



Department of Defense Legacy Resource Management Program

LEGACY PROJECT 07-367

Clear Zone Habitat Conservation on South Carolina Airstrip

Lynn Quattro

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Clear Zone Habitat Conservation on South Carolina Airstrip

Background

There are clear regulations surrounding vegetation management at military airfields for the purpose of reducing Bird/Wildlife Aircraft Strike Hazards (BASH). At military installations, vegetation heights in both the lateral and primary clear zones must be maintained at heights between 7 and 15 inches. This height is thought to restrict use by animal species, particularly flocking birds, waterfowl, wading birds and small mammals; the first three can result in significant BASH hazards and all can increase predator activity, especially by large birds of prey. Further, a great deal of research has been conducted to determine appropriate vegetation types that can be maintained at appropriate heights while providing poor habitat for wildlife species that are considered hazardous species. In order to comply with the regulations, non-native grass species have been used in clear zones; these generally allow for a monoculture of the desired species and are generally poor habitat for native animal species.

However, the potential for non-native grasses to spread can result in habitat degradation in areas outside of the clear zone. The Department of Defense desires to reduce the spread of non-native species on its facilities where possible. Further, native grasses planted in the clear zone may reduce maintenance costs because several native forbs maintain heights within the optimal range. Those that do grow taller than 15 inches do so at a slower rate than some of the non-native grasses; even if mowing is required, it is likely to be required fewer times during the growing season.

The airfield at McEntire Air National Guard Station currently has three runways; two of these are active and one is inactive. The inactive runway provides an opportunity to test two methods for replacing non-native grasses with native vegetation without impacting operations at the installation.

The clear zone at McEntire Air National Guard Station's airfield is planted mainly in Bahia grass with a few other non-native herbaceous plants; however, there are several native grasses and herbaceous plants scattered throughout this zone. A number of bird species have been observed using the grassland in the clear zone.

A concern surrounding native grasses is that they will attract wildlife species that could increase BASH at military installations. We feel that it could be possible to maintain a clear zone in native plants that attract small bird and mammal species while not increasing predator activity. However, this hypothesis needs to be tested; the inactive runway at McEntire allows for testing with little impact to ongoing military operations at the facility. Information gathered and lessons learned at McEntire could be utilized at other facilities within the southeast.

Recently, the South Carolina Department of Natural Resources (SCDNR) completed the state's Comprehensive Wildlife Conservation Strategy (CWCS) (also referred to as the Wildlife Action Plan in other states) which identifies species of conservation concern (also known as "priority species") within the state and provides conservation strategies that can be implemented to assist these species. Reduction of non-native species throughout the state is identified as a "Highest Priority" in the CWCS. Further, native grasslands, which provide habitat for a variety of priority species in the strategy, have been declining steadily over recent years. Any efforts to restore native grasslands would assist the DNR in protecting priority species and their habitats and meet objectives identified in the CWCS. These efforts

will simultaneously aid the Department of Defense and airfield managers concerned with B.A.S.H. (Bird Aircraft Strike Hazard) issues.

Objective:

This project proposes to use the inactive north/south runway at McEntire ANG Station as an experimental area to determine the success of two different methods of restoring native grassland communities in the clear zone. Other areas situated on McEntire can act as control areas.

We will document the occurrence (diversity and abundance) of birds using the abandoned airfield sections of McEntire ANG Station in the breeding and wintering seasons.

We will provide the Department of Defense Legacy Program, McEntire ANG Management, SC Department of Natural Resources and other interested parties information relative to the effects of airfield grassland management on bird occurrence.

Summary of Approach:

This project proposes to use the inactive north/south runway at McEntire ANG Station as an experimental area to determine the success of two different methods of restoring native grassland communities in the clear zone. Other areas situated on McEntire can act as control areas.

First, biological surveys will be conducted for native plants and birds. The plant survey will be conducted throughout the base to get a better understanding of all vegetative communities on the facility and the native seedbanks available on site. Dr. John Nelson of the University of South Carolina will conduct the plant surveys. These surveys are proposed to begin in the spring of 2007 and continue throughout each season.

Standard bird surveys will be conducted throughout the year to determine productivity and abundance in response to habitat manipulations and potential of BASH strikes. The first surveys will be conducted in late winter 2007 potentially utilizing flush counts to determine winter species abundance. The final pre-treatment bird surveys will also be conducted in spring 2007 and early summer 2007. The area will be surveyed using point-transect counts (breeding) and flush counts (winter). We will focus on identifying species of high conservation concern in South Carolina (e.g. Henslow's, grasshopper, LeConte's sparrows; Eastern meadowlark, Northern bobwhite quail) to ascertain the conservation value of airfield grassland management. We will also focus on recording the behavior (flocking, non-flocking, soaring) behavior of birds to ascertain BASH potential. After habitat treatments have been implemented, the same experimental design and types of surveys to measure bird response will continue. Further, these surveys will investigate the potential for BASH by observing whether species associated with increased BASH (birds of prey, geese, egrets, etc.) are present in greater or lesser numbers. Surveys will be conducted both on the inactive north/south and the main runway. The majority of the bird survey work will be part of the requirements for a M.S. degree.

Benefit:

The results of this research will provide scientific information and management –oriented data that will help the Department of Defense and private personnel understand how airfield management has the potential to affect both BASH. and the conservation of imperiled species.

Accomplishments:

Plant Survey

Vascular plants were studied at McEntire Air National Guard Base, located in eastern Richland County, South Carolina for one growing season, from November 2007- November 2008. 314 species are vouchered and/or predicted. Of these, 218 are vouchered by a formal collection, housed at the A. C. Moore Herbarium at the University of South Carolina. Of these, 176 are native, and 42 are introduced. An additional 96 species are "predicted" and not observed during the study, or seen during the study, but not collected. Of the overall list generated within this project, 262 are native and 52 are introduced. The accompanying list separates pteridophytes (ferns), gymnosperms (conifers) and flowering plants.

Bird Survey

To date we have conducted survey over 2 breeding seasons (2007-2008) and 2 winter seasons (2007-2008). During the breeding season (May-July) counts we recorded six species that are of highest conservation priority for South Carolina. These species included the following birds: Henslow's sparrow, grasshopper sparrow, Northern bobwhite, loggerhead shrike, American kestrel and Eastern meadowlark. During the two years of survey, our observations point to several trends (that will be analyzed for statistical significance) which bear watching.

1. Breeding bird abundance and diversity was greater than winter (seasonal considerations for BASH as more birds may be present in the spring and summer months))
2. Flocking species (e.g. red-winged blackbirds) may present greater BASH than soarers (e.g. raptors such as red-tailed hawks) based upon abundance
3. The proximity of other habitats (such as ponds and forested areas) as attractant for potential hazards must be considered
4. The areas undergoing restorative work are showing great potential to harbor grassland species of highest priority (6 of 7 species defined as such [see above narrative] in the SC-Comprehensive Wildlife Conservation Strategy were found at McEntire ANG Station)

Issues with the research that need to be addressed in future efforts such as that requested here are:

1. Some management activities (mowing) may have introduced some within treatment bias (habitat manipulation)
2. Some cryptic species may have been difficult to detect (sparrows) and thus may have been overlooked during surveys
3. The small size of the treatment area and lack of site replication may preclude the most rigorous statistical analyses

Prospectus for 2008 Funding “Clear Zone Habitat Conservation for Grassland Birds at the McEntire Air National Guard Station”

Submitted by: J. Drew Lanham, PhD (Principal Investigator), Clemson Univ., Dept. of Forest Resources

Previous studies at the McEntire Air National Guard Station in Eastover, SC have shown that grasslands around airfields have the great capacity to harbor sensitive species of grassland birds. In 2007-2008, we found 6 of 7 Highest Priority Grassland birds occurring on or proximate to the abandoned airfields at McEntire. Moreover, we found that when considering BASH issues, that more species of birds and greater abundances of birds were recorded during the breeding seasons. This may lead airfield managers to think more critically about the potential for seasonality and BASH.

Although our study to date has elucidated several factors we deem important for both bird conservation and BASH consideration, the management implications for our results are limited by a number of factors including:

1. Lack of site (airfield) replication to ascertain potential differences in bird abundance and diversity as affected by management strategies, airfield size, proximate landscape features
2. Lack of control over management implementation which introduced variation into a single site survey thus potentially confounding observations between experimental and control sites

Therefore, we propose that in the second year of this study, that we be funded to allow an expansion of the project to include more airfields (both military and private) which will in effect increase sample size and our ability to discern differences in airfield grassland management and any impacts on bird communities or BASH potential.

This project proposes to survey active and inactive airfields for birds using grassland habitats. We will contact and select 10-12 airfields (military and private) across South Carolina. These areas will be surveyed using point-transect counts (breeding) and flush counts (winter). We will focus on identifying species of high conservation concern in South Carolina (e.g. Henslow's, grasshopper, LeConte's sparrows; Eastern meadowlark, Northern bobwhite quail) to ascertain the conservation value of airfield grassland management. We will also focus on recording the behavior (flocking, non-flocking, soaring) behavior of birds to ascertain BASH potential.

Funding secured will be used in the following categories:

Graduate Student or technician salary \$14,000.00 (*may have to add in Graduate Asst. Differential-Tuition—if grad student is hired instead of a technician*)

Travel	\$6,000.00
Supplies	\$5,000.00

Contact Information:

Dr. J. Drew Lanham
Clemson University
Department of Forestry and Natural Resources
261 Lehotsky Hall
Clemson, SC 29634
Phone: (864)656-7294
Fax: (864) 656-3304
Email: lanhamj@clemson.edu

Study Site



- Research conducted at McEntire ANGS
- Clear zone near inactive runway #1836
- Located south of Columbia, SC

Study Site cont'd

- Burning occurred in May 2008
- Mowing during the summer
- Photos taken Feb 2009



Survey cont'd

- Photos taken Feb 2009



**VASCULAR PLANT LIST
OF McENTIRE AIR NATIONAL GUARD STATION,
RICHLAND COUNTY, SOUTH CAROLINA**

**John B. Nelson
3801 Duncan Street
Columbia SC 29208**

Preliminary Results, December 2008

Vascular plants were studied at McEntire Air National Guard Station, located in eastern Richland County, South Carolina for one growing season, from November 2007- November 2008. 314 species are vouchered and/or predicted. Of these, 218 are vouchered by a formal collection, housed at the A. C. Moore Herbarium at the University of South Carolina. Of these, 176 are native, and 42 are introduced. An additional 96 species are "predicted" and not observed during the study, or seen during the study, but not collected. Of the overall list generated within this project, 262 are native and 52 are introduced.

The accompanying list separates pteridophytes (ferns), gymnosperms (conifers) and flowering plants. The nomenclature of the genera and species largely follows that of Weakley 2007 (<http://www.herbarium.unc.edu/WeakleysFlora.pdf>), but follows the family taxonomy provided by Radford 1968 (Radford, A. E., H. Ahles, and C. R. Bell, Manual of the Flora of the Carolinas, Chapel Hill, UNC Press). Families are indicated in all caps, with the common name. Taxa are listed alphabetically. Italicized entries are predicted plants, or those seen but not collected. Each listing of a vouchered collection includes scientific name, common name, notes on abundance and habitat, and collection number. Names in **bold** are introduced species.

PTERIDOPHYTES:

ASPLENIACEAE Spleenwort family

Asplenium platyneuron (L.) B.S.P. "Ebony spleenwort"
Common-abundant, sandy woods and creek margins
26473

BLECHNACEAE ***Chain-fern family***

Woodwardia areolata (Linnaeus) T. Moore, Netted Chain Fern

DENNSTAEDTIACEAE ***Bracken family***

Pteridium aquilinum (Linnaeus) Kuhn var. ***pseudocaudatum*** (Clute) Heller, Tailed Bracken

DRYOPTERIDACEAE Wood-fern family

Athyrium asplenioides (Walt.) Tuckerm. "Wood-fern"
Occasional-common in shady woods along streams
26801

Polystichum acrostichoides (Michaux) Schott, Christmas Fern

OSMUNDACEAE Osmunda family

Osmunda cinnamomea L. "Cinnamon fern"
Occasional, shady wet ground along blackwater creeks
26524, 26881

Osmunda regalis L. var. *spectabilis* (Willd.) Gray "Royal fern"
Occasional-common, shady wet ground or upland woods
26524, 26643

GYMNOSPERMS:

CUPRESSACEAE Cypress family

Juniperus virginiana Linnaeus var. *virginiana*, Eastern Red Cedar

PINACEAE Pine family

Pinus echinata P. Miller, Shortleaf Pine
Pinus elliottii Engelman var. *elliottii*, Slash Pine
Pinus taeda Linnaeus, Loblolly Pine

FLOWERING PLANTS ("Monocots"):

ARACEAE Philodendron family

Orontium aquaticum L. "Never-wet"
Rare, along black-water streams
26640

Peltandra virginica (L.) Schott
Occasional-common, shady wet woods
26648

COMMELINACEAE Dayflower family

Commelina erecta Linnaeus var. *angustifolia* (Michaux) Fernald, Sand Dayflower

Murdannia keisak (Hassk.) Hand-Mazz. "Mudflower"
Occasional, restricted to wetlands usually in dense patches
26797

CYPERACEAE Sedge family

Carex albolutescens Schweintiz
Occasional-common in lawns, damp places, roadsides
26511, 26628

Carex caroliniana Schweinitz
Occasional in dry woods, sandy places
26510, 26600

Carex debilis Michx.
Occasional-common in shady wet woods
26644

Carex festucacea Schkuhr
Occasional in wet woods
26526

Carex fissa Mack.
Occasional, Carolina bays and damp lawns
26612

Carex lonchocarpa Willd.
Occasional in wet woods
26530, 26649

Carex lurida Wahl.
Occasional in wet woods
26529, 26647

Carex seorsa Howe in Gord. & Howe
Occasional-common in wet woods, stream margins
26645

Cyperus echinatus (L.) A. Wood "Globe flatsedge"
Common on damp ground, especially near ditches, pond margins
26879

Cyperus esculentus L. var. *macrostachyus* Boeckl. "Yellow nutsedge"
Rare (?), seen once in a damp, open field
26866

Cyperus pseudovegetus Steudel
Occasional in wetlands, damp lawns
26627, 26769

Cyperus rotundus L. "Purple nutsedge"
Occasional-common in damp fields
26868

Eleocharis acicularis (L.) R. & S. "Needle spikerush"
Common wetland, locally abundant in ponds
26788

Eleocharis obtusa (Willd.) Schultes
Occasional-abundant in open wet places

26625

Fimbristylis autumnalis (L.) R. & S. "Autumn rush"
Locally very abundant on drying pond silt
26780, 26888

Fuirena pumila (Torr.) Sprengel "Dwarf umbrella-sedge"
Occasional on damp sandy-peaty ground near streams
26887

Rhynchospora gracilentata Gray
Common-rare, on damp ground near streams
26886

Rhynchospora recognita (Gale) Kral
Occasional in wetlands, Carolina bays
26621

IRIDACEAE Iris family

Iris virginica L. "Blue flag"
Rare, swampy places
26521

Sisyrinchium rosulatum Bickn. "Annual blue-eyed grass"
Occasional-common, in lawns, open places
26514

JUNCACEAE Rush family

Juncus biflorus Ell.
Common-abundant, damp ground of wetlands, Carolina bays, lawns
26620, 26626

Juncus diffusissimus Buckl.
Occasional, wet places and Carolina bays
26624

Juncus effusus L. var. *solutus* (Fern. & Wieg.) Haem.-Ahti "Pond rush"
Occasional-abundant, wet places
26623

LILIACEAE Lily family

Allium canadense L. var. *canadense* "Wild onion"
Common-abundant in lawns, open roadsides
26610

Smilax glauca Walter, Whiteleaf Greenbrier

Smilax rotundifolia L. "Roundleaf catbriar"
Occasional in wet woods
26503

ORCHIDACEAE Orchid family

Spiranthes vernalis Engelm. & Grau "Spring ladies'-tresses"
Occasional in wet lawns, wetland margins
26605, 26622

Tipularia discolor (Pursh) Nuttall, Crane-fly Orchid

POACEAE Grass family

Agrostis perennans (Walt.) Tuckerman "Upland bentgrass"
Occasional-common, roadsides, lawns
26485, 26800

***Aira elegantissima* Schur "Elegant hair-grass"**
Common-abundant, roadsides, fields and lawns; benign (?) introduction
26427

Andropogon ternarius Michx. "Split stem beard-grass"
Common-abundant, a major component of fields
26413, 26863

Aristida longespica Poir. "Three-awn grass"
Occasional-common; dry woods, fields
26411

Aristida purpurascens Poir. "Arrowfeather three-awn grass"
Common in open lawns, fields, dry woods
26864, 26877

Arundinaria gigantea (Walt.) Muhl. "Switchcane"
Common near wet places
26499

***Bothriochloa ischaemum* (L.) Keng var. *songerica* (Rup.) Cal. & Har. "Old-world bluestem"**
Occasional-rare, newly reported for South Carolina; occurring at McEntire in lawns, pavement cracks of old runways
26598, 26618

***Bromus catharticus* Vahl "Rescue grass"**
Common and weedy, South American introduction
26452, 26615

***Bromus commutatus* Schrader "Hairy chess"**
Occasional and weedy, lawns

26614

Chasmanthium laxum (L.) Yates "Slender woodoats"
Common in wet woods, along stream banks
26883

***Cynodon dactylon* (L.) Pers. "Coastal bermudagrass"**
Extremely abundant and a major member of lawns; introduced, very weedy, but commonly grown intentionally
26410, 26860

Dichantherium dichotomum (L.) Gould var. *nitidum* (Lam.) LeBlonde "Shining witch grass"
Common-abundant, wet woods and stream banks
26646, 26795, 26889

Dichantherium meridionale (Ashe) Freckm.
Occasional-common? Damp ground, open lawns near Carolina bays
26603

Eragrostis hirsuta (Michx.) Nees
Common in upland woods and sandy places
26747

Eragrostis lugens Nees "Mourning love grass"
Occasional on open grassy fields
26851

Eragrostis spectabilis (Pursh) Steudel "Large love grass"
Occasional-common in open sandy woods, disturbed places
26740

***Eustachys retusa* (Lag. & Seg.) Kunth "Argentine finger-grass"**
open grassy fields, lawns, common?
26409, 26617

Glyceria striata (Lam.) Hitchcock "Fowl grass"
Occasional, wet woods
26527

***Hordeum pusillum* Nutt. "Little barley"**
Common on roadsides, in lawns
26501

***Lolium perenne* L. "English ryegrass"**
Common and weedy in lawns and on roadsides
26471

***Microstegium vimineum* (Trin.) Camus "Nasty-grass"**
Common and invasive, shady woods along creek margins
26789

Panicum dichotomiflorum Michx. "Fall panic-grass"
Occasional in wetlands, especially pond margins
26785

***Paspalum dilatatum* Poir. "Dallis grass"**
Abundant and widespread in lawns, a dominant groundcover
26750

Paspalum dissectum (L.) L. "Mudgrass"
Abundant, restricted to drying pond silt
26768

***Paspalum notatum* Fluegge "Bahia grass"**
Probably the most common plant at McEntire, in terms of aerial coverage; naturalized in lawns and open places
26597, 26857

Piptochaetium avenaceum (L.) Parodi "Blackseed speargrass"
Occasional clump-forming perennial, woodlands
26440

***Schedonorus arundinaceus* (Schreb.) Dum. "Tall fescue"**
Abundant, fields, roadsides, lawns; introduced and naturalized, valued as a forage crop
26425, 26504, 26616

***Secale cereale* L. "Cereal rye"**
Occasional; roadsides and fields, introduced for stabilization
26436

***Setaria parviflora* (Poir.) Herg. "Foxtail"**
Common-abundant, upland woods and sunny borders
26746

Sorghastrum nutans (L.) Nash "Indian-grass"
Occasional-uncommon; a tall bunch-grass, very conspicuous in dry woods and fields
26412

Steinchisma hians (Ell.) Nash "Gaping grass"
Occasional, open lawns
26630

Urochloa platyphylla (Munro ex Wright) Webster "Broadleaf signalgrass"
Occasional in weedy places, drying pond silt
26773

***Vulpia octoflora* (Walt.) Rydb. "Six-weeks fescue"**
Occasional-abundant, a regular feature of lawns and roadsides
26429, 26505

XYRIDACEAE Yellow-eyed grass family

Xyris jupicai L. C. Rich.
Occasional, shady wet woods along stream margins
26793

FLOWERING PLANTS ("Dicots"):

ACANTHACEAE *Acanthus family*

Ruellia caroliniensis (J.F. Gmelin) Steudel, Carolina Wild-petunia

ACERACEAE *Maple family*

Acer negundo Linnaeus var. *negundo*, Eastern Box Elder
Acer rubrum Linnaeus var. *rubrum*, Eastern Red Maple

AMARANTHACEAE *Pigweed family*

Amaranthus spinosus Linnaeus, Spiny Amaranth

ANACARDIACEAE Cashew family

Rhus aromatica Ait. "Fragrant sumac"
Rare, sandy woods
26468

Rhus copallinum Linnaeus var. *copallinum*, Winged Sumac

Toxicodendron pubescens P. Miller, Poison Oak
Toxicodendron radicans (Linnaeus) Kuntze var. *radicans*, Eastern Poison Ivy

APIACEAE Carrot family

Chaerophyllum tainturieri Hooker "Hairfruit chervil"
Occasional and weedy on damp ground,
26465

Daucus pusillus Michx. "Wild carrot"
Uncommon in lawns, disturbed places
26613

Sanicula canadensis L. var. *floridana* (Bickn.) Wolf "Snakeroot"
Occasional in shady, upland woods
26642

Spermolepis divaricata (Walter) Rafinesque ex Seringe, Southern Spermolepis
Thaspium barbinode (Michaux) Nuttall

APOCYNACEAE Dogbane family

Apocynum cannabinum L. "Dogbane"
Occasional in upland woods, dry borders
26754

AQUIFOLIACEAE ***Holly family***

Ilex coriacea (Pursh) Chapman, Big Gallberry
Ilex decidua Walter var. *decidua*, Possum-haw
Ilex opaca Aiton var. *opaca*, American Holly

ARALIACEAE ***Ivy family***

Aralia spinosa Linnaeus, Devil's-walking-stick

ARISTOLOCHIACEAE Birthwort family

Endodeca serpentaria (L.) Raf. "Virginia snakeroot"
Occasional-rare in oak-hickory woods
26875

Hexastylis arifolia (Michx.) Small "Wild ginger"
Occasional in shady woods, stream banks
26523

ASTERACEAE Sunflower family

Ambrosia artemisiifolia L. "Common ragweed"
Abundant in sunny, open places, lawns, disturbed ground
26749

Baccharis halimifolia Linnaeus, Silverling

Bidens bipinnata L. "Spanish needles"
Occasional, weedy open places, powerline r.o.ws, roadside
26741

Brickelleia eupatorioides (L.) Shinnars "False boneset"
Occasional-rare, damp lawns, Carolina bays
26859

Cirsium horridulum Michx. "Bull thistle"
Occasional-common in lawns, fields, open roadsides
26456

Conoclinium coelestinum (L.) DC. "Mistflower"
Rare, in shady woods along stream banks
26804

Conyza canadensis (L.) Cronq. "Horseweed"
Common in open borders and weedy places
26748

***Crepis pulchra* L. "Smallflower hawksbeard"**
Rare, a single large population seen on powerline r.o.w.
26507

Croptilon divaricatum (Nuttall) Rafinesque, Scratch-daisy

Eclipta prostrata (L.) L. "Yerba de Tajo"
Occasional, locally abundant on drying pond silt
26771, 26874

Elephantopus tomentosus L. "Elephant's foot"
Occasional in shady, damp woods
26791

Erigeron strigosus Muhl. ex Willd. "Fleabane"
Common and somewhat weedy, lawns and fields
26508, 26602

Eupatorium capillifolium (L.) Small "Dog fennel"
Common in open settings, old fields and ditches
26880

Eupatorium hyssopifolium Michx. "Hyssop-leaved boneset"
open grassy fields, occasional
26406, 26858

Eutrochium dubium (Willd.) Lamont "Joe-pye weed"
Rare, restricted to damp streams
26884

***Facelis retusa* (Lam.) Schultz-Bip. "Trampweed"**
Introduced from South America; weedy in lawns, roadsides
26459

Gamochaeta pensylvanica (Willd.) Cabrero "Rabbit tobacco"
Occasional-common, roadsides, weedy places
26438

Gamochaeta purpurea (L.) Cabr. "Rabbit tobacco"
Common on sandy, weedy ground
26764

Helenium amarum (Rafinesque) H. Rock var. *amarum*, Bitterweed

Heterotheca latifolia Buckl. "Camphorweed"
Common in open field, woods borders, roadsides

26753

Hypochoeris glabra L. "Smooth cat's-ear"
Occasional and weedy, lawns and roadsides
26506

Hypochoeris radicata L. "Common cat's-ear"
Common-abundant, weedy on roadsides, in lawns
26439

Krigia cespitosa (Raf.) Chambers var. *cespitosa* "Dwarf dandelion"
Common, roadsides and lawns
26472

Lactuca canadensis L. "Canada wild lettuce"
Occasional and weedy, borders and lawns
26608, 26619

Lactuca graminifolia Michx. "Grass-leaved lettuce"
Occasional in weedy places, lawns
26610

Lactuca hirsuta Muhl. ex Willd. "Wild lettuce"
open grassy fields, occasional-uncommon
26408

Mikania scandens (L.) Willd. "Climbing hemp"
Occasional in damp woods, usually on stream or pond margins
26794

Packera anonyma (Wood) Web. & Love "Sneezeweed"
Occasional on roadsides, powerline r.o.w.s, sometimes abundant
26476

Packera glabella (Poir.) C. Jeffr. "Butterweed"
Occasional, wet/damp places, stream margins
26441, 26477

Pityopsis graminifolia (Michx.) Nutt. "Grass-leaved goldenaster"
Common on sandy uplands, roadsides
26758

Pluchea camphorata (L.) DC. "Marsh fleabane"
Locally abundant on drying pond silt
26770

Pyrrhopappus carolinianus (Walt.) DC. "False dandelion"
Occasional-common, lawns and open places
26609

***Sericocarpus asteroides* (Linnaeus) Britton, Sterns, & Poggenburg, Toothed White-topped Aster**

Solidago altissima L. "Tall goldenrod"
Occasional-common in open fields, woods margins
26856

Solidago canadensis L. "Canada goldenrod"
Common in sandy upland woods, open lawns
26752

Solidago nemoralis Ait. "Old-field goldenrod"
Common in upland woodlands and open fields
26878

Solidago ulmifolia Muhl. ex Willd. "Elm-leaved goldenrod"
Occasional-rare on open grassy lawns, ditch edges
26861

Soliva sessilis Ruiz & Pavón, Field Burweed

***Sonchus asper* (L.) Hill "Spiny sowthistle"**
Occasional-common in weedy places, roadsides
26455

Symphotrichum dumosus (L.) Nesom "Frostflower"
open grassy fields, forest margins, occasional-common (abundant?)
26407, 26885

Taraxacum officinale G.H. Weber ex Wiggers, Common Dandelion

Verbesina occidentalis (L.) Walt. "Yellow crownbeard"
Rare, seen in shady woods along stream margin
26792

***Youngia japonica* (L.) DC. "Oriental false hawksbeard"**
Weedy in open disturbed places, lawns
26458

BETULACEAE* *Birch family

Alnus serrulata (Aiton) Willdenow, Tag Alder

BIGNONIACEAE* *Crossvine family

Bignonia capreolata Linnaeus, Cross-vine
Campsis radicans (Linnaeus) Seemann ex Bureau, Trumpet-creeper

BORAGINACEAE* *Forget-me-not family

***Heliotropium amplexicaule* Vahl "Blue heliotrope"**
Common and weedy, open places and lawns

26633

BRASSICACEAE Mustard family

***Arabidopsis thaliana* (L.) Heynh. "Mouse cress"**
Common and often overlooked, naturalized from Europe
26493

***Capsella bursa-pastoris* (Linnaeus) Medikus, Common Shepherd's Purse**

Cardamine hirsuta L. "Hairy bittercress"
Common, weedy on roadsides and lawns
26461

Lepidium virginicum L. "Poor man's pepper"
Common-abundant, weedy on roadsides, in lawns, disturbed places
26437

***Raphanus raphanistrum* "Wild radish"**
Common in disturbed places, annual introduction from Europe
26469

CACTACEAE Cactus family

Opuntia humifusa (Raf.) Raf. "Common prickly-pear"
Occasional-common on open sandy ground
26890

CAMPANULACEAE Bluebell family

Lobelia nuttallii Schultes "Nuttall's lobelia"
Occasional, open wetlands, Carolina bays
26606

Lobelia puberula Michx. "Downy lobelia"
Occasional in upland woods
26761

Triodanis perfoliata (L.) Nieuwl. "Venus' looking-glass"
Occasional-common, roadsides, lawns and sandy places
26494

***Wahlenbergia marginata* (Thunberg) Alphonse de Candolle**

CAPRIFOLIACEAE Honeysuckle family

***Lonicera japonica* Thunberg, Japanese Honeysuckle**

Lonicera sempervirens L. "Scarlet honeysuckle"
Occasional; woodlands
26430

Sambucus canadensis L. "Elderberry"
Occasional shrubs, damp grounds and borders
26634

Viburnum nudum L. "Nannyberry"
Occasional in wet woods, stream margins
26522

CARYOPHYLLACEAE Pink family

Cerastium glomeratum Thuillier, Sticky Mouse-ear

Silene caroliniana Walter "Carolina pink"
Rare; sandy woods
26448

Stellaria media (Linnaeus) Villars, Common Chickweed

CELASTRACEAE Wahoo family

Euonymus americanus L. "Strawberry bush"
Rare, damp woods or oak-hickory slopes
26796

CHENOPODIACEAE Goosefoot family

Dysphania ambrosioides (Linnaeus) Mosyakin & Clemants, Mexican-tea

CISTACEAE Rockrose family

Crocanthemum carolinianum (Walt.) Spach "Carolina frostweed"
Rare, sandy woods
26467

CLETHRACEAE *Clethra* family

Clethra alnifolia Linnaeus, Coastal White-alder

CONVOLVULACEAE Morning-glory family

Cuscuta compacta Juss. ex Choiss. "Dodder"
Occasional, parasitic on a variety of herbs and shrubs
26799

Dichondra carolinensis Michx. "Carolina ponyfoot"
Occasional, probably overlooked, in lawns, disturbed places
26502

Ipomoea cordatotriloba Dennst. "White morning-glory"
Occasional and weedy in a variety of upland habitats

26787

Ipomoea lacunosa L. "Small white morning-glory"
Common-occasional on ditch lines, open fields

26872

Ipomoea hederacea Jacq. "Ivy-leaf morning-glory"
Occasional, scattered in open fields

26869

Ipomoea hederifolia L. "Ivy-leaf morning-glory"
Rare, seen along a weedy ditch margin in an open field; rare in SC...northern limit?

26867

Jacquemontia tamnifolia (Linnaeus) Grisebach, Jacquemontia
Stylisma humistrata (Walter) Chapman, Southern Dawnflower

CORNACEAE Dogwood family

Cornus florida L. "Flowering dogwood"
Occasional-common, understory tree in peripheral woods surrounding base

26466

Cornus stricta Lamarck, Southern Swamp Dogwood

CUCURBITACEAE Melon family

Melothria pendula Linnaeus var. *pendula*, Melonette

CYRILLACEAE Ti-Ti family

Cyrilla racemiflora Linnaeus, Ti-ti

EBENACEAE Ebony family

Diospyros virginiana Linnaeus, American Persimmon

ERICACEAE Heath family

Chimaphila maculata (Linnaeus) Pursh, Pipsissewa
Eubotrys racemosa (Linnaeus) Nuttall, Coastal Fetterbush
Gaylussacia frondosa (Linnaeus) Torrey & A. Gray ex Torrey, Dangleberry

Leucothoe axillaris (Lam.) D. Don "Dog hobble"
Common and abundant, restricted to shady wet woods along stream margins

26803

Lyonia lucida (Lamarck) K. Koch, Shining Fetterbush
Oxydendrum arboreum (Linnaeus) Augustin de Candolle, Sourwood
Rhododendron canescens (Michaux) Sweet, Piedmont Azalea
Vaccinium arboreum Marshall, Farkleberry

Vaccinium corymbosum Linnaeus, Smooth Highbush Blueberry
Vaccinium stamineum Linnaeus var. *stamineum*, Common Deerberry

EUPHORBIACEAE Spurge family

Acalypha rhomboidea L. "Three-winged mercury"
Common in weedy settings on upland sites
26763

Chamaesyce nutans (Lag. & Seg.) Small "Eyebane"
Common on packed sand, open fields, and pavement edges
26870

Chamaesyce prostrata (Ait.) Small
Occasional-common on damp ground, drying pond edge
26782

Cnidoscolus stimulosus (Michaux) Engelman & A. Gray, Spurge-nettle

***Croton glandulosus* L. var. *septentrionalis* Muell-Arg.**
Occasional and weedy in open, sandy places
26756

Euphorbia curtissii Engelm. "Curtis' spurge"
Occasional in dry woods
26516

FABACEAE Bean family

Baptisia alba (L.) Vent. "White wild indigo"
Occasional-rare, woodlands
26517

Centrosema virginianum (Linnaeus) Bentham, Spurred Butterfly Pea

Chamaecrista fasciculata (Michx.) Greene "Partridge pea"
Occasional-common on roadsides, open woods borders
26744

Crotalaria spectabilis Roth, Showy Rattlebox

Desmodium strictum (Pursh) DC. "Beggar-ticks"
Occasional on sandy soils, oak-hickory woods
26765

Erythrina herbacea L. "Cherokee bean"
Rare, a single plant seen; anomalous occurrence this far inland!
26520

Galactia regularis (Linnaeus) Britton, Sterns, & Poggenburg

Glottidium vesicarium (Jacq.) Harper "Bladderpod"
Rare, restricted to open wetlands, pond margins
26779

Kummerhowia stipulacea (Max.) Schindl. "Korean clover"
Common (?) on roadsides, dry fields, and pavement edges
26871

Lespedeza cuneata (Dum.) G. Don "Highway lespedeza"
Common and weedy, borders and roadsides
26743

Lespedeza hirta (L.) Hornem. Var. curtissii (Clewel) Isely "Hairy lespedeza"
Occasional-common on brushy lawns
26855

Lespedeza violacea (L.) Pers. "Purple lespedeza"
Occasional, open woods
26742

Medicago lupulina Linnaeus, Black Medick
Pueraria montana (Loureiro) Merritt var. *lobata* (Willdenow) van der Maesen & S. Almeida,
Kudzu

Robinia pseudoacacia L. "Black locust"
Uncommon-rare, locally abundant near main entrance in woods
26474

Senna obtusifolia (L.) Irwin & Barn. "Coffee weed"
Occasional and weedy, in a variety of habitats, always in sun
26786

Strophostyles umbellata (Muhl.) Britt. "Sand bean"
Rare on sandy ground, woods borders
26759

Stylosanthes biflora (Linnaeus) Britton, Sterns, & Poggenburg, Pencil-flower
Tephrosia virginiana (Linnaeus) Persoon, Virginia Goat's-rue

Trifolium arvense L. "Rabbitfoot clover"
Common in lawns, waste places
26515

Trifolium campestre Schreber "Yellow clover"
Occasional-common, weedy on roadsides, in lawns, and disturbed places
26445

Trifolium repens L. "White clover"
Common-abundant, naturalized in lawns and weedy places
26496

Vicia sativa Linnaeus ssp. *nigra* (Linnaeus) Ehrhart, Narrowleaf Vetch

***Vicia tetrasperma* (L.) Moench "Lentil vetch"**
Occasional, weedy places; introduced for soil improvement
26451

***Wisteria sinensis* (Sims) DC. "Wisteria"**
Occasional at old home sites, woody vine
26447

FAGACEAE **Oak family**

Quercus alba Linnaeus, White Oak
Quercus falcata Michaux, Spanish Oak
Quercus hemisphaerica Bartram ex Willdenow, Sand Laurel Oak
Quercus marilandica Muenchhausen var. *marilandica*, Blackjack Oak
Quercus nigra Linnaeus, Water Oak
Quercus phellos Linnaeus, Willow Oak
Quercus stellata Wangenheim, Post Oak

FUMARIACEAE Fumitory family

***Fumaria officinalis* L. "Ground-smoke"**
Occasional-rare; lawns, disturbed places
26442

GERANIACEAE Geranium family

Geranium carolinianum L. "Carolina geranium"
Common and weedy, roadsides, disturbed places, and lawns
26434, 26495

HAMAMELIDACEAE **Witch-hazel family**

Liquidambar styraciflua Linnaeus, Sweet Gum

HYPERICACEAE Hypericum family

Hypericum drummondii (Grev. & Hook.) Torr. & Gray "Nits and lice"
Occasional on open, disturbed areas, lawns
26632, 26854

Hypericum gentianoides (L.) B.S.P. "Orange-grass"
Common on open sandy ground, in lawns and roadsides
26853

Hypericum hypericoides (L.) Crantz "St. Andrew's cross"
Common in dry woods
26760, 27798

Triadenum walteri (Gmel.) Gleason "Marsh St. Johns wort"
Occasional in shady woods at stream banks
26802

JUGLANDACEAE Hickory family

Carya glabra (P. Miller) Sweet var. *glabra*, Pignut Hickory

Carya tomentosa (Lam. ex Poir.) Nutt. "Mockernut hickory"
Common in upland woodlands
26876

LAMIACEAE Mint family

Clinopodium georgianum Harper "Georgia savory"
Rare, restricted to shady oak-hickory woods on southwest side of base
26805

Hedeoma hispida Pursh "Wild pennyroyal"
Rare, somewhat weedy-introduced from farther west?
26454, 26631

***Lamium amplexicaule* L. "Henbit"**
Common and weedy, lawns and roadsides
26446

Pycnanthemum flexuosum (Walt.) B.S.P. "Coastal mountain-mint"
Rare, wet lawns and Carolina bays
26607

Salvia lyrata Linnaeus, Lyreleaf Sage

Scutellaria elliptica Muhl. ex Spreng. "Pale skullcap"
Occasional in shady. Dry woods
26638

Scutellaria integrifolia L. "Blue skullcap"
Occasional, grassy openings, lawns, woods margins
26604

LAURACEAE Laurel family

Persea palustris (Rafinesque) Sargent, Swamp Bay
Sassafras albidum (Nuttall) Nees, Sassafras

LOGANIACEAE Logania family

Gelsemium sempervirens St. Hilaire, Carolina Jessamine

Polypremum procumbens L. "Indian chickweed"
Common, old fields, lawns, roadsides, sandy disturbed places
26423

LYTHRACEAE Lythrum family

Rotala ramosior (L.) Koehne "Toothcup"
Occasional, locally abundant on drying pond silt
26772, 26778, 26873

MAGNOLIACEAE Magnolia family

Liriodendron tulipifera L. "Yellow poplar"
Common canopy component in wet woods
26882

Magnolia grandiflora L. "Bull-bay"
Rare in shady woods on west side of base; attaining tree sizes but not (rarely?) blooming
26637

Magnolia virginiana Linnaeus var. *virginiana*, Northern Sweet Bay

MALVACEAE Mallow family

Modiola caroliniana (L.) G. Don "Bristlemallow"
Occasional-common? weedy along roadsides, open places
26478

Sida rhombifolia L. "Diamond mallow"
Occasional-common on upland sandy ground
26757

Sida spinosa L. "Prickly mallow"
Rare, seen on drying pond silt
26783

MELASTOMACEAE Tibouchina family

Rhexia mariana L. var. mariana "Meadow-beauty"
Occasional in open wetlands, pond margins
26775

MOLLUGINACEAE *Carpetweed family*

Mollugo verticillata Linnaeus, Carpetweed

MYRICACEAE *Wax myrtle family*

Morella cerifera (Linnaeus) Small, Common Wax-myrtle

NYSSACEAE *Nyssa* family

Nyssa biflora Walter, Swamp Tupelo

Nyssa sylvatica Marshall, Sour Gum

OLEACEAE Olive family

Ligustrum sinense Lour. "Chinese privet"

Common-abundant in a variety of habitats from damp to dry, weedy and well-established
26745

ONAGRACEAE Evening-primrose family

Ludwigia decurrens Walt. "Wingleaf primrose willow"

Common on open wet places, drying pond silt
26774

Ludwigia linearis Walt. var. *puberula* Engelm. & Gray "Marrow leaf primrose willow"

Common on pond margins, drying silt
26777

Ludwigia palustris (L.) Ell. "Creeping seedbox"

Common in wetlands, pond margins
26767

Oenothera laciniata Hill. "Cutleaf primrose"

Common, weedy places, lawns and roadsides
26424

OXALIDACEAE Sorrel family

Oxalis dillenii Jacq. "Yellow sorrel"

Occasional-common, weedy along roadsides, disturbed places
26431

PAPAVERACEAE Poppy family

Sanguinaria canadensis L. "Bloodroot"

Rare in two populations on southwest side of base, within oak-hickory wooded slopes
26460

PASSIFLORACEAE Passionflower family

Passiflora incarnata L. "Maypop"

Occasional-common, open borders and lawns
26636

PHYTOLACCAEAE *Pokeweed* family

Phytolacca americana Linnaeus, Common Pokeweed

PLANTAGINACEAE Plantain family

***Plantago virginica* L. "English plantain"**
Common-abundant, ubiquitous in lawns and disturbed places
26428, 26599, 26629

POLEMONIACEAE Phlox family

Phlox carolina L. "Carolina phlox"
Rare, shady oak-hickory woods on southwest side of base
26639

POLYGONACEAE Smartweed family

Persicaria pensylvanica (L.) Small "Smooth smartweed"
Most often in open damp places, locally very abundant on drying pond silt
26784

Polygonella americana (Fisch & Mey.) Small "Southern joint-weed"
Rare, seen once, in an open field along unused runway; a Southeastern endemic.
26865

Rumex verticillatis L. "Swamp dock"
Occasional, damp ground
26453

PRIMULACEAE Primula family

***Anagallis arvensis* L. "Scarlet pimpernel"**
Rare, seen in a single population within weedy powerline r.o.w.
26512

RANUNCULACEAE Buttercup family

Ranunculus hispidus Michaux "Hairy buttercup"
Occasional-rare; damp woods, stream margins
26444

RHAMNACEAE* *Buckthorn family

***Berchemia scandens* (Hill) K. Koch, Supplejack**

ROSACEAE Rose family

***Crataegus uniflora* Muenchhausen, Oneflower Hawthorn**

Malus angustifolia (Ait.) Michx. "Southern crabapple"
Occasional small tree, colonial; woods
26471

Potentilla canadensis L. "Dwarf cinquefoil"
Common and somewhat weedy along roadsides, in lawns
26457

Prunus angustifolia Marsh. "Chickasaw plum"
Occasional, forming thickets on sandy ground at woods margins
26519

Prunus serotina Ehrh. "Black cherry"
Common subcanopy tree, somewhat weedy, not achieving particularly large size at McEntire
26432, 26449

Prunus umbellata Elliott, Hog Plum

Rubus argutus Link "Tall blackberry"
Common on roadsides, in thickets
26498

Rubus cuneifolius Pursh "Sand dewberry"
Common in sandy woods, along roadsides
26601

Rubus enslenii Tratt. "Southern dewberry"
Common in sandy woods, roadsides, disturbed places
26509

Rubus pensylvanicus Poir. "Pennsylvania blackberry"
Occasional-rare? Open borders
26635

RUBIACEAE Madder family

Cephalanthus occidentalis Linnaeus, Buttonbush

Diodia teres Walt. "Poorjoe"
Common and weedy on dry soils
26762

Houstonia pusilla Schoepf, Tiny Bluet
Mitchella repens Linnaeus, Partridge-berry
Richardia brasiliensis Gomes

SALICACEAE Willow family

Populus deltoides Bartr. ex Marsh "Eastern cottonwood"
Uncommon trees near pond margins
26483

Salix nigra Marsh. "Black willow"
Occasional, most often at pond margins

26500

SAURURACEAE *Lizard's-tail family*

Saururus cernuus Linnaeus, Lizard's-tail

SAXIFRAGACEAE Saxifrage family

Itea virginica L. "Virginia willow"
Occasional-common, wet shady woods
26641

SCROPHULARIACEAE Figwort family

Agalinis fasciculata (Ell.) Raf. "Autumn bells"
Occasional-rare in open places, roadsides, powerlines
26755

Lindernia dubia (L.) Penn. Var. *anagallidea* (Michx.) Cooper.
Occasional, abundant locally on drying pond silt
26766

Mecardonia acuminata (Walter) Small
Infrequent, restricted to drying pond silt, open wetlands
26781

Nuttallanthus canadensis (L.) Sutton "Bastard toadflax"
Common, nearly ubiquitous in old fields and disturbed sites
26426

***Veronica arvensis* L. "Corn speedwell"**
Common, lawns and weedy places
26450

Veronica peregrina L. "Neckweed"
Common-abundant? Weedy places, lawns, roadsides
26443

SOLANACEAE Tomato family

Solanum carolinense L. "Horse-nettle"
Common on open fields, weedy ditches and borders
26862

SYMPLOCACEAE *Horse-sugar family*

Symplocos tinctoria (Linnaeus) L'Heritier de Brutelle, Sweetleaf

ULMACEAE Elm family

Celtis laevigata Willdenow, Southern Hackberry

Ulmus alata Michaux, Winged Elm

URTICACEAE *Nettle family*

Boehmeria cylindrica (Linnaeus) Swartz

VALERIANELLACEAE Valerian family

Valerianella radiata (L.) Dufr. "Common cornsalad"
Common and weedy; disturbed places and lawns
26435

VERBENACEAE Vervain family

Callicarpa americana Linnaeus, Beautyberry

Glandularia pulchella (Sweet) Troncoso "Sidewalk vervain"
Occasional and weedy along roadsides, disturbed places
26518

Verbena brasiliense Vell. "Brazilian vervain"
Occasional-common, old fields, weedy places
26414

Verbena rigida Sprengel "Sandpaper vervain"
Occasional-rare, weedy places and powerline r.o.ws
26513

VIOLACEAE Violet family

Viola arvensis Murray "Field pansy"
Occasional-common, lawns, roadsides, weedy places; benign introduction
26433

Viola primulifolia L. "Primrose violet"
Occasional-rare, stream margins, pond edges
26479

VITACEAE Grape family

Ampelopsis arborea (L.) Koehne "Pepper-vine"
Occasional-common woody vine, woods and borders
26751

Parthenocissus quinquefolia (Linnaeus) Planchon, Virginia-creeper