MISSOURI NATURAL AREA ADDITION FORM
Final Draft 11-17-06

Name of Area: Spring Creek Gap Glades **Nomination Date:** Winter 2006 (the original 40 acre natural area was designated in 1982)

Prepared By: Mike Leahy, Jeff Demand, John George, Lydia Miramontes

Inspection Date(s): June 2, 2006; June 8, 2006; June 16, 2006; August 23, 2006

Principal Feature(s) (Name and EO Code):	**Rank**	**Size**
Dolomite Glade (CTGZO15200.50 – being revised)	Exceptional	16 acres
Dry Chert Woodland (In progress)	Exceptional	51 acres

Rare or Endangered Species (Name, Status and EO Code):
None currently documented.

Other Features :	**Rank**	**Size**
Dolomite Glade	Notable	32 acres
Dry Chert Woodland	Notable	55 acres
Dry Limestone/Dolomite Woodland	Notable	61 acres
Dry-mesic Chert Forest and Woodland	Unranked	200+ acres
Dry-mesic Limestone/Dolomite Forest and Woodland	Unranked	200+ acres

Preservation Value:
This 652 acre addition to the Spring Creek Gap Glades Natural Area (NA) adds further exceptional and notable quality dolomite glades in addition to exceptional quality dry chert woodlands and notable quality dry dolomite woodlands not well represented on the existing natural area. This expanded natural area is representative of a Gasconade River Hills Subsection landscape and will conserve a suite of open woodland, glade and forest species not currently represented within the natural area system for this subsection. There are no other glade/woodland complexes of this size and quality represented in the Gasconade River Hills Subsection on public land. While other high-quality examples of these community types do occur within this subsection on private land, those found at Spring Creek Gap Conservation Area represent the best chance to restore these natural communities. This site lies within the Missouri Department of Conservation's (MDC) Spring Creek Gap Conservation Opportunity Area (COA) identified through the Comprehensive Wildlife Strategy (CWS).

Just over 200 native plant taxa have been documented from the expansion area in only four intensive site visits. The flora of the glades found in this natural area expansion is similar to that of the original natural area. However, the highest quality dolomite glade openings are still contained within the original 40 acre natural area. With management work it is expected that many of the grade B glades found within the expansion unit will eventually become grade A and similar to the ones on the original natural area. The extensive dry chert and dolomite woodlands of the natural area expansion allows for an opportunity to manage these natural communities not found on the original 40 acre natural area.

Within the Gasconade River Hills Subsection, other Missouri Natural Areas include: Clifty

Creek, the Eck Memorial, and Horseshoe Bend NAs. Clifty Creek NA is the only other Missouri Natural Area within the Gasconade River Hills Subsection representing dolomite glades. The glades at Clifty Creek NA are only notable in significance and are very small in comparison to those within the addition to Spring Creek Gap Glades NA. Dry and dry-mesic chert woodlands are aptly represented at the Eck Memorial NA but are of the shortleaf pine - post oak / lowbush blueberry subtype unlike the woodlands found here at Spring Creek Gap Glades NA that are the post oak – black jack oak / little bluestem subtype. In addition, the chert woodlands at Spring Creek Gap NA are associated with both dry dolomite woodlands and dolomite glades, very unlike the landscape context of the Eck Memorial NA natural communities.

Natural area designation on this 652 acre addition is consistent with MDC's Regional Management Guidelines of 1998 and input from the area manager, natural history biologist and MDC Central Region Coordination Team (RCT). The 1995 Area Plan for Spring Creek Gap Conservation Area identified a goal of restoring and maintaining at least 300 acres of glade/savanna (woodland) complexes. Over the last few years a large amount of restoration and management work has been completed within this 652 acre site. In short, this addition to the Spring Creek Gap Glades NA merits inclusion within the Missouri Natural Areas System.

Owner or Public Land Unit: Missouri Department of Conservation, Wildlife Division, Spring Creek Gap Conservation Area (CA)

Natural Division/Section: Ozark Natural Division, Upper Ozarks Section

Missouri Ecological Classification System: Ozark Highlands Section, Gasconade River Hills Subsection, Ozark Oak Woodland/Forest Hills Landtype Association

County: Maries
Quadrangle: Paydown 7.5"

Legal Description: N ½ Sec. 3 and NE ¼ N ½ Sec. 4 T39N, R8W and SW ¼ Sec. 34 T40N, R8W

Size of this Addition: 652 acres
Total Natural Area Size: 40 acres + 652 acres = 692 acres

Boundaries: (See Figures 1-3). Area is east of main north-south management access road and continues on across Cedar Creek to the eastern boundary of the conservation area. Boundary lines follow management access roads, trails, drainages, property boundaries and old-field boundaries throughout.

DESCRIPTION OF ADDITION:

Topography: The area consists of narrow ridges trending off of larger flat ridges. Local relief is 300 feet ranging from an elevation of 1100 feet on ridge knobs to 800 feet along Cedar Creek. The area contains a good portion of the upper Cedar Creek watershed that eventually drains into the Gasconade River. Slopes along ridges and creek bottoms are gently sloping and moderately steep to steep along sideslopes.

Geology: The bedrock geology is represented by Paleozoic Era deposits. These include the

Ordovician System, Canadian Series, Jefferson City-Cotter Dolomite Formation on the side slopes and creek bottoms and the Pennsylvanian System Undifferentiated Formation on the ridge tops on the east end of the area. Dolomite glades occur on the Jefferson City-Cotter Dolomite Formation.

Soils: Soils on moderately steep to steep side slopes with primarily south to west aspects are part of the Moko-rock outcrop complex soil mapping unit. These areas have 15-50% slopes and are very stony. Dolomite glades and dry dolomite woodlands occur on these soils.

The ridges and shoulder slopes and north facing aspects have Gatewood very gravelly silt loam soils with 3-8% and 15-35% slopes. These stony soils support dry chert woodlands on south and west aspects and dry-mesic chert and dolomite forests (woodlands) on north to east aspects.

Geologic Features: No significant geologic features.

Natural Communities (Name, Size, Quality, Dominant and Characteristic Species): See Figures 2 and 3 for the spatial extent of the natural communities.

Dolomite Glade (16 acres of Exceptional and 32 acres of Notable quality, Grades B to C)
A series of small dolomite glade openings on south to west side slopes within a matrix of dry chert woodlands on slopes above the glades and in intervening draws. North facing slopes have dry-mesic chert forest. Some glades have small areas of dry dolomite woodlands associated with them. There are 37 glade openings on the area ranging in size from 1/10 acre to 4 acres. Over time, with management, many of these glade openings will coalesce.

The dolomite glades are dominated by a mix of native warm season grasses including little bluestem (*Schizachyrium scoparium*), sideoats grama (*Bouteloua curtipendula*), big bluestem (*Andropogon gerardii*), switchgrass (*Panicum virgatum*) and Indian grass (*Sorghastrum nutans*), and glade forbs. Dominant glade forbs include Missouri coneflower (*Rudbeckia missouriensis*), narrow-leaved bluets (*Hedyotis nigricans*), and aromatic aster (*Aster oblongifolius*). The glades are moderately diverse and range from a moderate to low number and cover of conservative species. Conservative, characteristic glade flora include pale purple or glade coneflower (*Echinacea pallida* or *simulata*), yellow coneflower (*Echinacea paradoxa*), compass plant (*Silphium laciniatum*), prairie dock (*Silphium terebinthinaceum*), prairie dropseed (*Sporobolus heterolepis*), evolvulus (*Evolvulus nuttallianus*), purple prairie clover (*Dalea purpurea*), white prairie clover (*Dalea candida*), green milkweed (*Asclepias viridiflora*), Mead's sedge (*Carex meadii*), shooting star (*Dodecatheon meadii*), Missouri primrose (*Oenothera macrocarpa*), blazing star (*Liatris cylindracea*), and scurfy pea (*Psoralidium tenuiflorum*).

Pockets of conservative species occur but many areas lack the full complement of these species which may be a result of past livestock grazing and or harsh edaphic factors. Heavy cedar invasion in places has degraded a number of sites that historically were open glades as seen on the 1938 aerial photos for the area. No evidence of rock flipping or root digging was noted on the dolomite glades. However the lack of coneflowers on some glade openings is curious as to whether it is a natural feature or the result of past plant poaching.

Tree age data were collected along the margins of the exceptional quality glade openings. Core ages determined include: 16 in. diameter at breast height (dbh) post oak of 195 years, 14 in. dbh

chinkapin oak at 120 years, 13 in. dbh chinkapin oak at 125 years, 14 in. dbh chinkapin oak at 105 years and 35 ft. tall, and a 5 in. dbh suppressed eastern red cedar of 48 years growing under an old-age post oak.

Dry Chert Woodland (51 acres of Exceptional quality and 55 acres of Notable quality, Grades C to B)

The dry chert woodlands are dominated by post oak (*Quercus stellata*), blackjack oak (*Quercus marilandica*) and black hickory (*Carya texana*) in the overstory, aromatic sumac (*Rhus aromatic*a) in the understory, and sedges (*Carex hirsutella, Carex albicans*), bristly sunflower (*Helianthus hirsutus*), panic grass (*Panicum linearifolium*), dittany (*Cunila origanoides*), and an aster (*Aster anomalus*) in the ground-flora. Conservative, characteristic dry chert woodland flora include goat's rue (*Tephrosia virginiana*), cream white indigo (*Baptisia bracteata*), leadplant (*Amorpha canescens*), finger coreopsis (*Coreopsis palmata*), hairy bush clover (*Lespedeza hirta*), trailing bush clover (*Lespedeza procumbens*), lowbush blueberry (*Vaccinium pallidum*), big-flowered gerardia (*Aureolaria grandiflora*), spreading aster (*Aster patens*), and a goldenrod (*Solidago petiolaris*). Eastern red cedar encroachment was high in many woodland stands prior to extensive cedar thinning that has occurred over the last few years. Some areas have sandstone fragments at the soil surface, but overall, chert dominates the substrate. Currently the dry chert woodlands average 90 ft^2/acre of basal area.

Tree age data were collected within the exceptional quality dry chert woodland stands. Core ages determined include: 13 in. dbh post oak of 135 years at 35 ft. tall, 14 in. dbh white oak of 110 years, 18 in. dbh post oak at 195-200 years, and a 14 in. dbh post oak at 120 years.

Dry Dolomite Woodland (61 acres of Notable quality, Grades C to B)

The dry dolomite woodlands are dominated by chinkapin oak (*Quercus muhlenbergii*), northern red oak (*Quercus rubra*), and white oak (*Quercus alba*) in the overstory, Carolina buckthorn (*Rhamnus caroliniana*) in the understory, and elm-leaved goldenrod (*Solidago ulmifolia*), smooth aster (*Aster laevis*), rock muhly (*Muhlenbergia sobolifera*), and yellow pimpernel (*Taenidia integrimma*) in the ground-flora. Conservative, characteristic dry dolomite woodland flora include climbing milkweed (*Matelea decipiens*), orange puccoon (*Lithospermum canescens*), crested coral root orchid (*Hexalectris spicata*), and Ohio horse mint (*Blephilia ciliata*).

Tree age data were collected within the notable quality dry dolomite woodland stands. Core ages determined include: 9 in. dbh chinkapin oak at 107 years, 11 in. dbh chinkapin oak at 110 years, and a 14 in. dbh chinkapin oak at 120 years.

Dry chert and dolomite woodlands occur above and in draws associated with glades that occur on mid-slopes. Woodlands vary in quality but most are grade B to C. Black oak and northern red oak were high-graded from the woodlands approximately 50 years ago but character white oak group oaks were not logged in general. Overall the dry woodlands are a mixture of stands of old-age (110 – 130 years) post oak or chinkapin oak in a larger matrix of younger (50 – 90 years) northern red oak and black oak. Other areas have dense pole-sized blackjack oak and black hickory with scattered old-age post oak. Dry woodlands occur on ridges, shoulders, draws, and lower slopes of south to west aspects on moderately sloping to strongly sloping slopes. Canopy height here ranges from 35 to 50 feet tall.

Other Features – Natural Communities:
Dry-mesic chert and dolomite forests occur on north to east aspects with steep slopes. These forests are dominated by northern red oak and white oak with scattered mature sugar maples (*Acer saccharum*) on the lower slopes. The understory is dominated by a moderate degree of sugar maple saplings and ironwood stems (*Ostrya virginiana*). Ground-flora is dominated by large-flowered tick trefoil (*Desmodium glutinosum*), a tick trefoil (*Desmodium nudiflorum*), Christmas fern (*Polystichum acrostichoides*), false Solomon's seal (*Maianthemum racemosum*), wild geranium (*Geranium maculatum*), bedstraw (*Galium concinnum*), hog peanut (*Amphicarpaea bracteata*), and woodland brome (*Bromus pubescens*). More calcareous dry-mesic forests have wild ginger (*Asarum canadense*), green violet (*Hybanthus concolor*), goldenseal (*Hydrastis canadensis*), and longleaf tick clover (*Desmodium cuspidatum*). There are scattered double-stems on these sites but very few stumps. Historically these areas may have supported more woodland-like communities. However with decades of fire suppression they have taken on a definite forest character. The steep north to east aspects of these sites would usually preclude greater fire intensities. It is assumed that historically there likely would have been less sugar maple on the upper slopes within these natural communities.

Exotic species are rare overall. Along the fire lines and old horse trails sweet clovers (*Melilotus* spp.), Queen Anne's lace (*Daucus carota*), and common plantain (*Plantago major*) are commonly found in patches. Only one small patch of sericea (*Lespedeza sericea*) was located within the natural area addition, in the small creek bottom in the N ½ of Sec. 3 T39NR8W (UTM 605901.39 N 4223200.08 E). Scattered sericea is also located in the old-field adjacent to the natural area addition on the east side (UTM 606428.44 N 4223489.01 E). Areas of old fencing occur on the addition but grazing increaser plants such as buckbrush (*Symphoricarpos orbiculatus*) are only occasional and mainly limited to areas along Cedar Creek that historically were small fields in the 1930s.

Within the natural area expansion area most of the acreage is mature, late-successional vegetation. About 10 acres of old-fields that have succeeded into young forest occur in the bottoms along Cedar Creek. In addition, a five acre 10+ year old clear-cut area and 27 acres of intermediate forest harvest (10+ years) occur within the expansion area.

Historic Vegetation (GLO Survey Notes, Historic Accounts, Local Information):
Historically Lane's Prairie existed about a half mile to the east of Spring Creek Gap CA according to the General Land Office Survey Notes of 1833-1837. Undoubtedly prairie fires there would have backed into the area being considered for natural area expansion. Spring Creek Gap CA would have been an ecotone between the tallgrass prairie just to the east and the forests in the steep hills and moist bottoms of the Gasconade River to the west.

Specific surveyor notes of 1834 that cover portions of the natural area expansion include:

South boundary of Sec. 35 T40NR8W: *"Over very hilly stony poor post oak land"*
South boundary of Sec. 34 T40NR8W: *"Over exceedingly hilly poor stony post oak land"*
Going north between Sections 35 and 36 T40NR8W: *"Land rolling prairie good soil timber on west side post oak and black jack"*
Going north between Sections 34 and 35 T40NR8W: *"Land broken and stoney Timber post oak black jack and undergrowth same"*
Going north between Sections 3 and 4 T39NR8W: *"Land very broken and stony soil of third rate*

unfit for cultivation timber white oak post oak black oak and hickory undergrowth the same and dogwood." Also *"Land very broken and stony unfit for cultivation, timber white oak post oak black oak cedar and hickory undergrowth the same but little."*
Going north between Sections 2 and 3 T39NR8W: *"Land gently rolling soil of second rate fit for cultivation timber black oak post oak and hickory undergrowth the same."*

The 1938 U.S. Department of Agriculture aerial photos show much more extensive glade openings at that time. Areas that are wooded today with oak-hickory were wooded then as well but with a less dense canopy. Old fields in the bottoms along Cedar Creek are evident in the 1938 aerial photos.

Land Use History:

Grazing: The area has been grazed in the past as evidenced by old fences along property lines. Scattered patches of grazing indicator species such as buckbrush occur in the creek bottom areas but not on the slopes and ridges.

Logging: The area appears to have been high-grade logged around 50+ years ago at which time northern red oaks and black oaks were selectively harvested. Some areas of cedars were also historically cut for fence posts. MDC conducted a five acre clear-cut on a ridge and 27 acres of intermediate forest harvest on a north facing slope about ten years ago within the expansion area.

Fire: Fire scars are not uncommon on the older trees in places and charcoal fragments can be found on the ground. MDC conducted a large prescribed burn on a portion of this area in March 2005.

Litter: Little litter is present in the area. A few old cans and bottles are present here and there.

Travelways: A network of old logging roads (Figure 2) criss-cross the ridge tops. These have been used as a system of management access lanes, fire lines and foot trails by MDC.

Adjacent Land Uses: Land on Spring Creek Gap CA is primarily timbered with some old-fields. To the east of the area on private lands, high quality glade and woodland natural communities continue for another ¼ mile but then give way to extensive fescue pastures.

Potential Threats: Illegal horse-back riding and off-road vehicle use along the network of trails and fire lines on Spring Creek Gap CA has the potential to accelerate existing erosion problems and exacerbate invasive species problems. Erosion and invasive species issues along this network of trails needs to be addressed via management.

Recommended Additions: Private lands immediately adjacent to the east of this area contain similar quality natural communities and could make a nice addition to the site if the land were ever for sale and budgets allowed for it.

Supporting Information:

1938 U.S. Department of Agriculture Aerial Photos from Archives at the Missouri State Historical Society Library at the University of Missouri – Columbia.

General Land Office Survey Notes for Maries County from Missouri Department of Natural Resources, Division of Geology and Land Survey, Rolla.

References:

Currier, M.P. 1991. Final report on the Missouri Natural Features Inventory for Camden, Cole, Cooper, Gasconade, Maries, Miller, Moniteau, Morgan, and Osage Counties. Missouri Department of Conservation, Jefferson City, Missouri.

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Schroeder, W.A. 1981. Presettlement prairie of Missouri. Missouri Department of Conservation, Natural History Series No. 2. Jefferson City, Missouri.

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Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Soil survey of Maries County, Missouri [Online WWW]. Available URL: "http://soildatamart.nrcs.usda.gov/Survey.aspx?State=MO" [Accessed 1 November 2006].

Steyermark, Julian A. 1963. Flora of Missouri. The Iowa State University Press. Ames, Iowa.

Thom, R.H. and J.H. Wilson. 1980. The natural divisions of Missouri. Transactions of the Missouri Academy of Science 14: 9-23.

Thompson, T.L. 1995. The stratigraphic succession in Missouri (Revised – 1995). Missouri Department of Natural Resources, Division of Geology and Land Survey, Rolla, Missouri.

Vineyard, J. (ed.). 1979. Geologic map of Missouri. Missouri Department of Natural Resources, Division of Geology and Land Survey, Rolla.

Yatskievych, George. 1999. Steyermark's flora of Missouri, Volume 1, Revised Edition. Missouri Department of Conservation, Jefferson City, Missouri.

Yatskievych, G. and J. Turner. 1990. Catalogue of the flora of Missouri. Missouri Botanical Garden, St. Louis, Missouri.

Maps: See Figures 1-3 (Locator Map, Topographic Map and Digital Orthophoto Quad Map).
Photographs: See attached.

MISSOURI NATURAL AREAS COMMITTEE
NATURAL AREA MANAGEMENT RECOMMENDATIONS

Area Name: Spring Creek Gap Glades Natural Area (652 acres addition)

Administrative Agent: Missouri Department of Conservation, Wildlife Division, Spring Creek Gap Conservation Area

Management Goal (including management of buffer land): To restore, conserve, and maintain the natural integrity of the exceptional dolomite glades, dry chert woodlands and associated natural communities of this natural area addition.

Ecological Management Objectives (Prescribed Burns, Exotic Species Control, Monitoring, Selective Cutting, Mowing):

Objective 1: Restore and maintain the dolomite glade and dry chert and dolomite woodland natural communities.

Strategies:

1. Continue to apply prescribed fires to the high-quality dolomite glade/woodland complexes on the area. However, make sure that cedar slash has cured and rotted (at least two growing seasons) sufficiently to prevent too high of a fire intensity during burn operations. Alternatively, burn through cedar slash areas with light intensity firing techniques and cool burn conditions (e.g., relative humidity >40%, 20 ft. winds at 5-8 mph, backing and flanking fires).
2. Conduct burns during various seasons of the year as appropriate to promote growth of different groups of plant species. Winter, spring, summer and fall burns would all be appropriate at Spring Creek Gap Glades Natural Area. Burning season should be altered by area manager based upon burn responses and desired future effects. However, most burns will typically occur in winter and early spring.
3. Prescribed burns should occur about every third year for at least the first three burns on the area until the glade and woodland structure is more open. After that time a burn every fifth year may suffice to maintain the glade and woodland community.
4. Conduct burns under low to moderate intensities to avoid significant crown scorch to the old age oaks on the area.
5. Utilize mechanical and chemical control of woody stems > 1.5 inches dbh. Use fire to deaden stems < 1.5 inches dbh.
5. Slowly thin red cedar and hardwood invasion from the understories of the glades and woodlands (much of this has already been accomplished by cedar thinning operations on the area). Allow prescribed fires to deaden smaller stemmed woody invasive species. Over the next decade, reduce red cedar and other invasive native woody plant species cover in the understory by over 50%. In the glade openings themselves, slowly remove all but large (>10 inch dbh) red cedar stems. Limb-up larger diameter red cedars to allow for underburning.
6. Be mindful of excessive slash fuel buildup during thinning operations. Note that while the open glades and associated open woodlands may behave like a fuel model 2 (National Wildfire Coordinating Group standard fuel models used in

BEHAVE wildfire prediction software), glades and woodlands with large amounts of slash will more likely act like a fuel model 11 or 12. Closed woodlands and forests typically are fuel model 9, but some areas that had intensive cedar thinning may act like a fuel model 6. Managing fuel loading during the restoration phase of this addition to Spring Creek Gap glades NA will be critical.

7. Utilize MDC's *Forest Land Management Guide: Prescribed Fire* by George Hartman and Chapter Two, Ecological Management, in the *Terrestrial Natural Communities of Missouri* by Paul Nelson as technical guidelines to use for restoring the glades and woodlands via prescribed fire and thinning.

Objective 2: Utilize forest inventory data to guide decision making on restoration of woodland and forest natural communities.

Strategies:

1. Complete and or utilize a forest inventory on the compartment(s) included within the natural area addition.
2. Utilize results from the forest inventory on the area to inform/guide the use of silvicultural techniques to aid in restoring the woodlands and forests. Specifically, is there a role for a commercial timber sale on the natural area to remove northern red oaks and black oaks from stands to hasten restoration of open post-chinkapin-white oak woodlands? Is non-commercial thinning only needed? Is both commercial and non-commercial thinning required?
3. Utilize forest inventory results to assist with management prescriptions to maintain regeneration and recruitment of overstory tree species.
4. Re-inventory wooded communities as deemed appropriate by Forestry Division staff to assess changes in stand structure.

Objective 3: Work with adjacent landowners as appropriate in allowing for efficient, safe and effective prescribed burn units. Also, seek protection of adjacent glade and woodland acreage to the east of the natural area via MDC fee simple purchase, conservation easement, and or cooperative management agreements.

Objective 4: Utilize forest roads best management practices to slow erosion along sections of fire lines and management access roads/trails that are showing signs of soil erosion. Management access lanes that traverse hollows and go down side slopes have problem erosion spots and require best management practices (e.g., rolling grade dips, water bars, seeding, re-routes) to stabilize the soil. These erosion problem spots have been made worse by horse use in the past. In a number of cases a skilled dozer operator will be needed to correct the erosion problems. Follow-up seeding should use a mix of annual wheat or rye in combination with partridge pea.

Objective 5: Control sericea lespedeza and sweet clover problem exotic species where they occur along fire lines, access lanes, adjacent old-fields and old roads using a combination of mowing and appropriate herbicides.

Objective 6: Utilize simple visual monitoring during annual status report visits to assess natural area for invasion by non-native, invasive plant species. In particular, keep a look out for sericea lespedeza, sweet clovers, and teasel. If populations of these species become established in the

natural area, utilize control methods (chemical, mechanical, burning) as appropriate.

Development Objectives (Additional Land, Access, Parking, Trails, Interpretation, Signs):

Objective 1: Protect the glades from root digging, animal poaching, rock flipping, illegal horse use and ATV use.

Objective 2: Provide for public access and appreciation of the natural area.

Strategies:

1. Post Natural Area signs within one year of designation.
2. Post interpretive signs along the area trail system to explain the restoration and management work occurring.
3. Maintain the area trail system for foot traffic only.

Recreational Uses (Picnicking, Camping, Collecting Plant Materials, Hunting, Trapping, Fishing):

Objective 1: Protect the area from incompatible and illegal uses, particularly root digging, glade animal poaching and ATV use.

Objective 2: Allow recreational use of the area as specified in the MDC Wildlife Code Section 4.115 regulations.

Strategies:

1. Allow and encourage hunting and fishing as per conservation area and statewide regulations.
2. Hiking, bird watching, nature study and nature photography are all compatible uses.

Research Uses and Needs:

Collection of plants or animals for research purposes will require an MDC collector's permit as per the Wildlife Code. Basic photo monitoring and qualitative descriptions of the restoration of the natural communities would be useful. Monitoring results/notes should reside in the Natural History Biologist files.

Date Submitted: **Committee Approval Date:**

Prepared By: Mike Leahy, Jeff Demand, John George, Lydia Miramontes

Maps:

Figure 1:

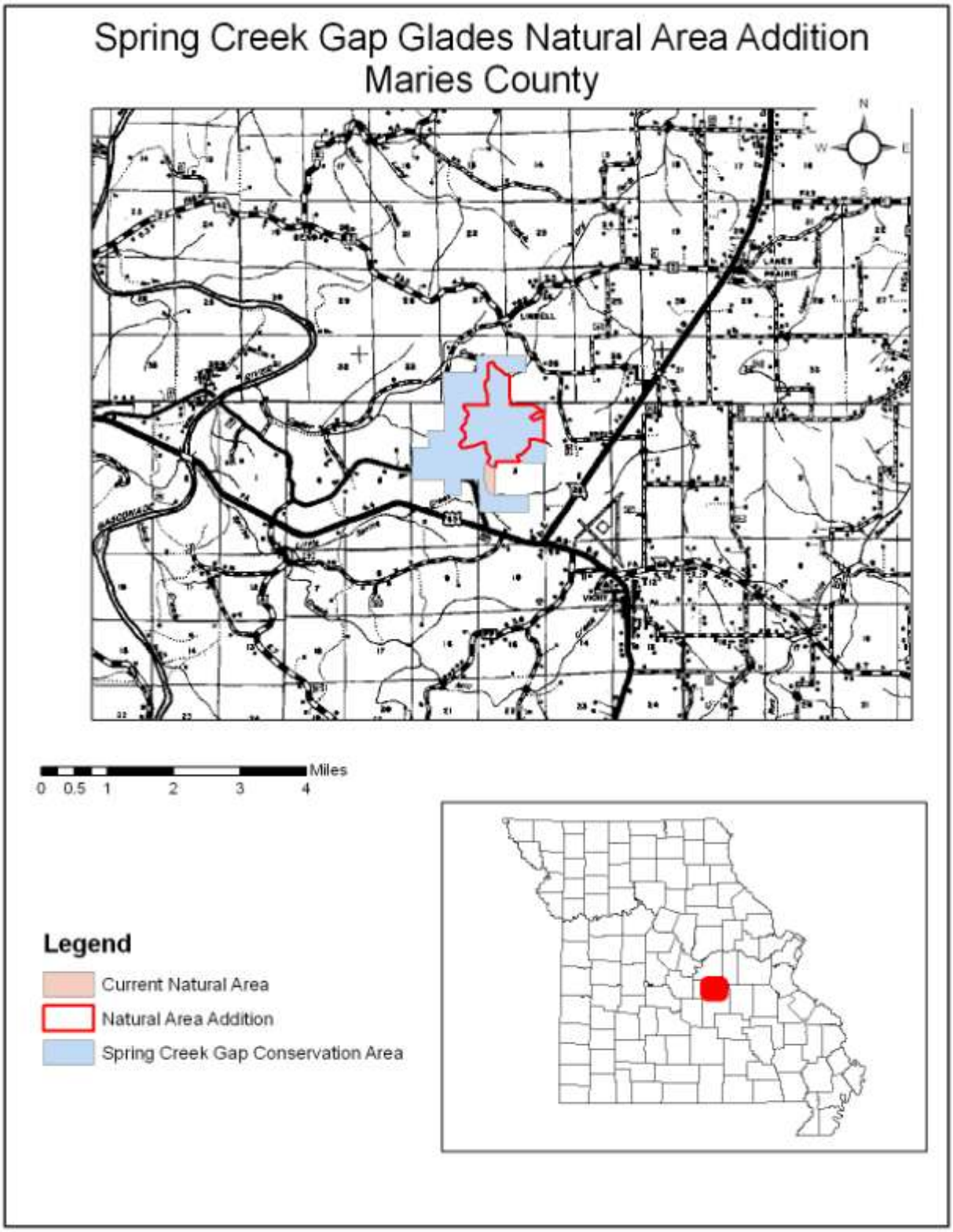


Figure 2:

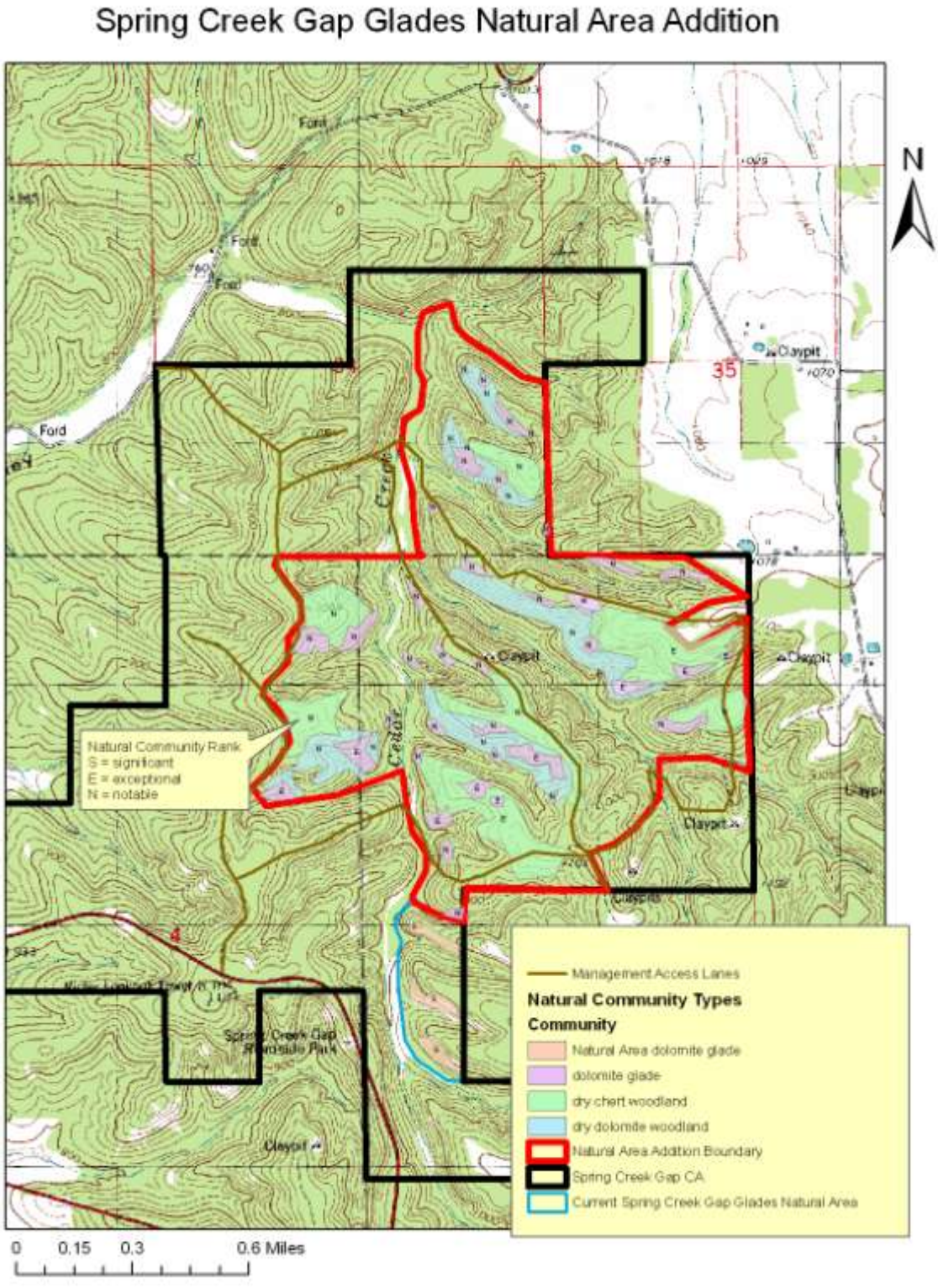
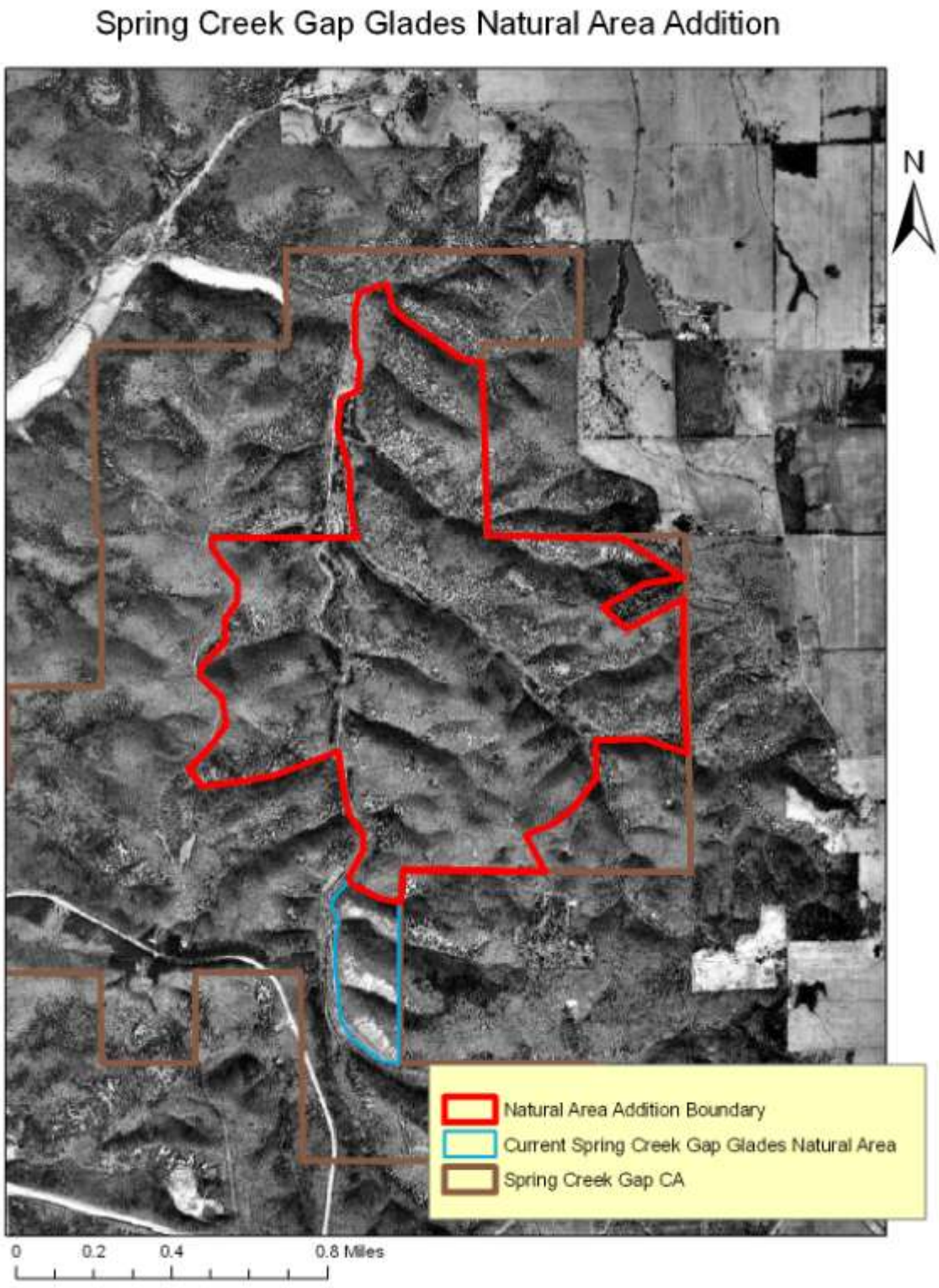

Spring Creek Gap Glades Natural Area Addition
N
Natural Community Rank:
S = significant
E = exceptional
N = notable
Management Access Lanes
Natural Community Types
Community
Natural Area dolomite glade
dolomite glade
dry chert woodland
dry dolomite woodland
Natural Area Addition Boundary
Spring Creek Gap CA
Current Spring Creek Gap Glades Natural Area
0 0.15 0.3 0.6 Miles

Figure 3:


Spring Creek Gap Glades Natural Area Addition
N
Natural Area Addition Boundary
Current Spring Creek Gap Glades Natural Area
Spring Creek Gap CA
0
0.2
0.4
0.8 Miles

Photos:

Photo of pale purple or glade coneflowers and yellow coneflowers on a dolomite glade.

Photo of dolomite glade opening with felled and burned cedars.

Jeff Demand, Area Manager, standing in dolomite glade opening.

Photo of old-age, open-grown white oak in restorable dry chert woodlands.

Appendix A: Bird Species List (birds heard or seen on the site visits during 2006):

Black and white warbler
Black-capped chickadee
Blue-winged warbler
Great crested flycatcher
Indigo bunting
Louisiana waterthrush
Northern parula
Oven bird
Pileated woodpecker
Red-eyed vireo
Summer Tanager
Tufted titmouse
Whipoorwill
White-eyed vireo
Yellow breasted chat
Yellow-billed cuckoo

Appendix B: Plant Species List:
Nomenclature follows:

Yatskievych, George. 1999. Steyermark's flora of Missouri, Volume 1, Revised Edition. Missouri Department of Conservation, Jefferson City, Missouri.

Yatskievych, G. and J. Turner. 1990. Catalogue of the flora of Missouri. Missouri Botanical Garden, St. Louis, Missouri.

Acer saccharinum	silver maple	*Baptisia bracteata*	cream white indigo
Acer saccharum	sugar maple	*Blephilia ciliata*	Ohio horse mint
Aesculus glabra	Ohio buckeye	*Bouteloua curtipendula*	sideoats grama
Allium stellatum	wild onion	*Brickellia eupatorioides*	false boneset
Amelanchier arborea	serviceberry	*Bromus pubescens*	Canada brome
Ampelopsis cordata	raccoon grape	*Bumelia lanugenosa*	woolly buckthorn
Amorpha canescens	lead plant	*Cacalia atriplicifolia*	pale Indian plantain
Amphicarpaea bracteata	hog peanut	*Cacalia plantaginea*	Indian plantain
Andropogon gerardii	big bluestem	*Camassia scilloides*	wild hyacinth
Anemone virginiana	thimbleweed	*Carex albicans*	sedge
Antennaria plantaginifolia	pussytoes	*Carex crawei*	sedge
Apocynum cannabinum	Indian hemp	*Carex eburnea*	sedge
Asarum canadense	wild ginger	*Carex hirsutella*	sedge
Asimina triloba	paw paw	*Carex meadii*	sedge
Asclepias purpurascens	purple milkweed	*Carex rosea*	sedge
Asclepias quadrifolia	four-leaved milkweed	*Carya ovata*	shagbark hickory
Asclepias tuberosa	butterfly weed	*Carya texana*	black hickory
Asclepias verticillata	whorled milkweed	*Castilleja coccinea*	Indian paintbrush
Asclepias viridiflora	green milkweed	*Ceanothus americanus*	New Jersey tea
Asplenium platyneuron	ebony spleenwort	*Celtis tenuifolia*	dwarf hackberry
Aster anomalus	aster	*Cercis canadensis*	eastern redbud
Aster laevis	smooth aster	*Chamaecrista fasciculata*	showy partridge pea
Aster oblongifolius	aromatic aster	*Comandra umbellata*	bastard toad flax
Aster patens	spreading aster	*Coreopsis palmata*	finger coreopsis
Aster sagittifolius	arrow-leaved aster	*Cornus florida*	flowering dogwood
Aster sericeus	silky aster	*Cornus obliqua*	pale dogwood
Aster turbinellus	aster	*Croton monanthogynus*	one-seeded croton
Aureolaria grandiflora	big-flowered gerardia	*Cryptotaenia canadensis*	honewort

Cunila origanoides dittany
Dalea candida white prairie clover
Dalea purpurea purple prairie clover
Danthonia spicata poverty grass
Delphinium carolinianum Carolina larkspur
Desmodium cuspidatum longleaf tick trefoil
Desmodium dillenii tall tickclover
Desmodium glutinosum large-flowered tick clover
Desmodium nudiflorum bare-stemmed tick trefoil
Desmodium rotundifolium dollar leaf
Desmodium spp. tick trefoil
Diospyros virginiana persimmon
Dodecatheon meadia shooting star
Echinacea pallida pale purple coneflower
Echinacea paradoxa purple coneflower
Erigeron annuus annual fleabane
Eryngium yuccifolium rattlesnake master
Euphorbia corollata flowering spurge
Evolvulus nuttallianus evolvulus
Festuca paradoxa cluster fescue
Festuca subverticillata nodding fescue
Fimbristylis puberula fimbristylis
Fraxinus americana white ash
Galactia regularis downy milkpea
Galium circaezans wild licorice
Galium concinnum shining bedstraw
Geranium maculatum wild geranium
Glandularia canadensis rose vervain
Hedyotis longifolia long-leaved bluets
Hedyotis nigricans narrow-leaved bluets
Helianthus hirsutus bristly sunflower
Heliotropium tenellum heliotrope
Hexalectris spicata crested coral root
Hieracium spp. hawkweed
Hydrastis canadensis goldenseal
Juniperus virginiana red cedar
Krigia spp. dandelion
Lespedeza hirta hairy bush clover
Lespedeza procumbens trailing bush clover
Lespedeza cuneata **sericea lespedeza**
Lespedeza violacea bush clover
Lespedeza virginica slender bush clover
Liatris aspera blazing star
Liatris cylindracea blazing star
Linum spp. flax
Lithospermum canescens puccoon
Lobelia spicata spiked lobelia
Lonicera flava yellow honeysuckle
Luzula bulbosa wood rush
Matelea decipiens climbing milkweed
Melilotus spp. **sweet clover**
Mirabilis nyctaginea wild four o'clock
Monarda bradburiana beebalm
Muhlenbergia spp. Muhly
Muhlenbergia sobolifera Rock muhly
Oenothera macrocarpa Missouri primrose
Ophioglossum engelmannii Engelmann's adder's tongue
Orbexilum pedunculatum Sampson's snakeroot
Ostrya virginiana ironwood
Oxalis violacea violet wood sorrel
Panicum acuminatum panic grass
Panicum boscii Bosc's panic grass
Panicum linearifolium panic grass
Parthenium integrifolium American feverfew
Parthenocissus quinquefolia Virginia creeper
Passiflora lutea yellow passion flower
Pedicularis lanceolata swamp lousewort
Penstemon digitalis smooth beard-tongue
Phlox pilosa prairie phlox
Physalis virginiana ground cherry
Physostegia virginiana false dragonhead
Physocarpus opulifolius ninebark
Platanus occidentalis sycamore
Podophllum peltatum May apple
Polystichum acrostichoides Christmas fern
Potentilla simplex common cinquefoil
Psoralidium tenuiflorum scurfy pea
Ptelea trifoliata hop tree
Quercus alba white oak
Quercus marilandica black jack oak
Quercus muhlenbergii chinkapin oak
Quercus rubra red oak
Quercus stellata post oak
Quercus velutina black oak
Ratibida pinnata grayhead prairie coneflower
Rhamnus caroliniana Carolina buckthorn
Rhus aromatica fragrant sumac
Rhus copallina winged sumac
Rosa carolina pasture rose
Rudbeckia hirta black-eyed Susan
Rudbeckia missouriensis Missouri coneflower
Ruellia humilis wild petunia
Sanguinaria canadensis bloodroot
Sanicula spp. black snakeroot
Schizachyrium scoparium little bluestem
Schrankia nuttallii sensitive brier
Scleria triglomerata tall nut grass
Scutellaria ovata skullcap
Scutellaria parvula small skullcap
Silphium integrifolium rosin weed
Silphium laciniatum compass plant
Silphium terebinthinaceum prairie dock
Sisyrinchium campestre prairie blue-eyed grass
Solidago nemoralis old-field goldenrod
Solidago petiolaris a goldenrod
Solidago radula rough goldenrod
Solidago rigida stiff goldenrod
Solidago ulmifolia elm-leaved goldenrod
Sorghastrum nutans Indian grass
Sporobolus asper rough dropseed
Sporobolus heterolepis prairie dropseed
Sporobolus vaginiflorus sheathed rush grass
Sporobolus spp. dropseed
Stylosanthes biflora pencil flower
Taenidia integerrima yellow pimpernel
Tephrosia virginiana goat's rue
Thalictrum revolutum wax-leaved meadow rue
Thaspium trifoliatum meadow parsnip
Toxicodendron radicans poison ivy
Trillium sessile toad trillium
Ulmus americana American elm
Vaccinium pallidum lowbush blueberry
Verbena urticifolia white vervain
Verbesina helianthoides yellow crownbeard

Vernonia baldwinii	ironweed
Vernonia spp.	ironweed
Viburnum rufidulum	southern black haw
Viola pedata	bird's foot violet
Viola triloba	cleft violet
Vitis aestivalis	summer grape
Zizia aptera	golden Alexanders