicot	Native	fields	Infrequent
Eupatorium capillifolium		dog fennel	Dicot	Native	fields	Frequent
Eupatorium fistulosum		trumpet weed	Dicot	Native	wet fields	Scarce
Eupatorium perfoliatum		common boneset	Dicot	Native	woods	Scarce
Eupatorium rotundifolium ssp. ovatum		roundleaf thoroughwort	Dicot	Native	fields	Infrequent

Species	Specimen Deposited	Common Name	Group	Origin	Habitat	Abundance
Fagus grandifolia		American beech	Dicot	Native	understory species	Scarce
Fleischmannia incarnata		pink thoroughwort	Dicot	Native	low woods	Scarce
Fragaria virginiana		Virginia strawberry	Dicot	Native	edge of woods	Occasional
Fraxinus americana		white ash, American ash	Dicot	Native	woods	Occasional
Fraxinus pennsylvanica		green ash	Dicot	Native	low woods/swamps	Scarce
Galium circaezans		licorice bedstraw	Dicot	Native	woods	Occasional
Gamochaeta argyrinea	x	silvery cudweed	Dicot	Native	roadsides/fields	Infrequent
Geranium carolinianum		Carolina geranium	Dicot	Native	mesic woods	Rare
Geum canadense		white avens	Dicot	Native	mesic woods/low woods	Occasional
Gleditsia triacanthos		honey locust	Dicot	Native	low woods	Scarce
Gnaphalium sp.			Dicot	Native	openings	
Gratiola virginiana		roundfruit hedge hyssop	Dicot	Native	wet areas	Rare
Helenium amarum		yellowdicks	Dicot	Native	roadsides/open areas	Infrequent
Helenium autumnale		common sneezeweed	Dicot	Native	roadsides/open areas	Scarce
Helenium flexuosum		purplehead sneezeweed	Dicot	Native	roadsides/open areas	Infrequent
Helianthus mollis		ashy sunflower	Dicot	Native	roadsides	Rare
Helianthus sp.			Dicot	Native	dry woods/openings	
Hemerocallis fulva		orange daylily	Monocot	Introduced	woods/old house site	Scarce
Hibiscus moscheutos ssp. moscheutos	x	crimsoneyed rose mallow, hibiscus	Dicot	Native	wet open areas	Scarce
Houstonia pusilla	x	tiny bluet	Dicot	Native	fields	Scarce
Hydrangea arborescens		wild hydrangea	Dicot	Native	streamsides	Infrequent
Hydrangea cinerea		ashy hydrangea	Dicot	Native	creek banks	Rare
Hydrolea uniflora		oneflower false fiddleleaf	Dicot	Native	swamps/wet woods	Very Rare
Hymenocallis caroliniana		Carolina spiderlily	Monocot	Native	low woods	Very Rare
Hypericum mutilum		dwarf St. Johnswort	Dicot	Native	wet areas	Scarce
Hypericum prolificum		shrubby St. Johnswort	Dicot	Native	open woods	Rare
Hypericum punctatum		spotted St. Johnswort	Dicot	Native	woods	Scarce
Hypericum stragulum		St. Andrew's cross	Dicot	Native	dry woods	Scarce

Species	Specimen Deposited	Common Name	Group	Origin	Habitat	Abundance
Ilex decidua var. decidua		possum haw	Dicot	Native	low woods	Frequent
Ilex opaca		American holly	Dicot	Native	woods	Scarce
Impatiens capensis		jewelweed	Dicot	Native	low woods	Scarce
Juglans nigra		black walnut	Dicot	Native	woods	Scarce
Juncus marginatus	x	grassleaf rush	Monocot	Native	wet areas	Rare
Juncus tenuis	x	path rush	Monocot	Native	wet areas	Scarce
Juniperus virginiana		red cedar	Gymnoperm	Native	successional woods	Occasional
Krigia caespitosa		weedy dwarf dandelion	Dicot	Native	roadsides	Occasional
Lactuca sp.			Dicot		roadsides	
Lamium amplexicaule		henbit	Dicot	Introduced	field edge/roadside	Occasional
Lamium purpureum		dead nettle	Dicot	Introduced	field edge/roadside	Occasional
Lathyrus hirsutus		Caley pea	Dicot	Introduced	field edge/roadside	Infrequent
Lechea mucronata		hairy pinweed	Dicot	Native	dry open areas	Scarce
Leersia oryzoides		rice cut grass	Monocot	Native	wet areas	Rare
Leersia virginica		white grass	Monocot	Native	stream edges	Scarce
Lepidium virginicum		Virginia pepperweed	Dicot	Native	roadside/disturbed areas	Occasional
Leptochloa panicea ssp. brachiata		mucronate sprangeltop	Monocot	Native	disturbed moist areas	Infrequent
Lespedeza cuneata		Chinese lespedeza	Dicot	Introduced	disturbed areas/dry woods	Occasional
Leucanthemum vulgare		oxeye daisy	Dicot	Introduced	roadsides/open areas	Occasional
Ligustrum sinense		Chinese privet	Dicot	Introduced	successional fields and woods	
Linaria canadensis	x	Canada toadflax	Dicot	Native	fields	Scarce
Lindera benzoin		spicebush	Dicot	Native	low woods	Scarce
Liquidambar styraciflua		sweet gum	Dicot	Native	woods	Infrequent
Liriodendron tulipifera		tulip tree, tulip poplar, yellow poplar	Dicot	Native	woods	Infrequent
Lobelia cardinalis		cardinal flower	Dicot	Native	low woods	Scarce
Lobelia puberula		downy lobelia	Dicot	Native	fields	Infrequent
Lonicera japonica		Japanese honeysuckle	Dicot	Introduced	woods	Frequent
Ludwigia decurrens		wingleaf primrose willow	Dicot	Native	wet areas	Rare

Species	Specimen Deposited	Common Name	Group	Origin	Habitat	Abundance
Ludwigia palustris		marsh seedbox	Dicot	Native	wet areas	Very Rare
Lycopus americanus		American water horehound	Dicot	Native	wet areas	Scarce
Lysimachia nummularia		creeping jenny	Dicot	Introduced	low woods	Scarce
Lysimachia radicans	x	trailing yellow loosestrife	Dicot	Native	wet areas	Rare
Maclura pomifera		osage orange, hedge apple, horse apple, bodock	Dicot	Native	woods	Infrequent
Macrothelypteris torresiana	x	sword fern	Pteridophyte	Introduced	L ow woods	Very Rare
Magnolia grandiflora	x	evergreen magnolia, southern magnolia	Dicot	Introduced	dry woods	Very Rare
Malus pumila		common apple	Dicot	Introduced	successional field	Very Rare
Matelea obliqua	x	climbing milkvine	Dicot	Native	woods, edge of woods	Rare
Mecardonia acuminata	x	axilflower	Dicot	Native	streamside	Scarce
Medicago lupulina		black medic	Dicot	Introduced	roadside/disturbed areas	Occasional
Melica mutica		twoflower melic grass	Monocot	Native	dry woods	Rare
Microstegium vimineum		Nepalese browntop	Monocot	Introduced	woods	Common
Morus alba		white mulberry	Dicot	Introduced	edge of woods	Scarce
Muhlenbergia schreberi		nimblewill	Monocot	Native	streamside	Scarce
Myosotis macrosperma		largeseed forget-me-not	Dicot	Native	woods	Infrequent
Myosotis verna		spring forget-me-not	Dicot	Native	woods	Occasional
Nemophila aphylla		smallflower baby blue eyes	Dicot	Native	mesic woods	Scarce
Nyssa aquatica		water tupelo	Dicot	Native	swamps/wet woods	Very Rare
Nyssa sylvatica var. biflora		swamp tupelo, swamp gum	Dicot	Native	low woods	Rare
Nyssa sylvatica var. sylvatica		black gum, black tupelo	Dicot	Native	woods	Occasional
Onoclea sensibilis		sensitive fern	Pteridophyte	Native	low woods	Scarce
Opuntia humifusa		prickly pear, cactus	Dicot	Native	edge of railroad tracks	Scarce
Ornithogalum umbellatum		star of Bethlehem	Monocot	Introduced	fields	Infrequent
Osmunda regalis var. spectabilis		royal fern	Pteridophyte	Native	wet areas	Rare
Ostrya virginiana		hophornbeam, ironwood	Dicot	Native	dry woods	Scarce
Oxalis stricta		common yellow oxalis	Dicot	Native	fields	Occasional
Oxalis violacea		violet wood sorrel	Dicot	Native	woods	Infrequent

Species	Specimen Deposited	Common Name	Group	Origin	Habitat	Abundance
Panicum anceps		beaked panic grass	Monocot	Native	fields	Infrequent
Parthenocissus quinquefolia		Virginia creeper	Dicot	Native	woods	Infrequent
Paspalum setaceum	x	thin paspalum	Monocot	Native	roadsides/fields	Occasional
Passiflora incarnata		purple passion flower, maypops	Dicot	Native	field edges	Infrequent
Passiflora lutea		yellow passion flower, maypops	Dicot	Native	woods	Scarce
Peltandra virginica		green arrow arum	Monocot	Native	swamps/wet woods	Scarce
Penthorum sedoides		ditch stonecrop	Dicot	Native	wet areas	Scarce
Perilla frutescens		beefsteak plant	Dicot	Introduced	roadside	Scarce
Phegopteris hexagonoptera		broad beech fern	Pteridophyte	Native	woods	Occasional
Philadelphus sp. [inodorus?]		mock orange	Dicot	Native	woods/fields	Rare
Phryma leptostachya		American lopseed	Dicot	Native	woods	Scarce
Phytolacca americana		American pokeweed	Dicot	Native	fields	Occasional
Pilea pumila		Canadian clearweed	Dicot	Native	low woods	Infrequent
Pinus echinata		shortleaf pine	Gymnoperm	Native	planted	Infrequent
Pinus taeda		loblolly pine	Gymnoperm	Native	plantations	Frequent
Plantago aristata		largebracted plantain	Dicot	Native	roadsides/fields	Scarce
Plantago rugelii		blackseed plantain	Dicot	Native	creek bottom/roadsides	Scarce
Plantago sp.			Dicot		fields	
Platanus occidentalis		American sycamore	Dicot	Native	low woods	Scarce
Poa sylvestris	x	woodland blue grass	Monocot	Native	wet woods	Infrequent
Podophyllum peltatum		may apple	Dicot	Native	woods/edges of woods	Frequent
Polygala sanguinea	x	purple milkwort	Dicot	Native	open areas	Rare
Polygonatum biflorum		true Solomon's seal	Monocot	Native	wet areas	Scarce
Polygonum caespitosum var. longisetum		oriental ladysthumb	Dicot	Introduced	wet areas	Scarce
Polygonum hydropiperoides		swamp smartweed	Dicot	Native	wet areas	Scarce
Polygonum persicaria	x	spotted ladysthumb	Dicot	Introduced	wet areas	Scarce
Polygonum sagittatum		arrowleaf tearthumb	Dicot	Native	wet woods	Rare
Polygonum scandens		climbing false buckwheat	Dicot	Native	wet areas	Scarce

Species	Specimen Deposited	Common Name	Group	Origin	Habitat	Abundance
Polygonum virginianum		jumpseed	Dicot	Native	low woods	Occasional
Polystichum acrostichoides		Christmas fern, holly fern	Pteridophyte	Native	woods	Infrequent
Populus deltoides		eastern cottonwood	Dicot	Native	eroded creek-side	Scarce
Potentilla simplex var. simplex		common cinquefoil	Dicot	Native	fields	Occasional
Prunus angustifolia		Chickasaw plum	Dicot	Native	roadsides	Rare
Prunus serotina		black cherry	Dicot	Native	woods	Occasional
Ptilimnium capillaceum		herb william	Dicot	Native	wet woods	Rare
Pueraria montana var. lobata		kudzu	Dicot	Introduced	disturbed areas/railroads	Frequent
Pycnanthemum spp.		mountain mint	Dicot	Native	woods/roadsides	
Pycnanthemum tenuifolium		narrowleaf mountain mint	Dicot	Native	fields	Infrequent
Pycnanthemum verticillatum var. pilosum	x	whorled mountain mint	Dicot	Native	roadside	Rare
Pyrrhopappus carolinianus		false dandelion, carolina false dandelion	Dicot	Native	roadsides	Infrequent
Pyrus calleryana		Bradford Pear	Dicot	Introduced	successional fields and woods	Rare
Quercus alba		white oak	Dicot	Native	woods	Occasional
Quercus coccinea		scarlet oak	Dicot	Native	woods	Infrequent
Quercus falcata		southern red oak	Dicot	Native	low woods	Frequent
Quercus imbricaria		shingle oak	Dicot	Native	woods	Infrequent
Quercus lyrata		overcup oak	Dicot	Native	low woods	Scarce
Quercus macrocarpa		bur oak, mossycup oak	Dicot	Native	woods	Scarce
Quercus marilandica		blackjack oak	Dicot	Native	dry woods	Scarce
Quercus michauxii	x	swamp chestnut oak, basket oak, cow oak	Dicot	Native	low woods	Scarce
Quercus nigra		water oak	Dicot	Native	low woods/swamps	Scarce
Quercus pagoda		cherrybark oak	Dicot	Native	low woods	Occasional
Quercus phellos		willow oak	Dicot	Native	low woods	Scarce
Quercus rubra		northern red oak	Dicot	Native	woods	Occasional
Quercus stellata		post oak	Dicot	Native	dry woods	Scarce
Quercus velutina		black oak	Dicot	Native	dry woods	Occasional

Species	Specimen Deposited	Common Name	Group	Origin	Habitat	Abundance
Quercus x guadalupensis (macrocarpa x stellata)	x	hybrid oak	Dicot	Native	dry woods	Very Rare
Quercus x vaga (palustris x velutina)	x	hybrid oak	Dicot	Native	low woods	Very Rare
Ranunculus bulbosus		St. Anthony's turnip	Dicot	Introduced	streamsides	Scarce
Ranunculus micranthus	x	rock buttercup	Dicot	Native	streamsides	Rare
Ranunculus recurvatus	x	blisterwort	Dicot	Native	streamsides	Scarce
Rhamnus caroliniana		Carolina buckthorn	Dicot	Native	woods	Infrequent
Rhexia virginica	x	meadow beauty	Dicot	Native	wet areas	Scarce
Rhus copallinum		winged sumac	Dicot	Native	dry woods	Infrequent
Rhynchospora sp. [chalarocephala ?]			Monocot	Native	pond edge	Very Rare
Robinia pseudoacacia		black locust	Dicot	Native	woods	Infrequent
Rosa carolina		Carolina rose, pasture rose	Dicot	Native	roadsides/fields	Scarce
Rosa multiflora		multiflora rose	Dicot	Introduced	edge of woods	Occasional
Rosa palustris		swamp rose	Dicot	Native	low woods/wetland	Rare
Rubus flagellaris	x	northern dewberry	Dicot	Native	woods	Infrequent
Rubus sp.		blackberry/rasberry	Dicot	Native	woods	Occasional
Rudbeckia hirta		black-eyed susan	Dicot	Native	roadsides	Scarce
Rudbeckia laciniata var. laciniata		cutleaf coneflower	Dicot	Native	low woods	Rare
Ruellia caroliniensis		Carolina wild petunia	Dicot	Native	woods	Scarce
Rumex acetosella	x	common sheep sorrel	Dicot	Introduced	fields	Infrequent
Rumex crispus		curly dock	Dicot	Introduced	ag. fields	Occasional
Rumex verticillatus		swamp dock	Dicot	Native	wetlands/wet woods	Infrequent
Sabatia angularis		rose pink	Dicot	Native	open areas	Scarce
Saccharum alopecuroidum		silver plume grass	Monocot	Native	roadside/ burned areas	Scarce
Sagittaria latifolia	x	broadleaf arrowhead	Monocot	Native	wetlands	Infrequent
Salix nigra		black willow	Dicot	Native	wet woods	Infrequent
Salvia lyrata		lyreleaf sage	Dicot	Native	open areas	Occasional
Sambucus canadensis		common elderberry	Dicot	Native	low woods	Infrequent

Species	Specimen Deposited	Common Name	Group	Origin	Habitat	Abundance
Sassafras albidum		sassafras	Dicot	Native	woods	Infrequent
Saururus cernuus		lizard's tail	Dicot	Native	low woods	Occasional
Scirpus cyperinus	x	wool grass	Monocot	Native	wet areas	Scarce
Scirpus georgianus	x	Georgia bulrush	Monocot	Native	wet areas	Scarce
Scleria pauciflora		fewflower nut rush	Monocot	Native	dry openings in woods	Scarce
Scrophularia marilandica	x	carpenter's square, figwort	Dicot	Native	mesic woods	Scarce
Scutellaria incana var. incana		hoary skullcap	Dicot	Native	field edges	Frequent
Scutellaria lateriflora	x	blue skullcap	Dicot	Native	woods	Scarce
Sedum ternatum		woodland stonecrop	Dicot	Native	woods	Rare
Senecio glabellus		butterweed	Dicot	Native	low woods	Infrequent
Senna marilandica		Maryland senna	Dicot	Native	dry woods	Rare
Silene stellata		widowsfrill	Dicot	Native	woods	Scarce
Silene virginica		fire pink	Dicot	Native	dry woods	Scarce
Silphium asteriscus var. latifolium		whorled rosinweed	Dicot	Native	roadsides/fields	Scarce
Silphium laciniatum		compass plant	Dicot	Native	roadsides/fields	Scarce
Sisyrinchium albidum		white blue-eyed grass	Monocot	Native	roadsides/fields	Scarce
Smallanthus uvedalius		hairy leafcup	Dicot	Native	edge of woods	Rare
Smilacina racemosa		false solomon's seal	Monocot	Native	mesic woods	Scarce
Smilax bona-nox		saw greenbrier	Monocot	Native	woods	Occasional
Smilax glauca		cat greenbrier	Monocot	Native	woods	Occasional
Smilax herbacea var. herbacea		smooth carrion flower	Monocot	Native	woods	Scarce
Smilax rotundifolia		roundleaf greenbrier	Monocot	Native	woods	Occasional
Solanum carolinense		Carolina horsenettle	Dicot	Native	fields	Occasional
Solidago juncea	x	early goldenrod	Dicot	Native	roadsides/fields	Scarce
Spiranthes tuberosa		little ladies'-tresses	Monocot	Native	dry openings in woods	Very Rare
Spirodela polyrhiza		duckmeat	Monocot	Native	water in swamps	Rare
Stellaria media ssp. media		common chickweed	Dicot	Introduced	woods	Occasional
Stylosanthes biflora		sidebeak pencil flower	Dicot	Native	dry woods	Scarce
Symphoricarpos orbiculatus		coralberry, snowberry	Dicot	Native	roadsides/fields	Infrequent

Species	Specimen Deposited	Common Name	Group	Origin	Habitat	Abundance
Taxodium distichum		bald cypress	Gymnoperm	Native	planted with some naturalized	Scarce
Teucrium canadense		Canada germander	Dicot	Native	wet woods	Rare
Thalictrum dioicum		early meadow-rue	Dicot	Native	woods	Scarce
Thalictrum revolutum		waxyleaf meadow-rue	Dicot	Native	mesic woods	Rare
Thelypteris noveboracensis		New York fern, maiden fern	Pteridophyte	Native	woodlands	Infrequent
Tipularia discolor		cranefly orchid	Monocot	Native	woods	Scarce
Toxicodendron radicans		poison ivy	Dicot	Native	woods	Common
Trachelospermum difforme		climbing dogbane	Dicot	Native	woods	Scarce
Tradescantia sp.		spiderwort	Monocot	Native	low woods	Rare
Triadenum walteri		greater marsh St. Johnswort	Dicot	Native	low woods	Rare
Trifolium pratense		red clover	Dicot	Introduced	ag. fields	Occasional
Trillium recurvatum	x	bloody butcher	Monocot	Native	mesic woods	Very Rare
Triodanis perfoliata var. perfoliata		clasping Venus' looking glass	Dicot	Native	roadside	Occasional
Typha latifolia		broadleaf cattail	Monocot	Native	wetlands	Occasional
Ulmus alata		winged elm	Dicot	Native	woods	Occasional
Ulmus americana		American elm	Dicot	Native	woods	Occasional
Urtica dioica		stinging nettle	Dicot	Introduced	low woods	Scarce
Vaccinium arboreum	x	farkleberry	Dicot	Native	dry woods	Rare
Vaccinium stamineum		deerberry	Dicot	Native	dry woods	Rare
Valerianella umbilicata		navel corn salad	Dicot	Native	roadside/distrubed areas	Infrequent
Verbascum blattaria		moth mullein	Dicot	Introduced	roadsides	Infrequent
Verbascum thapsus		common mullein	Dicot	Introduced	roadside/distrubed areas	Occasional
Verbena simplex		narrowleaf vervain	Dicot	Native	roadsides/open areas	Occasional
Verbena urticifolia		white vervain	Dicot	Native	roadsides/open areas	Scarce
Verbesina virginica		white crownbeard	Dicot	Native	roadsides/open areas	Occasional
Veronica hederifolia		ivyleaf speedwell	Dicot	Introduced	roadsides/open areas	Infrequent
Viburnum rufidulum		rusty black haw	Dicot	Native	dry woods	Scarce
Vicia sativa ssp. nigra		garden vetch	Dicot	Introduced	ag. fields	Occasional

Species	Specimen Deposited	Common Name	Group	Origin	Habitat	Abundance
Viola arvensis	x	European field pansy	Dicot	Introduced	ag. fields	Infrequent
Viola bicolor		field pansy	Dicot	Native	ag. fields	Infrequent
Viola canadensis		Canada violet	Dicot	Native	wooded slope	Very Rare
Viola cucullata	x	marsh blue violet	Dicot	Native	woodlands/low woods	Scarce
Viola palmata		early blue violet	Dicot	Native	woods	Scarce
Vitis cinerea var. cinerea		downy grape, sweet winter grape	Dicot	Native	woods	Occasional
Vitis rotundifolia		muscadine	Dicot	Native	woods	Infrequent
Xanthium strumarium		rough cockleburr	Dicot	Introduced	ag. fields	Occasional
Yucca filamentosa		Adam's needle, beargrass, yucca	Monocot	Native	roadsides/fields	Scarce
Zizia aurea	x	golden zizia	Dicot	Native	wet woods	Rare