ANL/ESD/TM-161

# Land Rehabilitation of the McKenna Hill Drop Zone, Fort Benning Military Reservation, Georgia: Surveys of Spontaneous Vascular Vegetation

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# Land Rehabilitation of the McKenna Hill Drop Zone, Fort Benning Military Reservation, Georgia: Surveys of Spontaneous Vascular Vegetation

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# Abstract

The forested, 640-acre McKenna Hill Drop Zone (the Site) at the Fort Benning Military Reservation in Georgia was cleared in 1988 for paratrooper training. Trees were harvested, stumps were grubbed and buried, and most of the Site was graded to flatten hilltops and fill in ravines. These activities resulted in mixing of the nonharvested vegetation, litter, duff, and topsoil with subsoil, leaving extensive bare areas. Because no efforts were made to establish a vegetational cover following the grading operations, the exposed soils were subject to severe erosion. Deep gullies developed, and eroded sediments accumulated in lowlands and in adjacent forest stands, causing damage to trees and understories. In addition to various rehabilitation efforts (1991−1994) to reduce soil erosion by installing structures to reduce runoff (water) and by increasing vegetational cover, surveys were conducted in 1993 and 1994 to evaluate the Site's ability to support spontaneous vascular plants. Of the 154 plant species recognized for the Site, 146 were considered spontaneous; the remaining 8 species were planted during the rehabilitation efforts to increase vegetational cover. The 146 spontaneous plant species represented 110 genera and 60 families. Among the seed plants, the number of species ranged from 60 (forbs) to 5 (brambles), but the number of species of graminoids, shrubs, trees and vines were in a relatively narrow range, from 15 to 25. The Site has the potential to support a rather rich native flora if soil erosion is arrested.

# Section 1
# Introduction

The McKenna Hill Drop Zone (the Site) was constructed in 1988 for paratrooper training by clearing about 640 acres of mostly hilly, forested land adjacent to the McKenna Hill Airport, within the Fort Benning Military Reservation in Georgia.

After trees were harvested from the Site, stumps were grubbed and buried, some ridge tops were flattened, and ravines were filled in across most of the Site. These activities resulted in the mixing of the remaining vegetation, litter, duff, topsoil, and subsoil — forming relatively infertile bare areas that were subject to severe soil erosion.

Because of the soil erosion on the Site, rills and deep gullies formed along slopes, and sediment accumulated in the lowlands. The soil erosion also caused off-site sediment outwash and accumulation in adjacent forested areas, leading indirectly to the death of trees and their understories. Wildlife habitat was also adversely affected, particularly some cavity (den) trees of the endangered Red Cockaded Woodpecker.

Following rehabilitation efforts on selected portions of the Site by Fort Benning personnel, a more comprehensive rehabilitation project was initiated in April 1991 under the management of investigators from Argonne National Laboratory (Argonne). The goal of the Argonne project was to reduce soil erosion by installing structures to control runoff (water) and by increasing vegetational cover (see Addendum for details concerning these portions of the project). The project also included surveys, conducted in 1993 and 1994, to evaluate the Site's ability to support spontaneous vascular plants. This report presents the findings of the two vascular plant surveys.

# Section 2
# **Background**

## 2.1 Location

The Fort Benning Military Reservation (Fort Benning) is located near the city of Columbus in west-central Georgia. Fort Benning encompasses over 180,000 acres, occupying considerable portions of Muscogee and Chattahoochee Counties in Georgia and extending across the Chattahoochee River into a relatively small portion of Russell County, Alabama (Figure 1).

The area of concern, the McKenna Hill Drop Zone (the Site), is located within the boundaries of the Fort Benning Military Reservation southeast of Columbus, Georgia, in Chattahoochee County along Hourglass Road east of U.S. Highway 27-280. The southwest corner of the Site begins about a mile east of the 8th Division Road t-junction with Hourglass Road (Figure 2).

## 2.2 Physiography

Georgia consists of five provinces. The Cumberland Plateau, the Ridge and Valley, and the Blue Ridge Provinces occupy relatively small areas in the north and northwestern portions of the state. South of these provinces are the Piedmont Plateau Province, which runs to about the middle of the state, followed southward by the large Coastal Plain Province.

The boundary line between the Piedmont Plateau Province and the Coastal Plain Province is called the Fall Line because of the steep falls of rivers, creeks, etc. as they cross the boundary. The Fall Line runs across the state from west-southwest to east-northeast, roughly following a line from Columbus to Macon to Augusta (Carter 1974; Duncan and Kartesz 1981; Brown and Kirkman 1990).

The Fall Line also marks the zone where the metamorphic rock of the Piedmont Plateau meets the sedimentary rock of the Coastal Plain. Water falls and rapids were formed at the Fall Line when the cutting forces of water lowered the Coastal Plain surface as rivers and creeks flowed from the harder bedrock of the Piedmont Plateau onto the softer bedrock of the Coastal Plain (Rand McNally 1983).

Superimposed on the physiographic provinces of Georgia are Major Land Resource Areas, apparently based on landscape features such as topography and drainage patterns. One such area is the Carolina and Georgia Sand Hills area, which seemingly coincides with the southward side of the Fall Line (Figure 1). In Georgia, this area is called the Carolina and Georgia Sand Hills Major Land Resource Area. For this study, it covers the eastern portion of Muscogee County and the northern three fourths of Chattahoochee County; this area encompasses most of Fort Benning, including the Site (Johnson 1983; Green 1997).

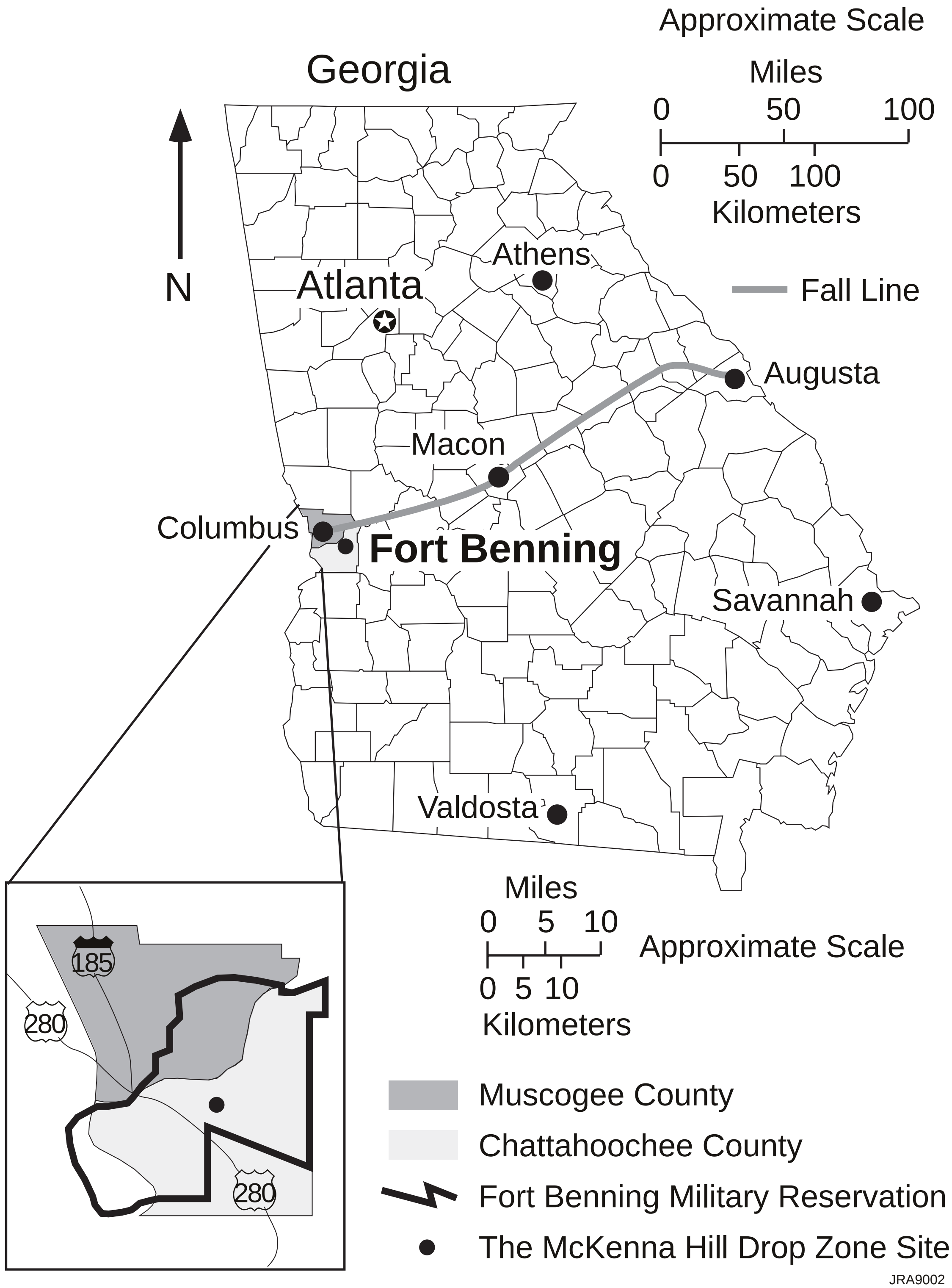


**Figure 1 Location of the Fort Benning Military Reservation in West-Central Georgia (adapted from Johnson 1983; Brown and Kirkman 1990; Rand McNally 1993)**

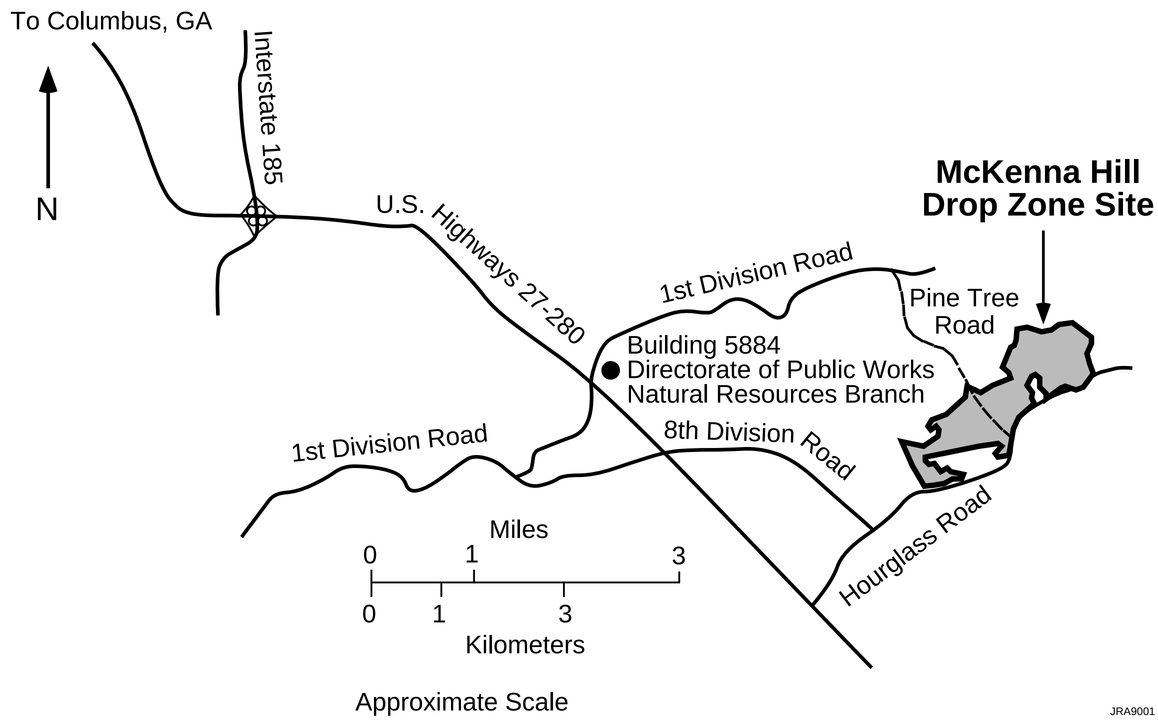


**Figure 2  Location and Configuration of the Site**

The Carolina and Georgia Sand Hills Major Land Resource Area contains primarily gently sloping to moderately steep uplands with well-drained soils that have a thick, sandy surface layer and a loamy subsoil. In some places, the subsoil is mostly firm and brittle.

To the north, the Southern Piedmont Major Land Resource Area consists mostly of very gently sloping to steep uplands with well-drained soils that have loamy surface layers and clayey subsoils.

The Southern Coastal Plain Major Land Resource Area, on the other hand, is characterized by very gently sloping soils on medium ridgetops with hillsides that extend to small drainageways; the hillsides are not as steep as those of the Southern Piedmont and the Carolina and Georgia Sand Hills Major Land Resource Areas (Johnson 1983; Green 1997).

## 2.3 Climate

The climatic conditions for the Site are similar to those reported for Columbus, Georgia (Carter 1974; Johnson 1983). The warmest months are July and August, with an average temperature of about 80.6 ºF (27 ºC). The coldest months are December and January, with an average temperature of about 47.4 ºF (8.6 ºC). The annual mean temperature is 64.3 ºF (17.9 ºC).

Precipitation is almost entirely in the form of rainfall, with a yearly average of 51.35 inches (in.) (131.7 millimeters [mm]). Normal total precipitation varies from an average monthly low of

2.17 in. (5.57 mm) in October to a high of 5.95 in. (15.3 mm) in March. The average precipitation in July, 5.65 in. (14.5 mm) is nearly equal to that in March.

The highest average annual relative humidity is 86% at 7 a.m., with an average monthly range of 83–89%. The lowest average annual relative humidity is 54% at 1 p.m., with an average monthly range of 49–60%.

## 2.4 Soils

Prior to modification of the Site for use as a drop zone in 1988, site soils were mapped by a soil survey team. Eight soil units were identified at the Site. Their unit names and textural features are as follows: Udorthents (loamy); Naukin (sandy clay loam); Ailey (loamy coarse sand); Dothan (loamy sand); Cowarts and Ailey (loamy sand); Fuquary (loamy sand); Troup (loamy sand); and Ochlochonee (sandy loam) (Fokes 1993; Green 1997).

Because the Site was altered considerably in 1988–1989 (see description below), these soil delineations are no longer applicable. The Site's different sandy-silty-clay soils might now be classified as various Urbanland complexes.

## 2.5 Site Alterations for Airborne Training

The hilly, mostly forested Site, consisting of about 637 acres (258 hectares [ha]), was cleared for a new airborne training drop zone during the winter of 1988–1989. Commercially useful portions of trees were harvested from the entire Site, except for the lower parts of Section A (Figure 3). (Note: Site sections were mapped and designated A–F by Argonne investigators in 1991.) The stumps were removed except for those throughout Section F and perhaps in some of the adjacent upland portions of Sections D and E. The grubbed stumps and slash were burned or pushed into ravines for burial. Some hilltops and ridges were flattened, and some ravines were filled in.

The clearing operations resulted in mixing of the unharvested vegetation, litter, duff, topsoils, and subsoils, leaving bare soil complexes over most of the Site. No measures were taken to provide a vegetational cover following the clearing operations, and the Site's exposed soils were subject to severe soil erosion.

## 2.6 Consequences of Soil Erosion

Erosion of the soils across the Site caused considerable damage to uplands, slopes, lowlands, and adjacent forested areas and waterways. Runoff from uplands, including the earthen runway of the McKenna Hill Airport, resulted in the formation of rills and deep gullies along slopes and the accumulation of sandy-silty-clay sediments in lowlands. Soil erosion also caused the outwash and accumulation of sediments in waterways. Pedons (soil particles) were transported beyond the Site's waterways, especially in Clear Creek and Clear Creek Pond (Figure 3).

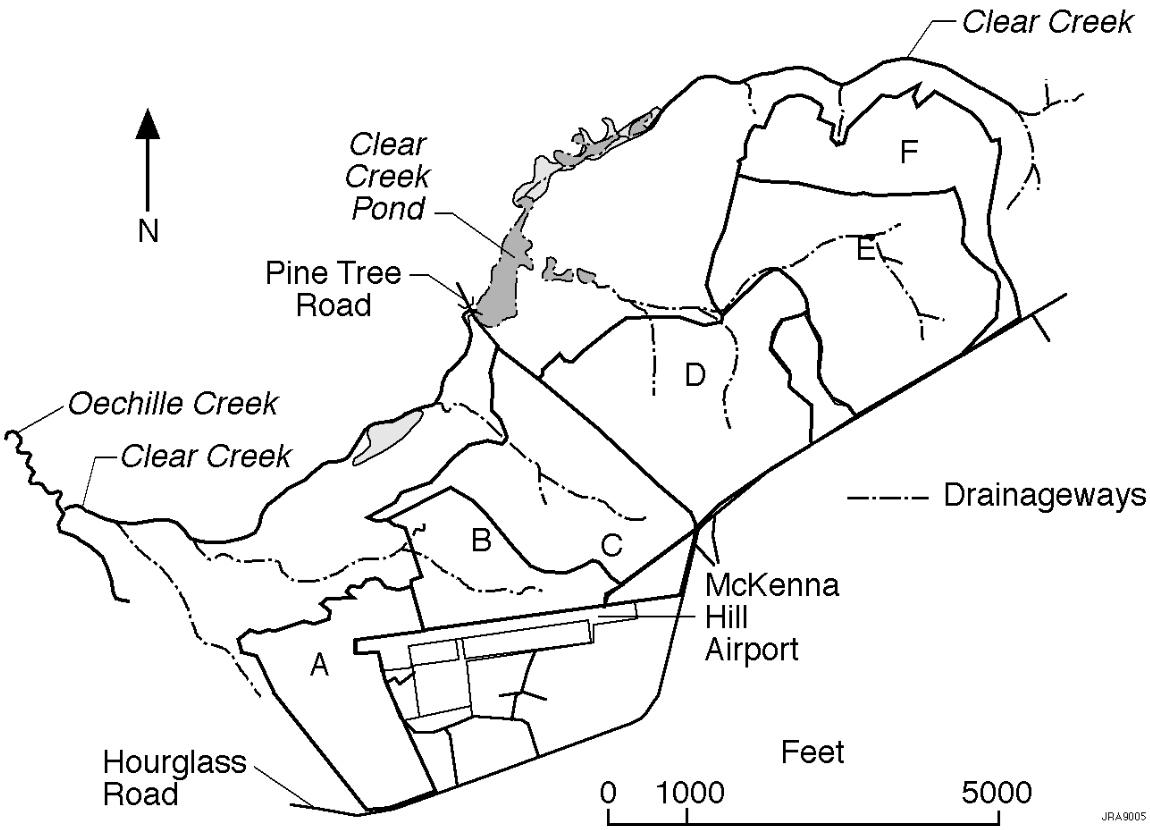


**Figure 3 Six Sections (A–F) of the Site and Drainageways in Each Section**

Outwash and accumulated sediments in adjacent forests buried large areas of understory vegetation and adversely altered soil factors enough to cause the death of some trees.

The tree deaths became a particular concern as early as 1990, because some of the dead and dying trees were used as cavity trees by the Red Cockaded Woodpecker (*Picoides borealis* = *Dendrocopus borealis*). Only certain living pines, especially *Pinus taeda* and *Pinus palustris*, can be used as cavity trees. The preferred trees are about 80 to 100 years old with a heartwood softening infection by the Red Heart fungus (*Phellinus pini*). When a suitable group of trees is available, one or more years may be required to prepare the cavities. The sudden death of cavity trees for a colony of the Red Cockaded Woodpecker may result in the loss of the Red Cockaded Woodpecker population because of limited opportunities for relocation (Walters 1991; Stangel 1993; Ertep and Lee 1994).

## 2.7 Erosion Control and Revegetation Efforts

Fort Benning personnel initiated rehabilitation efforts during the summer and fall of 1990. Their efforts focused on reducing the outwash and accumulation of sediments from the uplands and slopes of Section B, north-northwest of the McKenna Hill Airport Runway, into the adjacent forested area containing cavity trees.

They filled in gullies; smoothed slopes; constructed terraces; installed check dams with culverts; and limed, fertilized, and seeded (with grass) the lower slopes and valley floor. Later, riprap spillways were installed at the culvert outlet check dams, and pine seedlings were planted in the valley floor within the boundary area of the adjacent forest. In early 1991, pine seedlings were planted in the northeastern portions of the site (Sections E and F and a strip along the northern tree line of Section D).

Although Fort Benning personnel took measures to reduce soil erosion, sediment accumulation continued in the Red Cockaded Woodpecker colony area that continued to adversely affect cavity trees and other vegetation.

Other portions of the Site continued to be subject to severe erosion, which resulted in the formation of more rills and deep gullies, additional accumulation of sediments in lowlands, and outwash and accumulation of sediments into off-site locations. For example, a large portion of Clear Creek Pond (near the northwest boundary of the Site) filled in with sediments, and the water flow through Clear Creek Pond carried sediments downstream following heavy rainfalls.

## 2.8 Project Initiation

Because of the continuing soil erosion problems on the Site, investigators from the Center for Environmental Restoration Systems, Energy Systems Division of Argonne were directed to begin a land rehabilitation project. The project was carried out in collaboration with the following additional agencies: Environmental Management Division, Directorate of Public Works, Fort Benning Military Reservation; Environmental Division, Construction Engineering Research Laboratory; U.S. Army Corp of Engineers; and United States Department of Agriculture (USDA)/Natural Resources Conservation Service, Marion County Office, Georgia.

The initial objectives of the project were to select and evaluate the use of runoff control structures and revegetation methods. From 1991 through 1994, project efforts included site mapping and design, installation of different runoff control structures, site revegetation, and monitoring of the effectiveness of the runoff control and revegetation efforts (see Addendum for additional details). While runoff control and revegetation efforts were under way, Argonne conducted surveys of the Site’s spontaneous vascular plants in 1993 and 1994.

# Section 3
# Field Survey Methods

## 3.1 Objectives

In addition to the land rehabilitation efforts, Argonne personnel conducted vegetational surveys to evaluate the Site's ability to support spontaneous vascular plants. The following subsection describes the methods used to conduct those surveys.

## 3.2 Methods

### 3.2.1 Field Surveys

Argonne personnel conducted the vegetational surveys by walking the Site section by section (Figure 3). During the July 1993 surveys, plant taxon lists were made for different topographic features (mostly on uplands and slopes) within each section. Specimens of the various types of plants identified (called "voucher specimens") were collected and preserved to confirm field identifications and to identify unknown taxa.

The May 1994 surveys were similar to the July 1993 surveys, but each taxon for each topographic list was assigned a subjective abundance number: 1 (rare), 2 (occasional), 3 (common), and 4 (abundant).

### 3.2.2 Voucher Specimens

Voucher specimens collected in the field were dried using a standard plant press, and herbarium specimens were prepared by using the process described in Porter (1967). In addition to the1993 and 1994 collections, several miscellaneous specimens were collected from the Site in 1991; these specimens were added to those collected during the 1993 and 1994 surveys. The voucher specimens are stored in the University Herbarium at Chicago State University (Chicago, Illinois).

### 3.2.3 Taxonomy

*General*

Numerous floristic references were used to confirm the field identifications of the voucher specimens collected during the field surveys. These reference manuals included the following: Gleason 1952a,b,c; Radford et al. 1968; Godfrey 1988; and Brown and Kirkman 1990. Argonne also conducted additional comparative taxonomic work in the herbarium of the Morton Arboretum (Lisle, Illinois).

Latin names used for the vascular plants in our study are those used by Radford et al. (1968). We selected this publication as the standard taxonomic reference for our work because it appears to be the most comprehensive and the most applicable for the location of our investigation.

*Fort Benning and County Floristics*

Allen Pursell of the Natural Resources Management Branch of the Directorate of Public Works for Fort Benning provided Argonne with a general checklist of plant species for Fort Benning (the Fort Benning Plant List). The list contains over four hundred Latin names and collection numbers (Pursell 1993). Because voucher specimens for the species listed on the Fort Benning Plant List were not available, we were unable to confirm their identifications.

The Jones and Coile (1988) publication on the distribution of the vascular plants of Georgia was important for our study. The taxon distribution maps (by county) allowed us to compile a list of reported plant species for Chattahoochee County, in which the Site is located. We also listed the plant species for Muscogee County because a portion of Fort Benning is located in Muscogee County (Figure 1).

Prior to the 1988 Jones and Coile publication, Duncan (1950) published a preliminary report on the distribution (by county) of 87 tree species reported for Georgia. From this report, we compiled a list of tree species for Chattahoochee and Muscogee counties.

# Section 4
# Results and Conclusions

## 4.1 General Vegetational Features

Over 200 specimens of vascular plants were collected from the Site; from these, 154 species were identified. Among the 154 recognized plant species, 146 were considered to have occurred spontaneously; the remaining 8 species were planted (either as seeds or as seedlings). The 146 spontaneous species represented 110 genera in 60 families (see Appendix A.1 for a complete list of the identified species). All but one species of the spontaneous vascular plants were seed plants (spermatophytes) — the exception was *Pteridium acquilinum*, the Bracken Fern (Table 1).

As shown in Table 1, of the designated growth forms of seed plants, the number of species ranged from 60 forbs to 5 brambles. Of the forbs, 57 (or 39% of the 146 spontaneous species recognized for the Site) were dicots. The number of species of graminoids, shrubs, trees, and vines were in a relatively narrow range, from 15 to 25.

The number of species in sub-categories of the forbs, graminoids, and trees were noteworthy. There were considerably more dicots than monocots, grasses were more numerous than rushes, and angiosperm trees were far more numerous than gymnosperm trees.

Of the spontaneous seed plants that occurred across the Site during the period of the surveys, the dicot forbs represented the most aggressive pioneer species.

**Table 1 Number and Percent of Plant Species, by Growth Form, that Occurred on Uplands and Slopes of the Site**[a]

| Growth Form | Number of Species | Percent of Species |
|---|---|---|
| Ferns | 1.0 | 0.7 |
| Brambles | 5.0 | 3.4 |
| Forbs | 60.0 | 41.1 |
| (Monocots) | (3.0) | (2.1) |
| (Dicots) | (57.0) | (39.0) |
| Graminoids | 20.0 | 13.7 |
| (Grasses) | (14.0) | (9.6) |
| (Rushes) | (6) | (4.1) |
| Shrubs | 20.0 | 13.7 |
| Trees | 25.0 | 17.1 |
| (Angiosperms) | (21.0) | (14.4) |
| (Gymnosperms) | (4.0) | (2.7) |
| Vines | 15.0 | 10.3 |

[a] Table data based on 146 plant species collected during 1991, 1993, and 1994; see Appendix A.1.

## 4.2 Distribution Patterns of the Spontaneous Plant Species

Of the 146 spontaneous species identified, 15 were excluded from the distribution analyses: 6 were collected in 1991 but were not observed during the 1993 and 1994 surveys (*Andropogon scoparium, Danthonia compressia, Digitaria filiformis, Ipomoea hederacea, Quercus stellata,* and *Tephrosia virginiana)* and the remaining 9 were collected in moist to wet bottomlands but were not observed elsewhere during the surveys (*Acer rubrum, Heterotheca pilosa, Juncus debilis, J. dichotomus, J. effusus, J. georgianus, J. scirpoides, Panicum lanuginosum, Pyrrhopappus carolinianus, and Spigelia marilandica*). Appendix A.2 provides the patterns of distribution for the 131 spontaneous plant species across the six sections of the Site (A–F);

Appendix B.1 lists the distribution patterns for the eight planted species (mentioned in Section 4.1).

As Table 2 shows, the number of spontaneous plant species among the six sections varied from 45 in Section E to 74 in Section B.

Section B contained the largest number (74) of species. This number was not appreciably larger than the 70 species found in each of Sections C and F, probably because of collection errors, i.e., missing small, rare taxa represented by one or two individuals in an entire section. On the other hand, we expected to find a considerably larger number of species in Section F, compared to the other sections, because the stumps in this area had not been grubbed, so the soil profiles had not been mixed to the same extent and the seed bank was more intact than in the other sections.

The number of species (70) found in Section C was surprisingly high because this section was considered the most damaged section of the Site. At the time of our surveys, this section contained large bare areas and gullies; no rehabilitation treatments had been undertaken in this area, except in its uplands, which had been seeded with agricultural species.

The lowest number of species was found in Sections D (50 species) and E (45 species). These sections were similar because they were located on either side of the same watershed (see Figure 3) and received similar rehabilitation treatments. Both sections were planted with seedlings of *Pinus taeda,* which were fairly well established; however, vegetational cover between the pine seedlings was sparse, and erosion was evident, although some herbaceous plant seeding had occurred.

Of the 131 species identified, 18 (about 14%) occurred in all six sections of the Site. The number of species that were unique to each section varied from 1 for Section E to 14 for Sections B and C (Table 3).

As Table 4 reveals, the number of spontaneous plant species unique to each Site section, classified by growth form, was surprisingly different — particularly the growth form composition differences between Sections B and C.

Of the 14 plant species unique to Section B, 10 were dicot forbs: *Acalypha virginica, Carduus discolor, Eryngium yuccifolium, Eupatorium capillifolium, Euphorbia corollata, Helenium amarum, Solanum carolinense, Stylosanthes biflora, Trachelospermum difforme,* and *Verbena brasiliensis*.

Of the 14 plant species unique to Section C, 9 were shrubs: *Aralia spinosa, Baccharis halimifolia, Clethra alnifolia, Cyrilla racemiflora, Lathyrus hirsutus, Oxydendrum arboreum, Rhododendron canescens, Robinia hispida,* and *Viburnum rufidulum*.

**Table 2 Number and Percent of Plant Species, by Section, that Occurred on Uplands and Slopes of the Site[a]**

| | Section | | | | | |
|---|---|---|---|---|---|---|
| | A | B | C | D | E | F |
| Number of Species | 58 | 74 | 70 | 50 | 45 | 70 |
| Percent of Species | 44.3 | 56.5 | 53.4 | 38.2 | 34.4 | 53.4 |

[a] Data based on the 131 plant species collected during the 1993 and 1994 vegetational surveys; see Appendix A.2 for detailed distribution list.

**Table 3 Number and Percent of Plant Species that Occurred on Uplands and Slopes across All Six Sections (A–F) of the Site and Number and Percent Unique to Each of the Six Sections[a]**

| | Section | | | | | | |
|---|---|---|---|---|---|---|---|
| | A–F | A | B | C | D | E | F |
| Number of Species | 18 | 6 | 14 | 14 | 5 | 1 | 11 |
| Percent of Species per Site (n = 131) | 13.7 | 4.6 | 10.7 | 10.7 | 3.8 | 0.8 | 8.4 |

[a] For detailed distribution list, see Appendix A.2.

Although the species compositions provided useful information with respect to comparative taxonomic structures among the sections, we used subjective abundance values (discussed in Section 4.3) to evaluate the environmental influences of species and species diversity among the sections.

## 4.3 Abundance Values for the Spontaneous Plant Species

The number of plant species observed and assigned subjective abundance values varied from 43 for Section E to 68 for Section B (see Table 5 and Appendix A.3). (Abundance values for the eight planted species are provided in Appendix B.2.)

The sums of the abundance values for each section varied from 50 for Section A to 89 for Section B. The sums for Sections B and F, 89 and 86 respectively, are significantly higher than the sum for Section C (63).

The higher sums of the abundance values for Sections B and F indicate a higher plant species diversity than in Section C, although the number of species (or species richness) was about the same among the three sections.

**Table 4 Number of Plant Species, by Growth Form, that Occurred on Uplands and Slopes across All Six Sections of the Site and Number Unique to Each of the Six Sections**

| | Section | | | | | | |
|---|---|---|---|---|---|---|---|
| **Growth Form** | **A–F** | **A** | **B** | **C** | **D** | **E** | **F** |
| Ferns | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Brambles | 2 | 0 | 0 | 0 | 0 | 0 | 1 |
| Forbs | 7 | 3 | 10 | 3 | 1 | 1 | 6 |
| (Monocots) | (1) | (0) | (0) | (0) | (0) | (0) | (1) |
| (Dicots) | (6) | (3) | (10) | (3) | (1) | (1) | (5) |
| Graminoids | 1 | 0 | 2 | 1 | 3 | 0 | 0 |
| (Grasses) | (1) | (0) | (2) | (0) | (3) | (0) | (0) |
| (Rushes) | (0) | (0) | (0) | (1) | (0) | (0) | (0) |
| Shrubs | 1 | 0 | 0 | 9 | 0 | 0 | 1 |
| Trees | 4 | 1 | 2 | 1 | 1 | 0 | 0 |
| (Angiosperms) | (4) | (1) | (2) | (1) | (1) | (0) | (0) |
| (Gymnosperms) | (0) | (0) | (0) | (0) | (0) | (0) | (0) |
| Vines | 3 | 2 | 0 | 0 | 0 | 0 | 3 |
| **Total** | 18 | 6 | 14 | 14 | 5 | 1 | 11 |

**Table 5 Number of Plant Species (n) that Occurred on Uplands and Slopes across the Six Sections of the Site, Sum of Average Abundance Values (Sa) for each Section, and Quotient (Qf = Sa/n) for each Section[a]**

| | Section | | | | | |
|---|---|---|---|---|---|---|
| | **A** | **B** | **C** | **D** | **E** | **F** |
| Number of Species (n) | 53 | 68 | 63 | 46 | 43 | 61 |
| Sum of Abundance Values (Sa) | 50 | 89.2 | 58.5 | 50.7 | 53.0 | 85.5 |
| Quotient (Qf) | 0.94 | 1.31 | 0.93 | 1.10 | 1.23 | 1.40 |

[a] Based on observations made during the 1994 subjective abundance surveys. Appendix A.3 provides a detailed list of the abundance values for the spontaneous plant species across the six sections of the Site.

Another approach taken by Argonne to explore the plant diversity at the Site was to calculate the vegetational quotient (Qf) by dividing the sum of the species abundance values (Sa) by the number of species for each section (n). As shown in Table 5, the Qfs varied from 0.93 for Section C to 1.40 for Section F. Although these ratios may have no ecological importance, they suggest a subjective rating of the habitat quality of the sections with respect to vegetational cover. We would likely rate the sections from highest to lowest habitat quality in the following order: F, B, D, E (or E, D), A, and C.

Abundance values for the 16 plant species that occurred across all six sections are shown in Table 6.

Plant species with the highest abundance values across the Site were *Rubus cuneifolius, Eupatorium compositifolium, Rhus copallina, Diospyros virginiana, Ipomoea pandurata,* and *Smilax bona-nox* (see Appendix A.3).

The sum of the abundance values for the 16 plant species in each section listed ranged from 35 for Section B to 21 for Section C. The distribution pattern for these sums is similar to the pattern for those mentioned previously in reference to Table 5. A conspicuous exception in Table 6 is the sum of the abundance values for the 16 species in Section C; this value is the lowest among the six sections.

**Table 6 Average Abundance Values for the 16 Plant Species that Occurred on Uplands and Slopes across All Six Sections of the Site[a]**

| Growth Form/ Latin Name | Section A | B | C | D | E | F | Taxon Sum |
|---|---|---|---|---|---|---|---|
| Brambles | | | | | | | |
| *Rubus cuneifolius* | 3.3 | 3.0 | 2.0 | 3.0 | 3.0 | 2.8 | 17.1 |
| *Rubus flagellaris* | 1.0 | 3.0 | 2.2 | 1.5 | 1.5 | 0.5 | 9.7 |
| Dicot Forbs | | | | | | | |
| *Echinocystis lobata* | 0.5 | 0.7 | 1.3 | 1.7 | 1.3 | 2.3 | 7.8 |
| *Eupatorium compositifolium* | 2.5 | 2.5 | 2.0 | 2.3 | 2.8 | 2.5 | 14.6 |
| *Lespedeza hirta* | 1.5 | 1.8 | 0.3 | 1.0 | 1.8 | 2.0 | 8.4 |
| *Lespedeza virginica* | 0.5 | 0.7 | 0.7 | 0.7 | 0.5 | 1.0 | 4.1 |
| Graminoids | | | | | | | |
| *Danthonia sericea* | 1.0 | 1.5 | 0.7 | 1.3 | 2.0 | 2.5 | 9.0 |
| Monocot Forbs | | | | | | | |
| *Yucca filamentosa* | 0.5 | 1.8 | 1.2 | 2.3 | 2.3 | 1.0 | 9.1 |
| Shrubs | | | | | | | |
| *Hypericum hypericoides* | 0.3 | 0.8 | 0.7 | 1.0 | 1.0 | 1.8 | 5.6 |
| *Rhus copallina* | 2.5 | 2.7 | 1.7 | 2.7 | 3.0 | 3.5 | 16.1 |
| Trees | | | | | | | |
| *Carya pallida* | 0.3 | 3.4 | 0.7 | 1.3 | 2.0 | 2.0 | 9.7 |
| *Diospyros virginiana* | 3.0 | 2.8 | 2.2 | 2.2 | 2.5 | 2.5 | 15.2 |
| *Quercus marilandica* | 0.3 | 3.0 | 1.6 | 1.2 | 1.0 | 2.8 | 9.9 |
| *Sassafras albidum* | 1.0 | 0.7 | 1.0 | 1.3 | 2.3 | 2.8 | 9.1 |
| Vines | | | | | | | |
| *Ipomoea pandurata* | 2.0 | 3.8 | 0.8 | 2.2 | 0.8 | 1.8 | 11.4 |
| *Smilax bona-nox* | 2.1 | 2.8 | 2.2 | 1.0 | 2.8 | 2.0 | 12.9 |
| **Section Sum** | 22 | 35 | 21 | 27 | 31 | 34 | |

[a] Detailed abundance values are provided in Appendix A.3.

The occurrence of these 16 plant species across all six sections indicates that they have broad ecological amplitudes and represent early seral species. The implication is that some or all of these 16 plant species are the most usable for initial plantings during rehabilitation efforts.

# Section 5
# Comparative Floristics

## 5.1 Proem

In this section, we compare taxonomic elements of our plant species list for the Site to three selected sources of floristic information. One source of information is the Fort Benning Plant List provided by Pursell (1993). The second source is a manual by Jones and Coile (1988) of distributions (by county) of vascular plant species in Georgia. The third source, by Duncan (1950), provides the distribution (by county) of selected tree species in Georgia.

## 5.2 Fort Benning Plant Species List

The list of vascular species given to Argonne for Fort Benning includes 447 species listed according to their Latin names, with collection numbers and families. Some species are annotated with respect to synonyms.

Because the "Species List of Fort Benning, December 29, 1992" (the Fort Benning Plant List) is first organized alphabetically by plant family, then by genus, and then by specific epithet, we complied the entire list on a computer spreadsheet to enable us to sort the list by different taxonomic categories or even collection numbers. However, we did not include the authors of the species and synonyms, as the original list does (Appendix C).

At the time of this report, we cannot validate the identification for the taxa on the Fort Benning Plant List because we were not able to examine voucher specimens, if they still exist. However, we did check the names against our taxonomic reference for the project, Radford et al. 1968. Only 13 of the 447 Fort Benning species are not treated by Radford and coauthors (1968). The 13 species are listed in column 4 of Appendix C (by gn or sn).

In comparing the Fort Benning Plant List with our plant list for the Site (Argonne Plant List), we found that 81 species are on both lists. However, 65 species on our list are not on the Fort Benning Plant List (Appendices A.1 and C).

Of the 65 new species, 52 are in the 39 genera included on the Fort Benning Plant List. Twelve species represent new genera and three species represent new families for Fort Benning (Table 7).

If the 65 new plant species and the original plant species list for Fort Benning remain valid, the total taxon list would increase to 512 plant species, which would be a very rich vascular plant flora.

## 5.3 Vascular Flora of Georgia

Jones and Coile (1988) published an atlas of vascular plant species comprising the flora of Georgia. The atlas includes natural and naturalized species of pteridophytes (ferns and fern allies), gymnosperms (conifers and one cycad), and angiosperms (flowering plants).

The distribution patterns of the vascular plant species in the Jones and Coile atlas are illustrated by using county dot maps. That is, each of the species (over 3,000) has a representative state map with each of the 159 counties shown. A plant species that is documented for a given county is represented by a dot map in that county. Some species are represented by one dot in one county for the entire state; others have a wide distribution and are represented by dots in nearly every county of the state.

From the Jones and Coile (1988) atlas, we compiled a list of species represented by dots in Chattahoochee and Muscogee counties, Georgia (Appendix D). Our list for these counties indicates which species are reported on the Fort Benning Plant List and on the Argonne Plant List.

A total of 187 plant species are reported by Jones and Coile (1988) for Chattahoochee and Muscogee Counties. Of these, 13 are marked in Chattahoochee County, 161 in Muscogee County, and 13 in both counties.

In comparing the Fort Benning Plant List with plant species reported for both counties by Jones and Coile (1988), we found 8 species in common with those noted for Chattahoochee County, 66 for Muscogee County, and 9 for both counties.

We cannot add any plant names to the Fort Benning Plant List from the 91 other species reported by Jones and Coile for the two counties, because we do not know whether they represent specimens collected within the boundaries of the military reservation. Conversely, we cannot use any plant names from the Fort Benning Plant List as new county records for either Chattahoochee or Muscogee Counties because we could not validate the taxa with voucher specimens (see Section 5.2).

In comparing species on the Argonne Plant List with those reported for both counties by Jones and Coile (1988), we found 25 species in common with those reported for Muscogee County, three species for Chattahoochee County (*Cornus florida, Prunus serotina,* and *Rhus copallina*), and six species for both counties (*Callicarpa americana, Cassia fasciculata, Oenothera laciniata, Phlox nivalis, Cyrilla racemiflora,* and *Quercus marilandica*).

Duncan (1950) published a list of 87 tree species and their distributions in Georgia. He also used dot maps to show county distribution for each tree species. From Duncan's report, we compiled a list of tree species for Muscogee and Chattahoochee Counties (Appendix E). Each species on this list was marked to indicate whether it was included on the Argonne Plant List (Appendix A.1), the Fort Benning Plant List (Appendix C), and the list of plant species for both counties (Appendix D) compiled from Jones and Coile (1988).

## Table 7  Additional Species for the Fort Benning Plant List[a]

***New Species within Known Genera***

| | | | |
|---|---|---|---|
| *Acalypha virginica* | Euphorbiaceae | *Lonicera sempervirens* | Caprifoliaceae |
| *Andropogon scoparius* | Poaceae | *Paspalum dissectum* | Poaceae |
| *Arenaria stricta* | Caryophyllaceae | *Plantago virginica* | Plantaginaceae |
| *Campanula aparinoides* | Campanulaceae | *Quercus coccinea* | Fagaceae |
| *Carduus discolor* | Asteraceae | *Quercus falcata* | Fagaceae |
| *Carya pallida* | Juglandaceae | *Quercus margaretta* | Fagaceae |
| *Clematis crispa* | Ranunculaceae | *Quercus pumila* | Fagaceae |
| *Crataegus pulcherrima* | Rosaceae | *Quercus stellata* | Fagaceae |
| *Danthonia compressa* | Poaceae | *Rhus glabra* | Anacardiaceae |
| *Desmodium viridiflorum* | Fabaceae | *Rhynchosia difformis* | Fabaceae |
| *Digitaria filiformis* | Poaceae | *Robinia hispida* | Fabaceae |
| *Eragrostis spectabilis* | Poaceae | *Rosa setigera* | Rosaceae |
| *Eupatorium capillifolium* | Asteraceae | *Rubus cuneifolius* | Rosaceae |
| *Eupatorium compositifolium* | Asteraceae | *Rubus flagellaris* | Rosaceae |
| *Festuca octoflora* | Poaceae | *Rumex acetosella* | Polygonaceae |
| *Froelichia floridana* | Amaranthaceae | *Silene acaulis* | Caryophyllaceae |
| *Helianthus divaricatus* | Asteraceae | *Smilax bona-nox* | Liliaceae |
| *Heterotheca pilosa* | Asteraceae | *Smilax glauca* | Liliaceae |
| *Ipomoea hederacea* | Convolvulaceae | *Smilax rotundifolia* | Liliaceae |
| *Juncus dichotomus* | Juncaceae | *Tradescantia virginiana* | Commelinaceae |
| *Juncus effusus* | Juncaceae | *Vaccinium darrowii* | Ericaceae |
| *Juncus georgianus* | Juncaceae | *Vaccinium vacillans* | Ericaceae |
| *Krigia virginica* | Asteraceae | *Verbena brasiliensis* | Verbenaceae |
| *Lespedeza hirta* | Fabaceae | *Viburnum rufidulum* | Caprifoliaceae |
| *Lespedeza intermedia* | Fabaceae | *Vitis cinerea* | Vitaceae |
| *Lespedeza virginica* | Fabaceae | *Wisteria frutescens* | Fabaceae |

| ***New Species within New Genera*** | | ***New Species within New Families*** | |
|---|---|---|---|
| *Ambrosia artemisiifolia* | Asteraceae | *Acer rubrum* | Aceraceae |
| *Astragalus villosus* | Fabaceae | *Asimina parviflora* | Annonaceae |
| *Baccharis halimifolia* | Asteraceae | *Ulmus crassifolia* | Ulmaceae |
| *Echinocystis lobata* | Cucurbitaceae | | |
| *Houstonia longifolia* | Rubiaceae | | |
| *Lathyrus hirsutus* | Fabaceae | | |
| *Lithospermum caroliniense* | Boraginaceae | | |
| *Malus angustifolia* | Rosaceae | | |
| *Oxalis stricta* | Oxalidaceae | | |
| *Oxydendrum arboreum* | Ericaceae | | |
| *Rhododendron canescens* | Ericaceae | | |
| *Triplasis americana* | Poaceae | | |

[a] References: Appendices A.1 and C.

Duncan's (1950) report listed 31 tree species for Chattahoochee and Muscogee Counties. Seventeen species are indicated for both counties, nine species for Chattahoochee County, and five species for Muscogee County (Appendix E). A total of 26 tree species is reported for Chattahoochee County and 22 for Muscogee County.

Our comparative floristics analysis (Appendix E) revealed that 4 species from the list compiled from Duncan (1950) are also included on the list compiled for both counties by Jones and Coile (1988), 16 species are also on the Fort Benning Plant List, and 14 are also on the Argonne Plant List. Among the 14 tree species on both the Duncan (1950) list and the Argonne list (Appendix E), 8 species are listed for both counties, 4 species are listed for Chattahoochee County (including one of the planted species of *Pinus* at the Site, *P. palustris*), and 2 species are listed for Muscogee County.

Duncan (1950) reports ten interesting tree species for the two counties (Appendix E) that are not on the Jones and Coile (1988) list, the Fort Benning Plant List, or the Argonne Plant List. *Betula nigra, Caltalpa bignonioides, Gleditsia triacanthos, Melia azedarach, Morus rubra,* and *Populus deltoides* are listed for both counties. *Broussonetia papyrifera, Carpinus caroliniana,* and *Celtis laevigata* are indicated for Muscogee County, but only *Quercus alba* is listed for Chattahoochee County.

Of the 146 spontaneous vascular plant species on the Argonne Plant List (Appendix A.1), about 130 species can be considered new records for Chattahoochee County, Georgia.

# Section 6
# **Recommendations**

The last vegetational surveys were conducted at the Site in 1994. Therefore, new surveys need to be made to evaluate changes in the diversity of spontaneous plant species and assess the potential for rehabilitation to restore stable plant communities.

Apparently, the varied landscape at the Fort Benning Military Reservation supports a very rich vascular flora. The plant specimens listed on the Fort Benning Plant List need to be located and, if still in good condition, used to prepare herbarium voucher specimens to document the occurrences of species at particular locations.

All voucher specimens collected at Fort Benning need to be taken to a herbarium in Georgia for further taxonomic work and comparative floristic studies, especially in reference to the publications by Duncan and Kartesz (1981) and Jones and Coile (1988). We recommend the herbarium in the Department of Botany at the University of Georgia, Athens, for these investigations.

Fort Benning officials should enlist the help of a plant taxonomist with expertise in the flora of Georgia to annotate the herbarium voucher specimens represented on the Fort Benning Plant List and the Argonne Plant List. Then, the floristic information from both lists should be shared with plant taxonomists working on state and regional plant inventories.

# Section 7
# **References**

Brown, C.L., and L.K. Kirkman, 1990, *Trees of Georgia and Adjacent States,* Timer Press, Portland, Ore., 292 pp.

Carter, H.S., 1974, "The Climate of Georgia," in *Climates of the States, Volume I: Eastern States plus Puerto Rico and the U.S. Virgin Islands*, National Oceanic and Atmospheric Administration, Water Information Center, Port Washington, N.Y., pp. 71–89.

Duncan, W.H., 1950, "Preliminary Reports on the Flora of Georgia, Distribution of 87 Trees," *The American Midland Naturalist* 43(3):742–761.

Duncan, W.H., and J.T. Kartesz, 1981, *Vascular Flora of Georgia: An Annotated Checklist,* University of Georgia Press, Athens, Ga., 145 pp.

Ertep, S.A., and G.W. Lee, 1994, *Use of GRASS to Facilitate Red-Cockaded Woodpecker Management at Fort Benning Military Reservation,* Urban and Regional Information Association, pp. 628–633.

Fokes, L., 1993, personal communication, U.S. Department of Agriculture, Natural Resources Conservation Service, Buena Vista, Ga.

Gleason, H.A., 1952a, *Illustrated Flora of the Northeastern United States and Adjacent Canada, Volume I*, New York Botanical Garden, New York City, N.Y., 482 pp.

Gleason, H.A., 1952b, *Illustrated Flora of the Northeastern United States and Adjacent Canada, Volume II*, New York Botanical Garden, New York City, N.Y., 655 pp.

Gleason, H.A., 1952c, *Illustrated Flora of the Northeastern United States and Adjacent Canada, Volume III*, New York Botanical Garden, New York City, N.Y., 595 pp.

Godfrey, R.K., 1988, *Trees, Shrubs, and Woody Vines of Northern Florida and Adjacent Georgia and Alabama*, University of Georgia Press, Athens, Ga., 734 pp.

Green, A.J., 1997, *Soil Survey of Chattahoochee and Marion Counties, Georgia*, United States Department of Agriculture, Natural Resources Conservation Service, Washington, D.C., 144 pp. and 45 maps.

Johnson, J.H., 1983, *Soil Survey of Muscogee County, Georgia*, United States Department of Agriculture, Soil Conservation Service (Natural Resources Conservation Service), Washington, D.C., 132 pp. and 30 maps.

Jones (Jr.), S.B., and N.C. Coile, 1988, *The Distribution of the Vascular Flora of Georgia*, Department of Botany, University of Georgia, Athens, Ga., 230 pp.

Porter, C.L., 1967, *Taxonomy of Flowering Plants*, Second Edition, W.H. Freedom and Company, San Francisco, Calif., 324 pp.

Pursell, A., 1993, personal communication, Natural Resources Management Branch, Directorate of Public Works, Fort Benning Military Reservation, Ga.

Radford, A.E., et al., 1968, *Manual of the Vascular Flora of the Carolinas*, The University of North Carolina Press, Chapel Hill, N.C., 1183 pp.

Rand McNally, 1983, *Atlas of the United States,* Rand McNally and Company, Chicago, Ill., 192 pp.

Rand McNally, 1993, *Business Traveler's Road Atlas and Guide to Major Cities,* Rand McNally and Company, Chicago, Ill., 128 pp.

Stangel, P., 1993, "Endangered Woodpecker, Species Profile: Red-Cockaded Woodpecker (*Picoides borealis*)," *Wildbird* 993 (July):34–37.

Walters, J.R., 1991, "Application of Ecological Principles to the Management of Endangered Species: The Case of the Red-Cockaded Woodpecker," *Annual Reviews of Ecology and Systematics* (22):505–523.

# Appendix A.1
# Argonne Plant List

THE ARGONNE PLANT LIST (ALPHABETIC BY GENUS)
MCKENNA HILL DROP ZONE (THE SITE), FORT BENNING, GEORGIA

GROUP A. SPONTANEOUS SPECIES; GROUP B. PLANTED SPECIES

TAXON CODE - Three letters from the generic name and two letters from the species name (specific epithet).

YR - Year in which that specimen number was collected.

COLL. NO. - Collection numbers. Numbers with _p indicates that the species was planted on the site by either seeds or seedlings.

FB - Refers to the Fort Benning Plant List (December, 1992): sp-species on list; go-genus on list but not species; fn-family not on list (Appendix C)

MC - MUSCOGEE COUNTY(Co.): N-not reported for Co.; R1-reported for Co. by Duncan, 1950; R2-reorted for Co. by Jones and Coile, 1988; R3-reported for Co. by Duncan, 1950 and Jones and Coile, 1988 (Appendices D and E).

CC - CHATTAHOOCHEE COUNTY (Co.): N*-not reported for Co. and thus new Co. record; R-1 reported for Co. by Duncan, 1950; R2-- reported for Co. by Jones and Coile, 1988; R3-reported for Co. by Duncan, 1950 and Jones and Coile, 1988 (Appendices D and E).

GROWTH FORM: Growth form of species: BRAM-bramble; FERN-fern; FODI-herbaceous dicot; FOMO-herbaceous monocot; GRJU- graminoid/Juncaceae; GRPO-graminoid/Poaceae; SHRU-shrub; TREE-tree; VINE-vine.

NAMES: Species, family and common names follow those of Radford and co-authors (1968, indicated as RAB under REF (reference) in last column unless otherwise indicated (G=Gleason, 1952 by volume; Gf=Godfrey, 1988).

The two letters va, vb, etc. following the Latin name indicate that the specimen represents a somewhat different morphological form of that species.

Common names in (___) were designated by the investigators of the present study for project use only.

| TAXON CODE | YR | COLL. NO. | FB | MC | CC | GROW FORM | SCIENTIFIC NAME | FAMILY | COMMON NAME | REF. |
|---|---|---|---|---|---|---|---|---|---|---|
| GROUP A. SPONTANEOUS SPECIES | | | | | | | | | | |
| ACAVI | 94 | 2231 | go | N | N* | FODI | Acalypha virginica | Euphorbiaceae | Three Seeded Mercury | RAB-664 |
| ACERU | 94 | 2214 | fn | N | N* | TREE | Acer rubrum | Aceraceae | Red Maple | RAB-688 |
| AESSY | 94 | 2211 | sp | N | N* | TREE | Aesculus sylvatica | Hippocastanaceae | (Buckeye) | RAB-690 |
| AMBAR | 94 | 2145 | gn | N | N* | FODI | Ambrosia artemisiifolia | Asteraceae | Ragweed | RAB-1016 |
| ANDSC | 91 | 2103 | go | N | N* | GRPO | Andropogon scoparius | Poaceae | Little Bluestem | RAB-163 |
| APOCA | 91 | 2105 | sp | N | N* | FODI | Apocynum cannabinum va | Apocynaceae | Indian Hemp | RAB-847 |
| APOCA | 94 | 2116 | sp | N | N* | FODI | Apocynum cannabinum vb | Apocynaceae | Indian Hemp | RAB-847 |
| ARASI | 94 | 2225 | sp | N | N* | SHRU | Aralia spinosa | Araliaceae | Hercules Club | RAB-760 |
| AREST | 93 | 2028 | go | N | N* | FODI | Arenaria stricta va | Caryophyllaceae | (Sandwort) | G2-132 |
| AREST | 93 | 2067 | go | N | N* | FODI | Arenaria stricta vb | Caryophyllaceae | (Sandwort) | G2-132 |
| ASCAM | 94 | 2180 | sp | N | N* | FODI | Asclepias amplexicaulis va | Asclepiadaceae | Milkweed | RAB-852 |
| ASCAM | 94 | 2250 | sp | N | N* | FODI | Asclepias amplexicaulis vb | Asclepiadaceae | Milkweed | RAB-852 |
| ASCTU | 94 | 2172 | sp | R2 | N* | FODI | Asclepias tuberosa va | Asclepiadaceae | Butterfly-weed | RAB-850 |
| ASCTU | 94 | 2240 | sp | R2 | N* | FODI | Asclepias tuberosa vb | Asclepiadaceae | Butterfly-weed | RAB-850 |
| ASIPA | 94 | 2157 | fn | N | N* | TREE | Asimina parviflora | Annonaceae | Dwarf Pawpaw | RAB-476 |
| ASTPA | 93 | 2074 | sp | N | N* | FODI | Aster paternus va | Asteraceae | White-topped Aster | RAB-1073 |
| ASTPA | 94 | 2222 | sp | N | N* | FODI | Aster paternus vb | Asteraceae | White-topped Aster | RAB-1073 |
| ASRVI | 94 | 2203 | gn | N | N* | FODI | Astragalus villosus va | Fabaceae | (Villos A.) | RAB-626 |
| ASRVI | 94 | 2226 | gn | N | N* | FODI | Astragalus villosus vb | Fabaceae | (Villos A.) | RAB-626 |
| BACHA | 93 | 2050 | gn | N | N* | SHRU | Baccharis halimifolia | Asteraceae | Groundsel-tree | RAB-1067 |
| CAIAM | 93 | 2065 | sp | R2 | R2 | FODI | Callicarpa americana | Verbenaceae | French Mulberry | RAB-894 |
| CANAP | 94 | 2124 | go | N | N* | FODI | Campanula aparinoides | Campanulaceae | (Bluebell) | RAB-1004 |
| CAMRA | 93 | 2039.8 | sp | R2 | N* | VINE | Campsis radicans va | Bignoniaceae | Trumpet Vine | RAB-963 |
| CAMRA | 93 | 2039.9 | sp | R2 | N* | VINE | Campsis radicans vb | Bignoniaceae | Trumpet Vine | RAB-963 |
| CADDI | 94 | 2238 | go | N | N* | FODI | Carduus discolor | Asteraceae | Thistle | RAB-1043 |
| CAYPA | 93 | 2012.9 | go | N | N* | TREE | Carya pallida va | Juglandaceae | Pale Hickory | RAB-365 |
| CAYPA | 93 | 2012.8 | go | N | N* | TREE | Carya pallida va | Juglandaceae | Pale Hickory | RAB-365 |
| CAYPA | 94 | 2160 | go | N | N* | TREE | Carya pallida vb | Juglandaceae | Pale Hickory | RAB-365 |
| CAYPA | 94 | 2167 | go | N | N* | TREE | Carya pallida vc | Juglandaceae | Pale Hickory | RAB-365 |
| CAYPA | 94 | 2227 | go | N | N* | TREE | Carya pallida vd | Juglandaceae | Pale Hickory | RAB-365 |
| CAYPA | 94 | 2228 | go | N | N* | TREE | Carya pallida ve | Juglandaceae | Pale Hickory | RAB-365 |
| CASFU | 93 | 2010 | sp | R2 | R2 | FODI | Cassia fasciculata | Fabaceae | Partridge Pea | RAB-577 |
| CEAAM | 94 | 2146 | sp | N | N* | SHRU | Ceanothus americanus | Rhamnaceae | New Jersey Tea | RAB-693 |
| CLECR | 94 | 2186 | go | N | N* | VINE | Clematis crispa | Ranunculaceae | Leather-flower | RAB-457 |
| CLERE | 93 | 2072 | sp | N | N* | VINE | Clematis reticulata | Ranunculaceae | (Clematis) | RAB-459 |
| CLTAL | 94 | 2206 | sp | N | N* | SHRU | Clethra alnifolia | Clethraceae | Sweet Pepperbush | RAB-793 |
| COEMA | 93 | 2063 | sp | R2 | N* | FODI | Coreopsis major va | Asteraceae | (Whorled C.) | RAB-1124 |
| COEMA | 94 | 2114 | sp | R2 | N* | FODI | Coreopsis major vb | Asteraceae | (Whorled Coreopsis) | RAB-1124 |
| CORFL | 93 | 2073 | sp | R1 | R3 | SHRU | Cornus florida va | Cornaceae | Flowering Dogwood | RAB-790 |
| CORFL | 94 | 2162 | sp | R1 | R3 | SHRU | Cornus florida vb | Cornaceae | Flowering Dogwood | RAB-790 |
| CRAFL | 93 | 2069 | sp | N | N* | TREE | Crataegus flava va | Rosaceae | Yellow Haw, Gf | RAB-560 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| CRAFL | 94 | 2139 | sp | N | N* | TREE | Crataegus flava vb | Rosaceae | Yellow Haw, Gf | RAB-560 |
| CRAPU | 94 | 2140 | go | N | N* | TREE | Crataegus pulcherrima | Rosaceae | (Hawthorn) | Gf-558 |
| CYIRA | 94 | 2224 | sp | R2 | R2 | SHRU | Cyrilla racemiflora | Cyrillaceae | Leatherwood | RAB-678 |
| DANCO | 91 | 2102 | go | N | N* | GRPO | Danthonia compressa | Poaceae | Oat Grass | RAB-94 |
| DANSE | 94 | 2117 | sp | N | N* | GRPO | Danthonia sericea va | Poaceae | Oat Grass | RAB-94 |
| DANSE | 94 | 2198 | sp | N | N* | GRPO | Danthonia sericea vb | Poaceae | Oat Grass | RAB-94 |
| DESVI | 93 | 2049 | go | N | N* | FODI | Desmodium viridiflorum | Fabaceae | Beggar Lice | RAB-611 |
| DIGFI | 91 | 2108 | go | N | N* | GRPO | Digitaria filiformis | Poaceae | Crab Grass | RAB-138 |
| DIOVI | 93 | 2023 | sp | R1 | R1 | TREE | Diospyros virginiana va | Ebenaceae | Persimmon | RAB-826 |
| DIOVI | 93 | 2078 | sp | R1 | R1 | TREE | Diospyros virginiana vb | Ebenaceae | Persimmon | RAB-826 |
| DIOVI | 94 | 2156 | sp | R1 | R1 | TREE | Diospyros virginiana vc | Ebenaceae | Persimmon | RAB-826 |
| ECILO | 94 | 2120 | gn | N | N* | FODI | Echinocystis lobata | Cucurbitaceae | Balsam Apple | RAB-1001 |
| ERASE | 91 | 2099 | go | N | N* | GRPO | Eragrostis spectabilis va | Poaceae | Love Grass | RAB-70 |
| ERASE | 94 | 2130 | go | N | N* | GRPO | Eragrostis spectabilis vb | Poaceae | Love Grass | RAB-70 |
| ERASE | 94 | 2154 | go | N | N* | GRPO | Eragrostis spectabilis vc | Poaceae | Love Grass | RAB-70 |
| EREOP | 94 | 2256 | sp | N | N* | GRPO | Eremochloa ophiuroides | Poaceae | Buse | RAB-166 |
| ERIST | 94 | 2112 | sp | N | N* | FODI | Erigeron strigosus | Asteraceae | Daisy Fleabane | RAB-1068 |
| ERYYU | 94 | 2229.8 | sp | N | N* | FODI | Eryngium yuccifolium | Apiaceae | Rattlesnake Master | RAB-768 |
| ERYYU | 94 | 2229.9 | sp | N | N* | FODI | Eryngium yuccifolium | Apiaceae | Rattlesnake Master | RAB-768 |
| EUPCA | 94 | 2251 | go | N | N* | FODI | Eupatorium capillifolium | Asteraceae | Dog-fennel | RAB-1056 |
| EUPCO | 93 | 2003 | go | N | N* | FODI | Eupatorium compositifolium va | Asteraceae | Dog-fennel | RAB-1056 |
| EUPCO | 93 | 2006 | go | N | N* | FODI | Eupatorium compositifolium vb | Asteraceae | Dog-fennel | RAB-1056 |
| EUPCO | 93 | 2021 | go | N | N* | FODI | Eupatorium compositifolium vc | Asteraceae | Dog-fennel | RAB-1056 |
| EUPCO | 94 | 2111 | go | N | N* | FODI | Eupatorium compositifolium vd | Asteraceae | Dog-fennel | RAB-1056 |
| EUPCO | 94 | 2253 | go | N | N* | FODI | Eupatorium compositifolium ve | Asteraceae | Dog-fennel | RAB-1056 |
| EUHCO | 94 | 2201 | sp | R2 | N* | FODI | Euphorbia corollata | Euphorbiaceae | Flowering Spurge | RAB-672 |
| FESOC | 91 | 2094 | go | N | N* | GRPO | Festuca octoflora va | Poaceae | Fescue | RAB-82 |
| FESOC | 94 | 2176 | go | N | N* | GRPO | Festuca octoflora vb | Poaceae | Fescue | RAB-82 |
| FROFL | 93 | 2048 | go | R2 | N* | FODI | Froelichia floridana va | Amaranthaceae | (Cottonweed) | RAB-427 |
| FROFL | 94 | 2192.2 | go | R2 | N* | FODI | Froelichia floridana vb | Amaranthaceae | (Cottonweed) | RAB-427 |
| GNAOB | 94 | 2127 | sp | N | N* | FODI | Gnaphalium obtusifolium | Asteraceae | Rabbit Tobacco | RAB-1066 |
| HEEAM | 93 | 2009 | sp | R2 | N* | FODI | Helenium amarum va | Asteraceae | Bitter-weed | RAB-1133 |
| HEEAM | 93 | 2058.8 | sp | R2 | N* | FODI | Helenium amarum vb | Asteraceae | Bitter-weed | RAB-1133 |
| HEEAM | 93 | 2058.9 | sp | R2 | N* | FODI | Helenium amarum vb | Asteraceae | Bitter-weed | RAB-1133 |
| HEIRO | 93 | 2030 | sp | N | N* | FODI | Helianthemum rosmarinifolium va | Cistaceae | Rockrose | RAB-720 |
| HEIRO | 94 | 2131 | sp | N | N* | FODI | Helianthemum rosmarinifolium vb | Cistaceae | Rockrose | RAB-720 |
| HELDI | 93 | 2062 | go | N | N* | FODI | Helianthus divaricatus | Asteraceae | Sunflower | RAB-1115 |
| HETPI | 94 | 2237 | go | N | N* | FODI | Heterotheca pilosa | Asteraceae | None | RAB-1101 |
| HOULD | 94 | 2165 | gn | N | N* | FODI | Houstonia longifolia | Rubiaceae | None | RAB-983 |
| HYPHY | 94 | 2115 | sp | N | N* | SHRU | Hypericum hypericoides va | Hypericaceae | St. Andrew's Cross | RAB-710 |
| HYPHY | 94 | 2194 | sp | N | N* | SHRU | Hypericum hypericoides vb | Hypericaceae | St. Andrew's Cross | RAB-710 |
| HYPHY | 94 | 2223 | sp | N | N* | SHRU | Hypericum hypericoides vc | Hypericaceae | St. Andrew's Cross | RAB-710 |
| ILEGL | 94 | 2149 | sp | N | N* | SHRU | Ilex glabra va | Aquifoliaceae | Inkberry | RAB-684 |
| ILEGL | 93 | 2057 | sp | N | N* | SHRU | Ilex glabra vb | Aquifoliaceae | Inkberry | RAB-684 |
| IPOHE | 91 | 2084 | go | N | N* | VINE | Ipomoea hederacea | Convolvulaceae | (Hairy I.) | RAB-866 |

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|---|---|---|---|---|---|---|---|---|---|---|
| IPOPA | 93 | 2004 | sp | N | N* | VINE | Ipomoea pandurata va | Convolvulaceae | Man-root | RAB-868 |
| IPOPA | 94 | 2123 | sp | N | N* | VINE | Ipomoea pandurata vb | Convolvulaceae | Man-root | RAB-868 |
| IPOPA | 94 | 2129 | sp | N | N* | VINE | Ipomoea pandurata vc | Convolvulaceae | Man-root | RAB-868 |
| JUNBI | 93 | 2055.8 | sp | N | N* | GRJU | Juncus biflorus | Juncaceae | (Rush) | RAB-276 |
| JUNBI | 93 | 2055.9 | sp | N | N* | GRJU | Juncus biflorus | Juncaceae | (Rush) | RAB-276 |
| JUNDE | 94 | 2218 | sp | N | N* | GRJU | Juncus debilis | Juncaceae | (Rush) | RAB-280 |
| JUNDI | 94 | 2248 | go | N | N* | GRJU | Juncus dichotomus | Juncaceae | (Rush) | RAB-276 |
| JUNEF | 94 | 2220 | go | N | N* | GRJU | Juncus effusus | Juncaceae | (Rush) | RAB-275 |
| JUNGE | 94 | 2217 | go | R2 | N* | GRJU | Juncus georgianus | Juncaceae | (Rush) | RAB-276 |
| JUNSC | 94 | 2219 | sp | N | N* | GRJU | Juncus scirpoides | Juncaceae | (Rush) | RAB-278 |
| KRIVI | 94 | 2134 | go | N | N* | FODI | Krigia virginica | Asteraceae | Dwarf Dandelion | RAB-1032 |
| LATHI | 94 | 2171 | gn | N | N* | SHRU | Lathyrus hirsutus | Fabaceae | (Lathyrus) | RAB-633 |
| LESBI | 93 | 2031 | sp | N | N* | FODI | Lespedeza bicolor va | Fabaceae | (Shrubby L.) | RAB-616 |
| LESBI | 93 | 2036 | sp | N | N* | FODI | Lespedeza bicolor vb | Fabaceae | (Shrubby L.) | RAB-616 |
| LESHI | 93 | 2033 | go | N | N* | FODI | Lespedeza hirta va | Fabaceae | (Hairy L.) | RAB 617 |
| LESHI | 94 | 2239 | go | N | N* | FODI | Lespedeza hirta vb | Fabaceae | (Hairy L.) | RAB-617 |
| LESHI | 94 | 2119 | go | N | N* | FODI | Lespedeza hirta vc | Fabaceae | (Hairy L.) | RAB-613 |
| LESIN | 94 | 2179 | go | N | N* | FODI | Lespedeza intermedia va | Fabaceae | (Meso L.) | RAB-617 |
| LESIN | 94 | 2212 | go | N | N* | FODI | Lespedeza intermedia vb | Fabaceae | (Meso L.) | RAB-617 |
| LESVI | 93 | 2017 | go | N | N* | FODI | Lespedeza virginica va | Fabaceae | (Virginia L.) | RAB-616 |
| LESVI | 93 | 2066.8 | go | N | N* | FODI | Lespedeza virginica vb | Fabaceae | (Virginia L.) | RAB-616 |
| LESVI | 93 | 2066.9 | go | N | N* | FODI | Lespedeza virginica vb | Fabaceae | (Virginia L.) | RAB-616 |
| LIQST | 93 | 2020 | sp | R1 | R1 | TREE | Liquidambar styraciflua va | Hamamelidaceae | Sweet-gum | RAB-529 |
| LIQST | 94 | 2163 | sp | R1 | R1 | TREE | Liquidambar styraciflua vb | Hamamelidaceae | Sweet-gum | RAB-529 |
| LITCA | 94 | 2183 | gn | R2 | N* | FODI | Lithospermum caroliniense | Boraginaceae | Puccoon | RAB-882 |
| LOLMU | 91 | 2104 | sp | N | N* | GRPO | Lolium multiflorum va | Poaceae | Rye Grass | RAB-85 |
| LOLMU | 94 | 2164 | sp | N | N* | GRPO | Lolium multiflorum vb | Poaceae | Rye Grass | RAB-85 |
| LOLMU | 94 | 2185 | sp | N | N* | GRPO | Lolium multiflorum vc | Poaceae | Rye Grass | RAB-85 |
| LONSE | 94 | 2143 | go | N | N* | VINE | Lonicera sempervirens | Caprifoliaceae | Coral Honeysuckle | RAB-991 |
| MALAN | 93 | 2042 | gn | N | N* | TREE | Malus angustifolia | Rosaceae | Crab-apple | RAB-557 |
| MYRCE | 93 | 2027 | sp | N | N* | SHRU | Myrica cerifera | Myricaceae | Wax Myrtle | RAB-362 |
| NYSSY | 93 | 2079 | sp | R2 | N* | TREE | Nyssa sylvatica va | Nyssaceae | Black Gum | RAB-789 |
| NYSSY | 94 | 2159 | sp | R2 | N* | TREE | Nyssa sylvatica vb | Nyssaceae | Black Gum | RAB-789 |
| OENLA | 94 | 2193 | sp | R2 | R2 | FODI | Oenothera laciniata | Onagraceae | (Evening Primrose) | RAB-752 |
| OPUCO | 93 | 2076 | sp | N | N* | FODI | Opuntia compressa | Cactaceae | Prickly Pear | RAB-735 |
| OXAST | 94 | 2175 | gn | N | N* | FODI | Oxalis stricta | Oxalidaceae | Wood Sorrel | RAB-649 |
| OXYAR | 93 | 2052 | gn | N | N* | SHRU | Oxydendrum arboreum | Ericaceae | Sourwood | RAB-808 |
| PANLA | 94 | 2245 | sp | N | N* | GRPO | Panicum lanuginosum | Poaceae | (Panic Grass) | RAB-154 |
| PANLX | 94 | 2118 | sp | N | N* | GRPO | Panicum laxiflorum va | Poaceae | (Panic Grass) | RAB-151 |
| PANLX | 94 | 2133 | sp | N | N* | GRPO | Panicum laxiflorum vb | Poaceae | (Panic Grass) | RAB-151 |
| PANLX | 94 | 2184 | sp | N | N* | GRPO | Panicum laxiflorum vc | Poaceae | (Panic Grass) | RAB-151 |
| PANLX | 94 | 2209 | sp | N | N* | GRPO | Panicum laxiflorum vd | Poaceae | (Panic Grass) | RAB-151 |
| PANRA | 94 | 2197 | sp | N | N* | GRPO | Panicum ravenelii | Poaceae | (Panic Grass) | RAB-153 |
| PASDI | 93 | 2082 | go | N | N* | GRPO | Paspalum dissectum | Poaceae | (Paspalum) | RAB-133 |
| PASUR | 94 | 2254 | sp | N | N* | GRPO | Paspalum urvillei | Poaceae | (Paspalum) | RAB-134 |

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| PASIN | 93 | 2037 | sp | N | N* | VINE | Passiflora incarnata va | Passifloraceae | Maypops | RAB-734 |
| PASIN | 91 | 2083 | sp | N | N* | VINE | Passiflora incarnata vb | Passifloraceae | Maypops | RAB-734 |
| PASIN | 94 | 2113 | sp | N | N* | VINE | Passiflora incarnata vc | Passifloraceae | Maypops | RAB-734 |
| PHONI | 94 | 2189 | sp | R2 | R2 | FODI | Phlox nivalis | Polemoniaceae | (Mossy Phlox) | RAB-870 |
| PHYAM | 93 | 2080 | sp | N | N* | FODI | Phytolacca americana | Phytolaccaceae | Poke | RAB-429 |
| PINGL | 93 | 2044 | sp | N | R1 | TREE | Pinus glabra | Pinaceae | Spruce Pine | RAB-38 |
| PLAAR | 93 | 2059 | sp | N | N* | FODI | Plantago aristata va | Plantaginaceae | Plantain | RAB-977 |
| PLAAR | 94 | 2126 | sp | N | N* | FODI | Plantago aristata vb | Plantaginaceae | Plantain | RAB-977 |
| PLAAR | 94 | 2174 | sp | N | N* | FODI | Plantago aristata vc | Plantaginaceae | NCN (Plantain) | RAB-977 |
| PLAVI | 94 | 2125 | go | N | N* | FODI | Plantago virginica | Plantaginaceae | Plantain | RAB-977 |
| PLTOC | 93 | 2008 | sp | N | N* | TREE | Platanus occidentalis | Platanaceae | Sycamore | RAB-531 |
| POGNA | 94 | 2213 | sp | R2 | N* | FODI | Polygala nana | Polygalaceae | (Yellow P.) | RAB-660 |
| POGPO | 94 | 2128 | sp | R2 | N* | FODI | Polygala polygama | Polygalaceae | (Polygala) | RAB-656 |
| PRUAN | 93 | 2041 | sp | N | N* | TREE | Prunus angustifolia | Rosaceae | Chickasaw Plum | RAB-566 |
| PRUSE | 94 | 2144 | sp | N | R3 | TREE | Prunus serotina | Rosaceae | Black Cherry | RAB-569 |
| PTEAQ | 93 | 2051 | sp | R2 | N* | FERN | Pteridium aquilinum va | Pteridaceae | Bracken | RAB-18 |
| PTEAQ | 91 | 2107 | sp | R2 | N* | FERN | Pteridium aquilinum vb | Pteridaceae | Bracken | RAB-18 |
| PYHCA | 94 | 2236 | sp | N | N* | FODI | Pyrrhopappus carolinianus | Asteraceae | None | RAB-1032 |
| QUECO | 93 | 2056 | go | N | N* | TREE | Quercus coccinea | Fagaceae | Scarlet Oak | RAB-381 |
| QUEFA | 93 | 2022 | go | R1 | R1 | TREE | Quercus falcata va | Fagaceae | Spanish Oak | RAB-381 |
| QUEFA | 94 | 2196 | go | R1 | R1 | TREE | Quercus falcata vb | Fagaceae | Spanish Oak | RAB-381 |
| QUEFA | 94 | 2199 | go | R1 | R1 | TREE | Quercus falcata vc | Fagaceae | Spanish Oak | RAB-381 |
| QUEMR | 93 | 2075 | go | N | N* | TREE | Quercus margaretta | Fagaceae | Scrubby Post Oak | RAB-374 |
| QUEMA | 93 | 2013 | sp | R3 | R3 | TREE | Quercus marilandica va | Fagaceae | Black Jack Oak | RAB-381 |
| QUEMA | 94 | 2221 | sp | R3 | R3 | TREE | Quercus marilandica vb | Fagaceae | Black Jack Oak | RAB-381 |
| QUEMA | 94 | 2234 | sp | R3 | R3 | TREE | Quercus marilandica vc | Fagaceae | Black Jack Oak | RAB-381 |
| QUENI | 93 | 2038 | sp | R2 | N* | TREE | Quercus nigra va | Fagaceae | Water Oak | RAB-382 |
| QUENI | 94 | 2136 | sp | R2 | N* | TREE | Quercus nigra vb | Fagaceae | Water Oak | RAB-382 |
| QUEPU | 93 | 2034 | go | N | N* | TREE | Quercus pumila | Fagaceae | Running Oak | RAB-385 |
| QUEST | 91 | 2085 | go | R1 | N* | TREE | Quercus stellata | Fagaceae | Post Oak | RAB-374 |
| RHOCA | 94 | 2210 | gn | N | N* | SHRU | Rhododendron canescens | Ericaceae | Wild Azalea | RAB-799 |
| RHUCO | 93 | 2011 | sp | N | R3 | SHRU | Rhus copallina va | Anacardiaceae | Winged Sumac | RAB-678 |
| RHUCO | 91 | 2092 | sp | N | R3 | SHRU | Rhus copallina vb | Anacardiaceae | Winged Sumac | RAB-678 |
| RHUGL | 93 | 2077 | go | R1 | R1 | SHRU | Rhus glabra | Anacardiaceae | Smooth Sumac | RAB-678 |
| RHYDI | 94 | 2147 | go | N | N* | VINE | Rhynchosia difformis | Fabaceae | None | RAB-638 |
| ROBHI | 94 | 2247.2 | go | N | N* | SHRU | Robinia hispida | Fabaceae | Bristly Locust | RAB-623 |
| ROSCA | 91 | 2091 | sp | N | N* | BRAM | Rosa carolina va | Rosaceae | Wild Rose | RAB-552 |
| ROSCA | 94 | 2207 | sp | N | N* | BRAM | Rosa carolina vb | Rosaceae | Wild Rose | RAB-552 |
| ROSCA | 94 | 2243 | sp | N | N* | BRAM | Rosa carolina vc | Rosaceae | Wild Rose | RAB-552 |
| ROSSE | 94 | 2166 | go | N | N* | BRAM | Rosa setigera | Rosaceae | Prairie Rose | RAB-550 |
| RUBCU | 93 | 2024 | go | N | N* | BRAM | Rubus cuneifolius va | Rosaceae | Blackberry | RAB-540 |
| RUBCU | 91 | 2090 | go | N | N* | BRAM | Rubus cuneifolius vb | Rosaceae | Blackberry | RAB-540 |
| RUBFL | 93 | 2005 | go | N | N* | BRAM | Rubus flagellaris va | Rosaceae | Dewberry | RAB-541 |
| RUBFL | 93 | 2025 | go | N | N* | BRAM | Rubus flagellaris vb | Rosaceae | Dewberry | RAB-541 |
| RUBFL | 91 | 2089 | go | N | N* | BRAM | Rubus flagellaris vc | Rosaceae | Dewberry | RAB-541 |

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| RUMAC | 94 | 2151 | go | N | N* | FODI | Rumex acetosella va | Polygonaceae | Sheep-sorrel | RAB-403 |
| RUMAC | 94 | 2170 | go | N | N* | FODI | Rumex acetosella vb | Polygonaceae | Sheep-sorrel | RAB-403 |
| RUMAC | 94 | 2182 | go | N | N* | FODI | Rumex acetosella vc | Polygonaceae | Sheep-sorrel | RAB-403 |
| SALNI | 94 | 2142 | sp | R2 | N* | TREE | Salix nigra va | Salicaceae | Black Willow | RAB-358 |
| SALNI | 94 | 2215 | sp | R2 | N* | TREE | Salix nigra vb | Salicaceae | Black Willow | RAB-358 |
| SASAL | 93 | 2047 | sp | R1 | R1 | TREE | Sassafras albidum | Lauraceae | Trew ex Blackwell | RAB-478 |
| SCHMI | 94 | 2178 | sp | N | N* | BRAM | Schrankia microphylla | Fabaceae | Sensitive Brier | RAB-574 |
| SENSM | 94 | 2148 | sp | N | N* | FODI | Senecio smallii | Asteraceae | (Small's S.) | RAB-1037 |
| SEIAC | 94 | 2247.1 | go | N | N* | FODI | Silene acaulis | Caryophyllaceae | Moss Campion | G2-141 |
| SILCO | 93 | 2016 | sp | R2 | N* | FODI | Silphium compositum va | Asteraceae | (Basal S.) | RAB-1103 |
| SILCO | 93 | 2064 | sp | R2 | N* | FODI | Silphium compositum vb | Asteraceae | (Basal S.) | RAB-1103 |
| SILDE | 94 | 2205 | sp | R2 | N* | FODI | Silphium dentatum | Asteraceae | (Toothed S.) | RAB-1103 |
| SMIBO | 94 | 2109 | go | N | N* | VINE | Smilax bona-nox va | Liliaceae | (Greenbrier) | RAB-285 |
| SMIBO | 94 | 2168 | go | N | N* | VINE | Smilax bona-nox vb | Liliaceae | (Greenbrier) | RAB-285 |
| SMIBO | 94 | 2200 | go | N | N* | VINE | Smilax bona-nox vc | Liliaceae | (Greenbrier) | RAB-285 |
| SMIGL | 93 | 2015 | go | N | N* | VINE | Smilax glauca va | Liliaceae | (Greenbrier) | RAB-287 |
| SMIGL | 93 | 2054 | go | N | N* | VINE | Smilax glauca vb | Liliaceae | (Greenbrier) | RAB-287 |
| SMIRO | 91 | 2087 | go | N | N* | VINE | Smilax rotundifolia va | Liliaceae | (Greenbrier) | RAB-285 |
| SMIRO | 94 | 2110 | go | N | N* | VINE | Smilax rotundifolia vb | Liliaceae | (Greenbrier) | RAB-285 |
| SOACA | 91 | 2093 | sp | R2 | N* | FODI | Solanum carolinense va | Solanaceae | Nightshade | RAB-932 |
| SOACA | 94 | 2122 | sp | R2 | N* | FODI | Solanum carolinense vb | Solanaceae | Nightshade | RAB-932 |
| SPEBI | 94 | 2152 | sp | N | N* | FODI | Specularia biflora | Campanulaceae | Venus' Looking-glass | RAB-1002 |
| SPEPE | 94 | 2155 | sp | N | N* | FODI | Specularia perfoliata | Campanulaceae | Venus' Looking-glass | RAB-1002 |
| SPGMA | 94 | 2249 | sp | N | N* | FODI | Spigelia marilandica | Loganiaceae | Indian Pink | RAB-833 |
| STISY | 94 | 2138 | sp | R2 | N* | FODI | Stillingia sylvatica va | Euphorbiaceae | (Herbaceous S.) | RAB-667 |
| STISY | 94 | 2230 | sp | R2 | N* | FODI | Stillingia sylvatica vb | Euphorbiaceae | (Herbaceous S.) | RAB-667 |
| STYBI | 94 | 2233 | sp | N | N* | FODI | Stylosanthes biflora | Fabaceae | Pencil Flower | RAB-604 |
| TEPVI | 91 | 2106 | sp | R2 | N* | FODI | Tephrosia virginiana | Fabaceae | Goat's Rue | RAB-624 |
| TETHE | 94 | 2202 | sp | R2 | N* | FODI | Tetragonotheca helianthoides | Asteraceae | (Four-parted T.) | RAB-1106 |
| TRADI | 94 | 2242 | sp | N | N* | VINE | Trachelospermum difforme | Apocynaceae | Climbing Dogbane, Gf | RAB-845 |
| TRDVI | 94 | 2188 | go | N | N* | FOMO | Tradescantia virginiana | Commelinaceae | Spiderwort | RAB-271 |
| TRPAM | 94 | 2158 | gn | N | N* | GRPO | Triplasis americana | Poaceae | None | RAB-64 |
| ULMAL | 94 | 2241 | fn | R1 | R1 | TREE | Ulmus alata | Ulmaceae | Winged Elm | RAB-386 |
| VACAR | 94 | 2192.1 | sp | N | N* | SHRU | Vaccinium arboreum | Ericaceae | Sparkleberry | RAB-814 |
| VACDA | 93 | 2068 | go | N | N* | SHRU | Vaccinium darrowii | Ericaceae | Glaucous Blueberry (Gf) | Gf-275 |
| VACEL | 93 | 2043 | sp | N | N* | SHRU | Vaccinium elliottii | Ericaceae | None | RAB-815 |
| VACEL | 94 | 2137 | sp | N | N* | SHRU | Vaccinium elliottii | Ericaceae | Mayberry, Gf | RAB-815 |
| VACST | 93 | 2045 | sp | N | N* | SHRU | Vaccinium stamineum va | Ericaceae | Squaw-huckleberry | RAB-814 |
| VACST | 94 | 2177 | sp | N | N* | SHRU | Vaccinium stamineum vb | Ericaceae | Squaw-huckleberry | RAB-814 |
| VACVA | 93 | 2035 | go | N | N* | SHRU | Vaccinium vacillans | Ericaceae | NCN | RAB-815 |
| VERBA | 94 | 2235 | go | N | N* | FODI | Verbena brasiliensis va | Verbenaceae | (Squared Stemed V.) | RAB-888 |
| VERBA | 94 | 2246 | go | N | N* | FODI | Verbena brasiliensis vb | Verbenaceae | (Square Stemed V.) | RAB-888 |
| VENAN | 93 | 2071 | sp | R2 | N* | FODI | Vernonia angustifolia | Asteraceae | (Ironweed) | RAB-1047 |
| VIBRU | 94 | 2204 | go | N | N* | SHRU | Viburnum rufidulum | Caprifoliaceae | Blue Haw | RAB-995 |
| VITCI | 94 | 2181 | go | N | N* | VINE | Vitis cinerea | Vitaceae | Pigeon Grape | RAB-697 |

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| VITRO | 93 | 2053 | sp | R2 | N* | VINE | Vitis rotundifolia va | Vitaceae | Muscadine | RAB-695 |
| VITRO | 91 | 2086 | sp | R2 | N* | VINE | Vitis rotundifolia vb | Vitaceae | Muscadine | RAB-695 |
| VITRO | 94 | 2191 | sp | R2 | N* | VINE | Vitis rotundifolia vc | Vitaceae | Muscadine | RAB-695 |
| WISFR | 94 | 2173 | go | N | N* | VINE | Wisteria frutescens | Fabaceae | American wisteria, Gf | RAB-620 |
| YUCFI | 93 | 2001 | sp | N | N* | FOMO | Yucca filamentosa va | Liliaceae | Bear-grass | RAB-299 |
| YUCFI | 94 | 2232 | sp | N | N* | FOMO | Yucca filamentosa vb | Liliaceae | Bear-grass | RAB-299 |
| B. PLANTED SPECIES | | | | | | | | | | |
| CYNDA | 93 | 2029_p | sp | N | N* | GRPO | Cynodon dactylon | Poaceae | Bermuda Grass | RAB-116 |
| ERACU | 93 | 2019_p | sp | N | N* | GRPO | Eragrostis curvula | Poaceae | (Love Grass) | RAB-70 |
| LESCU | 93 | 2040_p | sp | R2 | N* | FODI | Lespedeza cuneata va | Fabaceae | Sericea | RAB-617 |
| LESCU | 91 | 2088_p | sp | R2 | N* | FODI | Lespedeza cuneata vb | Fabaceae | Sericea | RAB-617 |
| LESCU | 94 | 2150_p | sp | R2 | N* | FODI | Lespedeza cuneata vc | Fabaceae | Sericea | RAB-617 |
| PANRM | 94 | 2255_p | go | N | N* | GRPO | Panicum ramosum | Poaceae | (Panic Grass) | RAB-148 |
| PASNO | 93 | 2002_p | go | N | N* | GRPO | Paspalum notatum va | Poaceae | Bahia Grass | RAB-134 |
| PASNO | 93 | 2018_p | go | N | N* | GRPO | Paspalum notatum vb | Poaceae | Bahia Grass | RAB-134 |
| PASNO | 91 | 2101_p | go | N | N* | GRPO | Paspalum notatum vc | Poaceae | Bahia Grass | RAB-134 |
| PASNO | 94 | 2135_p | go | N | N* | GRPO | Paspalum notatum vd | Poaceae | Bahia Grass | RAB-134 |
| PINPA | 93 | 2061_p | sp | N | R1 | TREE | Pinus palustris | Pinaceae | Long-leaf Pine | RAB-36 |
| PINTA | 93 | 2026_p | sp | N | N* | TREE | Pinus taeda | Pinaceae | Loblolly Pine | RAB-36 |
| SECCE | 93 | 2007_p | sp | N | N* | GRPO | Secale cereale va | Poaceae | Rye | RAB-86 |
| SCACE | 94 | 2153_p | sp | N | N* | GRPO | Secale cereale vb | Poaceae | Rye | RAB-86 |
| Collected off the Site | | | | | | | | | | |
| PUELO | 94 | 2244 | sp | N | N* | VINE | Pueraria lobata | Fabaceae | Kudzu | RAB-641 |

# Appendix A.2
# Distribution Patterns of Spontaneous Plant Species across the Six Sections of the Site

DISTRIBUTION PATTERNS OF THE SPONTANEOUS PLANT SPECIES AMONG THE SIX SECTIONS OF THE SITE INDICATED BY P (PRESENT) OR U (UNOBSERVED). INFORMATION BASED ON JULY 1993 AND MAY 1994 PLANT SURVEYS. MCKENNA HILL DROP ZONE, FORT BENNING MILITARY RESERVATION, GEORGIA.

| LATIN NAME | GROWTH FORM,a | SECTION A | B | C | D | E | F |
|---|---|---|---|---|---|---|---|
| IN ALL SECTIONS | | | | | | | |
| Arenaria stricta | FODI | P | P | P | P | P | P |
| Carya pallida | TREE | P | P | P | P | P | P |
| Danthonia sericea | GRPO | P | P | P | P | P | P |
| Diospyros virginiana | TREE | P | P | P | P | P | P |
| Echinocystis lobata | FODI | P | P | P | P | P | P |
| Eupatorium compositifolium | FODI | P | P | P | P | P | P |
| Hypericum hypericoides | SHRU | P | P | P | P | P | P |
| Ipomoea pandurata | VINE | P | P | P | P | P | P |
| Lespedeza hirta | FODI | P | P | P | P | P | P |
| Lespedeza virginica | FODI | P | P | P | P | P | P |
| Quercus marilandica | TREE | P | P | P | P | P | P |
| Rhus copallina | SHRU | P | P | P | P | P | P |
| Rubus cuneifolius | BRAM | P | P | P | P | P | P |
| Rubus flagellaris | BRAM | P | P | P | P | P | P |
| Sassafras albidum | TREE | P | P | P | P | P | P |
| Smilax bona-nox | VINE | P | P | P | P | P | P |
| Smilax glauca | VINE | P | P | P | P | P | P |
| Yucca filamentosa | FOMO | P | P | P | P | P | P |
| IN SECTION A ONLY | | | | | | | |
| Crataegus pulcherrima | TREE | P | U | U | U | U | U |
| Lespedeza bicolor | FODI | P | U | U | U | U | U |
| Lonicera sempervirens | VINE | P | U | U | U | U | U |
| Rhynchosia difformis | VINE | P | U | U | U | U | U |
| Senecio smallii | FODI | P | U | U | U | U | U |
| Specularia biflora | FODI | P | U | U | U | U | U |
| IN SECTION B ONLY | | | | | | | |
| Acalypha virginica | FODI | U | P | U | U | U | U |
| Carduus discolor | FODI | U | P | U | U | U | U |
| Eremochloa ophiuroides | GRPO | U | P | U | U | U | U |
| Eryngium yuccifolium | FODI | U | P | U | U | U | U |
| Eupatorium capillifolium | FODI | U | P | U | U | U | U |
| Euphorbia corollata | FODI | U | P | U | U | U | U |
| Helenium amarum | FODI | U | P | U | U | U | U |
| Paspalum urvillei | GRPO | U | P | U | U | U | U |
| Platanus occidentalis | TREE | U | P | U | U | U | U |
| Solanum carolinense | FODI | U | P | U | U | U | U |
| Stylosanthes biflora | FODI | U | P | U | U | U | U |
| Trachelospermum difforme | VINE | U | P | U | U | U | U |
| Ulmus alata | TREE | U | P | U | U | U | U |
| Verbena brasiliensis | FODI | U | P | U | U | U | U |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| IN SECTION C ONLY | | | | | | | |
| Aesculus sylvatica | TREE | U | U | P | U | U | U |
| Aralia spinosa | SHRU | U | U | P | U | U | U |
| Baccharis halimifolia | SHRU | U | U | P | U | U | U |
| Clethra alnifolia | SHRU | U | U | P | U | U | U |
| Cyrilla racemiflora | SHRU | U | U | P | U | U | U |
| Juncus dichotomus | GRJU | U | U | P | U | U | U |
| Lathyrus hirsutus | SHRU | U | U | P | U | U | U |
| Oxydendrum arboreum | SHRU | U | U | P | U | U | U |
| Polygala nana | FODI | U | U | P | U | U | U |
| Rhododendron canescens | SHRU | U | U | P | U | U | U |
| Robinia hispida | SHRU | U | U | P | U | U | U |
| Silene acaulis | FODI | U | U | P | U | U | U |
| Silphium dentatum (v) | FODI | U | U | P | U | U | U |
| Viburnum rufidulum | SHRU | U | U | P | U | U | U |
| | | | | | | | |
| IN SECTION D ONLY | | | | | | | |
| Asimina parviflora | TREE | U | U | U | P | U | U |
| Helianthus divaricatus | FODI | U | U | U | P | U | U |
| Lolium multiflorum | GRPO | U | U | U | P | U | U |
| Paspalum dissectum | GRPO | U | U | U | P | U | U |
| Triplasis americana | GRPO | U | U | U | P | U | U |
| | | | | | | | |
| IN SECTION E ONLY | | | | | | | |
| Houstonia longifolia | FODI | U | U | U | U | P | U |
| | | | | | | | |
| IN SECTION F ONLY | | | | | | | |
| Aster paternus [syn] | FODI | U | U | U | U | U | P |
| Clematis crispa | VINE | U | U | U | U | U | P |
| Lithospermum caroliniense | FODI | U | U | U | U | U | P |
| Oxalis stricta | FODI | U | U | U | U | U | P |
| Phlox nivalis | FODI | U | U | U | U | U | P |
| Schrankia microphylla | BRAM | U | U | U | U | U | P |
| Tradescantia virginiana | FOMO | U | U | U | U | U | P |
| Vaccinium arboreum | SHRU | U | U | U | U | U | P |
| Vernonia angustifolia | FODI | U | U | U | U | U | P |
| Vitis cinerea | VINE | U | U | U | U | U | P |
| Wisteria frutescens | VINE | U | U | U | U | U | P |
| | | | | | | | |
| IN TWO OR MORE SECTIONS | | | | | | | |
| | | | | | | | |
| IN FIVE SECTIONS | | | | | | | |
| Coreopsis major | FODI | U | P | P | P | P | P |
| Erigeron strigosus | FODI | P | P | U | P | P | P |
| Gnaphalium obtusifolium | FODI | P | P | P | P | P | U |
| Liquidambar styraciflua | TREE | P | P | P | P | P | U |
| Panicum laxiflorum | GRPO | P | U | P | P | P | P |
| Passiflora incarnata | VINE | P | P | P | P | P | U |
| Quercus falcata | TREE | U | P | P | P | P | P |
| Quercus margaretta | TREE | U | P | P | P | P | P |
| Quercus pumila | TREE | P | U | P | P | P | P |
| Silphium compositum | FODI | U | P | P | P | P | P |
| Smilax rotundifolia | VINE | P | P | P | P | U | P |
| Vaccinium elliottii | SHRU | P | P | P | U | P | P |
| Vaccinium vacillans | SHRU | P | U | P | P | P | P |
| | | | | | | | |
| IN FOUR SECTIONS | | | | | | | |
| Apocynum cannabinum | FODI | P | P | U | P | P | U |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Campanula aparinoides | FODI | P | P | P | U | P | U |
| Ceanothus americanus | SHRU | P | P | P | U | U | P |
| Desmodium viridiflorum | FODI | U | U | P | P | P | P |
| Eragrostis spectabilis | GRPO | P | P | U | P | P | U |
| Ilex glabra | SHRU | P | U | P | U | P | P |
| Pinus glabra | TREE | P | U | U | P | P | P |
| Plantago aristata | FODI | P | P | U | P | U | P |
| Prunus serotina | TREE | P | P | P | U | U | P |
| Pteridium aquilinum | FERN | U | P | P | P | U | P |
| Quercus nigra | TREE | P | P | P | U | P | P |
| Rosa setigera | BRAM | U | P | P | U | P | P |
| Rumex acetosella | FODI | P | P | U | U | P | P |
| | | | | | | | |
| IN THREE SECTIONS | | | | | | | |
| Asclepias amplexicaulis | FODI | U | P | P | U | U | P |
| Asclepias tuberosa | FODI | U | P | P | U | U | P |
| Cornus florida | SHRU | P | U | U | U | P | P |
| Krigia virginica | FODI | P | P | U | U | U | P |
| Malus angustifolia | TREE | P | U | P | P | U | U |
| Myrica cerifera | SHRU | P | P | P | U | U | U |
| Nyssa sylvatica | TREE | U | P | U | P | U | P |
| Oenothera laciniata | FODI | U | P | P | U | U | P |
| Panicum ravenelii | GRPO | U | P | P | U | U | P |
| Phytolacca americana | FODI | U | P | U | U | P | P |
| Prunus angustifolia | TREE | P | P | U | P | U | U |
| Quercus coccinea | TREE | U | U | P | U | P | P |
| Rhus glabra | SHRU | U | U | U | P | P | P |
| Specularia perfoliata | FODI | U | P | U | P | U | P |
| Vaccinium darrowi | SHRU | U | P | P | U | U | P |
| Vaccinium stamineum (v) | SHRU | P | U | P | U | U | P |
| Vitis rotundifolia | VINE | U | P | P | P | U | U |
| | | | | | | | |
| IN TWO SECTIONS | | | | | | | |
| Ambrosia artemisiifolia | FODI | P | U | U | P | U | U |
| Astragalus villosus | FODI | U | P | P | U | U | U |
| Callicarpa americana | FODI | U | U | U | P | P | U |
| Campsis radicans | VINE | P | U | U | U | U | P |
| Cassia fasciculata | FODI | U | P | P | U | U | U |
| Clematis reticulata | VINE | U | U | P | U | U | P |
| Crataegus flava | TREE | P | U | U | U | U | P |
| Festuca octoflora | GRPO | U | P | U | U | U | P |
| Froelichia floridana | FODI | U | U | P | U | U | P |
| Helianthemum rosmarinifolium | FODI | P | U | U | P | U | U |
| Juncus biflorus | GRJU | U | U | P | U | U | P |
| Lespedeza intermedia | FODI | U | U | P | U | U | P |
| Opuntia compressa | FODI | U | P | U | U | U | P |
| Plantago virginica | FODI | P | P | U | U | U | U |
| Polygala polygama | FODI | P | P | U | U | U | U |
| Rosa carolina | BRAM | U | P | P | U | U | U |
| Salix nigra | TREE | P | P | U | U | U | U |
| Stillingia sylvatica | FODI | P | P | U | U | U | U |
| Tetragonotheca helianthoides | FODI | U | P | P | U | U | U |

a. See Appendix A.1 for explanation of growth form codes.

# Appendix A.3
# Abundance Values of Spontaneous Plant Species across the Six Sections of the Site

AVERAGE SUBJECTIVE ABUNDANCE VALUES FOR THE SPONTANEOUS PLANT SPECIES AMONG THE SIX SECTIONS OF THE SITE. INFORMATION BASED ON MAY 1994 SURVEYS. MCKENNA HILL DROP ZONE, FORT BENNING MILITARY RESERVATION, GEORGIA.

SA = SECTION LETTER AND NUMBER OF AREAS IN SECTION SURVEYED FOR TAXON ABUNDANCE
NA = NUMBER OF AREAS OF THE SECTION IN WHICH THE TAXON OCCURRED
ASAV = AVERAGE SUBJECTIVE ABUNDANCE VALUE. THE PLUS SIGN (+) INDICATES CONBINED VALUES FOR THAT TAXON.

| LATIN NAME | GROWTH FORM,a | SA | NA | ASAV |
|---|---|---|---|---|
| SECTION A | | | | |
| Ambrosia artemisiifolia | FODI | A4 | 1 | 0.3 |
| Apocynum cannabinum | FODI | A4 | 1 | 0.3 |
| Arenaria stricta (v) | FODI | A4 | 1 | 0.3 |
| Campanula aparinoides | FODI | A4 | 3 | 1 |
| Campsis radicans | VINE | A4 | 2 | 1 |
| Carya pallida | TREE | A4 | 1 | 0.3 |
| Ceanothus americanus | SHRU | A4 | 2 | 0.8 |
| Cornus florida | SHRU | A4 | 1 | 0.3 |
| Crataegus flava | TREE | A4 | 1 | 0.3 |
| Crataegus pulcherrima | TREE | A4 | 1 | 0.3 |
| Danthonia sericea | GRPO | A4 | 4 | 1 |
| Diospyros virginiana | TREE | A4 | 4 | 3 |
| Echinocystis lobata | FODI | A4 | 2 | 0.5 |
| Eragrostis spectabilis | GRPO | A4 | 4 | 2.5 |
| Erigeron strigosus | FODI | A4 | 4 | 1.5 |
| Eupatorium compositifolium | FODI | A4 | 4 | 2.5 |
| Gnaphalium obtusifolium | FODI | A4 | 4 | 2 |
| Helianthemum rosmarinifolium | FODI | A4 | 3 | 1.5 |
| Hypericum hypericoides | SHRU | A4 | 1 | 0.3 |
| Ilex glabra | SHRU | A4 | 1 | 0.3 |
| Ipomoea pandurata | VINE | A4 | 4 | 2 |
| Krigia virginica | FODI | A4 | 2 | 0.5 |
| Lespedeza bicolor | FODI | A4 | 2 | 0.5 |
| Lespedeza hirta | FODI | A4 | 4 | 1.5 + |
| Lespedeza virginica | FODI | A4 | 2 | 0.5 |
| Liquidambar styraciflua | TREE | A4 | 3 | 1.4 |
| Lonicera sempervirens | VINE | A4 | 1 | 0.3 |
| Panicum laxiflorum | GRPO | A4 | 4 | 1.3 |
| Passiflora incarnata | VINE | A4 | 3 | 0.6 |
| Plantago aristata | FODI | A4 | 1 | 0.3 |
| Plantago virginica | FODI | A4 | 2 | 0.5 |
| Polygala polygama | FODI | A4 | 1 | 0.3 |
| Prunus angustifolia | TREE | A4 | 3 | 1.3 |
| Prunus serotina | TREE | A4 | 1 | 0.5 |
| Quercus marilandica | TREE | A4 | 1 | 0.3 |
| Quercus nigra | TREE | A4 | 3 | 1.4 + |

| | | | | |
|---|---|---|---|---|
| Quercus pumila | TREE | A4 | 2 | 0.8 |
| Rhus copallina | SHRU | A4 | 4 | 2.5 |
| Rhynchosia difformis | VINE | A4 | 1 | 0.3 |
| Rubus cuneifolius | BRAM | A4 | 4 | 3.3 |
| Rubus flagellaris | BRAM | A4 | 3 | 1 |
| Rumex acetosella | FODI | A4 | 2 | 0.5 |
| Salix nigra | TREE | A4 | 2 | 0.5 |
| Sassafras albidum | TREE | A4 | 3 | 1 |
| Senecio smallii | FODI | A4 | 1 | 0.3 |
| Smilax bona-nox | VINE | A4 | 4 | 2.1 |
| Smilax rotundifolia | VINE | A4 | 2 | 1 |
| Specularia biflora | FODI | A4 | 2 | 0.8 |
| Stillingia sylvatica | FODI | A4 | 1 | 0.3 |
| Vaccinium elliotii | SHRU | A4 | 2 | 0.5 |
| Vaccinium stamineum | SHRU | A4 | 1 | 0.3 |
| Vaccinium vacillans | SHRU | A4 | 3 | 1.1 |
| Yucca filamentosa | FODI | A4 | 2 | 0.5 |
| SECTION B | | | | |
| Acalypha virginica | FODI | B3 | 2 | 1.3 |
| Apocynum cannabinum | FODI | B3 | 2 | 1.2 |
| Asclepias amplexicaulis | FODI | B3 | 2 | 0.7 |
| Asclepias tuberosa | FODI | B3 | 1 | 0.7 |
| Astragalus villosus | FODI | B3 | 2 | 1.2 |
| Campanula aparinoides | FODI | B3 | 3 | 1.5 |
| Carduus discolor | FODI | B3 | 1 | 0.5 |
| Carya pallida | TREE | B3 | 3 | 3.4 + |
| Ceanothus americanus | SHRU | B3 | 2 | 1 |
| Coreopsis major | FODI | B3 | 3 | 2 |
| Danthonia sericea | GRPO | B3 | 2 | 1.5 |
| Diospyros virginiana | TREE | B3 | 3 | 2.8 |
| Echinocystis lobata | FODI | B3 | 1 | 0.7 |
| Eragrostis spectabilis | GRPO | B3 | 3 | 2 |
| Erigeron strigosus | FODI | B3 | 3 | 1.8 |
| Eryngium yuccifolium | FODI | B3 | 2 | 0.8 |
| Eupatorium compositifolium | FODI | B3 | 3 | 2.5 |
| Euphorbia corollata | FODI | B3 | 1 | 0.3 |
| Festuca octoflora | GRPO | B3 | 2 | 1.3 |
| Gnaphalium obtusifolium | FODI | B3 | 2 | 1.5 |
| Hypericum hypericoides | SHRU | B3 | 2 | 0.8 |
| Ipomoea pandurata | VINE | B3 | 3 | 3.8 + |
| Krigia virginica | FODI | B3 | 1 | 0.5 |
| Lespedeza hirta | FODI | B3 | 1 | 1.8 + |
| Lespedeza virginica | FODI | B3 | 1 | 0.7 |
| Liquidambar styraciflua | TREE | B3 | 2 | 1.3 |
| Myrica cerifera | SHRU | B3 | 1 | 0.3 |
| Nyssa sylvatica | TREE | B3 | 2 | 1 |
| Oenothera laciniata | FODI | B3 | 1 | 0.5 |
| Opuntia compressa | FODI | B3 | 1 | 0.7 |
| Platanus occidentalis | TREE | B3 | 1 | 0.3 |
| Panicum ravenelii | GRPO | B3 | 1 | 0.5 |
| Passiflora incarnata | VINE | B3 | 2 | 1.5 |
| Phytolacca americana | FODI | B3 | 1 | 0.3 |
| Plantago aristata | FODI | B3 | 2 | 2 + |
| Plantago virginica | FODI | B3 | 2 | 1.2 |
| Polygala polygama | FODI | B3 | 2 | 0.7 |
| Prunus angustifolia | TREE | B3 | 1 | 0.8 |
| Prunus serotina | TREE | B3 | 2 | 0.7 |
| Pteridium aquilinum | FERN | B3 | 2 | 1.5 |

| | | | | |
|---|---|---|---|---|
| Quercus falcata | TREE | B3 | 3 | 5 + |
| Quercus margaretta | TREE | B3 | 2 | 1.5 |
| Quercus marilandica | TREE | B3 | 3 | 3 + |
| Quercus nigra | TREE | B3 | 2 | 2.5 + |
| Rhus copallina | SHRU | B3 | 3 | 2.7 |
| Rosa carolina | BRAM | B3 | 2 | 0.7 |
| Rosa setigera | BRAM | B3 | 1 | 0.5 |
| Rubus cuneifolius | BRAM | B3 | 3 | 3 |
| Rubus flagellaris | BRAM | B3 | 3 | 3 |
| Rumex acetosella | FODI | B3 | 1 | 0.5 |
| Salix nigra | TREE | B3 | 1 | 0.3 |
| Sassafras albidum | TREE | B3 | 1 | 0.7 |
| Silphium compositum | FODI | B3 | 3 | 2.5 |
| Smilax bona-nox | VINE | B3 | 2 | 2.8 + |
| Smilax glauca | VINE | B3 | 3 | 1.7 |
| Smilax rotundifolia | VINE | B3 | 1 | 0.7 |
| Solanum carolinense | FODI | B3 | 2 | 1 |
| Specularia perfoliata | FODI | B3 | 2 | 1.2 |
| Stillingia sylvatica | FODI | B3 | 1 | 0.3 |
| Stylosanthes biflora | FODI | B3 | 1 | 0.3 |
| Tetragonotheca helianthoides | FODI | B3 | 1 | 0.7 |
| Trachelospermum difforme | VINE | B3 | 1 | 0.3 |
| Ulmus crassifolia | TREE | B3 | 1 | 0.3 |
| Vaccinium darrowii | SHRU | B3 | 1 | 0.3 |
| Vaccinium elliottii | SHRU | B3 | 2 | 0.7 |
| Verbena basiliensis | FODI | B3 | 1 | 0.3 |
| Vitis rotundifolia | VINE | B3 | 3 | 1.3 |
| Yucca filamentosa | FODI | B3 | 3 | 1.8 |
| | | | | |
| SECTION C | | | | |
| Aesculus sylvatica | TREE | C3 | 1 | 0.3 |
| Aralia spinosa | SHRU | C3 | 1 | 0.3 |
| Asclepias amplexicaulis | FODI | C3 | 1 | 0.3 |
| Asclepias tuberosa | FODI | C3 | 1 | 0.3 |
| Aster paternus | FODI | C3 | 1 | 0.8 |
| Astragalus villosus | FODI | C3 | 1 | 0.7 |
| Baccharis halimifolia | SHRU | C3 | 1 | 0.3 |
| Campanula aparinoides | FODI | C3 | 1 | 0.7 |
| Carya pallida | TREE | C3 | 1 | 0.7 |
| Cassia fasciculata | FODI | C3 | 1 | 0.3 |
| Ceanothus americanus | SHRU | C3 | 2 | 0.7 |
| Clematis reticulata | VINE | C3 | 1 | 0.7 |
| Clethra alnifolia | SHRU | C3 | 2 | 0.3 |
| Coreopsis major | FODI | C3 | 3 | 1.8 |
| Cyrilla racemiflora | SHRU | C3 | 1 | 0.3 |
| Danthonia sericea | GRPO | C3 | 2 | 0.7 |
| Diospyros virginiana | TREE | C3 | 3 | 2.2 |
| Echinocystis lobata | FODI | C3 | 3 | 1.3 |
| Eupatorium compositifolium | FODI | C3 | 3 | 2 |
| Gnaphalium obtusifolium | FODI | C3 | 2 | 0.7 |
| Hypericum hypericoides | SHRU | C3 | 1 | 0.7 |
| Ilex glabra | SHRU | C3 | 2 | 1 |
| Ipomoea pandurata | VINE | C3 | 1 | 0.8 |
| Lespedeza hirta | FODI | C3 | 1 | 0.3 |
| Lespedeza intermedia | FODI | C3 | 1 | 0.3 |
| Lespedeza virginica | FODI | C3 | 2 | 0.7 |
| Liquidambar styraciflua | TREE | C3 | 3 | 2.3 |
| Malus angustifolia | TREE | C3 | 1 | 0.7 |
| Myrica cerifera | SHRU | C3 | 1 | 0.3 |

| | | | | |
|---|---|---|---|---|
| Oenothera laciniata | FODI | C3 | 1 | 0.3 |
| Panicum laxiflorum | GRPO | C3 | 1 | 0.5 |
| Panicum ravenelii | GRPO | C3 | 1 | 0.3 |
| Passiflora incarnata | VINE | C3 | 1 | 0.3 |
| Polygala nana | FODI | C3 | 1 | 0.3 |
| Polygala polygama | FODI | C3 | 2 | 1 |
| Prunus serotina | TREE | C3 | 1 | 0.3 |
| Pteridium aquilinum | FERN | C3 | 3 | 1.2 |
| Quercus coccinea | TREE | C3 | 2 | 1 |
| Quercus falcata | TREE | C3 | 3 | 3.6 + |
| Quercus margaretta | TREE | C3 | 1 | 0.8 |
| Quercus marilandia | TREE | C3 | 2 | 1.6 + |
| Quercus nigra | TREE | C3 | 1 | 1.5 + |
| Quercus pumila | TREE | C3 | 1 | 0.8 |
| Rhododendron canescens | SHRU | C3 | 1 | 0.5 |
| Rhus copallina | SHRU | C3 | 3 | 1.7 |
| Rosa carolina | BRAM | C3 | 1 | 0.3 |
| Rosa setigera | BRAM | C3 | 2 | 1.3 |
| Rubus cuneifolius | BRAM | C3 | 2 | 2 |
| Rubus flagellaris | BRAM | C3 | 3 | 2.2 |
| Sassafras albidum | TREE | C3 | 2 | 1 |
| Silphium compositum | FODI | C3 | 2 | 1.5 |
| Silphium dentatum | FODI | C3 | 1 | 0.5 |
| Smilax bona-nox | VINE | C3 | 2 | 2.2 + |
| Smilax glauca | VINE | C3 | 3 | 1.5 |
| Smilax rotundifolia | VINE | C3 | 2 | 1.2 |
| Tetragonotheca helianthoides | FODI | C3 | 2 | 0.8 |
| Vaccinium darrowii | SHRU | C3 | 2 | 0.7 |
| Vaccinium elliottii | SHRU | C3 | 2 | 1.3 |
| Vaccinium stamineum | SHRU | C3 | 1 | 0.3 |
| Vaccinium vacillans | SHRU | C3 | 3 | 1.5 |
| Viburum rufidulum | SHRU | C3 | 1 | 0.3 |
| Vitis rotundifolia | VINE | C3 | 1 | 0.5 |
| Yucca filamentosa | FODI | C3 | 2 | 1.2 |
| | | | | |
| SECTION D | | | | |
| Ambrosia artemisiifolia | FODI | D3 | 1 | 0.3 |
| Apocynum cannabinum | FODI | D3 | 1 | 0.7 |
| Arenaria stricta (v) | FODI | D3 | 1 | 0.3 |
| Asimina parviflora | TREE | D3 | 1 | 0.3 |
| Carya pallida | TREE | D3 | 3 | 1.3 |
| Coreopsis major | FODI | D3 | 2 | 1.3 + |
| Crataegus flava | TREE | D3 | 2 | 1 |
| Danthonia sericea | GRPO | D3 | 2 | 1.3 |
| Desmodium viridiflorum | FODI | D3 | 1 | 0.3 |
| Diospyros virginiana | TREE | D3 | 3 | 2.2 |
| Echinocystis lobata | FODI | D3 | 3 | 1.7 |
| Eragrostis spectabilis | GRPO | D3 | 1 | 0.8 |
| Erigeron strigosus | FODI | D3 | 2 | 1 |
| Eupatorium compositifolium | FODI | D3 | 3 | 2.3 |
| Gnaphalium obtusifolium | FODI | D3 | 2 | 1 |
| Helianthemum rosmarinifolium | FODI | D3 | 1 | 1.2 |
| Hypericum hypericoides | SHRU | D3 | 2 | 1 |
| Ipomoea pandurata | VINE | D3 | 1 | 2.2 + |
| Lespedeza hirta | FODI | D3 | 1 | 1 + |
| Lespedeza virginica | FODI | D3 | 2 | 0.7 |
| Liquidambar styraciflua | TREE | D3 | 1 | 0.7 |
| Malus angustifolia | TREE | D3 | 1 | 0.3 |
| Nyssa sylvatica | TREE | D3 | 3 | 2.2 |

| | | | | |
|---|---|---|---|---|
| Panicum laxiflorum | GRPO | D3 | 1 | 1 + |
| Passiflora incarnata | VINE | D3 | 2 | 1 |
| Pinus glabra | TREE | D3 | 1 | 0.3 |
| Prunus angustifolia | TREE | D3 | 1 | 0.7 |
| Pteridium aquilinum | FERN | D3 | 1 | 0.3 |
| Quercus falcata | TREE | D3 | 3 | 1.2 |
| Quercus margaretta | TREE | D3 | 3 | 1.5 |
| Quercus marilandica | TREE | D3 | 3 | 1.2 |
| Quercus pumila | TREE | D3 | 1 | 0.3 |
| Rhus copallina | SHRU | D3 | 3 | 2.7 |
| Rhus glabra | SHRU | D3 | 2 | 1 |
| Rubus cuneifolius | BRAM | D3 | 3 | 3 |
| Rubus flagellaris | BRAM | D3 | 2 | 1.3 |
| Sassafras albidum | TREE | D3 | 2 | 1.3 |
| Silphium compositum | FODI | D3 | 2 | 1 |
| Smilax bona-nox | VINE | D3 | 2 | 1 |
| Smilax glauca | VINE | D3 | 1 | 0.3 |
| Smilax rotundifolia | VINE | D3 | 2 | 1 |
| Specularia perfoliata | FODI | D3 | 1 | 0.7 |
| Triplasis americana | GRPO | D3 | 1 | 0.5 |
| Vaccinium vacillans | SHRU | D3 | 3 | 1.3 |
| Vitis rotundifolia | VINE | D3 | 2 | 0.7 |
| Yucca filamentosa | FODI | D3 | 3 | 2.3 |
| SECTION E | | | | |
| Apocynum cannabinum | FODI | E2 | 1 | 1 |
| Arenaria stricta (v) | FODI | E2 | 2 | 1.5 |
| Callicarpa americana | FODI | E2 | 1 | 0.3 |
| Campanula aparinoides | FODI | E2 | 1 | 0.5 |
| Carya pallida | TREE | E2 | 2 | 2 |
| Coreopsis major | FODI | E2 | 1 | 0.8 |
| Cornus florida | SHRU | E2 | 1 | 0.5 |
| Danthonia sericea | GRPO | E2 | 2 | 2 |
| Desmodium viridiflorum | FODI | E2 | 2 | 1 |
| Diospyros virginiana | TREE | E2 | 2 | 2.5 |
| Echinocystis lobata | FODI | E2 | 2 | 1.3 |
| Eragrostis spectabilis | GRPO | E2 | 1 | 1 + |
| Erigeron strigosus | FODI | E2 | 2 | 2.3 |
| Eupatorium compositifolium | FODI | E2 | 1 | 2.8 + |
| Gnaphalium obtusifolium | FODI | E2 | 1 | 1 |
| Houstonia longifolia | FODI | E2 | 1 | 0.5 |
| Hypericum hypericoides | SHRU | E2 | 2 | 1 |
| Ipomoea pandurata | VINE | E2 | 1 | 0.8 |
| Lespedeza hirta | FODI | E2 | 2 | 1.8 |
| Lespedeza virginica | FODI | E2 | 1 | 0.5 |
| Panicum laxiflorum | GRPO | E2 | 2 | 1 |
| Passiflora incarnata | VINE | E2 | 1 | 1.5 |
| Phytolacca americana | FODI | E2 | 1 | 0.5 |
| Pinus glabra | TREE | E2 | 1 | 0.5 |
| Polygala polygama | FODI | E2 | 1 | 0.5 |
| Quercus falcata | TREE | E2 | 1 | 0.5 |
| Quercus margaretta | TREE | E2 | 1 | 0.5 |
| Quercus marilandica | TREE | E2 | 1 | 1 |
| Quercus nigra | TREE | E2 | 1 | 0.5 |
| Quercus pumila | TREE | E2 | 2 | 2 |
| Rhus copallina | SHRU | E2 | 2 | 3 |
| Rhus glabra | SHRU | E2 | 1 | 1 |
| Rosa setigera | BRAM | E2 | 1 | 0.5 |
| Rubus cuneifolius | BRAM | E2 | 2 | 3 |

| | | | | |
|---|---|---|---|---|
| Rubus flagellaris | BRAM | E2 | 1 | 1.5 |
| Rumex acetosella | FODI | E2 | 1 | 0.5 |
| Sassafras albidum | TREE | E2 | 2 | 2.3 |
| Silphium compositum | FODI | E2 | 1 | 0.5 |
| Smilax bona-nox | VINE | E2 | 2 | 2.8 + |
| Smilax glauca | VINE | E2 | 1 | 0.5 |
| Vaccinium elliotii | SHRU | E2 | 1 | 0.5 |
| Vaccinium vacillans | SHRU | E2 | 1 | 1 |
| Yucca filamentosa | FODI | E2 | 2 | 2.3 |
| SECTION F | | | | |
| Arenaria stricta (v) | FODI | F2 | 1 | 1 |
| Asclepias amplexicaulis | FODI | F2 | 1 | 0.5 |
| Asclepias tuberosa | FODI | F2 | 1 | 0.8 |
| Carya pallida | TREE | F2 | 2 | 2 + |
| Ceanothus americanus | SHRU | F2 | 1 | 0.5 |
| Clematis crispa | VINE | F2 | 1 | 0.5 |
| Clematis reticulata | VINE | F2 | 1 | 1 |
| Coreopsis major | FODI | F2 | 2 | 2 |
| Cornus florida | SHRU | F2 | 1 | 0.5 |
| Crataegus flava | TREE | F2 | 2 | 2.3 |
| Danthonia sericea | GRPO | F2 | 2 | 2.5 |
| Desmodium viridiflorum | FODI | F2 | 2 | 1.5 |
| Diospyros virginiana | TREE | F2 | 2 | 2.5 |
| Echinocystis lobata | FODI | F2 | 2 | 2.3 |
| Erigeron strigosus | FODI | F2 | 2 | 1.5 |
| Eupatorium compositifolium | FODI | F2 | 2 | 2.5 |
| Festuca octoflora | GRPO | F2 | 1 | 1 |
| Hypericum hypericoides | SHRU | F2 | 2 | 1.8 |
| Ilex glabra | SHRU | F2 | 1 | 0.5 |
| Ipomoea pandurata | VINE | F2 | 2 | 1.8 |
| Juncus biflorus | GRJU | F2 | 2 | 1.8 |
| Krigia virginica | FODI | F2 | 1 | 0.5 |
| Lespedeza hirta | FODI | F2 | 2 | 2 |
| Lespedeza intermedia | FODI | F2 | 1 | 1 |
| Lespedeza virginica | FODI | F2 | 1 | 1 |
| Lithospermum caroliniense | FODI | F2 | 1 | 0.5 |
| Nyssa sylvatica | TREE | F2 | 1 | 0.5 |
| Oenothera laciniata | FODI | F2 | 1 | 1 |
| Oxalis stricta | FODI | F2 | 1 | 1 |
| Panicum laxiflorum | GRPO | F2 | 1 | 1 |
| Panicum ravenelii | GRPO | F2 | 1 | 0.8 |
| Phlox nivalis | FODI | F2 | 1 | 0.5 |
| Plantago aristata | FODI | F2 | 2 | 2 + |
| Prunus serotina | TREE | F2 | 1 | 1 |
| Pteridium aquilinum | FERN | F2 | 1 | 1.3 |
| Quercus coccinea | TREE | F2 | 2 | 1.5 |
| Quercus falcata | TREE | F2 | 2 | 3 + |
| Quercus marilandica | TREE | F2 | 2 | 2.8 |
| Quercus nigra | TREE | F2 | 1 | 2 + |
| Quercus pumila | TREE | F2 | 2 | 2 |
| Rhus copallina | SHRU | F2 | 2 | 3.5 |
| Rhus glabra | SHRU | F2 | 1 | 0.5 |
| Rosa setigera | BRAM | F2 | 2 | 1.3 |
| Rubus cuneifolius | BRAM | F2 | 2 | 2.8 |
| Rubus flagellaris | BRAM | F2 | 1 | 0.5 |
| Rumex acetosella | FODI | F2 | 2 | 1.5 |
| Sassafras albidum | TREE | F2 | 2 | 2.8 |
| Schrankia microphylla | BRAM | F2 | 2 | 2 |

| | | | | |
|---|---|---|---|---|
| Silphium compositum | FODI | F2 | 1 | 1 |
| Smilax bona-nox | VINE | F2 | 2 | 2 |
| Smilax glauca | VINE | F2 | 1 | 0.5 |
| Smilax rotundifolia | VINE | F2 | 2 | 1 |
| Specularia perfoliata | FODI | F2 | 2 | 1 |
| Tradescantia virginiana | FOMO | F2 | 1 | 0.8 |
| Vaccinium darrowii | SHRU | F2 | 2 | 1.5 |
| Vaccinium elliottii | SHRU | F2 | 2 | 1.8 |
| Vaccinium stamineum | SHRU | F2 | 1 | 1 |
| Vaccinium vacillans | SHRU | F2 | 2 | 1.5 |
| Vitis cinerea | VINE | F2 | 1 | 0.5 |
| Wisteria frutescens | VINE | F2 | 1 | 0.8 |
| Yucca filamentosa | FODI | F2 | 1 | 1 |

a. See Appendix A.1 for explanation of growth form codes.

# Appendix B.1
# Distribution Patterns of Planted Species across the Six Sections of the Site

DISTRIBUTION PATTERNS OF THE PLANTED SPECIES AMONG THE SIX SECTIONS OF THE SITE INDICATED BY P (PRESENT) OR U (UNOBSERVED). INFORMATION BASED ON JULY 1993 AND MAY 1994 PLANT SURVEYS. MCKENNA HILL DROP ZONE, FORT BENNING MILITARY RESERVATION, GEORGIA.

| LATIN NAME | GROWTH FORM,a | SECTION A | B | C | D | E | F |
|---|---|---|---|---|---|---|---|
| Cynodon dactylon | GRPO | P | P | U | U | U | U |
| Eragrostis curvula | GRPO | P | P | U | U | U | U |
| Lespedeza cuneata | FODI | P | P | P | P | P | U |
| Panicum ramosum | GRPO | P | U | U | U | U | U |
| Paspalum notatum | GRPO | P | P | U | P | P | U |
| Pinus palustris | TREE | U | U | U | P | P | P |
| Pinus taeda | TREE | P | P | P | P | P | P |
| Secale cereale | GRPO | U | P | P | P | P | U |

a. See Appendix A.1 for explanation of growth forms.

# Appendix B.2
# Abundance Values of Planted Species across the Six Sections of the Site

AVERAGE SUBJECTIVE ABUNDANCE VALUES FOR THE PLANTED SPECIES AMONG THE SIX SECTION OF THE SITE.
INFORMATION BASED ON MAY, 1994 SURVEYS. MCKENNA HILL DROP ZONE, FORT BENNING MILITARY RESERVATION, GEORGIA.

SA = SECTION LETTER AND NUMBER OF AREAS IN SECTION SURVEYED FOR TAXON ABUNDANCE
NA = NUMBER OF AREAS OF THE SECTION IN WHICH THE TAXON OCCURRED
ASAV = AVERAGE SUBJECTIVE ABUNDANCE VALUE.

| LATIN NAME | GROWTH FORM,a | SA | NA | ASAV |
|---|---|---|---|---|
| SECTION A | | | | |
| Lespedeza cuneata | FODI | A4 | 3 | 1.5 |
| Paspalum notatum | GRPO | A4 | 1 | 3.9 |
| Pinus taeda | TREE | A4 | 4 | 2 |
| SECTION B | | | | |
| Lespedeza cuneata | FODI | B3 | 1 | 0.7 |
| Paspalum notatum | GRPO | B3 | 2 | 3.5 |
| Pinus taeda | TREE | B3 | 3 | 1.3 |
| Secale cereale | GRPO | B3 | 1 | 0.2 |
| SECTION C | | | | |
| Lespedeza cuneata | FODI | C3 | 1 | 0.3 |
| Pinus taeda | TREE | C3 | 3 | 1.5 |
| Secale cereale | GRPO | C3 | 1 | 0.8 |
| SECTION D | | | | |
| Lespedeza cuneata | FODI | D3 | 1 | 0.3 |
| Paspalum notatum | GRPO | D3 | 1 | 1.3 |
| Pinus palustris | TREE | D3 | 1 | 1.2 |
| Pinus taeda | TREE | D3 | 3 | 2.8 |
| Secale cereale | GRPO | D3 | 1 | 1.5 |
| SECTION E | | | | |
| Lespedeza cuneata | FODI | E2 | 1 | 0.5 |
| Paspalum notatum | GRPO | E2 | 1 | 0.5 |
| Pinus palustris | TREE | E2 | 1 | 1 |
| Pinus taeda | TREE | E2 | 2 | 4 |
| Secale cereale | GRPO | E2 | 2 | 2.3 |
| SECTION F | | | | |
| Pinus palustris | TREE | F2 | 2 | 4 |
| Pinus taeda | TREE | F2 | 2 | 1.3 |

a. See Appendix A.1 for explanation of growth forms.

# Appendix C
# Fort Benning Plant Species List

FORT BENNING PLANT LIST, FORT BENNING MILITARY RESERVATION, GEORGIA.

NOTE: THIS LIST OF PLANT SPECIES WAS ADAPTED FROM "SPECIES LIST FOR FORT BENNING, DECEMBER 1992" PROVIDED THROUGH THE COURTESY OF ALLEN PURSELL (1993).

ITEM NO. = NUMBER ASSIGNED (1,2,3, ETC.) TO EACH SPECIES IN THE ORDER IN WHICH IT APPEARED IN THE ORIGINAL LIST.
COLL. NO. = COLLECTION NUMBER(S) FOR EACH SPECIES ON THE ORIGINAL LIST.
RAB = PAGE NUMBER IN RADFORD ET AL., 1968.
AN/RAB = ANNOTATIONS WITH RESPECT TO RAB:
n = genus not in RAB
sn = species not in RAB
sy = synonym in RAB
ok = same species as in RAB
AN/SI = ANNOTATIONS WITH RESPECT TO THE ARGONNE PLANT LIST (APPENDIX A.1):
S = species also reported in present study
G = genus reported for present study
n = neither genus nor species reported in the present study

| ITEM NO. | COLL NO. | RAB | AN RAB | AN SI | LATIN NAME | FAMILY |
|---|---|---|---|---|---|---|
| 87 | 428 | ____ | gn | n | Abelia grandiflora | Caprifoliaceae |
| 163 | 666 | 664 | ok | G | Acalypha gracilens | Euphorbiaceae |
| 30 | 400 | 1102 | ok | n | Acanthospermum australe | Asteraceae |
| 9 | 235 | 781 | ok | n | Aegopodium Podagraria | Apiaceae |
| 10 | 298 | 690 | ok | n | Aesculus pavia | Hippocastanaceae |
| 221 | 734 | 690 | sy | S | Aesculus x neglecta | Hippocastanaceae |
| 395 | 637 | 547 | sy | n | Agrimonia microcarpa | Rosaceae |
| 300 | 198 | 112 | ok | n | Agrostis hyemalis | Poaceae |
| 172 | 70 | 574 | ok | n | Albizia julibrissin | Fabaceae |
| 250 | 258 | 314 | ok | n | Allium canadense | Liliaceae |
| 74 | 133 | 366 | ok | n | Alnus serrulata | Betulaceae |
| 5 | 134/ 537 | 422 | ok | n | Alternanthera philoxeroides | Amaranthaceae |
| 173 | 570 | 599 | ok | n | Amorpha fruticosa | Fabaceae |
| 301 | 539 | 163 | ok | G | Andropogon ternarius | Poaceae |
| 302 | 770 | 163 | ok | G | Andropogon virginicus | Poaceae |
| 303 | 735 | 140 | ok | n | Anthaenantia villosa | Poaceae |
| 174 | 243 | 634 | ok | n | Apios americana | Fabaceae |
| 18 | 135 | 847 | ok | S | Apocynum cannabinum | Apocynaceae |
| 24 | 197 | 760 | ok | n | Aralia spinosa | Araliaceae |
| 91 | 701 | 441 | ok | G | Arenaria caroliniana | Caryophyllaceae |
| 92 | 408 | 443 | ok | G | Arenaria lanuginosa | Caryophyllaceae |
| 22 | 517 | 259 | ok | n | Arisaema triphyllum | Araceae |
| 304 | 689 | 98 | ok | n | Aristida tuberculosa | Poaceae |
| 396 | 208 | 558 | sy | n | Aronia arbutifolia | Rosaceae |
| 305 | 398 | 61 | ok | n | Arundo donax | Poaceae |
| 25 | 15 | 852 | ok | S | Asclepias amplexicaulis | Asclepiadaceae |
| 26 | 20 | 850 | ok | S | Asclepias tuberosa | Asclepiadaceae |

| | | | | | | |
|---|---|---|---|---|---|---|
| 27 | 469 | 850 | ok | n | Asclepias verticillata | Asclepiadaceae |
| 29 | 371 | 30 | ok | n | Asplenium platyneuron | Aspleniaceae |
| 31 | 359 | 1082 | ok | n | Aster lateriflorus | Asteraceae |
| 32 | 330/ 373 | 1073 | ok | S | Aster paternus | Asteraceae |
| 422 | 749 | 957 | ok | n | Aureolaria virginica | Scrophulariaceae |
| 306 | 317 | 140 | ok | n | Axonopus affinis | Poaceae |
| 175 | 387 | 582 | ok | n | Baptisia alba | Fabaceae |
| 176 | 331 | 581 | ok | n | Baptisia lanceolata | Fabaceae |
| 435 | 188 | 394 | ok | n | Boehmeria cylindrica | Urticaceae |
| 79 | 232 | 452 | ok | n | Brasenia schreberi | Cabombaceae |
| 307 | 75 | 75 | ok | n | Bromus commutatus | Poaceae |
| 308 | 421 | 75 | ok | n | Bromus japonicus | Poaceae |
| 114 | 695 | 191 | ok | n | Bulbostylis barbata | Cyperaceae |
| 115 | 708 | 190 | ok | n | Bulbostylis capillaris | Cyperaceae |
| 437 | 376 | 894 | ok | S | Callicarpa americana | Verbenaceae |
| 81 | 746 | 1003 | ok | G | Campanula americana | Campanulaceae |
| 75 | 283 | 963 | ok | S | Campsis radicans | Bignoniaceae |
| 86 | 475 | 317 | ok | n | Canna X generalis | Cannaceae |
| 32 | 750 | 1041 | ok | G | Carduus lanceolatus | Asteraceae |
| 116 | 352 | 228 | ok | n | Carex albolutescens | Cyperaceae |
| 117 | 463 | 227 | ok | n | Carex atlantica | Cyperaceae |
| 118 | 296 | 246 | ok | n | Carex complanata | Cyperaceae |
| 119 | 619 | 248 | ok | n | Carex crinita | Cyperaceae |
| 120 | 163B | 244 | ok | n | Carex debilis | Cyperaceae |
| 121 | 628 | 251 | ok | n | Carex folliculata | Cyperaceae |
| 122 | 652 | 248 | ok | n | Carex glaucescens | Cyperaceae |
| 123 | 627 | 254 | ok | n | Carex intumescens | Cyperaceae |
| 124 | 94 | 253 | ok | n | Carex lurida | Cyperaceae |
| 125 | 275b | 234 | ok | n | Carex tenax | Cyperaceae |
| 231 | 21 | 365 | ok | G | Carya tomentosa | Juglandaceae |
| 177 | 488 | 577 | ok | S | Cassia fasciculata | Fabaceae |
| 178 | 786 | 576 | ok | n | Cassia marilandica | Fabaceae |
| 179 | 595 | 576 | ok | n | Cassia obtusifolia | Fabaceae |
| 394 | 309/ 437 | 693 | ok | S | Ceanothus americanus | Rhamnaceae |
| 309 | 448 | 130 | ok | n | Cenchrus incertus | Poaceae |
| 180 | 267 | 635 | ok | n | Centrosema virginianum | Fabaceae |
| 407 | 401 | 979 | ok | n | Cephalanthus occidentalis | Rubiaceae |
| 181 | 550 | 574 | ok | n | Cercis canadensis | Fabaceae |
| 310 | 287 | _____ | gn | n | Chasmanthium latifolium | Poaceae |
| 311 | 524 | _____ | gn | n | Chasmanthium sessiliflorum | Poaceae |
| 153 | 395 | 795 | ok | n | Chimaphila maculata | Ericaceae |
| 312 | 788 | 115 | ok | n | Cinna arundinacea | Poaceae |
| 393 | 394 | 459 | ok | G | Clematis reticulata | Ranunculaceae |
| 98 | 372 | 792 | ok | S | Clethra alnifolia | Clethraceae |
| 182 | 302 | 636 | ok | n | Clitoria mariana | Fabaceae |
| 164 | 55 | 661 | ok | n | Cnidoscolus stimulosus | Euphorbiaceae |
| 99 | 14 | 269 | ok | n | Commelina erecta | Commelinaceae |
| 100 | 305 | 269 | ok | n | Commelina erecta | Commelinaceae |
| 101 | 782 | 269 | ok | n | Commelina virginica | Commelinaceae |
| 34 | 496 | 1127 | ok | n | Coreopsis grandiflora | Asteraceae |
| 35 | 726 | 1124 | ok | S | Coreopsis major | Asteraceae |
| 109 | 190 | 792 | ok | n | Cornus amomum | Cornaceae |
| 110 | 50 | 790 | ok | S | Cornus florida | Cornaceae |
| 397 | 206 | 560 | ok | G | Crataegus flava | Rosaceae |
| 398 | 112 | 562 | ok | G | Crataegus spathulata | Rosaceae |
| 399 | 43 | 560 | ok | n | Crataegus uniflora | Rosaceae |
| 183 | 4 | 585 | sy | n | Crotalaria rotundifolia | Fabaceae |

| | | | | | | |
|---|---|---|---|---|---|---|
| 165 | 715 | 662 | ok | n | Croton glandulosus | Euphorbiaceae |
| 257 | 772 | 741 | ok | n | Cuphea carthagensis | Lythraceae |
| 103 | 252 | 860 | ok | n | Cuscuta campestris | Convolvulaceae |
| 313 | 263 | 116 | ok | S | Cynodon dactylon | Poaceae |
| 126 | 327 | 180 | ok | n | Cyperus filiculmis | Cyperaceae |
| 127 | 441 | 176 | ok | n | Cyperus haspan | Cyperaceae |
| 128 | 510 | 176 | ok | n | Cyperus iria | Cyperaceae |
| 129 | 533A | 172 | ok | n | Cyperus odoratus | Cyperaceae |
| 130 | 512 | 180 | ok | n | Cyperus ovularis | Cyperaceae |
| 131 | 444 | 178 | ok | n | Cyperus pseudovegetus | Cyperaceae |
| 132 | 681 | 178 | ok | n | Cyperus retrofractus | Cyperaceae |
| 133 | 679 | 180 | ok | n | Cyperus retrorsus | Cyperaceae |
| 134 | 451 | 170 | ok | n | Cyperus tenuifolius | Cyperaceae |
| 148 | 135 | 678 | ok | S | Cyrilla racemiflora | Cyrillaceae |
| 314 | 79 | 94 | ok | S | Danthonia sericea | Poaceae |
| 11 | 84 | 771 | ok | n | Daucus pusillus | Apiaceae |
| 184 | 246 | 609 | ok | G | Desmodium ciliare | Fabaceae |
| 185 | 218 | 612 | ok | G | Desmodium fernaldii | Fabaceae |
| 186 | 417 | 611 | ok | G | Desmodium laevigatum | Fabaceae |
| 187 | 531 | 605 | ok | G | Desmodium nudiflorum | Fabaceae |
| 188 | 554 | 608 | ok | G | Desmodium sessilifolium | Fabaceae |
| 189 | 88 | 608 | ok | G | Desmodium tenuifolium | Fabaceae |
| 315 | 728 | 151 | sy | n | Dichanthelium aciculare | Poaceae |
| 316 | 168 | 154 | sy | S | Dichanthelium acuminatum | Poaceae |
| 317 | 690 | 159 | sy | n | Dichanthelium boscii | Poaceae |
| 318 | 158 | 155 | sy | n | Dichanthelium dichotomum | Poaceae |
| 319 | 61 | 151 | sy | S | Dichanthelium laxiflorum | Poaceae |
| 320 | 27 | 154 | sy | n | Dichanthelium oligosanthes | Poaceae |
| 321 | 146 | 153 | sy | S | Dichanthelium ravenellii | Poaceae |
| 322 | 193 | 158 | sy | n | Dichanthelium scabriusculum | Poaceae |
| 323 | 31/<br>725 | 158 | sy | n | Dichanthelium sphaerocarpon | Poaceae |
| 324 | 528 | 158 | sy | n | Dichanthelium sphaerocarpon | Poaceae |
| 325 | 260 | 138 | ok | G | Digitaria sanguinalis | Poaceae |
| 408 | 358 | 979 | ok | n | Diodia teres | Rubiaceae |
| 409 | 12B | 979 | ok | n | Diodia virginiana | Rubiaceae |
| 149 | 157 | 318 | ok | n | Dioscorea villosa | Dioscoreaceae |
| 152 | 60 | 826 | ok | S | Diospyros virginiana | Ebenaceae |
| 151 | 160 | 517 | ok | n | Drosera rotundifolia | Droseraceae |
| 135 | 654B | 180 | ok | n | Dulichium arundinaceum | Cyperaceae |
| 326 | 790 | 132 | ok | n | Echinochloa crusgalli | Poaceae |
| 137 | 320 | 184 | ok | n | Eleocharis  obtusa | Cyperaceae |
| 136 | 378 | 188 | ok | n | Eleocharis montevidensis | Cyperaceae |
| 138 | 159 | 188 | ok | n | Eleocharis tuberculosa | Cyperaceae |
| 36 | 603 | 1048 | ok | n | Elephantopus tomentosus | Asteraceae |
| 327 | 643 | 116 | ok | n | Eleusine indica | Poaceae |
| 328 | 568 | 89 | ok | n | Elymus virginicus | Poaceae |
| 329 | 291 | 70 | ok | S | Eragrostis curvula | Poaceae |
| 330 | 787 | 70 | ok | n | Eragrostis pilosa | Poaceae |
| 331 | 646 | 71 | ok | n | Eragrostis refracta | Poaceae |
| 332 | 100 | 166 | ok | n | Eremochloa ophiuroides | Poaceae |
| 333 | 507 | 161 | ok | n | Erianthus contortus | Poaceae |
| 37 | 613 | 1070 | ok | n | Erigeron canadensis | Asteraceae |
| 38 | 77 | 1068 | ok | S | Erigeron strigosus | Asteraceae |
| 381 | 651 | 402 | ok | n | Eriogonum tomentosum | Polygonaceae |
| 12 | 485 | 768 | ok | n | Eryngium prostratum | Apiaceae |
| 13 | 34 | 768 | ok | S | Eryngium Yuccifolium | Apiaceae |
| 39 | 729 | 1056 | ok | G | Eupatorium album | Asteraceae |
| 40 | 473A | 1061 | ok | G | Eupatorium coelestinum | Asteraceae |

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| 41 | 611 | 1058 | ok | G | Eupatorium hyssopifolium | Asteraceae |
| 166 | 107/ 671 | 672 | ok | S | Euphorbia corollata | Euphorbiaceae |
| 167 | 478 | 670 | ok | G | Euphorbia dentata | Euphorbiaceae |
| 168 | 719 | 674 | ok | S | Euphorbia maculata | Euphorbiaceae |
| 211 | 692 | 370 | ok | n | Fagus grandifolia | Fagaceae |
| 334 | 420 | 84 | ok | G | Festuca elatior | Poaceae |
| 335 | 294 | 84 | ok | n | Festuca paradoxa | Poaceae |
| 400 | 338 | 533 | ok | n | Fragaria vesca | Rosaceae |
| 139 | 501 | 193 | ok | n | Fimbristylis miliacea | Cyperaceae |
| 6 | 677 | 427 | ok | G | Froelichia gracilis | Amaranthaceae |
| 140 | 686 | 201 | ok | n | Fuirena squarrosa | Cyperaceae |
| 42 | 683 | 1132 | ok | n | Gaillardia aestivalis | Asteraceae |
| 410 | 392 | 986 | ok | n | Galium pilosum | Rubiaceae |
| 411 | 217 | 986 | ok | n | Galium pilosum | Rubiaceae |
| 412 | 136 | 987 | ok | n | Galium tinctorium | Rubiaceae |
| 273 | 732 | 754 | ok | n | Gaura filipes | Onagraceae |
| 218 | 337 | 651 | ok | n | Geranium carolinianum | Geraniaceae |
| 229 | 110 | 327 | ok | n | Gladiolus X gandavensis | Iridaceae |
| 43 | 612 | 1066 | ok | S | Gnaphalium obtusifolium | Asteraceae |
| 44 | 397 | 1066 | ok | G | Gnaphalium purpureum | Asteraceae |
| 282 | 618 | 339 | ok | n | Habenaria ciliaris | Orchidaceae |
| 283 | 618 | 340 | ok | n | Habenaria cristata | Orchidaceae |
| 284 | 625 | 337 | ok | n | Habenaria flava | Orchidaceae |
| 285 | 114 | 335 | ok | n | Habenaria lacera | Orchidaceae |
| 434 | 538 | 827 | ok | n | Halesia diptera | Styracaceae |
| 413 | 381 | 981 | sn | n | Hedyotis nigricans | Rubiaceae |
| 414 | 297 | 981 | sn | n | Hedyotis purpurea | Rubiaceae |
| 45 | 379 | 1133 | ok | S | Helenium amarum | Asteraceae |
| 46 | 556 | 1132 | ok | G | Helenium flexuosum | Asteraceae |
| 97 | 733 | 720 | ok | S | Helianthemum rosmarinifolium | Cistaceae |
| 47 | 470 | 1115 | ok | G | Helianthus hirsutus | Asteraceae |
| 48 | 724 | 1115 | ok | G | Helianthus microcephalus | Asteraceae |
| 49 | 757 | 1116 | sy | G | Helianthus resinosus | Asteraceae |
| 50 | 203 | 1106 | ok | n | Heliopsis helianthoides | Asteraceae |
| 76 | 780 | 879 | ok | n | Heliotropium indicum | Boraginaceae |
| 51 | 607 | 1099 | ok | G | Heterotheca graminifolia | Asteraceae |
| 52 | 756 | 1101 | ok | G | Heterotheca subaxillaris | Asteraceae |
| 263 | 617 | 706 | ok | n | Hibiscus aculeatus | Malvaceae |
| 336 | 166 | 87 | ok | n | Hordeum pusillum | Poaceae |
| 14 | 238 | 765 | ok | n | Hydrocotyle verticillata | Apiaceae |
| 222 | 438 | 715 | ok | G | Hypericum gentianoides | Hippocastanaceae |
| 223 | 439 | 715 | ok | G | Hypericum gymnanthum | Hypericaceae |
| 224 | 78 | 710 | ok | S | Hypericum hypericoides | Hypericaceae |
| 225 | 584 | 715 | ok | G | Hypericum mutilum | Hypericaceae |
| 226 | 487 | 712 | ok | G | Hypericum prolificum | Hypericaceae |
| 227 | 325 | 716 | ok | G | Hypericum punctatum | Hypericaceae |
| 228 | 615 | 711 | ok | G | Hypericum stans | Hypericaceae |
| 53 | 211 | 1030 | ok | n | Hypochoeris glabra | Asteraceae |
| 150 | 687 | 323 | ok | n | Hypoxis sessilis | Dioscoreaceae |
| 241 | 781 | 898 | sn | n | Hyptis mutabilis | Lamiaceae |
| 20 | 30A | 684 | ok | S | Ilex glabra | Aquifoliaceae |
| 21 | 17 | 681 | ok | G | Ilex opaca | Aquifoliaceae |
| 190 | 409 | 624 | sn | n | Indigofera suffruticosae | Fabaceae |
| 104 | 344 | 866 | ok | G | Ipomoea coccinea | Convolvulaceae |
| 105 | 220 | 868 | ok | S | Ipomoea pandurata | Convolvulaceae |
| 106 | 341 | 866 | ok | G | Ipomoea purpurea | Convolvulaceae |
| 107 | 462 | 868 | ok | G | Ipomoea trichocarpa | Convolvulaceae |
| 420 | 319 | 519 | ok | n | Itea virginica | Saxifragaceae |

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| 108 | 583 | 863 | ok | n | Jacquemontia tamnifolia | Convolvulaceae |
| 232 | 164/ 169 | 280 | ok | G | Juncus acuminatus | Juncaceae |
| 233 | 459 | 276 | ok | S | Juncus biflorus | Juncaceae |
| 234 | 589 | 275 | ok | G | Juncus bufonius | Juncaceae |
| 235 | 125 | 275 | ok | G | Juncus coriaceus | Juncaceae |
| 236 | 150 | 280 | ok | S | Juncus debilis | Juncaceae |
| 237 | 127 | 280 | ok | G | Juncus elliottii | Juncaceae |
| 238 | 63 | 278 | ok | G | Juncus scirpoides | Juncaceae |
| 239 | 509 | 275 | ok | G | Juncus tenuis | Juncaceae |
| 240 | 653 | 276 | ok | G | Juncus trigonocarpus | Juncaceae |
| 113 | 557 | 43 | ok | n | Juniperus virginiana | Cupressaceae |
| 154 | 374 | 803 | ok | n | Kalmia latifolia | Ericaceae |
| 54 | 41 | 1031 | sn | G | Krigia occidentalis | Asteraceae |
| 162 | 128 | 267 | ok | n | Lachnocaulon anceps | Eriocaulaceae |
| 55 | 578 | 1022 | ok | n | Lactuca canadensis | Asteraceae |
| 56 | 265 | 1022 | ok | n | Lactuca graminifolia | Asteraceae |
| 258 | 702 | ____ | gn | n | Lagerstroemia indica | Lythraceae |
| 337 | 492 | 123 | ok | n | Leersia virginica | Poaceae |
| 77 | 85 | 494 | ok | n | Lepidium virginicum | Brassicaceae |
| 338 | 261 | 140 | ok | n | Leptoloma cognatum | Poaceae |
| 191 | 328 | 616 | ok | S | Lespedeza bicolor | Fabaceae |
| 192 | 95 | 617 | ok | S | Lespedeza cuneata | Fabaceae |
| 193 | 367/ 482 | 615 | ok | G | Lespedeza procumbens | Fabaceae |
| 194 | 177 | 616 | ok | G | Lespedeza repens | Fabaceae |
| 155 | 447 | 808 | ok | n | Leucothoe axillaris | Ericaceae |
| 57 | 706 | 1051 | ok | n | Liatris elegans | Asteraceae |
| 58 | 525 | 1051 | ok | n | Liatris squarrosa | Asteraceae |
| 272 | 449 | 832 | ok | n | Ligustrum sinense | Oleaceae |
| 251 | 626 | 311 | ok | n | Lilium michauxii | Liliaceae |
| 423 | 505 | 942 | ok | n | Lindernia anagallidea | Scrophulariaceae |
| 254 | 71 | 645 | ok | G | Linum striatum | Linaceae |
| 220 | 276 | 529 | ok | S | Liquidambar styraciflua | Haloragaceae |
| 260 | 172 | 473 | ok | n | Liriodendron tulipifera | Magnoliaceae |
| 82 | 669 | 1007 | ok | n | Lobelia puberula | Campanulaceae |
| 339 | 104 | 85 | ok | S | Lolium multiflorum | Poaceae |
| 88 | 503 | 990 | ok | G | Lonicera japonica | Caprifoliaceae |
| 274 | 471 | 747 | ok | n | Ludwigia alternifolia | Onagraceae |
| 275 | 553 | 745 | ok | n | Ludwigia decurrens | Onagraceae |
| 276 | 586 | 745 | ok | n | Ludwigia leptocarpa | Onagraceae |
| 277 | 769 | 747 | ok | n | Ludwigia linearis | Onagraceae |
| 278 | 199 | 745 | ok | n | Ludwigia virgata | Onagraceae |
| 421 | 775 | 14 | ok | n | Lygodium japonicum | Schizaeaceae |
| 156 | 37 | 806 | ok | n | Lyonia lucida | Ericaceae |
| 391 | 239 | 821 | ok | n | Lysimachia lanceolata | Primulaceae |
| 259 | 576 | 740 | ok | n | Lythrum lineare | Lythraceae |
| 261 | 450 | 473 | ok | n | Magnolia grandiflora | Magnoliaceae |
| 262 | 46 | 473 | ok | n | Magnolia virginiana | Magnoliaceae |
| 286 | 416 | 351 | ok | n | Malaxis unifolia | Orchidaceae |
| 266 | 456 | 262 | ok | n | Mayaca fluviatilis | Mayacaceae |
| 424 | 774 | 938 | ok | n | Mecardonia acuminata | Scrophulariaceae |
| 252 | 622 | 305 | ok | n | Melanthium hybridum | Liliaceae |
| 340 | 490 | 79 | ok | n | Melica mutica | Poaceae |
| 195 | 577 | 593 | ok | n | Melilotus alba | Fabaceae |
| 112 | 747 | 1001 | ok | n | Melothria pendula | Cucurbitaceae |
| 425 | 175 | 943 | ok | n | Micranthemum umbrosum | Scrophulariaceae |
| 59 | 808 | 1061 | ok | n | Mikania scandens | Asteraceae |
| 415 | 697 | 981 | ok | n | Mitchella repens | Rubiaceae |

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| 242 | 753 | 914 | ok | n | Monarda punctata | Lamiaceae |
| 268 | 47-B | 362 | ok | S | Myrica cerifera | Myricaceae |
| 269 | 30B | 362 | ok | G | Myrica heterophylla | Myricaceae |
| 219 | 225 | 758 | sn | n | Myriophyllum aquaticum | Haloragaceae |
| 270 | 231 | 451 | ok | n | Nelumbo lutea | Nelumbonaceae |
| 271 | 154 | 789 | ok | S | Nyssa sylvatica | Nyssaceae |
| 279 | 540 | 750 | ok | G | Oenothera biennis | Onagraceae |
| 280 | 435 | 752 | ok | G | Oenothera fruticosa | Onagraceae |
| 281 | 80 | 750 | ok | S | Oenothera laciniata | Onagraceae |
| 28 | 237 | 28 | ok | n | Onoclea sensibilis | Aspidiaceae |
| 80 | 1 | 735 | ok | S | Opuntia compressa | Cactaceae |
| 288 | 126 | 14 | ok | n | Osmunda regalis | Osmundaceae |
| 341 | 751 | 145 | ok | G | Panicum amarum | Poaceae |
| 342 | 404B | 144 | ok | G | Panicum anceps | Poaceae |
| 343 | 176 | 158 | ok | G | Panicum scoparium | Poaceae |
| 344 | 789 | 145 | ok | G | Panicum stipitatum | Poaceae |
| 345 | 768 | 146 | ok | G | Panicum verrucosum | Poaceae |
| 346 | 795 | 145 | ok | G | Panicum virgatum | Poaceae |
| 93 | 597 | 435 | ok | n | Paronychia herniarioides | Caryophyllaceae |
| 442 | 210 | 694 | ok | n | Parthenocissus quinquefolia | Vitaceae |
| 347 | 758 | 134 | ok | G | Paspalum boscianum | Poaceae |
| 348 | 316 | 135 | sy | G | Paspalum ciliatifolium | Poaceae |
| 349 | 614 | 136 | sy | G | Paspalum longipilum | Poaceae |
| 350 | 802 | 136 | ok | G | Paspalum praecox | Poaceae |
| 351 | 391 | 134 | ok | S | Paspalum urvillei | Poaceae |
| 289 | 245 | 734 | ok | S | Passiflora incarnata | Passifloraceae |
| 23 | 191 | 257 | ok | n | Peltandra virginica | Araceae |
| 426 | 53 | 947 | ok | n | Penstemon australis | Scrophulariaceae |
| 111 | 745 | 516 | ok | n | Penthorum sedoides | Crassulaceae |
| 369 | 119 | 872 | ok | G | Phlox carolina | Polemoniaceae |
| 370 | 722 | 869 | ok | S | Phlox nivalis | Polemoniaceae |
| 371 | 118 | 870 | ok | G | Phlox pilosa | Polemoniaceae |
| 372 | 117 | 870 | ok | n | Phlox subulata | Polemoniaceae |
| 352 | 287 | 60 | ok | n | Phyllostachys aurea | Poaceae |
| 430 | 716 | 929 | ok | n | Physalis angulata | Solanaceae |
| 431 | 249 | 929 | ok | n | Physalis pubescens | Solanaceae |
| 290 | 285 | 429 | ok | S | Phytolacca americana | Phytolaccaceae |
| 291 | 571 | 38 | ok | G | Pinus echinata | Pinaceae |
| 292 | 805 | 38 | ok | S | Pinus glabra | Pinaceae |
| 293 | 599 | 36 | ok | S | Pinus palustris | Pinaceae |
| 294 | 600 | 36 | ok | S | Pinus taeda | Pinaceae |
| 295 | 318 | 977 | ok | S | Plantago aristata | Plantaginaceae |
| 296 | 111 | 977 | ok | G | Plantago hookeriana | Plantaginaceae |
| 297 | 103 | 975 | ok | G | Plantago lanceolata | Plantaginaceae |
| 298 | 106 | 974 | sn | G | Plantago wrightiana | Plantaginaceae |
| 299 | 284 | 531 | ok | S | Platanus occidentalis | Plantanaceae |
| 373 | 364 | 658 | ok | G | Polygala curtissii | Polygalaceae |
| 374 | 429 | 656 | ok | G | Polygala grandiflora | Polygalaceae |
| 375 | 434 | 658 | ok | G | Polygala incarnata | Polygalaceae |
| 376 | 192 | 658 | ok | G | Polygala lutea | Polygalaceae |
| 377 | 180 | 657 | ok | G | Polygala mariana | Polygalaceae |
| 378 | 122 | 660 | ok | S | Polygala nana | Polygalaceae |
| 379 | 2 | 656 | ok | S | Polygala polygama | Polygalaceae |
| 380 | 516 | 658 | ok | G | Polygala verticillata | Polygalaceae |
| 382 | 703 | 414 | sn | n | Polygonella fimbriata | Polygonaceae |
| 383 | 178 | 412 | ok | n | Polygonum hydropiperoides | Polygonaceae |
| 384 | 299 | 412 | ok | n | Polygonum hydropiperoides | Polygonaceae |
| 385 | 170 | 410 | ok | n | Polygonum persicaria | Polygonaceae |
| 386 | 585 | 412 | ok | n | Polygonum setaceum | Polygonaceae |

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| 387 | 779 | 406 | sn | n | Polygonum virginianum | Polygonaceae |
| 389 | 696 | 33 | ok | n | Polypodium polypodioides | Polypodiaceae |
| 255 | 370 | 835 | ok | n | Polypremum procumbens | Loganiaceae |
| 390 | 223 | 46 | ok | n | Potamogeton diversifolius | Potamogetonaceae |
| 243 | 526 | 905 | ok | n | Prunella vulgaris | Lamiaceae |
| 401 | 98 | 566 | ok | S | Prunus angustifolia | Rosaceae |
| 402 | 212 | 569 | ok | S | Prunus serotina | Rosaceae |
| 403 | 207 | 566 | ok | G | Prunus umbellata | Rosaceae |
| 196 | 241 | 600 | ok | n | Psoralea psoralioides | Fabaceae |
| 392 | 23 | 18 | ok | S | Pteridium aquilinum | Pteridaceae |
| 15 | 460 | 784 | ok | n | Ptilimnium capillaceum | Apiaceae |
| 197 | 806 | 641 | ok | n | Pueraria lobata | Fabaceae |
| 244 | 630 | 919 | ok | n | Pycnanthemum incanum | Lamiaceae |
| 60 | 472B/ 543 | 1032 | ok | S | Pyrrhopappus carolinianus | Asteraceae |
| 212 | 675 | 380 | ok | G | Quercus laevis | Fagaceae |
| 213 | 280 | 381 | ok | S | Quercus marilandica | Fagaceae |
| 214 | 67 | 382 | ok | S | Quercus nigra | Fagaceae |
| 215 | 251 | 385 | ok | G | Quercus phellos | Fagaceae |
| 216 | 555 | 378 | ok | G | Quercus shumardii | Fagaceae |
| 267 | 461 | 743 | ok | n | Rhexia mariana | Melastomataceae |
| 7 | 179 | 678 | ok | S | Rhus copallina | Anacardiaceae |
| 8 | 89 | 676 | ok | G | Rhus toxicodendron | Anacardiaceae |
| 198 | 8 | 636 | ok | G | Rhynchosia reniformis | Fabaceae |
| 199 | 355 | 638 | ok | G | Rhynchosia tomentosa | Fabaceae |
| 141 | 764 | 204 | ok | n | Rhynchospora corniculata | Cyperaceae |
| 142 | 594 | 208 | ok | n | Rhynchospora glomerata | Cyperaceae |
| 143 | 194 | 212 | ok | n | Rhynchospora inexpansa | Cyperaceae |
| 416 | 455 | 981 | ok | n | Richardia brasiliensis | Rubiaceae |
| 446 | 546 | 981 | ok | n | Richardia scabra | Rubiaceae |
| 200 | 109 | 621 | ok | G | Robinia pseudoacacia | Fabaceae |
| 404 | 82 | 551 | ok | G | Rosa bracteata | Rosaceae |
| 405 | 113 | 552 | ok | S | Rosa carolina | Rosaceae |
| 406 | 108 | 540 | ok | G | Rubus betulifolius | Rubiaceae |
| 61 | 624 | 1108 | ok | n | Rudbeckia fulgida | Asteraceae |
| 62 | 365 | 1109 | ok | n | Rudbeckia hirta | Asteraceae |
| 1 | 301 | 973 | ok | n | Ruellia caroliniensis | Acanthaceae |
| 2 | 519 | 972 | ok | n | Ruellia humilis | Acanthaceae |
| 388 | 354 | 405 | ok | G | Rumex hastatulus | Polygonaceae |
| 217 | 564 | 838 | ok | n | Sabatia angularis | Fagaceae |
| 353 | 598 | 141 | ok | n | Sacciolepis striata | Poaceae |
| 4 | 402 | 54 | ok | n | Sagittaria latifolia | Alismataceae |
| 418 | 250 | 358 | ok | S | Salix nigra | Salicaceae |
| 89 | 369 | 996 | ok | n | Sambucus canadensis | Caprifoliaceae |
| 16 | 536 | 767 | ok | n | Sanicula canadensis | Apiaceae |
| 248 | 458 | 478 | ok | S | Sassafras albidum | Lauraceae |
| 419 | 121 | 356 | ok | n | Saururus cernuus | Saururaceae |
| 201 | 766 | 574 | ok | S | Schrankia microphylla | Fabaceae |
| 144 | 590/ 761 | 198 | ok | n | Scirpus cyperinus | Cyperaceae |
| 145 | 58 | 216 | ok | n | Scleria ciliata | Cyperaceae |
| 146 | 521 | 215 | ok | n | Scleria oligantha | Cyperaceae |
| 147 | 730 | 215 | ok | n | Scleria triglomerata | Cyperaceae |
| 245 | 146 | 902 | ok | n | Scutellaria elliptica | Lamiaceae |
| 169 | 311 | 667 | sy | n | Sebastiana fruticosa | Euphorbiaceae |
| 354 | 333 | 86 | ok | S | Secale cereale | Poaceae |
| 429 | 704 | 7 | ok | n | Selaginella arenicola | Selaginellaceae |
| 63 | 101 | 1037 | sy | S | Senecio anonymus | Asteraceae |
| 202 | 688 | 619 | sn | n | Sesbania vesicaria | Fabaceae |

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| 355 | 549 | 126 | ok | n | Setaria geniculata | Poaceae |
| 356 | 403 | 126 | ok | n | Setaria glauca | Poaceae |
| 427 | 771 | 956 | ok | n | Seymeria pectinata | Scrophulariaceae |
| 264 | 566 | 703 | ok | n | Sida elliottii | Malvaceae |
| 265 | 498 | 702 | ok | n | Sida rhombifolia | Malvaceae |
| 94 | 24 | 448 | ok | G | Silene antirrhina | Caryophyllaceae |
| 95 | 560 | 447 | ok | G | Silene stellata | Caryophyllaceae |
| 64 | 727 | 1105 | ok | G | Silphium asteriscus | Asteraceae |
| 65 | 57/ 676 | 1103 | ok | S | Silphium compositum | Asteraceae |
| 66 | 362 | 1103 | ok | S | Silphium dentatum | Asteraceae |
| 230 | 97 | 326 | sy | n | Sisyrinchium atlanticum | Iridaceae |
| 253 | 45 | 287 | ok | G | Smilax smallii | Liliaceae |
| 432 | 324 | 932 | ok | S | Solanum carolinense | Solanaceae |
| 67 | 777 | 1091 | ok | n | Solidago juncea | Asteraceae |
| 68 | 124 | 1092 | ok | n | Solidago nemoralis | Asteraceae |
| 69 | 545 | 1092 | ok | n | Solidago odora | Asteraceae |
| 70 | 579 | 1023 | ok | n | Sonchus asper | Asteraceae |
| 357 | 794 | 165 | ok | n | Sorghastrum nutans | Poaceae |
| 358 | 513 | 165 | ok | n | Sorghum halepense | Poaceae |
| 359 | 638 | 165 | ok | n | Sorghum vulgare | Poaceae |
| 433 | 446 | 44 | ok | n | Sparganium americanum | Sparganiaceae |
| 83 | 504 | 1002 | ok | S | Specularia biflora | Campanulaceae |
| 84 | 9 | 1002 | ok | S | Specularia perfoliata | Campanulaceae |
| 360 | 572 | 93 | ok | n | Sphenopholis filiformis | Poaceae |
| 361 | 293 | 93 | ok | n | Sphenopholis nitida | Poaceae |
| 256 | 759 | 833 | ok | S | Spigelia marilandica | Loganiaceae |
| 287 | 396 | 349 | ok | n | Spiranthes praecox | Orchidaceae |
| 362 | 405 | 105 | ok | n | Sporobolus poiretii | Poaceae |
| 170 | 40 | 667 | ok | S | Stillingia sylvatica | Euphorbiaceae |
| 363 | 563 | 97 | ok | n | Stipa avenacea | Poaceae |
| 96 | 13 | 436 | ok | n | Stipulicida setacea | Caryophyllaceae |
| 203 | 522 | 640 | ok | n | Strophostyles umbellata | Fabaceae |
| 204 | 132 | 604 | ok | S | Stylosanthes biflora | Fabaceae |
| 205 | 216 | 626 | ok | G | Tephrosia spicata | Fabaceae |
| 206 | 69 | 624 | ok | S | Tephrosia virginiana | Fabaceae |
| 71 | 214 | 1106 | ok | n | Tetragonotheca helianthoides | Asteraceae |
| 246 | 529 | 898 | ok | n | Teucrium canadense | Lamiaceae |
| 19 | 289 | 845 | ok | S | Trachelospermum difforme | Apocynaceae |
| 102 | 532 | 271 | ok | G | Tradescantia rosea | Commelinaceae |
| 171 | 466 | 665 | ok | n | Tragia urens | Euphorbiaceae |
| 17 | 534 | 773 | ok | n | Trepocarpus aethusae | Apiaceae |
| 247 | 116A | 898 | ok | n | Trichostema dichotomum | Lamiaceae |
| 364 | 765 | 64 | ok | n | Tridens flavus | Poaceae |
| 207 | 313 | 590 | ok | n | Trifolium incarnatum | Fabaceae |
| 208 | 304 | 592 | ok | n | Trifolium reflexum | Fabaceae |
| 365 | 295 | 166 | ok | n | Tripsacum dactyloides | Poaceae |
| 366 | 741 | 66 | ok | n | Uniola latifolia | Poaceae |
| 367 | 476 | 66 | ok | n | Uniola sessiliflora | Poaceae |
| 249 | 413 | 969 | ok | n | Utricularia cornuta | Lentibulariaceae |
| 157 | 141 | 814 | ok | S | Vaccinium arboreum | Ericaceae |
| 158 | 16 | 816 | ok | G | Vaccinium corymbosum | Ericaceae |
| 159 | 18 | 814 | ok | S | Vaccinium elliottii | Ericaceae |
| 160 | 26 | 816 | ok | G | Vaccinium myrsinites | Ericaceae |
| 161 | 39 | 814 | ok | S | Vaccinium stamineum | Ericaceae |
| 436 | 335 | 997 | ok | n | Valerianella radiata | Valerianaceae |
| 428 | 389 | 945 | ok | n | Verbascum thapsus | Scrophulariaceae |
| 438 | 247 | 888 | ok | G | Verbena bonariensis | Verbenaceae |
| 439 | 11 | 890 | ok | G | Verbena carnea | Verbenaceae |

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| 440 | 383 | 891 | ok | G | Verbena rigida | Verbenaceae |
| 441 | 514 | 889 | ok | n | Verbena urticifolia | Verbenaceae |
| 72 | 752 | 1118 | ok | n | Verbesina virginica | Asteraceae |
| 73 | 520 | 1047 | ok | S | Vernonia angustifolia | Asteraceae |
| 90 | 464 | 993 | ok | G | Viburnum nudum | Caprifoliaceae |
| 443 | 96 | 695 | ok | S | Vitis rotundifolia | Vitaceae |
| 368 | 187 | 82 | sy | n | Vulpia octoflora | Poaceae |
| 85 | 426 | 1004 | ok | n | Wahlenbergia marginata | Campanulaceae |
| 78 | 685 | 511 | ok | n | Warea cuneifolia | Brassicaceae |
| 209 | 230 | 620 | ok | G | Wisteria sinensis | Fabaceae |
| 444 | 674 | 263 | ok | n | Xyris fimbriata | Xyridaceae |
| 445 | 500 | 265 | ok | n | Xyris jupicai | Xyridaceae |
| 3 | 10 | 299 | ok | S | Yucca filamentosa | Liliaceae |
| 210 | 410 | 602 | ok | n | Zornia bracteata | Fabaceae |

# Appendix D
# Vascular Plant Species for Muscogee and Chattahoochee Counties, Georgia, from Jones and Coile 1998

VASCULAR PLANT SPECIES INDICATED FOR MUSCOGEE AND CHATTAHOOCHEE COUNTIES, GEORGIA FROM JONES AND COILE (1988).

ITEM = NUMBER ASSIGNED (1, 2, 3, ETC.) TO EACH SPECIES IN THE ORDER IN WHICH IT APPEARED IN JONES AND COILE (1988).
PAGE = THE PAGE NUMBER IN WHICH THE SPECIES DISTRIBUTION IS SHOWN IN JONES AND COILE (1988).
MC = MUSCOGEE COUNTY: Y-INDICATED FOR COUNTY, N-NOT INDICATED FOR COUNTY
CC = CHATTAHOOCHEE COUNTY: Y-INDICATED FOR COUNTY, N-NOT INDICATED FOR COUNTY.
FB = IN REFERENCE TO THE FORT BENNING PLANT LIST (APPENDIX C): Y-ON LIST, N-NOT ON LIST.
SI = IN REFERENCE TO THE ARGONNE PLANT LIST (APPENDIX A.1): Y-ON LIST, N-NOT ON LIST.

| ITEM NO. | PAGE NO. | MC, a | CC, a | FB | SI | LATIN NAME | FAMILY |
|---|---|---|---|---|---|---|---|
| 163 | 173 | N | Y | N | N | Aconitum uncinatum | Ranunculaceae |
| 126 | 144 | Y | N | Y | N | Aesculus pavia | Hippocastanaceae |
| 127 | 144 | Y | N | Y | Y | Aesculus pavia X A. sylvatica | Hippocastanaceae |
| 26 | 30 | Y | N | N | N | Agrostis elliottiana | Poaceae (B) |
| 183 | 206 | Y | N | N | N | Ampelopsis arborea | Vitaceae |
| 65 | 87 | Y | N | N | N | Anthemis arvensis | Asteraceae (B) |
| 63 | 82 | Y | N | N | N | Arenaria uniflora | Caryophyllaceae |
| 48 | 71 | Y | N | N | N | Aristolochia serpentaria | Aristolochiacea |
| 50 | 72 | Y | N | N | N | Ascepias variegata | Asclepiadaceae |
| 49 | 72 | Y | N | Y | Y | Asclepias tuberosa | Asclepiadaceae |
| 123 | 141 | Y | N | N | N | Ascyrum hypericoides | Hypericaceae |
| 47 | 69 | Y | N | N | N | Asimina triloba | Annonaceae |
| 1 | 1 | ? Y | ? N | Y | N | Asplenium platyneuron | Aspleniaceae (A) |
| 66 | 90 | Y | N | N | N | Aster tortifolius | Asteraceae (B) |
| 2 | 2 | ? Y | ? N | N | N | Athyrium filix-femina (C) | Aspidiaceae (A) |
| 104 | 126 | N | Y | N | N | Baptisia lactea | Fabaceae |
| 51 | 75 | Y | N | N | N | Bignonia capreolata | Bignoniaceae |
| 55 | 76 | Y | N | Y | N | Brasenia schreberi | Cabombaceae (B) |
| 178 | 202 | Y | Y | Y | Y | Callicarpa americana | Verbenaceae |
| 52 | 75 | Y | N | Y | Y | Campsis radicans | Bignoniaceae |
| 20 | 21 | Y | N | N | N | Cyperus strigosus | Cyperaceae |
| 18 | 18 | Y | N | Y | N | Carex tenax | Cyperaceae |
| 56 | 77 | Y | Y | Y | Y | Cassia fasciculata | Fabaceae (B) |
| 57 | 77 | Y | N | Y | N | Cassia obtusifolia | Fabaceae (B) |
| 58 | 77 | Y | N | N | N | Cassia occidentalis | Fabaceae (B) |
| 167 | 182 | Y | N | Y | N | Cephalanthus occidentalis | Rubiaceae |
| 145 | 160 | Y | N | N | N | Chionanthus virginicus | Oleaceae |
| 67 | 93 | Y | N | N | N | Chrysopsis gossypina | Asteraceae (B) |
| 68 | 93 | Y | N | N | N | Chrysopsis mariana | Asteraceae (B) |
| 179 | 203 | Y | N | N | N | Clerodendron indicum | Verbenaceae |
| 105 | 126 | Y | N | Y | N | Clitoria mariana | Fabaceae |
| 141 | 158 | Y | N | N | N | Cocculus carolinus | Menispermaceae |
| 15 | 12 | Y | N | N | N | Commelina communis | Commelinaceae |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 69 | 94 | Y | N | N | N | Coreopsis lanceolata | Asteraceae (B) |
| 70 | 94 | Y | N | Y | Y | Coreopsis major | Asteraceae (B) |
| 95 | 112 | N | Y | Y | Y | Cornus florida | Cornaceae |
| 17 | 13 | Y | N | N | N | Croomia pauciflora | Croomiaceae |
| 106 | 127 | Y | N | Y | N | Crotalaria rotundifolia | Fabaceae |
| 101 | 122 | Y | N | N | N | Crotonopsis elliptica | Euphorbiaceae |
| 19 | 20 | Y | N | N | N | Cyperus grantiophilus | Cyperaceae |
| 97 | 116 | Y | Y | Y | Y | Cyrilla racemiflora | Cyrillaceae |
| 107 | 127 | N | Y | N | N | Dalea carnea | Fabaceae |
| 175 | 194 | Y | N | N | N | Datura stramonium | Solanaceae |
| 108 | 127 | Y | N | N | N | Daubentonia punicea | Fabaceae |
| 164 | 174 | Y | N | N | N | Delphinium carolinianum | Ranunculaceae |
| 96 | 112 | Y | N | N | N | Diamorpha smallii | Cornaceae |
| 98 | 117 | Y | N | N | N | Drosera capillaris | Droseraceae |
| 21 | 22 | Y | N | Y | N | Dulichium arundinaceum | Cyperaceae |
| 27 | 37 | Y | N | Y | N | Eragrostis pilosa | Poaceae (B) |
| 159 | 169 | N | Y | Y | N | Eriogonum tomentosum | Polygonaceae |
| 71 | 96 | Y | N | N | N | Eupatorium fistulosum | Asteraceae (B) |
| 72 | 96 | Y | N | N | N | Eupatorium incarnatum | Asteraceae (B) |
| 102 | 123 | Y | N | Y | Y | Euphorbia corollata | Euphorbiaceae |
| 22 | 23 | Y | N | N | N | Fimbristylis annua | Cyperaceae |
| 44 | 68 | Y | N | N | Y | Froelichia floridana | Amaranthaceae |
| 73 | 97 | Y | N | Y | N | Gaillardia aestivalis | Asteraceae (B) |
| 146 | 162 | N | Y | Y | N | Gaura filipes | Onagraceae |
| 134 | 154 | Y | N | N | N | Gelsemium sempervirens | Loganiaceae |
| 122 | 140 | Y | N | N | N | Geranium maculatum | Geraniaceae |
| 74 | 98 | Y | N | N | N | Gnaphalium helleri | Asteraceae (B) |
| 129 | 147 | Y | N | N | N | Hedeoma hispidum | Lamiaceae (B) |
| 75 | 98 | Y | N | Y | Y | Helenium amarum | Asteraceae (B) |
| 53 | 75 | Y | N | Y | N | Heliotropium indicum | Boraginaceae |
| 137 | 156 | Y | N | N | N | Hibiscus moscheutos | Malvaceae |
| 124 | 142 | Y | N | Y | N | Hypericum mutilum | Hypericaceae |
| 33 | 55 | Y | N | N | N | Hypoxis hirsuta | Liliaceae |
| 92 | 111 | Y | N | N | Y | Ipomoea hederacea | Convolvulaceae |
| 93 | 111 | Y | N | N | N | Ipomoea lacunosa | Convolvulaceae |
| 29 | 50 | Y | N | N | N | Iris virginica | Iridaceae |
| 170 | 188 | Y | N | Y | N | Itea virginica | Saxifragaceae |
| 30 | 51 | Y | N | N | Y | Juncus georgianus | Juncaeae |
| 31 | 51 | Y | N | N | N | Juncus polycephalus | Juncaeae |
| 32 | 51 | Y | N | N | N | Juncus repens | Juncaeae |
| 76 | 101 | Y | N | N | N | Krigia oppositifolia | Asteraceae (B) |
| 77 | 101 | Y | N | Y | N | Lactuca canadensis | Asteraceae (B) |
| 109 | 130 | Y | N | Y | Y | Lespedeza cuneata | Fabaceae |
| 78 | 102 | Y | N | N | N | Liatris graminifolia | Asteraceae (B) |
| 133 | 153 | Y | N | N | N | Linum medium | Linaceae |
| 54 | 76 | Y | N | N | Y | Lithospermum caroliniense | Boraginaceae |
| 59 | 78 | Y | Y | N | N | Lobelia amoena | Campanulaceae |
| 61 | 80 | Y | N | Y | N | Lonicera japonica | Caprifoliaceae |
| 147 | 162 | N | Y | Y | N | Ludwigia alternifolia | Onagraceae |
| 148 | 162 | Y | N | Y | N | Ludwigia leptocarpa | Onagraceae |
| 4 | 4 | Y | N | N | N | Lycopodium carolinianum | Lycopodiaceae (A) |
| 5 | 5 | Y | N | N | N | Lycopodium digitatum | Lycopodiaceae (A) |
| 3 | 4 | Y | N | N | N | Lycopodium x brucei | Lycopodiaceae (A) |
| 162 | 173 | Y | N | Y | N | Lysimachia lanceolata | Polygonaceae |
| 136 | 155 | Y | N | N | N | Magnolia acuminata | Magnoliaceae |
| 39 | 58 | Y | N | Y | N | Mayaca fluviatilis | Mayacaceae |
| 171 | 192 | Y | N | Y | N | Mecardonia acuminata | Scrophulariaceae |
| 130 | 148 | Y | Y | Y | N | Monarda punctata | Lamiaceae (B) |
| 125 | 143 | Y | N | N | N | Myriophyllum heterophyllum | Haloragaceae |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 142 | 160 | Y | N | N | N | Nuphar luteum | Nymphaeaceae |
| 143 | 160 | Y | N | N | N | Nymphaea odorata | Nymphaeaceae |
| 144 | 160 | Y | N | Y | Y | Nyssa sylvatica | Nyssaceae |
| 149 | 164 | Y | N | Y | N | Oenothera biennis | Onagraceae |
| 150 | 164 | Y | N | Y | N | Oenothera fruticosa | Onagraceae |
| 151 | 164 | Y | Y | Y | Y | Oenothera laciniata | Onagraceae |
| 6 | 5 | Y | N | Y | N | Onoclea sensibilis | Aspidiaceae (A) |
| 7 | 6 | Y | Y | N | N | Osmunda cinnamomea | Osmundaceae (A) |
| 152 | 164 | Y | N | N | N | Oxalis dillenii | Oxalidaceae |
| 184 | 206 | Y | N | Y | N | Parthenocissus quinquefolia | Vitaceae |
| 153 | 165 | Y | N | N | N | Passiflora edulis | Passifloraceae |
| 172 | 192 | Y | N | Y | N | Penstemon australis | Scrophulasiaceae |
| 128 | 145 | Y | N | N | N | Phacelia dubia | Hydrophyllaceae (B) |
| 154 | 168 | Y | Y | Y | Y | Phlox nivalis | Polemoniaceae |
| 155 | 168 | Y | N | Y | N | Phlox pilosa | Polemoniaceae |
| 79 | 103 | Y | N | N | N | Pityopsis graminifolia | Asteraceae (B) |
| 80 | 103 | Y | N | N | N | Pluchea camphorata | Asteraceae (B) |
| 156 | 168 | Y | N | Y | N | Polygala lutea | Polygalaceae |
| 157 | 169 | Y | N | Y | Y | Polygala nana | Polygalaceae |
| 158 | 169 | Y | N | Y | Y | Polygala polygama | Polygalaceae |
| 34 | 56 | Y | N | N | N | Polygonatum biflorum | Liliaceae |
| 160 | 170 | Y | N | N | N | Polygonum pensylvanicum | Polygonaceae |
| 8 | 6 | Y | N | Y | N | Polypodium polyoioides | Aspidiaceae (A) |
| 135 | 154 | Y | N | Y | N | Polypremum procumbens | Loganiaceae |
| 9 | 6 | Y | N | N | N | Polystichum acrostichoides | Aspidiaceae (A) |
| 166 | 181 | N | Y | Y | Y | Prunus serotina | Rosaceae |
| 168 | 185 | Y | N | N | N | Ptelea trifoliata | Rutaceae |
| 10 | 6 | Y | N | Y | Y | Pteridium aquilinum | Pteridaceae (A) |
| 114 | 136 | N | Y | N | N | Quercus askansana | Fagaceae |
| 115 | 136 | Y | N | N | N | Quercus hemisphaerica | Fagaceae |
| 116 | 136 | Y | Y | N | N | Quercus incana | Fagaceae |
| 117 | 136 | Y | Y | Y | N | Quercus laevis | Fagaceae |
| 118 | 137 | Y | Y | Y | Y | Quercus marilandica | Fagaceae |
| 119 | 137 | Y | N | Y | Y | Quercus nigra | Fagaceae |
| 120 | 137 | Y | N | Y | N | Quercus phellos | Fagaceae |
| 138 | 157 | Y | N | Y | N | Rhexia mariana | Melastomataceae |
| 139 | 157 | Y | N | N | N | Rhexia nashii | Melastomataceae |
| 140 | 158 | Y | N | N | N | Rhexia virginica | Melastomataceae |
| 99 | 119 | Y | N | N | N | Rhododendron alabamense | Ericaceae |
| 45 | 68 | N | Y | Y | Y | Rhus copallina | Anacardiaceae |
| 46 | 68 | Y | N | Y | N | Rhus toxicodendron (D) | Anacardiaceae (B) |
| 110 | 132 | Y | N | Y | N | Rhynchosia reniformis | Fabaceae |
| 23 | 25 | Y | N | Y | N | Rhynchospora glomerata | Cyperaceae |
| 82 | 104 | Y | N | Y | N | Rudbeckia hirta | Asteraceae (B) |
| 83 | 104 | Y | N | N | N | Rudbeckia triloba | Asteraceae (B) |
| 81 | 104 | Y | N | Y | N | Rudbeckia fulgida | Asteraceae (B) |
| 121 | 140 | Y | N | N | N | Sabatia macrophylla | Gentianaceae |
| 169 | 186 | Y | N | Y | Y | Salix nigra | Salicaceae |
| 131 | 150 | Y | N | N | N | Salvia lyrata | Lamiaceae (B) |
| 64 | 83 | Y | N | N | N | Saponaria officinalis | Caryophyllaceae |
| 24 | 27 | Y | N | Y | N | Scirpus cyperinus | Cyperaceae |
| 25 | 27 | Y | N | N | N | Scirpus koilolepis | Cyperaceae |
| 11 | 6 | Y | N | N | N | Selaginella apoda | Selaginellaceae (A) |
| 12 | 7 | Y | N | N | N | Selaginella kraussiana | Selaginellaceae (A) |
| 84 | 105 | Y | N | N | N | Senecio tometosus | Asteraceae (B) |
| 173 | 193 | N | Y | Y | N | Seymeria pectinate | Scrophulasiaceae |
| 85 | 105 | Y | N | Y | Y | Silphium compositum | Asteraceae (B) |
| 86 | 105 | Y | N | Y | Y | Silphium dentatum | Asteraceae (B) |
| 41 | 63 | Y | N | Y | N | Smilax smallii | Liliaceae (A) |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 42 | 64 | Y | N | N | N | Smilax walteri | Liliaceae (A) |
| 176 | 195 | Y | N | Y | Y | Solanum carolinense | Solanaceae |
| 177 | 196 | Y | N | N | N | Solanum sisymbriifolium | Solanaceae |
| 87 | 108 | Y | N | N | N | Solvia pterosperma | Asteraceae (B) |
| 28 | 46 | N | Y | N | N | Sorghastrum elliottii | Poaceae (B) |
| 43 | 64 | Y | N | Y | N | Sparganium americanum | Typhaceae |
| 40 | 61 | Y | N | N | N | Spiranthes vernalis | Orchidaceae |
| 103 | 124 | Y | N | Y | Y | Stillingia sylvatica | Fabaceae |
| 94 | 112 | Y | N | N | N | Stylisma humistra | Convolvulaceae |
| 180 | 203 | Y | N | N | N | Stylodon carneus | Verbenaceae |
| 161 | 172 | Y | N | N | N | Talinum teretifolium | Polygonaceae |
| 111 | 133 | Y | N | Y | N | Tephrosia spicata | Fabaceae |
| 112 | 133 | Y | N | Y | Y | Tephrosia viginiana | Fabaceae |
| 88 | 108 | Y | N | Y | Y | Tetragonotheca helianthoides | Asteraceae (B) |
| 165 | 176 | Y | N | N | N | Thalictrum thalictroides | Ranunculaceae |
| 13 | 7 | Y | N | N | N | Thelypteris torresiana | Aspidiaceae (A) |
| 16 | 12 | Y | N | N | N | Tradescantia hirsuticaulis | Commelinaceae |
| 35 | 56 | Y | N | N | N | Trillium catesbaei | Liliaceae |
| 36 | 56 | Y | N | N | N | Trillium decipiens | Liliaceae |
| 37 | 57 | Y | N | N | N | Trillium underwoodii | Liliaceae |
| 132 | 152 | Y | N | N | N | Utricularia biflora | Lentibulariaceae |
| 38 | 58 | Y | N | N | N | Uvularia perfoliata | Liliaceae |
| 100 | 121 | N | Y | Y | N | Vaccinium myrsinites | Ericaceae |
| 174 | 193 | Y | N | Y | N | Verbascum thapsus | Scrophulasiaceae |
| 181 | 203 | Y | N | Y | N | Verbena bonariensis | Verbenaceae |
| 89 | 109 | Y | N | N | N | Verbesina aristata | Asteraceae (B) |
| 90 | 109 | Y | N | Y | N | Verbesina virginica | Asteraceae (B) |
| 91 | 109 | Y | N | Y | Y | Vernonia angustifolia | Asteraceae (B) |
| 62 | 81 | Y | Y | Y | N | Viburnum nudum | Caprifoliaceae |
| 182 | 205 | Y | Y | N | N | Viola pedata | Violaceae |
| 185 | 206 | Y | N | N | N | Vitis aestivalis | Vitaceae |
| 186 | 206 | Y | N | Y | Y | Vitis rotundifolia | Vitaceae |
| 187 | 206 | Y | N | N | N | Vitis vulpina | Vitaceae |
| 60 | 79 | Y | N | Y | N | Wahlenbergia marginata | Campanulaceae |
| 14 | 8 | Y | N | N | N | Woodwardia aerolata | Blechnaceae (A) |
| 113 | 135 | Y | N | Y | N | Zornia bracteata | Fabaceae |

a: ?Y and ?N indicates that the county dot location is
uncertain, but location selected, as shown.
(A): Species listed under pteridophytes in Jones and Coile (1988).
(B): Family names (right of equal sign) used in Jones and Coile, 1988
: Poaceae = Gramineae
: Asteraceae = Compositae
: Hydrophyllaceae = Guttiferae
: Lamiaceae = Labiatae
: Cabombaceae = Buxaceae
: Fabaceae = Caesalpiniaceae
: Liliaceae = Smilaceae
(C): A. filix-femina var. asplenioides
(D): Rhus toxicodendron = Toxicodendron radicans
: A. x neglecta and A. pavia reported in the Fort Benning Check List

# Appendix E
# Vascular Plant Species for Muscogee and Chattahoochee Counties, Georgia, from Duncan 1950

VASCULAR PLANT SPECIES INDICATED FOR MUSCOGEE AND
CHATTACHOOGEE COUNTIES, GEORGIA FROM DUNCAN (1950)

ITEM NO. = NUMBER USED BY DUNCAN (1950).
MC = MUSCOGEE COUNTY: Y-INDICATED FOR COUNTY, N-NOT INDICATED FOR COUNTY
CC = CHATTACHOOGEE COUNTY: Y-INDICATED FOR COUNTY, N-NOT INDICATED FOR COUNTY
JC = IN REFERENCE TO JONES AND COILE (1988; APPENDIX D): YM-REPORTED FOR MUSCOGEE COUNTY, YC-REPORTED FOR CHATTACHOOGEE COUNTY, YB-REPORTED FOR BOTH COUNTIES
FB = IN REFERENCE TO THE FORT BENNING PLANT LIST (APPENDIX C): Y-ON LIST, N-NOT ON LIST.
SI = IN REFERENCE TO THE SITE PLANT LIST (APPENDIX A.1): Y-ON LIST, N-NOT ON LIST

| ITEM No. | MC | CC | JC | FB | SI | LATIN NAME |
|---|---|---|---|---|---|---|
| 46 | Y | Y | N | Y | N | Albizia julibrissin |
| 16 | Y | Y | N | N | N | Betula nigra |
| 32 | Y | N | N | N | N | Broussonetia papyrifera |
| 84 | Y | Y | N | N | N | Caltalpa bignonioides |
| 14 | Y | N | N | N | N | Carpinus caroliniana |
| 29 | Y | N | N | N | N | Celtis laevigata |
| 86 | N | Y | YM | Y | N | Cephalanthus occidentalis |
| 47 | Y | Y | N | Y | N | Cercis canadensis |
| 71 | Y | Y | YC | N | Y | Cornus florida |
| 78 | Y | Y | N | Y | Y | Diospyros virginiana |
| 49 | Y | Y | N | N | N | Gleditsia triacanthos |
| 8 | N | Y | N | Y | N | Juniperus virginiana |
| 42 | Y | Y | N | Y | Y | Liquidambar styraciflua |
| 39 | Y | Y | N | Y | N | Liriodendron tulipifera |
| 38 | N | Y | N | Y | N | Magnolia virginiana |
| 53 | Y | Y | N | N | N | Melia azedarach |
| 31 | Y | Y | N | N | N | Morus rubra |
| 1 | N | Y | N | Y | Y | Pinus glabra |
| 2 | N | Y | N | Y | Y | Pinus palustris |
| 43 | Y | N | N | Y | Y | Platanus occidentalis |
| 13 | Y | Y | N | N | N | Populus deltiodes |
| 45 | N | Y | N | Y | Y | Prunus serotina |
| 19 | N | Y | N | N | N | Quercus alba |
| 21 | Y | Y | N | N | Y | Quercus falcata |
| 23 | Y | Y | YB | Y | Y | Quercus marilandica |
| 24 | Y | N | N | N | Y | Quercus stellata |
| 54 | N | Y | YC | Y | Y | Rhus copallina |
| 55 | Y | Y | N | N | Y | Rhus glabra |
| 50 | N | Y | N | Y | N | Robinia pseudoacacia |
| 40 | Y | Y | N | Y | Y | Sassafras albidum |
| 26 | Y | Y | N | N | N | Ulmus alata |

Addendum

# Land Rehabilitation of the McKenna Hill Drop Zone, Fort Benning Military Reservation, Georgia: Erosion Control and Revegetation Methods

# Land Rehabilitation of the McKenna Hill Drop Zone, Fort Benning Military Reservation, Georgia: Erosion Control and Revegetation Methods

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# Contents

## Figures



## Tables

# Section 1
# Introduction

During the winter of 1988–1989, an area of approximately 258 hectares [ha] (637 acres) was prepared as a new parachute drop zone near the McKenna Hill Airstrip on the Fort Benning Military Reservation (Fort Benning), Georgia, and was named the McKenna Hill Drop Zone (the Site). To prepare the Site, trees were removed, stumps grubbed and buried, some of the ridges flattened, and gullies filled. These operations destroyed the vegetation and mixed plant remains with the topsoil, duff, and litter layers with the subsoils, leaving infertile soils exposed. No measures were taken following the clearing and grading operations to establish a permanent vegetational cover over the altered landscape, so the Site was subject to severe soil erosion.

In early 1991, a very major concern was the high rate of soil erosion on the Site that resulted in the buildup of sediment outwash around trees, including cavity (den, nest) trees of a colony of the Red Cockaded Woodpecker. The colony of concern was located adjacent to one of the Site's watersheds.

The Red Cockaded Woodpecker is an endangered bird, and it is specific in selecting colony sites and cavity trees. Colonies are established only in open pine stands with little or no understory. Furthermore, only living trees of certain pine species of 80 to 100 years of age and infected with heartwood disease are used for cavity trees. Also, the woodpeckers may take one or more years to prepare cavities in suitable pine trees. If cavity trees die, they are abandoned.

The accumulation of sediments around the base of cavity trees may kill them, because of reduced soil aeration and higher water table levels in their root zones. Thus, the basis of concern with respect to the sediment outwash was the Red Cockaded Woodpecker colony adjacent to the Site.

In addition to the potential adverse impact of the Site's soil erosion on the Red Cockaded Woodpecker colony, runoff and sediment from the Site was degrading the quality of surface water in off-site drainage ways. An extensive area of Clear Creek Pond was filled with sediments and sediments were carried into Clear Creek following major rainfalls.

The Environmental Management Division (EMD) of the Directorate of Public Works (DPW) at Fort Benning contacted the Environmental Division of the Construction Engineering Research Laboratories (CERL) for suggestions regarding the control of soil erosion and revegetation of the Site. In turn, CERL asked the Center for Environmental Restoration Systems (CERS) in the Energy Systems Division at Argonne National Laboratory to develop and implement a soil erosion control and revegetation research effort at the Site. From 1991 through 1994, this effort consisted of designing, implementing, and monitoring the effectiveness of various runoff control structures and revegetation methods that are adaptable to military training lands. This report summarizes these research activities, their costs, and their effectiveness.

# Section 2
# **Background**

The Fort Benning Military Reservation covers about 73,450 ha (181,500 acres) in west-central Georgia with a small portion extending into east-central Alabama on the Georgia-Alabama boarder.

Fort Benning has long, hot summers because moist tropical air from the Gulf of Mexico persistently covers the region with average daily temperatures slightly above 26.7°C (80°F) and average daily maximum temperatures of 32.2°C (90°F) during July and August. Winters are cool and fairly short, with average daily temperatures of about 8.3°C (47°F) and average daily minimum temperatures of 2.2°C (36°F) during December and January. Total annual precipitation averages about 1,306 millimeters (mm) (51.4 inches [in.]), and approximately one-half of this falls during the normal growing season from April through September. Summer precipitation is mainly by afternoon thunderstorms that are highly variable. Table 1 gives the 1951 to 1977 temperature and precipitation data recorded at Columbus, Georgia (Johnson 1983).

The Site (McKenna Hill Drop Zone) is about 14.5 km (9 mi) east of the main cantonment area of Fort Benning (Figure 1). The Site begins on the north side of Hourglass Road about 1 km (0.6 mi) northeast of the intersection of Eight Division Road and Hourglass Road (Figure 2). Hourglass Road runs along the south side of the Site with the intersection of Pine Tree Road and Hourglass Road at about the center of the south edge of the Site. Pine Tree Road runs north-northwest and divides the Site into two parts of about equal size. The McKenna Hill Airstrip and a Military Operation in Urban Terrain (MOUT) area are adjacent to the southeast corner of the Site, but are not included in it (Figure 2). Drainage from most of the Site is to the north, with the western half draining directly into the lower part of Clear Creek. The eastern half of the Site, east of Pine Tree Road, drains into Clear Creek Pond and the upper part of Clear Creek, upstream from Clear Creek Pond.

**Table 1 Average Temperatures and Precipitation Reported for Columbus, Georgia, 1951–1977[a]**

| | Temperature | | | Precipitation |
|---|---|---|---|---|
| Month | Average Daily Maximum °C (°F) | Average Daily Minimum °C (°F) | Average Daily °C (°F) | Average mm (in.) |
| January | 14.0 (57.2) | 1.9 (35.5) | 8.1 (46.4) | 109 (4.31) |
| February | 16.2 (61.1) | 3.0 (37.4) | 9.6 (49.2) | 115 (4.54) |
| March | 19.9 (67.9) | 6.6 (43.9) | 13.3 (55.9) | 151 (5.95) |
| April | 25.2 (77.4) | 11.0 (51.8) | 18.1 (64.6) | 108 (4.26) |
| May | 28.8 (83.9) | 15.6 (60.0) | 22.2 (72.0) | 108 (4.27) |
| June | 31.9 (89.4) | 19.7 (67.4) | 25.8 (78.4) | 112 (4.39) |
| July | 32.7 (90.9) | 21.5 (70.7) | 27.1 (80.8) | 144 (5.65) |
| August | 32.6 (90.7) | 21.3 (70.3) | 26.9 (80.5) | 103 (4.06) |
| September | 29.9 (85.90 | 18.7 (65.6) | 24.3 (75.7) | 93 (3.67) |
| October | 24.9 (76.9) | 11.7 (53.1) | 18.3 (65.0) | 55 (2.17) |
| November | 19.3 (66.8) | 5.7 (42.2) | 12.5 (54.5) | 78 (3.06) |
| December | 15.3 (59.5) | 2.8 (37.1) | 9.1 (48.3) | 128 (5.02) |
| Yearly: | | | | |
| Average | 24.2 (75.6) | 11.6 (52.9) | 18.0 (64.3) | |
| Total | | | | 1304 (51.35) |

[a] From Johnson 1983.

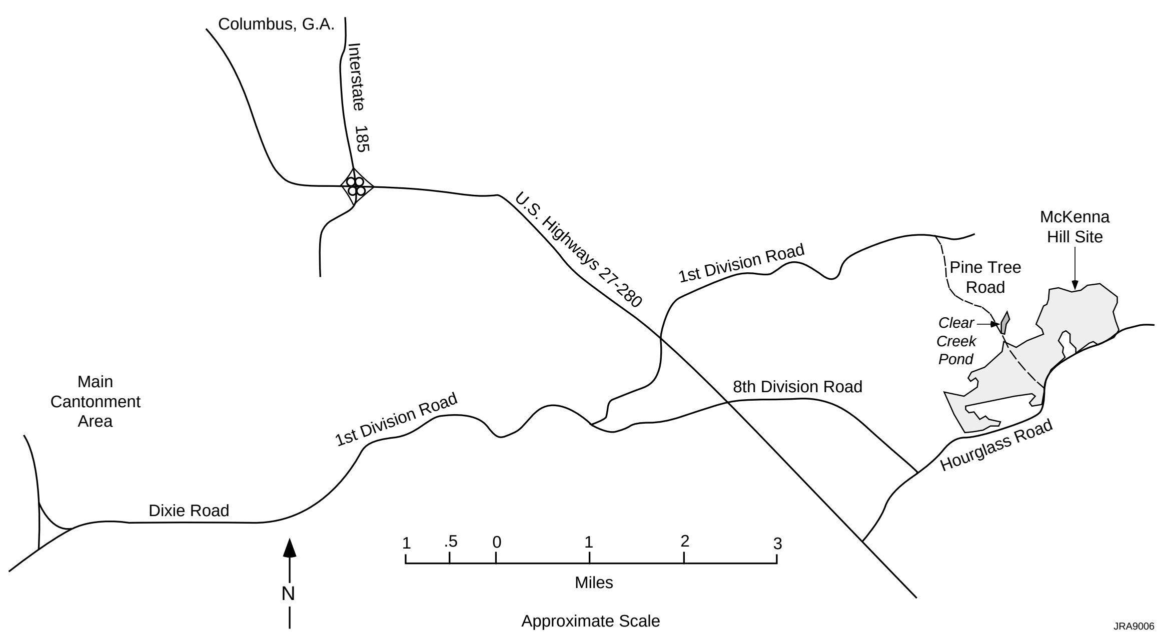


**Figure 1 Location of McKenna Hill Drop Zone (the Site)**

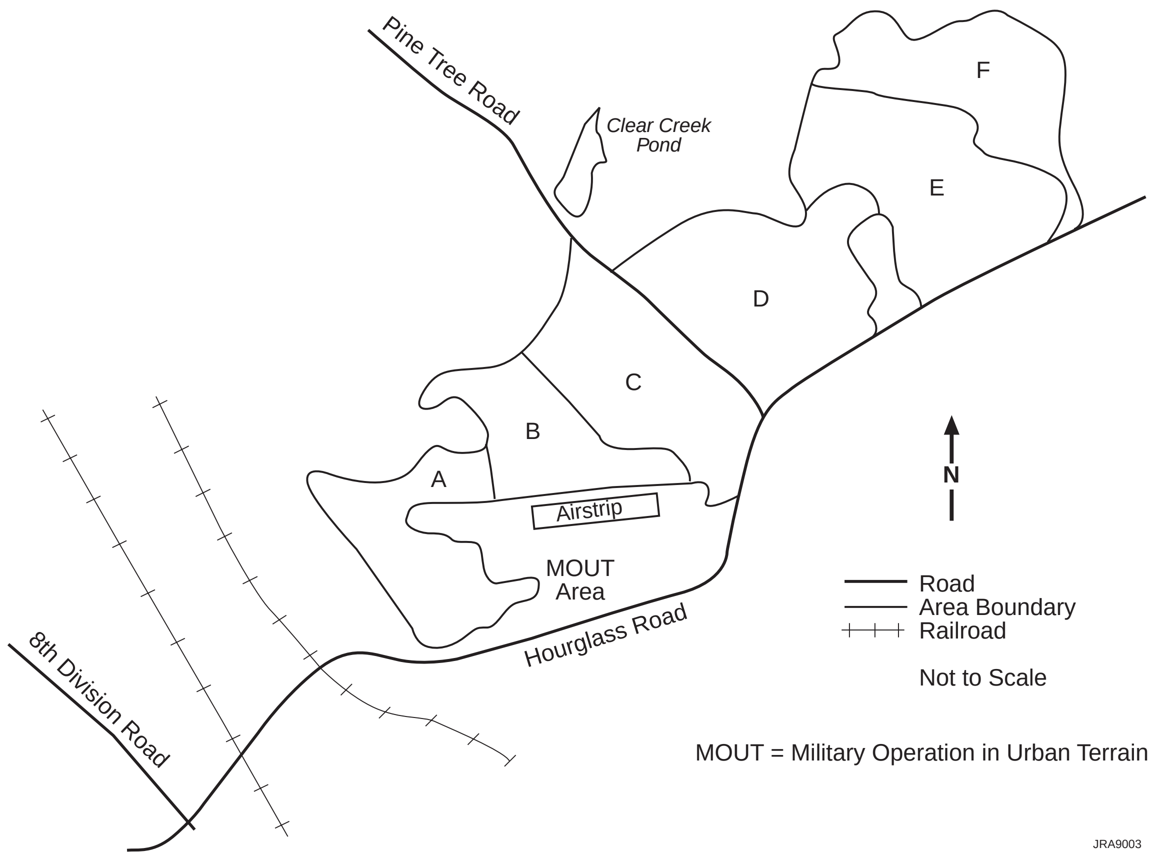


**Figure 2  Site Sections A–F**

# Section 3
# **Field Surveys**

## 3.1 Proem

A CERS inspection team visited the Site during April 1991 to assess the soil erosion and vegetational conditions. For this assessment, the Site was divided into six sections (A, B, C, D, E, and F) shown in Figure 2. The sections generally correspond to watersheds of the Site with an exception of Sections D and E. These sections could be considered one large watershed, but were divided because Section E had been planted with pine seedlings prior to the team visit while Section D had not been planted. A Global Positioning System (GPS) was used during this and later Site visits to map the boundaries and determine the size of each of the six sections. Sizes of the six sections are as follows: Section A 31.2 ha (78 acres); Section B 25.1 ha (62 acres); Section C 44.5 ha (110 acres), Section D 56.2 ha (139 acres); Section E 67.6 ha (167 acres), and Section F 32.8 ha (81 acres).

## 3.2 Section A

Section A generally had 75% or more vegetational cover consisting of established grasses, forbs, and shrubs with a few small trees. It was apparent that most of Section A was cleared before the 1988-1989 clearing operation, because of the amount and type of established vegetation observed. The slope west of the airstrip had wide, level terraces. Generally, rill formation was not a major problem on the west slope, but there were several narrow-deep gullies that developed at locations where terraces were topped and washed out. The major cause of these gullies was runoff from the airstrip and a barren-steep slope along the west and northwest edge of the airstrip. The airstrip was expanded during the 1988-1989 clearing operation and the steep slopes apparently were not seeded. A steep slope north of the airstrip was cleared in 1988-1989. Here several deep gullies developed because of the lack of vegetational cover. Also, there was a buffer of forest between the cleared area of the Section and Clear Creek, but sediments were washed from the cleared areas through the forested area to Clear Creek.

## 3.3 Section B

Section B was a major concern because the runoff and sediment outwash from this watershed was adversely affecting cavity trees of the Red Cockaded Woodpecker colony. All drainage from Section B including the eastern half of the airstrip occurred through a single valley into an area where several cavity trees were located adjacent to the Site. Because of the adverse effects of sediment accumulation around the bases of cavity trees, several attempts were made prior to April 1991 to control soil erosion and revegetate selected areas of Section B.

Sometime after the clearing and grading operations on the Site, a silt fence was constructed across the valley of Section B to reduce runoff velocity and trap sediments. During the summer or fall of 1990, terraces were cut into the slopes, gullies filled, and slopes smoothed, and six check dams constructed across the valley. One check dam washed out during a rain storm before the area of the Section was seeded. Subsequently, culvert pipes were installed in all check dams.

During September of 1990, about 9 ha (22 acres) of the Section, including the valley floor, dams, terraces, and lower slopes, were limed, fertilized, and seeded. Agricultural lime was applied at the rate of about 1,344 kg $ha^{-1}$ (1,200 lb $acre^{-1}$) and approximately 90 kg $ha^{-1}$ (80 lb $acre^{-1}$) each of nitrogen, $P_2O_5$, and $K_2O$ were applied before a seedbed was prepared by disking. The prepared area was broadcast seeded with a mixture of 129 kg $ha^{-1}$ (115 lb $acre^{-1}$) of Browntop Millet, 73 kg $ha^{-1}$ (65 lb $acre^{-1}$) of Annual Ryegrass (*Lolium multiflorum*), and 39 kg $ha^{-1}$ (35 lb $acre^{-1}$) of Bahia Grass. Next, the seeded area was lightly disked and mulched with 2.24 mg $ha^{-1}$ (1 ton $acre^{-1}$) of straw. Unfortunately, sometime after the rehabilitation effort, the area burned, which destroyed most of the straw mulch. Later, riprap spillways were installed at all check dam culvert outlets, and pine tree seedlings were planted in the valley floor adjacent to the cavity trees. All design and rehabilitation operations for this 9-ha area were carried out by Range, Road, and Section personnel of Fort Benning; the revegetation operations were done with the Section's agricultural equipment.

In April of 1991, the seeded portions of Area B had a thick stand of Annual Ryegrass, but the Bahia Grass was not becoming established, apparently because of competition from the Annual Ryegrass. The dams were intact and sediments had been trapped in all the pools. The terraces were diverting runoff into the dam pools, and in locations where the terraces followed the contour, the terrace channels were stable. However, some areas of the terrace channels had a steep grade and soil erosion had occurred in the terrace channel. The upland areas and upper slopes of the Section that were seeded in 1990 had about 75% vegetational cover of graminoids, forbs, vines, shrubs, and a few hardwood tree seedlings. There was evidence of active soil erosion on most of the slopes, but no large gullies had developed. A major soil erosion problem was runoff from the eastern half of the airstrip that caused some deep rills and small gullies along the steep slope adjacent to the northern edge of the airstrip.

## 3.4 Section C

Of the six sections of the Site, Section C was the most lacking in vegetational cover that resulted in severe soil erosion on most of the steep slopes. Upland areas had about 50% vegetational cover made up mostly of forbs, vines, and shrubs. Ditch grading along Pine Tree Road, on the east side of Section C, carried runoff from the road over the edge of the steep slopes and, at the outlet of each ditch, a deep gully had developed. The slopes on the west side of Section C had grades of 30% or greater with deep rills and little or no vegetational cover. The only vegetation on many of the steeper slopes were a few vines trailing down their rills. There were relatively large areas on the flat uplands of the Section characterized by exposed subsoils on which the vegetational cover was less than 10%.

A large gully that extended from the valley floor to a culvert under Pine Tree Road, was up to 4.5 m (15 ft) deep and over 6 m (20 ft wide). The valley floor, an area of about 4 ha (10 acres), was essentially devoid of vegetation except for a few wetland plants in a seep. Sediment outwash from the lowlands of the Section into an adjacent forest accumulated to at least 1.5 m (5 ft), and seemingly caused the death of all trees and shrubs subject to this accumulation.

## 3.5 Sections D and E

Sections D and E lacked adequate vegetational cover for effective control of soil erosion. Apparently, some soil erosion occurred during each period of precipitation. Uplands had scattered annual grasses, shrubs, and vines interspersed among bare areas. Some areas of the uplands had vegetational cover of 60% to 75%, but most areas had vegetational cover of less than 50%. In some of the more favorable soil conditions, small hardwood tree seedlings had become established, especially in Section D.

The more gentle slopes (5 to 15%) generally had less than 50% vegetational cover, and runoff from the uplands over these slopes had caused many rills and small gullies 0.3 to 1 m (1 to 3 ft) in depth. The steeper slopes and uplands where grading exposed the subsoil had very little vegetational cover. At many locations, gullies with vertical sides 2 m (7 ft) deep and up to 4 m (13 ft) wide had developed in slopes leading to the main drainage way (joint valley floor of Sections D and E).

Sediment outwash from slopes of Sections D and E formed a barren lowland plain across the main drainage way that had the appearance of dry washes in deserts. Also, sediments were transported from the main drainage outlet into an adjacent forested area. Here sediments accumulated to a thickness of one meter (3 ft) or more that seeming lead to the death of all tree and understory plant taxa.

Section E and a narrow strip along the north tree line in Section D were planted with pine seedlings in early 1991 by personnel of Fort Benning's Natural Resources Section of DPW. Seedlings were planted in rows on 1.8 to 2.4 m (6 to 8 ft) centers with about 2.4 m (8 ft) between seedlings in the rows. A V-shaped blade on the front of the tractor that pulled the tree planter was used to fill gullies on the slopes. After the seedings were planted, new gullies developed on most of the slopes and there was little or no vegetational cover. Most of the pine seedlings showed new growth. However, without graminoids or forbs or both to stabilize the soil surfaces among the spaced pine seedlings there was little control of soil erosion.

## 3.6 Section F

Pine seedlings were planted in Section F at about the same time as in Sections D and E. But in contrast, soil erosion was not a major problem in Section F, probably owing to a substantially intact soil profile. (Stumps were not grubbed and buried and no grading or leveling was done in Section F following the clearing operations during the drop zone preparations of the Site).

The duff and topsoil layers were present. Grasses, shrubs, vines and other forms of plants were becoming reestablished. The soil was soft, no subsoil was visible, and gully and rill soil erosion were not observed. In addition, the pine seedlings looked healthy and had new growth.

# Section 4
# Erosion Control and Revegetation Efforts

## 4.1 Proem

Four separate erosion control and revegetation contracts were fulfilled at the Site from April 1992 through July 1994. Each of these contracts was design to address specific problems at the Site. Detailed plans and specifications for these contracts were developed by personnel at CERS following the collection of detailed Site-specific information.

Contractual work was done by a local land rehabilitation contractor under the supervision of staff members of CERS. Following the implementation of the different contracts, the effectiveness of erosion control and revegetation methods was evaluated by recording field observations and by monitoring vegetational development at selected locations. A description of these field observation and monitoring efforts along with results are provided subsequently under the heading Field Observations and Monitoring.

## 4.2 First Contract

In 1991, the immediate concern of Fort Benning's EMD staff members was the continual adverse influence of sediment outwash from Section B into the adjacent Red Cockaded Woodpecker colony. Although the construction of a terrace system and check dams along with revegetation efforts were completed in the fall of 1990 by Fort Benning personnel that resulted in a reduction of sediment accumulation in the bird colony, additional soil erosion control measures were needed.

Contractual specifications were developed for measures to reduce runoff velocity, trap sediments, and improve vegetational cover in Section B. Specific tasks in the contract involved construction of 76 m (250 ft) of silt fence, installation of 19 riprap waterbars in terrace channels, and fertilization of 25 ha (62 acre) in Section B. These contractual specifications were submitted for bid to local contractors during August 1992. Unfortunately no bids were obtained, but again the contractual specifications were submitted for bids in February 1992. A suitable bid was obtained, and the tasks of the contract were implemented in April 1992.

A silt fence was designed to reduce runoff velocity and trap sediments from the watershed of Section B before sediment outwash entered the Red Cockaded Woodpecker colony. The silt fence consisted of 0.9 m (3 ft) wide filter fabric supported by woven wire fastened to steel posts with 1.2 m (4 ft) centers. The bottom of the filter fabric and woven wire was buried in a 15 cm (6 in) trench to prevent runoff from running under the fence. The silt fence ran across the valley floor nearly at the boundary of Section B and the bird colony.

Waterbars were designed to reduce runoff velocity and prevent erosion in the terrace channels. The waterbars consisted of a 1.2 m (4 ft) strip of 15 to 30 cm (6 to 12 in) size riprap extending across a terrace channel. The elevation of the riprap in the center of the terrace channel was about 15 cm (6 in) below the elevation of the riprap on the terrace cut-slope and front-slope to prevent runoff from running around the waterbar. Nineteen (19) waterbars were located in segments of terrace channels where active scouring occurred.

Fertilizer was applied to a portion of Section B to improve the growth of the existing vegetation, thus stabilizing the soil. Fertilizer was broadcast on 25 ha (62 acre) at a rate to supply 56 kg $ha^{-1}$ (50 lb $acre^{-1}$) each of nitrogen, $P_2O_5$, and $K_2O$. This low fertilizer application rate was considered necessary to prevent nutrient losses by runoff.

The total cost for this contract was $14,175, which included all materials, labor, and equipment necessary to complete the three tasks. Also, the total cost included all other contractor expenditures such as mobilization and demobilization, and profit for the contractor. Average cost per construction unit for the three tasks included in this contract were as follows: materials and construction of the silt fence was \$12.80 $m^{-1}$ (\$3.90 $ft^{-1}$); cost of broadcast fertilization at a rate to supply 56 kg $ha^{-1}$ (50 lb $acre^{-1}$) each of nitrogen, $P_2O_5$, and $K_2O$ was \$72 $ha^{-1}$ (\$29 $acre^{-1}$); and riprap cost was \$149 $m^{-3}$ (\$114 $yd^{-3}$) for the 76.5 $m^{-3}$ (100 $yd^{-3}$) required for the 19 waterbars. A large portion of waterbar construction was for transporting the riprap from the staging area at the Site to the 19 locations and placement of the riprap in the terrace channel.

## 4.3 Second Contract

A second contract, directed towards revegetation, was implemented during January 1993. The tasks of the contract included the applications of agricultural limestone and fertilizer followed by drill seeding on 81 ha (200 acre) of the Site. These revegetation efforts were applied to the uplands and gentle slopes to increase vegetational cover and hence, reduce runoff from the uplands onto steeper slopes. Treated areas were uplands and near slopes of less than 10% in Sections C, D, and E. Global Positioning System (GPS) data were combined with existing topographic information in the Geographic Information System (GIS) to map the treated areas and to determine their unit (hectares) areas.

Sections A and F were not included because general reseeding was not considered a high priority at the time because of limited resources.

A broadcast spreader was used to apply agricultural limestone at a rate of 2.24 Mg $ha^{-1}$ (1 ton $acre^{-1}$) and fertilizer at a rate to supply 56 kg $ha^{-1}$ (50 lb $acre^{-1}$) each of nitrogen, $P_2O_5$, and $K_2O$ on the treated areas.

Following the application of limestone and fertilizer, the seed mixture shown in Table 2 was drilled using a no-till seed drill. Seeds of the mixture consisted of perennial grasses and a legume to provide long-term soil stabilization, and Cereal Rye to provide immediate soil erosion control. The no-till drill used was equipped with large diameter travel wheels in line with the drill coulters enabling it to be pulled over the rough and eroded terrain. The center drill coulter on the drill was removed so the rows of small pine seedlings could be straddled during the drilling operation.

**Table 2 Seed Mixture Used at the Site in January 1993**

| Latin Name | Common Name | Variety | Type | Drilling Rate kg $ha^{-1}$ (lb $acre^{-1}$)[a] |
|---|---|---|---|---|
| *Eragrostis curvula* | Weeping Love Grass | | | 1.1 (1.0) |
| *Paspalum notatum* | Bahia Grass | Pensacola | | 33.6 (30.0) |
| *Cynodon dactylon* | Bermuda Grass | Common | unhulled | 4.5 (4.0) |
| *Lespedeza cuneta* | Sericea Lespedza | Interstate | unhulled | 16.8 (15.0) |
| *Secale cereale* | Cereal Rye | | | 62.7 (56.0) |
| **Total** | | | | 118.7 (106.0) |

[a] Pure live seed.

Total cost of this contract was $39,000. The total cost included all materials, labor, equipment with associated costs and profit for liming, fertilizing and drill seeding the 81 ha (200 acres) of the uplands and gentle slopes of Sections C, D and E. Costs associated with the different tasks were as follows: agricultural limestone was furnished and broadcasted at 2.24 Mg $ha^{-1}$ (1 ton $acre^{-1}$) for a cost of $52 $ha^{-1}$ ($21 $acre^{-1}$); fertilizer was broadcast at a rate to supply 56 kg $ha^{-1}$ (50 lb $acre^{-1}$) each of nitrogen, $P_2O_5$, and $K_2O$ at a cost of $203 $ha^{-1}$ ($82 $acre^{-1}$); and the seed mixture was $128 $ha^{-1}$ ($52 $acre^{-1}$) and the no-till drill planting added about $99 $ha^{-1}$ ($40 $acre^{-1}$) for a total seeding cost of $227 $ha^{-1}$ ($92 $acre^{-1}$). The average cost for all tasks in this revegetation effort was about $482 $ha^{-1}$ ($195 $acre^{-1}$).

## 4.4 Third Contract

The third contract, also directed toward revegetation, was implemented during July 1993. This contract was similar to the second contract (January 1993), but in the revegetation effort here about 55 ha (135 acres) of the steeper slopes in Sections D and E were limed, fertilized and seeded.

Application rates for limestone and fertilizer were the same as those used in the second contract (January 1993). Also, the same seed mixture was used, except that Browntop Millet replaced Cereal Rye (*Secale cereale*).

The no-till drill was used to seed some of the areas. But on rough and eroded areas and very steep slopes, the seed mixture was broadcast and later tracked to cover the seeds. Objectives of the tracking operation were to press the soil amendments and seeds into the subsurface of the soil and to leave shallow depressions in the soil surface perpendicular to the direction of the slope (parallel to the contour).

In addition, a total of 259 m (850 ft) of silt fence was constructed across five washes along the north boundary of Section D. Here the construction of the silt fence was of the same type and design used during the first contract (April 1992).

Total cost of this contract was $58,000 including all materials, labor, equipment, other contractor costs, and profit. The total cost here was somewhat higher than for the previous revegetation effort (Second Contract), because of rougher terrain and steeper slopes. In addition, the tracking operation was required on the rough areas and steep slopes where broadcast seeding was used. Cost of the silt fence construction was about \$18 $m^{-1}$ (\$5.50 $ft^{-1}$). The cost for agricultural limestone was about \$ 62 $ha^{-1}$ (\$25 $acre^{-1}$) and broadcast application was about \$86 $ha^{-1}$ (\$35 $acre^{-1}$) for a total liming cost of \$ 148 $ha^{-1}$ (\$60 $acre^{-1}$). Fertilizer costs were \$99 $ha^{-1}$ (\$40 $acre^{-1}$) and broadcast application was about \$ 148 $ha^{-1}$ (\$60 $acre^{-1}$) for a total fertilizer purchase and application cost of \$247 $ha^{-1}$ (\$100 $acre^{-1}$). The cost of the seed mixture was \$119 $ha^{-1}$ (\$48 $acre^{-1}$) with an average cost for planting the seeds at \$215 $ha^{-1}$ (\$87 $acre^{-1}$). Average cost for the tracking operation was \$247 $ha^{-1}$ (\$100 $acre^{-1}$). The average cost for the combined revegetation tasks was about \$976 $ha^{-1}$ (\$395 $acre^{-1}$).

## 4.5 Fourth Contract

The fourth contract was implemented in May and June of 1994. In this contract, four types of soil erosion control structures and four revegetation methods were employed.

The four soil erosion control structures were: (1) construction of a total of 122 m (400 ft) of new silt fences among five washes, building earth berms at each of the two ends of the five silt fences and filling in an washout under an existing silt fence; (2) installation of extensions on the inlet pipes of six existing check dams; (3) construction of 427 m (1400 ft) of graded terraces associated with a 99 m (325 ft) of riprap lined waterway; and (4) construction of six porous check dams.

The four revegetation methods involved: (1) applications of agricultural limestone, fertilizer, and a seed mixture followed by light tillage on 6.6 ha (16.4 acres); (2) applications of agricultural limestone, fertilizer, a seed mixture and mulch followed by tracking on 0.5 ha (1.3 acres); (3) light tillage followed by applications of agricultural limestone, fertilizer, a seed mixture and mulch followed by tracking on 1.9 ha (4.6 acres); and (4) land smoothing followed by applications of agricultural limestone, fertilizer, a seed mixture and mulch followed by tracking on 2.3 ha (5.7 acres).

In this contract, the installation of all soil erosion control structures and areas treated for revegetation were located near the airstrip in Sections A and B with the exception of the construction of the silt fences and related work which was done along the northern boundary of Section D.

Several segments of silt fences, constructed across the washes on the northern boundary of Section D during July 1993, had been filled with trapped sediments. At each of the five locations, a new silt fence was installed next to the old fence on the up-slope side. Earth berms were constructed at each end of the five silt fences to prevent runoff from going around the fences. Also, an washout under the silt fence in Section B was repaired.

Elbow (L) extensions were installed on the inlet end of the culvert pipes of the six existing check dams in Section B (Figure 3). These extensions limited the rate of runoff flow through existing check dam metal culverts, thus reducing velocity below each check dam.

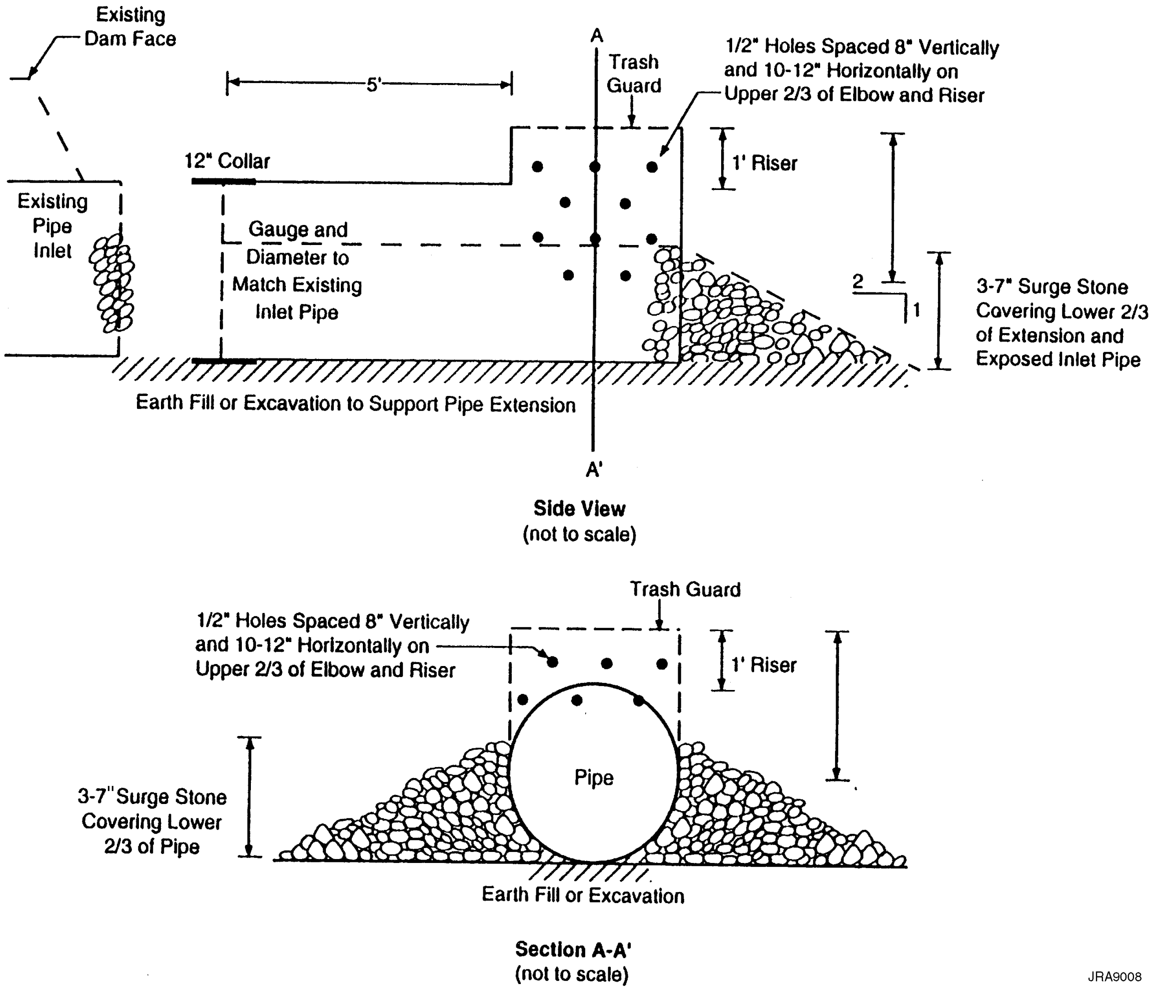


**Figure 3 Construction Details for Check Dam Culvert Pipe Extensions in Section B**

A terrace graded system, with riprap lined outlets on each terrace and with a riprap lined waterway (Figure 4), was constructed to divert runoff from the airstrip and control its velocity down the steep slope on the north side of the airstrip (Figure 2).

Six porous check dams were constructed in a gully along the north side of the airstrip (Figure 5). A particularly noteworthy feature of these check dams is the geotexile core placed there to trap sediments.

With respect to the four revegetation methods, agricultural limestone was applied at the rate of 2.24 Mg ha$^{-1}$ (1 ton acre$^{-1}$), and fertilizer was applied at a rate to supply 56 kg ha$^{-1}$ (50 lb acre$^{-1}$) each of nitrogen, $P_2O_5$, and $K_2O$. The seed mixture and its rate of application used for the four revegetation methods are shown in Table 3.

Differences among the four revegetation methods were the operations that preceded or followed applications of ground agricultural limestone, fertilizer, and the seed mixture.

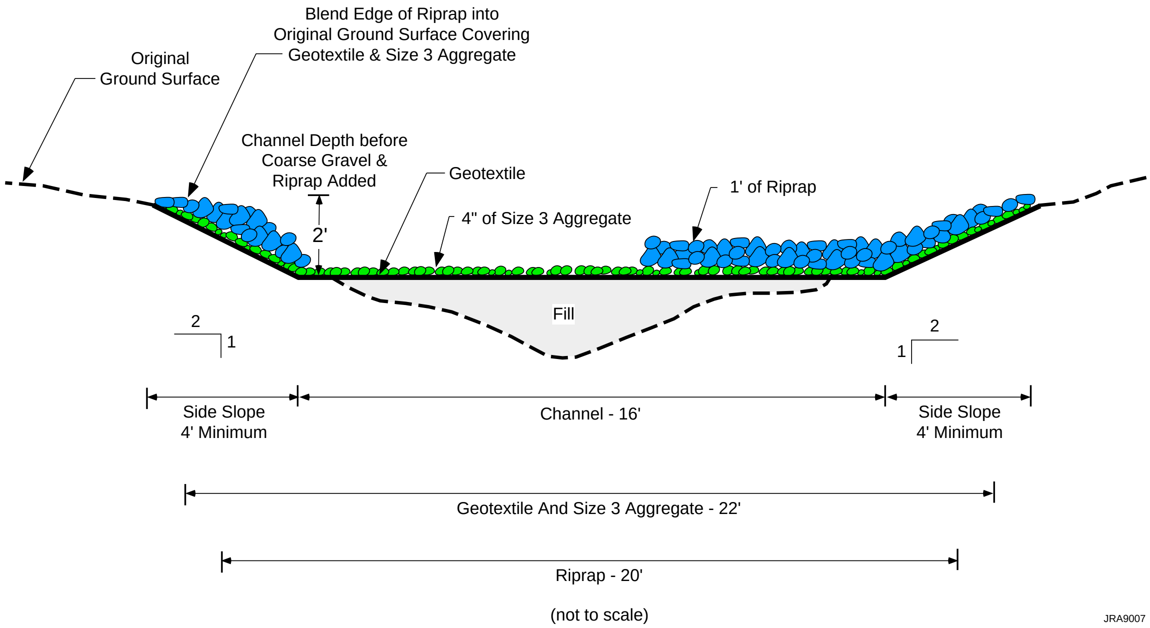


**Figure 4 Construction Details for the Waterway in Section B**

**Table 3 Seed Mixture Used for All Revegetation Methods at the Site in May and June 1994**

| Latin Name | Common Name | Variety | Type | Broadcast Rate kg ha$^{-1}$ (lb acre$^{-1}$)[a] |
|---|---|---|---|---|
| *Paspalum notatum* | Bahia Grass | Pensacola | | 28.0 (25.0) |
| *Cynodon dactylon* | Bermuda Grass | common | hulled | 2.2 (2.0) |
| *Cynodon dactylon* | Bermuda Grass | common | unhulled | 2.2 (2.0) |
| *Lespedeza cuneata* | Sericea Lespedeza | Interstate | hulled | 4.5 (4.0) |
| *Lespedeza cuneata* | Sericea Lespedeza | Interstate | unhulled | 4.5 (4.0) |
| *Lespedeza stipulacea* | Korean Lespedeza | | hulled | 4.5 (4.0) |
| *Panicum ramosum* | Browntop Millet | | | 5.6 (5.0) |
| Total | | | | 51.5 (46.0) |

[a] Pure live seed.

The first method was used on an area northwest of the airstrip with limited vegetational cover. It involved seeding with the no-till drill, but the seed tubes were disconnected to broadcast the seed and the drill coulters lightly tilled the soil surface to cover the seeds.

The second revegetation method was used in areas disturbed by the terrace and waterway construction. These areas were mulched with 4.48 Mg ha$^{-1}$ (2 ton acre$^{-1}$) of wheat straw and followed by tracking to anchor the mulch to the soil surface.

The third revegetation method was used to stabilize a 3.6 m wide (12 ft) strip along the edges of the airstrip. Disking was used to prepare a seedbed before this area was limed, fertilized, drill seeded, mulched and tracked.

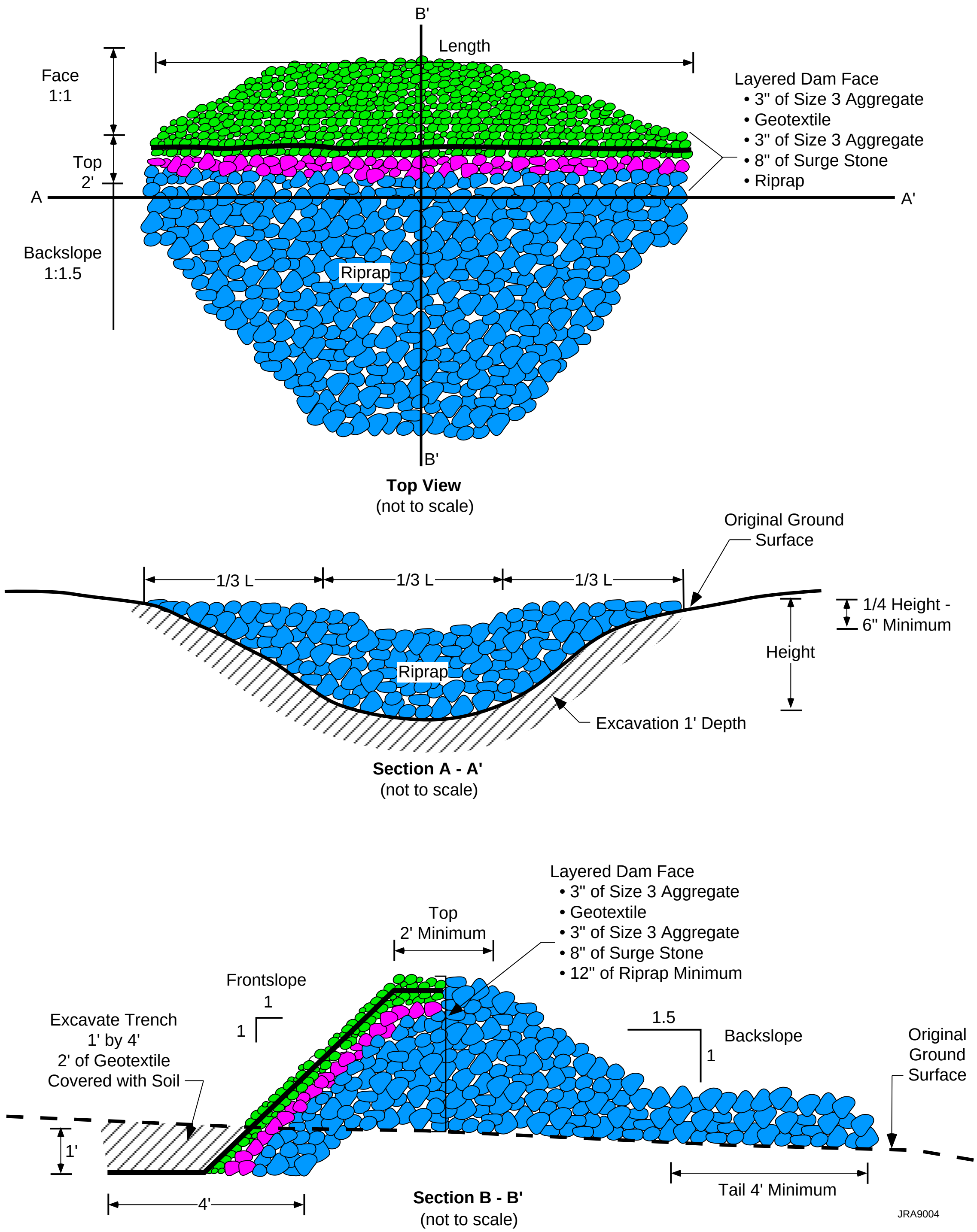


**Figure 5 Construction Details for the Porous Check Dams in Section B**

The fourth revegetation method was used on steep and eroded slopes at the north and west end of the airstrip, and was used on an area that had been cleared in 1988-1989 northwest of the airstrip. These areas required extensive land smoothing by a bulldozer before they could be treated for revegetation.

Total cost of this soil erosion control and revegetation contract was almost $95,000 which included all associated contractor costs. Cost of silt fence construction was about $18 m$^{-1}$ ($5.50 ft$^{-1}$) and the berm construction was about $100 each. Materials and installation of the inlet pipe extensions on the existing check dams averaged about $3,000 each. Almost one-half of this cost was for the fabrication of each elbow extension, and the remaining cost was for installation of the extension and placement of the riprap around each extension. Terrace grading averaged $12.75 M$^{-1}$ ($3.90 ft$^{-1}$) and cost of the riprap lined outlets on each terrace was about $118 M$^{-1}$ ($36 ft$^{-1}$). The lined waterway construction cost was about $266 M$^{-1}$ ($81 ft$^{-1}$) due to cost associated with placement of the riprap over the Geotextile. Total costs for each of the four revegetation methods were as follows: method 1: $966 ha$^{-1}$ ($391 acre$^{-1}$), method 2: $2,597 ha$^{-1}$ ($1,051 acre$^{-1}$, method 3: $2,844 ha$^{-1}$ ($1,151 acre$^{-1}$) and method 4: $5,068 ha$^{-1}$ ($2,051 acre$^{-1}$). Liming, fertilization, and seed cost were similar to costs in previous revegetation contracts. The higher cost was due to mulching at about $1,483 ha$^{-1}$ ($600 acre$^{-1}$) and smoothing at $2,471 ha$^{-1}$ ($1,000 acre$^{-1}$).

### 4.6 Closing Comments Concerning the Contractual Works

The four contracts implemented at the McKenna Hill Drop Zone from April 1992 through June 1994 were designed to address some of the most pressing soil erosion control and revegetation concerns at the Site. The major problem of soil erosion control and revegetation of Section C was not addressed because of the expected high cost of rehabilitating it.

The contracts implemented aided in improving and establishing vegetational cover on 172 ha (425 acre) of the Site.

The soil erosion control structures were designed and placed to reduce runoff and sediment volume in areas that were potentially damaging to Red Cockaded Woodpecker habitats and Clear Creek Pond.

The contracts implemented were not expected to completely rehabilitate the Site, but only to initiate the rehabilitation process on selected portions of the Site.

# Section 5
# Field Observations and Monitoring

## 5.1 Proem

Field observations and monitoring were used to assess the changing soil erosion and vegetational conditions at the Site (McKenna Hill Drop Zone). Also, this information was used to develop contract specifications and to determine the effectiveness of the soil erosion control and revegetation methods implemented at the Site.

## 5.2 Preliminary Test Plots

During a site visit in early July 1991, small test plots were established to evaluate the effectiveness of broadcast seeding without seedbed preparation for improving vegetational cover. Four treatment plots were set up at each of two locations without existing vegetation. One location was on a gentle slope (3%) and the second was on a steep slope (28%).

Treatments to be evaluated were: (1) seeded without seedbed preparation; (2) seeded and fertilizer application without seedbed preparation; (3) seeded with a minimum seedbed preparation; and (4) seeded and fertilizer application with a minimum seedbed preparation.

The seed mixture was applied by the broadcast method at a rate of 2.2 kg $ha^{-1}$ (2 lb $acre^{-1}$) for Bermuda Grass and 11.2 kg $ha^{-1}$ (10 lb $acre^{-1}$) for Bahia Grass and Browntop Millet. Fertilizer was applied at the rate to supply 56 kg $ha^{-1}$ (50 lb $acre^{-1}$) each of nitrogen, $P_2O_5$, and $K_2O$.

Minimum seedbed preparation was accomplished using a hand cultivator.

Although early July, 1991 was a late seeding date, the tests would indicate the normal response of the seeds to these treatments under less than ideal environmental conditions.

Establishment of plants from the seed mixture in the plots was monitored during Site visits for four months after July, 1991.

No vegetation became established in any of the plots with the two treatments that did not include minimum seedbed preparation. This indicated the soil crust must be broken to establish new grass and legume seedlings.

Only a few scattered plants became established in plots that received minimum seedbed preparation, but did not have fertilizer applications. This indicated soil fertility was a major limiting factor at this Site.

Plants became established in plots that were treated (minimum seedbed preparation, applied fertilizer and seeded), but they were in less than good condition. However, the tests did indicate that seeding on the Site with agricultural species would most likely be unsuccessful without both seedbed preparation and the application of fertilizer.

## 5.3 Soil Samples

Soil samples were collected during 1992 from representative locations and analyzed to determine the physical and chemical characteristics of the soils at the Site.

Results of physical analyses showed both textural class extremes were represented at the Site. Exposed subsoils on eroded slopes had a clay texture, whereas soils of uplands and sediments in washes had a loamy sand texture. None of the locations sampled had more than 12% silt indicating the physical properties of the soils across the Site were less than ideal.

All soil samples analyzed were acidic with an average pH of about 5.0, but determination of the lime requirement indicated only about 2.24 Mg $ha^{-1}$ (1 ton $acre^{-1}$) of agricultural limestone was needed to increase soil pH to 6.5 (the normal pH range for the development and growth of most grasses and legumes).

Extractable potassium and available phosphorous levels were about one-tenth the level found in normal agricultural soils. The average organic matter content of the soil samples was less than 1%, indicating the low nitrogen status of the Site's soils. These results indicated applications of limestone and fertilizer were needed to improve soil fertility to an acceptable level to support vegetational cover for effective soil erosion control.

## 5.4 Vegetational Monitoring at Four Locations in Section B

During the implementation of the initial rehabilitation contract in April 1992 (4.2 First Contract), areas in four different locations in Section B were selected for monitoring the responses of plants to the application of fertilizer.

Locations of the monitoring areas were not randomly selected, but chosen to represent different topographic features and associated vegetation observed in Section B.

The first location was in the upland area of the northeastern part of the Section. The area selected here had a fair stand of grass with some forbs, vines, and shrubs along with a few small barren patches. The selected area was rather typical of disturbed uplands Section B.

The second location was on a southwest facing slope of about 10% in the southeast portion of the Section. In the selected area here, the vegetation consisted of small amounts of grass and forb cover with some vine and shrub cover. On the other hand, there were larger patches of barren soil and exposed rock. These features of the selected area was rather typical on disturbed slopes of Section B.

The third location was on a 30% northeast facing slope in the western portion of the Section. The selected area here was seeded during the 1990 rehabilitation effort and the vegetational cover consists of mostly Annual Ryegrass. Annual Ryegrass litter from the previous growing season was common on most of the areas in Section B that were seeded in 1990.

The fourth location selected was on the relatively undisturbed upland in the southwestern portion of Section B. The selected area here had a high percent of grass cover, but little forb, shrub, and vine cover along with a few bare spots. This selected area was characteristic of the relatively undisturbed upland portions of Section B.

In the selected area of each location, nine transects 10 m (32.8 feet) in length were established for monitoring changes in vegetational cover. The amount and type of vegetational cover along each transect was determined by the point-intercept method using a 10-pin point frame (Chambers and Brown, 1983). The frame was placed perpendicular to the transect at one-meter intervals. This method provided 100 observations in an area of about 3 by 9 meters that were used to estimate relative amounts of exposed soil, litter, grasses, forbs, shrubs, and vines along each transect.

Three of the nine transects at each location were controls that represented naturally occurring plants not having been subjected to fertilizer and seed applications.

The other six transects at each location had fertilizer applications provided by the contractor. Three of these six transects were used to determine the influence of applied fertilizer on existing vegetation at each location. The remaining three of the six transects that received fertilizer were broadcast seeded as well.

Plants comprising the seed mixture and their seeding rates were as follows: Bahia Grass 11.2 kg $ha^{-1}$ (10 lb $acre^{-1}$); Bermuda Grass 2.2 kg $ha^{-1}$ (2 lb $acre^{-1}$); Browntop Millet 11.2 kg $ha^{-1}$ (10 lb $acre^{-1}$); Crimson Clover 9.0 kg $ha^{-1}$ (8 lb $acre^{-1}$); and Annual Ryegrass 5.6 kg $ha^{-1}$ (5 lb $acre^{-1}$).

The mean percent covers for each category by location, treatment, and the four data collection dates are shown in Table 4. Also shown are the total percent vegetational covers, which are the sums of the grass, forb, shrub and vine covers.

Inspection of the data indicate that there were substantial differences in percent covers within the categories measured along the transects of a particular location on April 4 (1992) when the initial data was collected. This indicates that the areas in which the nine transects were placed at each location were not (and were not expected to be) homogeneous stands.

There is a marked increase in grass cover shown in the May (1992) data due to normal spring growth that is reflected in total vegetational cover.

At all four locations, the total vegetational covers were consistently higher in September (1992) on the portions of the areas treated with fertilizer, with or without seeding. This indicates that the application of fertilizer early in the growing season (April 1992) was effective in increasing vegetational cover.

In addition to field measurements of vegetation at the four locations in Section B, visual observations in 1992 revealed little or no establishment of the broadcast seeded plants. Thus, broadcast seeding is not effective without seed bed preparations.

**Table 4 Mean Percent Cover for Exposed Soil and Vegetational Components at Four Locations and on Four Dates of 1992 in Section B of the Site (n=3)**

| Location | Collection Date | Treatment | Exposed Soil | Litter | Grass | Forb | Shrub | Vine | Total Vegetation[a] |
|---|---|---|---|---|---|---|---|---|---|
| East Upland | April 4 | Control | 26.7 | 48.3 | 9.7 | 10.0 | 0.7 | 4.7 | 25.0 |
| | | Fertilizer | 31.7 | 58.3 | 4.3 | 5.7 | 0.0 | 0.0 | 10.0 |
| | | Fertilizer + Seed | 17.7 | 67.0 | 5.7 | 5.7 | 2.0 | 2.0 | 15.3 |
| | May 5 | Control | 30.3 | 46.0 | 13.7 | 5.0 | 2.3 | 2.7 | 23.7 |
| | | Fertilizer | 32.7 | 45.3 | 12.3 | 9.7 | 0.0 | 0.0 | 22.0 |
| | | Fertilizer + Seed | 18.0 | 47.3 | 15.3 | 9.3 | 0.0 | 10.0 | 34.7 |
| | June 29 | Control | 23.3 | 40.3 | 16.3 | 11.0 | 1.7 | 7.3 | 36.3 |
| | | Fertilizer | 19.0 | 38.0 | 22.0 | 20.7 | 0.0 | 0.3 | 43.0 |
| | | Fertilizer + Seed | 8.3 | 42.7 | 19.7 | 17.7 | 0.0 | 11.7 | 49.0 |
| | September 14 | Control | 24.7 | 13.7 | 26.0 | 31.3 | 0.7 | 3.7 | 61.7 |
| | | Fertilizer | 13.0 | 4.7 | 35.0 | 46.7 | 0.0 | 0.7 | 82.3 |
| | | Fertilizer + Seed | 9.7 | 15.3 | 35.3 | 34.3 | 0.0 | 5.3 | 75.0 |
| East Slope | April 4 | Control | 38.7 | 43.7 | 9.3 | 1.3 | 3.7 | 3.3 | 17.7 |
| | | Fertilizer | 52.7 | 30.0 | 5.7 | 0.3 | 2.3 | 9.0 | 17.3 |
| | | Fertilizer + Seed | 58.7 | 32.0 | 2.3 | 3.3 | 2.3 | 1.3 | 9.3 |
| | May 5 | Control | 39.3 | 34.3 | 11.0 | 3.0 | 4.7 | 7.7 | 26.3 |
| | | Fertilizer | 41.7 | 16.7 | 19.0 | 2.7 | 3.0 | 17.0 | 41.7 |
| | | Fertilizer + Seed | 50.0 | 21.7 | 10.7 | 4.3 | 12.3 | 1.0 | 28.3 |
| | June 29 | Control | 25.0 | 28.7 | 20.7 | 11.0 | 5.3 | 9.3 | 46.3 |
| | | Fertilizer | 38.3 | 12.0 | 30.3 | 6.3 | 0.3 | 12.7 | 49.7 |
| | | Fertilizer + Seed | 45.7 | 10.3 | 18.7 | 12.0 | 11.0 | 2.3 | 44.0 |
| | September 14 | Control | 44.7 | 5.3 | 31.3 | 10.0 | 5.3 | 3.3 | 50.0 |
| | | Fertilizer | 28.7 | 1.0 | 55.0 | 5.7 | 0.0 | 9.7 | 70.3 |
| | | Fertilizer + Seed | 40.0 | 2.0 | 33.3 | 14.7 | 8.0 | 2.0 | 58.0 |
| West Slope | April 4 | Control | 27.3 | 64.0 | 7.7 | 0.7 | 0.3 | 0.0 | 8.7 |
| | | Fertilizer | 17.0 | 68.7 | 10.3 | 3.0 | 0.0 | 1.0 | 14.3 |
| | | Fertilizer + Seed | 32.0 | 50.7 | 9.3 | 4.0 | 0.7 | 3.3 | 17.3 |
| | May 5 | Control | 28.0 | 37.7 | 25.7 | 7.3 | 0.7 | 0.7 | 34.3 |
| | | Fertilizer | 9.3 | 38.3 | 39.3 | 8.0 | 3.0 | 2.0 | 52.3 |
| | | Fertilizer + Seed | 19.7 | 27.7 | 26.7 | 15.3 | 1.7 | 9.0 | 52.7 |
| | June 29 | Control | 25.3 | 31.3 | 33.7 | 6.7 | 1.3 | 1.7 | 43.3 |
| | | Fertilizer | 13.0 | 43.0 | 25.0 | 5.7 | 5.3 | 8.0 | 44.0 |
| | | Fertilizer + Seed | 33.0 | 23.7 | 21.3 | 12.3 | 2.3 | 7.3 | 43.3 |

**Table 4 Mean Percent Cover for Exposed Soil and Vegetational Components at Four Locations and on Four Dates of 1992 in Section B of the Site (n=3) (Cont.)**

| Location | Collection Date | Treatment | Exposed Soil | Litter | Grass | Forb | Shrub | Vine | Total Vegetation[a] |
|---|---|---|---|---|---|---|---|---|---|
| West Slope (Cont.) | September 14 | Control | 49.0 | 12.0 | 28.7 | 9.0 | 1.0 | 0.3 | 39.0 |
| | | Fertilizer | 7.0 | 11.7 | 54.3 | 12.7 | 4.7 | 9.7 | 81.3 |
| | | Fertilizer + Seed | 33.7 | 7.0 | 32.7 | 19.0 | 0.0 | 7.7 | 59.3 |
| West Upland | April 4 | Control | 35.0 | 49.7 | 10.7 | 4.3 | 0.3 | 0.0 | 15.3 |
| | | Fertilizer | 14.3 | 65.0 | 8.0 | 11.3 | 0.7 | 0.7 | 20.7 |
| | | Fertilizer + Seed | 33.7 | 36.0 | 14.7 | 11.0 | 4.0 | 0.7 | 30.3 |
| | May 5 | Control | 28.7 | 29.7 | 36.0 | 5.0 | 0.3 | 0.3 | 41.7 |
| | | Fertilizer | 7.7 | 31.7 | 47.3 | 8.7 | 1.7 | 3.0 | 60.7 |
| | | Fertilizer + Seed | 17.7 | 13.0 | 46.3 | 16.3 | 0.7 | 6.0 | 69.3 |
| | June 29 | Control | 33.0 | 17.5 | 24.5 | 21.5 | 0.0 | 3.5 | 52.3 |
| | | Fertilizer | 8.7 | 23.0 | 49.0 | 15.7 | 1.7 | 2.0 | 68.3 |
| | | Fertilizer + Seed | 9.7 | 14.0 | 37.0 | 32.3 | 0.0 | 7.0 | 76.3 |
| | September 14 | Control | 43.0 | 7.5 | 28.0 | 19.5 | 0.0 | 1.3 | 52.7 |
| | | Fertilizer | 13.0 | 11.7 | 59.3 | 13.7 | 1.0 | 1.3 | 75.3 |
| | | Fertilizer + Seed | 16.3 | 11.3 | 47.3 | 20.0 | 0.0 | 5.0 | 72.3 |

[a] Sum of grass, forb, shrub, vine, pine, and rye cover

## 5.5 Field Observations in Seeded Areas at Two Locations Supporting Pine Seedlings, East of Pine Tree Road

Two locations selected east of Pine Tree Road had suitable areas to test the success of broadcast seeding in areas previously planted (winter 1991) with pine seedlings.

One location was on the east side of the road near the top of the hill. At this location the aboveground vegetation of the seeded area was burned prior to planting the pine seedlings.

The second location was in an old borrow pit east of Pine Tree Road about 0.5 km (0.3 mile) north of the top of the hill. The seeded area at this location was barren except for the pine seedlings.

The seed mixture broadcasted on the areas (April 1992) at these two locations was the same as the one given previously for the four selected locations in Section B (Table 3). Here the seeding was done without seed preparation or the application of fertilizer.

No cover measurements were taken in these areas, but visual estimates were made to evaluate the establishment of vegetation by broadcast seeding without seedbed preparation or the application of fertilizer in areas supporting pine seedlings.

Field observations (1992), in the seeded areas at the two locations East of Pine Tree Road, indicated that there was little or no establishment of the species included in the seed mixture. This was another indication that broadcast seeding without some type of seedbed preparation was ineffective for growth of seedlings.

Because of the observations made here and those mentioned previously concerning broadcast seeding without seedbed preparations, seeding operations after April 1992 were done by using a no-till seed drill or by broadcasting followed by tracking.

## 5.6 Field Observations in Section B after April 1992

During the Site visits in 1992, regular inspections were made in Section B (May, June, and September) to evaluate the effectiveness of the soil erosion control structures installed and the revegetation methods employed in April 1992 (4.2 First Contract).

Plant litter and sediment on the up-slope side of the waterbars indicated that runoff was slowed and that water was retained by the waterbars.

Vegetation, mainly Bermuda Grass and Bahia Grass, became established in many sections of the terrace channels.

There was evidence of runoff flow through the silt fence as noted by the accumulation of litter and sediment on the up-slope side of the silt fence.

## 5.7 Field Observations and Vegetational Monitoring of Uplands and Gentle Slopes in Sections C, D, and E

### 5.7.1 Proem

The information discussed here refers to the January 1993 rehabilitation effort (4.3 Second Contract). During this rehabilitation effort, uplands and gentle slopes of less than 10% in Sections C, D, and E received limestone and fertilizer applications and were seeded.

### 5.7.2 General Field Observations in 1993

Following the January 1993 seeding operations, there were several winter rains that apparently resulted in soil moistures that were ideal for the establishment and growth of the Cereal Rye into very thick stands. By June, the Cereal Rye was about 1 m (3.2 ft) tall, headed-out and mature. The seeded areas had the appearance of grain fields ready for harvest.

Fort Benning received below normal rainfall during the late spring and summer of 1993, hence the vegetation at the Site was under moisture stress for long periods. In areas with exposed subsoils, the Cereal Rye had very high densities, which probably prevented the establishment of other seeded species, because of shading by the Cereal Rye and its competition for soil moisture.

During the fall of 1993, there were a few small Bermuda Grass and Bahia Grass seedlings and an occasional Sericea Lespedza seedling becoming established in the drill rows of the seeded areas. In other areas that had some vegetational cover before the January 1993 seeding, the Cereal Rye stands were thinner, and there were generally more seedlings of other seeded species becoming established in drill rows. Probably, the near-normal rainfall during the late fall (1993) promoted germination of the seeded species.

By the summer of 1994, the litter of Cereal Rye was still very evident on areas seeded during January 1993 (Sections C, D, and E). Also, there were small Bahia Grass and Sericea Lespedeza plants still coming up in the drill rows (and elsewhere on the Site). Weeping Love Grass plants were evident in areas with sandy soils, and some of these plants had seed heads. On the other hand, the number of Bahia Grass, Sericea Lespedeza, and Weeping Love Grass plants appeared to be increasing with time, but generally Bermuda Grass was not observed on most seeded areas.

In reference to observations in the seeded areas of Sections C, D, and E, the dense stands of Cereal Rye followed by the drought during the summer of 1993 apparently had delayed the germination of some of the seeds of other species in the seed mixture until soil moisture conditions improved. These observations indicate that the seeding rate for Cereal Rye was too heavy, and the seeding rate of cover crops, such as Cereal Rye, in new seed applications should be reduced or omitted from of the seed mixture.

### 5.7.3 Vegetational Monitoring within the Seeded Areas of Sections C, D, and E

Six monitoring plots were established in the seeded areas to measure the effectiveness of the January 1993 seeding operations.

Three of the plots were established in areas that were barren (one plot in each Section); the other three plots were set up in areas that had some existing vegetation (one plot in each Section).

Each plot had three pairs of 10 m (32.8 ft) transects. One of transects of each pair received treatment (limestone, fertilizer, and seed mixture), while the other transect of each pair was used as a control. Thus, there were a total of 18 transects that were treated and 18 transects that were untreated (controls).

Agriculture limestone and fertilizer were applied to treated transects as described previously (4.3 Second Contract). In addition, the seed mixture and its application rate for the same transects are shown in Table 2.

Vegetational covers of the transects were measured using the point frame method (Chambers and Brown 1983). Field data were collected on five different dates: in July, September, and December 1993 and in April and May 1994.

Mean percent covers for eight categories calculated from field collected data are shown in Table 5.

**Table 5 Mean Percent Cover for Exposed Soil and Six Vegetational Components on Five Dates in Reference to the January 1993 Seeding Operations in Sections C, D, and E of the Site**

| Date | Treat-ment | n[a] | Exposed Soil | Litter | Grass | Forb | Shrub | Vine | Pine | Cereal Rye | Total Vegetation[b] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| July 1993 | Seeded | 15 | 43.3 (a)[c] | 14.5 (a) | 8.5 (a) | 10.1 (a) | 0.9 (a) | 1.9 (a) | 0.7 (a) | 20.1 (a) | 42.1 (a) |
| | Control | 15 | 56.5 (a) | 17.8 (a) | 11.3 (a) | 9.9 (a) | 0.7 (a) | 1.3 (a) | 3.2 (a) | 0.7 (b) | 27.1 (b) |
| September 1993 | Seeded | 18 | 47.1 (a) | 29.0 (a) | 11.3 (a) | 11.1 (a) | 0.7 (a) | 0.2 (a) | 0.7 (a) | 0.0 (a) | 23.9 (a) |
| | Control | 18 | 54.8 (a) | 12.3 (b) | 15.8 (a) | 14.3 (a) | 1.2 (a) | 0.2 (a) | 1.4 (a) | 0.0 (a) | 32.8 (a) |
| December 1993 | Seeded | 18 | 47.0 (a) | 39.9 (a) | 7.6 (a) | 0.9 (a) | 0.1 (a) | 0.7 (a) | 3.0 (a) | 0.9 (a) | 13.1 (a) |
| | Control | 18 | 55.4 (a) | 33.1 (a) | 6.5 (a) | 1.2 (a) | 0.6 (a) | 0.8 (a) | 2.6 (a) | 0.1 (a) | 11.7 (a) |
| April 1994 | Seeded | 18 | 39.4 (a) | 37.0 (a) | 12.1 (a) | 6.3 (a) | 0.7 (a) | 1.3 (a) | 2.3 (a) | 0.9 (a) | 23.6 (a) |
| | Control | 18 | 52.9 (a) | 20.2 (a) | 12.1 (a) | 8.6 (a) | 1.4 (a) | 1.3 (a) | 3.4 (a) | 0.0 (b) | 26.8 (a) |
| May 1994 | Seeded | 18 | 9.4 (b) | 55.2 (a) | 15.7 (a) | 10.1 (a) | 1.8 (a) | 1.1 (a) | 4.1 (a) | 2.7 (a) | 35.4 (a) |
| | Control | 18 | 36.3 (a) | 26.6 (b) | 18.2 (a) | 9.2 (a) | 2.7 (a) | 1.0 (a) | 5.9 (a) | 0.0 (a) | 37.1 (a) |

[a] Number of transects

[b] Sum of grass, forb, shrub, vine, pine, and Cereal Rye covers.

[c] Means for area, date, and cover category followed by the same letter [(a) or (b)] are not significantly different (P = 0.05) by Sidak's pairwise test.

The mean percent covers show that there was a reduction in the proportion of exposed soil on transects that were treated (limed, fertilized and seeded), but the difference was not statistically significant until May 1994.

Mean percent covers for litter were also consistently higher on the treated transects following the initial measurements made in July 1993.

Mean percent covers for all vegetational categories remain about the same throughout the monitoring period with the exception of the Cereal Rye. The initially high mean percent cover for Cereal Rye (seeded transects, July 1993) represented its standing crop. On subsequent dates, the Cereal Rye shoots are part of the litter category.

The lack of response in the grass and forb categories was probably due to the slow establishment of the seeded perennial plants. By May 1994, these plants were just becoming visible and if a point frame pin did not fall in a drill row, the presence of these species was not recorded.

As mentioned above, the information in Table 5 shows that there was a reduction in percent exposed soil as a result of the seeding efforts, and thus a reduction in the soil erosion potentials in seeded areas.

## 5.8 Field Observations of Steep Slopes in Sections D and E

### 5.8.1 Proem

This portion of the report refers to 55 ha (135 acre) of steep slopes in Areas D and E, which were limed, fertilized, and seeded in July, 1993 (paragraph 4.4, Third Contract). No plots were established to monitor the germination and development of seeded species on the steep slopes.

### 5.8.2 Field Observations

By September (1993) the Browntop Millet was only a few inches tall when it headed out probably owing to the very dry conditions during the summer. Seedlings in drill rows of were evident on many of the barren slopes.

During the following April (1994) Weeping Love Grass and Sericea Lespedeza seedlings were the most prevalent of the seeded plants. Also, it was noted at this time that most of the grass seedlings were pale yellow-green, which indicated that they needed additional fertilizer for normal growth and development.

Almost one year after the seeding operations, May 1994, small grass and legume seedlings were observed in the drill rows. Seemingly, the drought following seeding operations had delayed germination of some of the seeds until soil moisture conditions improved. This indicates that it may take one or more growing seasons beyond the planting season for some seeded plants to become established.

## 5.9 Living Silt Fences

### 5.9.1 Proem

One persistent problem at the Site (McKenna Hill Drop Zone) is the transport of sediment from the Site into adjacent areas.

Silt fences were constructed across washes along the Site boundary to reduce sediment outwash into adjacent areas. However, the silt fences became ineffective as they filled with sediment. At some locations, they were topped with sediments in less than one year.

A potential solution to this problem was to use tall native grasses as living silt fences in washes to reduce runoff water velocity and trap sediments.

### 5.9.2 Selection and Planting of Native Plants for Field Trials

Five species were selected for preliminary living silt fence trials at the Site. They were as follows:

Giant Reed (*Arundo donax*);
Marshhay Cord Grass (*Spartina patens*);
Atlantic Coastal Panic Grass (*Panicum amarulum*);
Eastern Grama Grass (*Tripsacum dactyloides*); and
Alamo Switch Grass (*Panicum virgatum*).

Arrangements were made with the USDA Plant Materials Center in Americus, Georgia, to supply Giant Reed corms and Marshhay Cord Grass transplants. Atlantic Coastal Panic Grass and Eastern Grama Grass transplants were obtained from a horticultural supplier in Florida. Transplants of Alamo Switch Grass were not available, but seeds were used instead of transplants.

During a Site visit in April 1994, test plantings of each species were made in several active washes in Section D. For the four species with available transplants, these plantings were made with different spacing between transplants and in different patterns to evaluate survival of each species, the spread of each species, and the ability of each species to reduce runoff velocity and trap sediments. Seeds of Alamo Switch Grass were broadcast onto the test area.

### 5.9.3 Field Observations in May 1994

In early May 1994, only five weeks after plantings, all Giant Reed corms were rooted and had reached average heights of about 0.5 m (2 ft). Also, many of the corms had produced several stalks.

The other transplanted species were alive, but no new growth of aerial shoots or rhizomes was observed. Furthermore, there was no evidence that the seeds of Alamo Switch Grass seed had germinated.

### 5.9.4 Field Observations in July 1994

During the two months between early May and early July 1994, the Site received a total of about 610 mm (24 in.) of rainfall, which included rain from several intense storms. Even though this amount of rainfall was considerable, Site examinations made in early July (1994) found no evidence that the seeds of Alamo Switch Grass had germinated during the three and one-half months since they were planted.

Nearly 50% of the transplants of Eastern Grama Grass had survived in good condition. But the remaining transplants were generally only in fair condition even though one plant had a seed head.

About 60% of the transplants of Marshhay Cord Grass were still visible, whereas the surviving transplants were small and showed little or no signs of new growth.

Almost 90% of the transplants of Atlantic Coastal Panic Grass survived in good condition for the most part. Many transplants had new growth and two individuals had seed heads.

All the transplants of Giant Reed survived and most individual plants were developing new stalks. New shoots on several transplants were more than 1 m (3.3 ft) in height. There was evidence in the plot with transplants on 0.3-m (1-ft) centers that runoff was slowed and that trash and sediment were trapped by new aerial shoots of the Giant Reed.

### 5.9.5 Field Observations in February 1995

A final Site inspection was conducted during February 1995; all plants at the living silt fence trails area appeared to be dormant. Two species, the Giant Reed and the Atlantic Coastal Panic Grass, were present and conspicuous at that time.

Based on almost one year of field observations, the four rows of Giant Reed, spaced on 0.3-m (1-ft) centers, appeared to be the most promising soil erosion control species in the watercourses.

Atlantic Coastal Panic Grass was the only other species in this evaluation that showed some promise, but the Giant Reed was far superior in this species evaluation.

Preliminary results here indicate that additional field testing, with additional species, should be conducted to evaluate the use of tall grasses as living silt fences to reduce runoff velocity and trap sediment.

# Section 6
# **References**

Johnson, J.H., 1983, *Soil Survey of Muscogee County, Georgia,* United States Department of Agriculture, Soil Conservation Service, United States Government Printing Office, Washington, D.C.

Chambers, J.C., and R.W. Brown, 1983, *Methods for Vegetation Sampling and Analysis on Revegetated Mined Lands,* United States Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station, General Technical Report INT-151, Ogden, Utah.