

**BIOLOGICAL EVALUATION**  
**REGIONAL FORESTER SENSITIVE SPECIES**  
**and SPECIES OF CONCERN**

**Mark Twain National Forest**  
***Potosi/Fredericktown District***  
St. Genevieve, St. Francois, Madison, and Bollinger Counties, Missouri

**East Fredericktown**

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**INTRODUCTION**

The purpose of this Biological Evaluation (BE) is to document the potential effects that planned management activities associated with this project may have upon Regional Forester's Sensitive Species (RFSS) and other Species of Concern that are found on the Mark Twain National Forest (MTNF). The objectives of this BE are:

- a) to ensure that Forest Service actions do not contribute to a loss of viability on the Mark Twain National Forest or cause a trend toward federal listing of any species;
- b) to comply with the requirements of the Forest Land and Resource Management Plan and ensure that actions do not jeopardize the continued existence of these species on the National Forest;
- c) and to provide a process and standard by which to ensure that these species receive full consideration in the decision making process;

Site-specific effects determinations for each species are summarized at the end of this document.

**PROPOSED MANAGEMENT ACTION**

**Summary of Proposed Action:** The primary purpose of the East Fredericktown project area analysis is to explore opportunities within the East Fredericktown project area that would improve forest health. In particular, activities are considered that would reduce the threat of insects (primarily red-oak borer), wildfire, and disease within the project area. To reduce these threats, two action alternatives (Alternatives 1 and 2) have been proposed. These two alternatives would focus primarily on activities that would create a more resilient mix of tree species and reduce the density of trees within stands to a healthier, more sustainable level. This would be achieved by conducting treatments that would reduce the black and scarlet oak composition within stands and encourage the growth and regeneration of more resilient species such as shortleaf pine and white oak.

The two action alternatives that are being considered for implementation within the East Fredericktown project area are as follows:

## **Alternative 1 (Non-commercial Treatment)**

This alternative responds to the issue of improving forest health and vigor without the use of commercial timber harvesting. This alternative would allow approximately 4,754 acres of forest stands to be treated mechanically by using the seedtree, shelterwood, sanitation/salvage cut, selection with groups, and thinning methods (methods are defined in Appendix A) (J.Walker, pers.comm.). These methods would achieve stand conditions that would favor regeneration of desirable tree species such as shortleaf pine, white oak, post oak, and hickories. (D.Dostal, pers.comm.). Because these treatments would be conducted non-commercially, there would be no removal of timber products as the result of these treatments, with a few exceptions for firewood removal. Therefore, there would be no temporary road construction or road reconstruction associated with this alternative (J.Walker, pers.comm.).

Several stands, including some mechanically treated, would be burned with prescribed fire to reduce hazardous fuels that may increase as a result of silvicultural treatments and to encourage pine and oak regeneration. Prescribed burning may be conducted at any time of year, other than May 15 – August 15, but would most likely occur during the spring and fall seasons. In some cases, stands may be prescribed burned more than once in order to achieve woodland conditions and a more herbaceous understory. Preparation of these areas for prescribed burning would involve the construction of approximately 5.4 miles of dozer line, with the remaining firelines being constructed with handtools or utilizing features such as existing roads and streams (C.Woods, per.comm.).

In addition to timber stand improvement activities, a variety of other activities are proposed to improve and enhance the forest community. This alternative would designate 1,608 acres of forest as “old growth” habitat in order to perpetuate a continual supply of large diameter trees and old growth conditions for wildlife species that require these habitat conditions. No timber stand improvement activities would occur in these designated “old growth” stands, however, some low-intensity prescribed burning for hazardous fuels reduction would occur.

Wildlife habitat would also be enhanced by the construction of 30 vernal pools within the analysis area and maintenance of 4 existing permanent ponds. Vernal pool construction would consist of using a small-size dozer to create a temporary pond approximately 300 square feet in size and the majority of these vernal ponds will be constructed in stands proposed for silvicultural treatments. Permanent pond maintenance would involve the felling of small diameter trees growing on the pond dam, and clearing encroaching brush from around the pond edge. In some cases, the pond may be cleaned out with a small dozer.

This alternative would also allow for the removal and clean-up of several dumps within the analysis area. Dump cleanup would involve using a small dozer to scoop the dump materials into a truck and refuse would be hauled off-site and disposed of properly. (J.Walker, pers.comm.).

Also proposed in the alternative are activities intended to improve water quality and reduce soil erosion. These activities involve relocation of a 0.6 mile section of the

Audubon Trail in order to remove it from a riparian flood zone. Relocation of this trail would involve constructing a new 0.6 mile section of trail using a small dozer and hand tools and would disturb a corridor approximately 10 feet wide and closure of the old, former trail section (T.Leimer, pers.comm.). Also proposed is the revegetation and stabilization of eroding soils located in 19 stands within the project area, including at an existing Artesian well site.

Table 1. Summary of activities proposed for Alternative 1 (Non-commercial Treatment)

Proposed Activity	Approximate Area Affected
Heavy Mechanical Treatment (Seedtree Cut)	850 acres
Moderate Mechanical Treatment (Shelterwood Cut)	1,543 acres
Moderate Mechanical Treatment (Sanitation/Salvage Cut)	922 acres
Moderate Mechanical Treatment (Selection with Groups)	362 acres
Moderate Mechanical Treatment (Thinning)	1,077 acres
<i>Subtotal (Mechanical Treatments)</i>	<i>4,754 acres</i>
Prescribed burning	2,603 acres
Miles of dozer-constructed fireline	5.4 miles
Old growth designated	1,608 acres
Vernal ponds constructed	30 ponds
Permanent ponds maintained	4 ponds
Dumps removed	11 sites
Trail reconstructed	0.6 miles
Areas with erosion control activities	19 stands

### **Alternative 2 (Modified Proposed Action)**

This alternative would utilize commercial timber harvesting as a means for achieving forest health and vigor. This alternative would allow forest stands to be treated commercially by using the seedtree, shelterwood, sanitation/salvage cut, overstory removal, selection with groups, and thinning methods (methods are defined in Appendix A) (J.Walker, pers.comm.). Some firewood removal may also be allowed. Release of desirable tree species from competition would also occur by implementing crop tree release and release of pine saplings. These methods would achieve stand conditions that would favor regeneration of desirable tree species such as shortleaf pine, white oak, post oak, and hickories. (D.Dostal, pers.comm.).

Because these treatments would be conducted commercially, the removal of timber products would require the construction of approximately 24.3 miles of temporary roads and reconstruction of approximately 9.5 miles of existing unimproved roads. Temporary roads would be constructed using a dozer or other heavy equipment and be approximately 20 feet wide. They may be unsurfaced or partially surfaced with rock. Following use for timber treatments, these temporary roads would be decommissioned. Decommissioning roads would involve placing a barricade, such as an earthen or rock berm at the road entrance. It may also involve posting “road closed” signs, or obliterating the road by scarifying the road surface, reshaping the contours to match the surrounding area, and scattering tree tops in the area. Reconstruction of roads would include improving the

condition of an existing road by clearing the roadside vegetation, constructing drainage features, and adding surfacing material. The clearing limit would be from 20-40 feet wide, which includes a driving surface width of 12-24 feet (A. Sullivan, pers.comm.).

Several forest stands, including many timber harvest units, would be burned with prescribed fire to reduce hazardous fuels that may increase as a result of silvicultural treatments and to encourage pine and oak regeneration. Prescribed burning may be conducted at any time of year, other than May 15 – August 15, but would most likely occur during the spring and fall seasons. In some cases, stands may be prescribed burned more than once in order to achieve woodland conditions and a more herbaceous understory. Preparation of these areas for prescribed burning would involve the construction of approximately 5.4 miles of dozer line, with the remaining firelines being constructed with handtools or utilizing features such as existing roads and streams (C.Woods, per.comm.).

In addition to timber stand improvement activities, a variety of other activities are proposed to improve and enhance the forest community. This alternative would designate 1,608 acres of forest as “old growth” habitat in order to perpetuate a continual supply of large diameter trees and old growth conditions for wildlife species that require these habitat conditions. No timber stand improvement activities would occur in these designated “old growth” stands, however, some low-intensity prescribed burning for hazardous fuels reduction would occur.

Wildlife habitat would also be enhanced by the construction of 30 vernal pools within the analysis area and maintenance of 4 existing permanent ponds. Vernal pool construction would consist of using a small-size dozer to create a temporary pond approximately 300 square feet in size and the majority of these vernal ponds will be constructed in stands proposed for silvicultural treatments. Permanent pond maintenance would involve the felling of small diameter trees growing on the pond dam, and clearing encroaching brush from around the pond edge. In some cases, the pond may be cleaned out with a small dozer.

Habitat for rare terrestrial plants and animals associated with glade communities would also be improved as part of this alternative. A total of 33 glades have been identified for restoration activities that would involve the cutting and removal of undesirable woody species that are currently encroaching upon the historically open glades. These activities may be accomplished either non-commercially or commercially, depending upon whether or not there is a market for the trees. If done commercially, the encroaching trees would be felled and pulled out to a landing area outside of the glade. If done non-commercially, the trees would be felled, lopped, and tops would either be piled (and perhaps burned) or moved to the edge of the glade. Undesirable species to be treated would be identified by the forest ecologist/botanist on a site-specific basis but would mostly include red cedar and small diameter trees such as hawthorn and buckthorn.

This alternative would also allow for the removal and clean-up of several dumps within the analysis area. Dump cleanup would involve using a small dozer to scoop the dump materials into a truck and refuse would be hauled off-site and disposed of properly. (J.Walker, pers. comm.).

Also proposed in the alternative are activities intended to improve water quality and reduce soil erosion. These activities involve relocation of a 0.6 mile section of the Audubon Trail in order to remove it from a riparian flood zone. Relocation of this trail would involve constructing a new 0.6 mile section of trail using a small dozer and hand tools and would disturb a corridor approximately 10 feet wide and closure of the old, former trail section (T.Leimer, pers.comm.). Other activities to reduce soil erosion potential include the decommissioning of 45.8 miles of existing roads. Decommissioning of these roads may involve placing a barricade, such as an earthen or rock berm at the road entrance. It may also involve obliterating the road by scarifying the road surface, reshaping the contours to match the surrounding area, and scattering tree tops in the road. (A. Sullivan, pers.comm.). Also proposed is the revegetation and stabilization of eroding soils located in 19 stands within the project area, including at an existing Artesian well site.

Table 2. Summary of activities proposed for Alternative 2 (Modified Proposed Action)

Proposed Activity	Approximate Area Affected
Timber Harvest (Seedtree Cut)	850 acres
Timber Harvest (Shelterwood Cut)	1,543 acres
Timber Harvest (Sanitation/Salvage/Overstory removal Cut)	987 acres
Timber Harvest (Selection with Groups Cut)	362 acres
Timber Harvest (Thinning)	1,077 acres
<i>Subtotal (Timber Harvest)</i>	<i>4,819 acres</i>
Release (Pine saplings)	173 acres
Crop Tree Release	1,607 acres
Temporary roads constructed	24.3 miles
Roads reconstructed	9.5 miles
Existing roads decommissioned	45.8 miles
Prescribed burning	2,603 acres
Miles of dozer-constructed fireline	5.4 miles
Old growth designated	1,608 acres
Vernal ponds constructed	30 ponds
Permanent ponds maintained	4 ponds
Glades restored	33 sites
Dumps removed	11 sites
Trail reconstructed	0.6 miles
Areas with erosion control activities	19 stands

**Alternative 1 and 2 Protective Measures:** Several protective measures that are in addition to the standards and guidelines required by the MTNF Land and Resource Management Plan (aka Forest Plan) have been incorporated into the proposed action for both Alternatives 1 and 2. These protective measures can be found in Appendix B.

### **Alternative 3 (No Action)**

This alternative would initiate no new active management within the project area. This alternative provides a baseline (reference point) against which to describe the

environmental effects of the two action alternatives being considered. This is a viable alternative and responds to concerns of those who want no active management to occur in the project area beyond what is currently ongoing as the result of natural processes, routine maintenance or current management direction.

**Project Location:** The legal description for the project area is: Township 32 North, Range 7 East, Sections 11-13; Township 32 North, Range 8 East, Sections 3, 6-11, 15, 18, 19, 21-23, 25, 26, 34-36; Township 33 North, Range 8 East, Sections 29, 30, 35; Township 34 North, Range 7 East, Sections 12, 36; Township 34 North, Range 8 East, Sections 2-4, 9, 17, 19-21, 28-33; Township 35 North, Range 8 East, Sections 9, 11-14, 16, 19-30, 34-36; Township 35 North, Range 7 East, Section 24, Fifth Principal Meridian. A general map of the project area can be found in Appendix C.

**Project Management Prescription Areas:** 4.14, 4.15, 4.16 and 4.17

**Project Area Size:** The project area represents approximately 76,813 acres of which approximately 17,657 acres are National Forest.

**Land Type Associations in Project Area:** Oak-Pine Breaks-Limestone (HC), Oak-Pine Plains-Limestone (PA), Oak-Pine Plains-Limestone (PB), Oak-Pine Hills-Limestone (HD), Oak Pine Hills-Felsite (HA).

## SPECIES CONSIDERED AND EVALUATED

All of the species identified by the Regional Forester as Sensitive Species and that are known or likely to occur on the Mark Twain National Forest are considered in this BE (see Table 1A, Appendix A). In addition, four other species are considered that have been proposed as RFSS during the last MTNF RFSS Species List Maintenance Summary (2/27/03). These species are likely to be added to the RFSS list prior to implementation of this project.

The Regional Forester's Sensitive Species list was first issued on March 8, 1994, and later updated on February 29, 2000. This latest list contains 126 plants and animals. Of these 126 species, 57 species (27 animals, 30 plants) are likely or known to occur on the Potosi-Fredericktown District (see Table 2A, Appendix A).

A review of field surveys, the Missouri Fish and Wildlife Information System (MoFWIS) for St. Genevieve, St. Francois, Madison, and Bollinger Counties, Missouri, plus a review of the Missouri Heritage 2003 (6/24/03, ver. 1.2) database, and the MTNF BE Program for the four LTAs in the project area indicated that the following RFSS are known or likely to occur in the project area:

**Table 2. Regional Forester's Sensitive Species likely or known to occur within the project area**

(Species' common names in bold have been documented in the project area; species' common names not in bold are considered known or likely, according to BE Program & MOFWIS, but have not been documented within the project area)

<b>Common Name</b>	<b>Scientific Name</b>	<b>Species Group</b>	<b>Habitat Group</b>
<b>Ozark snaketail dragonfly</b>	<i>Ophiogomphus westfalli</i>	Insect	Riparian/Streams/Rivers
<b>A heptogeniid mayfly</b>	<i>Stenonema bednariki</i>	Insect	Streams/Rivers
<b>Dioecious sedge</b>	<i>Carex sterilis</i>	Plant	Riparian/Fen/Seep
<b>Goldie's woodfern</b>	<i>Dryopteris goldiana</i>	Plant	Riparian/Fen/Seep
<b>Butternut</b>	<i>Juglans cinerea</i>	Plant	Riparian/Forest/Slope
<b>Spotted phlox</b>	<i>Phlox maculate pyramidalis</i>	Plant	Riparian/Fen/Seep
<b>Small green woodland orchid</b>	<i>Platanthera clavellata</i>	Plant	Riparian/Fen/Seep
<b>Moss</b>	<i>Seligeria donniana</i>	Plant	Riparian
Bachman's sparrow	<i>Aimophila aestivalis</i>	Bird	Glade/Grassland
Cerulean warbler	<i>Dendroica cerulea</i>	Bird	Riparian/Forest/Slope
Peregrine falcon	<i>Falco peregrinus anatum</i>	Bird	Grassland
Migrant loggerhead shrike	<i>Lanius ludovicianus migrans</i>	Bird	Grassland
Western sand darter	<i>Etheostoma clarium</i>	Fish	Streams/Rivers
Blacknose shiner	<i>Notropis heterolepis</i>	Fish	Streams/Rivers
Ozark shiner	<i>Notropis ozarcanus</i>	Fish	Streams/Rivers
Longnose darter	<i>Percina nasuta</i>	Fish	Streams/Rivers
Snuffbox	<i>Epioblasma triquetra</i>	Mollusc	Rivers
Rabbitsfoot	<i>Quadrula cylindrica</i>	Mollusc	Rivers
Purple lilliput	<i>Toxolasma lividus</i>	Mollusc	Rivers
Big Creek crayfish	<i>Orconectes peruncus</i>	Mollusc	Streams/Rivers
Big River belted crayfish	<i>Orconectes harrisonii</i>	Mollusc	Streams/Rivers
St. Francis River crayfish	<i>Orconectes quadruncus</i>	Mollusc	Streams/Rivers
Forked aster	<i>Aster furcatus</i>	Plant	Bluff
Epiphytic sedge	<i>Carex decomposita</i>	Plant	Wetland/Seeps/Fens
Open ground Whitlow grass	<i>Draba aprica</i>	Plant	Riparian/Bluffs
Wavy-leaf purple coneflower	<i>Echinacea simulata</i>	Plant	Glade/Grassland
Large-leaved grass of Parnassus	<i>Parnassia grandifolia</i>	Plant	Riparian/Wetland/Seeps/Fens
Gattinger's goldenrod	<i>Solidago gattingerii</i>	Plant	Glade
Ozark cornsalad	<i>Vallerianella ozarkana</i>	Plant	Glade
Sand grape	<i>Vitus rupestris</i>	Plant	Riparian

(MoFWIS report 7/23/03; BE Program reports run 7/24/03)

In addition to these RFSS species, there are other Species of Concern that have no Regional Forester or federal status, yet, are considered in this evaluation because they have some type of state designation that determines they are at risk in Missouri or throughout their range. These species were identified for the Mark Twain National Forest using the Missouri Fish and Wildlife Information System (MoFWIS) 7/13/00 and Wildlife Code of Missouri (3/1/02) and are shown in Table 3A of Appendix A.

A review of this list using MoFWIS, the BE Program and the MTNF Heritage CD (6/24/03 ver. 1.2) indicated that, of all these Species of Concern, only the following would be expected to occur within the project area because these species are known to occur statewide or within the range of the project area.

<b>Table 3. Additional Species of Concern known or likely to occur in the project area</b>			
<b>(Species' common names in bold have been documented in the project area; species' common names not in bold are considered known or likely, according to BE Program &amp; MOFWIS, but have not been documented within the project area)</b>			
<b>Common Name</b>	<b>Scientific Name</b>	<b>Species Group</b>	<b>Habitat Group</b>
<b>Spotted skunk</b>	<i>Spilogale putorius interrupta</i>	Mammal	Grassland
Flathead chub	<i>Platygobio gracilis</i>	Fish	Streams/Rivers
Harlequin darter	<i>Etheostoma histrio</i>	Fish	Streams/Rivers
Taillight shiner	<i>Notropis maculatus</i>	Fish	Streams/River
Eastern prairie fringed orchid	<i>Platanthera leucophaea</i>	Plant	Extirpated
Snowy egret	<i>Egretta thula</i>	Bird	Wetland
Northern harrier	<i>Circus cyaneus</i>	Bird	Grassland
Barn owl	<i>Tyto alba</i>	Bird	Grassland
King rail	<i>Rallus elegans</i>	Bird	Wetland
American bittern	<i>Botaurus lentiginosus</i>	Bird	Wetland

As shown in the above tables, each RFSS or Species of Concern can be associated with one or more primary habitat group. However, although the MoFWIS and BE Program indicates that several of these species are known or within the project area, field surveys and a review of MTNF Heritage CD indicate that no suitable habitat for species associated with the following habitat groups is likely to occur in the project area:

- Caves
- Wetland/Swamps

Therefore, species associated strictly with these two habitats would **not be impacted** by the three alternatives being considered in this analysis.

The following habitat groups and their associated species are known to occur within the project area and, therefore, are discussed in greater detail in this BE:

- Riparian: Represented along the edges perennial streams and the Castor River.
- Stream/River: Includes all perennial streams and rivers within the project area.

- Forest/Slopes: Represented primarily by forested uplands and hillsides throughout project area on both private and National Forest lands involved.
- Grassland: Represented on private lands only, in form of pasture and farmland.
- Glade: several igneous and limestone glades scattered throughout the project area on both National Forest and private lands.
- Seep: many seeps located on National Forest in project area.
- Fen: small fens scattered throughout the project area on private and National Forest.
- Bluff: some rock outcrops and bluffs along perennial streams and Castor River.

The “project area” is defined as the area in which activities associated with one or more of the proposed alternatives could potentially have a direct, indirect, or foreseeable cumulative effect upon an RFSS or Species of Concern, or habitat in which the species is likely to occur. For this analysis, the project area includes the private and National Forest lands within the East Fredericktown analysis area (see Map, Appendix B).

## SURVEY INFORMATION

In preparation of this BE, site-specific surveys within the project area were combined with a general knowledge of the habitats that are likely or known to occur within the project influence areas. Lynda Mills (USFS biologist) conducted biological field surveys of the project area during 2003 on January 8, March 4, April 1, 3, 23, and May 12. These surveys were cursory in nature and focused on determining the habitat conditions within the project area and locating potential habitat for wildlife species.

Botanical surveys were also conducted by a contract botanist (Alan Brant) during the growing season of 2003 and results of those surveys have been reviewed as part of this BE. These botanical surveys focused on the drainages within the project area (generally considered areas of highest potential for rare plant communities) and were considered to be nearly complete by July 2003 and will continue until winter of 2003 (A.Brant, pers. comm.).

Additional special habitat information such as seep, fen, and glade locations was collected by Susan Stevens (USFS Archeology Technician) during her extensive field surveys within the project area and reviewed during the preparation of this BE.

One night of survey work by Sybil Amelon (USFS biologist) was conducted within the project area during June 2003. The surveys involved mistnetting a location in the north end of the project area to determine bat use of the area. No federally listed bat species were captured during this survey.

Other surveys not specific to this project have been conducted in the vicinity of the project area. For example, in partnership with the Mark Twain National Forest and others, the Missouri Department of Conservation (MDC) has been very aggressive in conducting species surveys and maintaining data on both listed and common species. Information collected by MDC during their surveys was reviewed as preparation for this

BE by utilizing the Missouri Fish and Wildlife Information System (MOFWIS) and the Missouri Heritage 6/24/2003 v. 1.2 database.

In addition to the extensive fieldwork done in preparation of the Missouri Heritage and MOFWIS databases, there are numerous field surveys conducted annually or as part of research projects in Missouri. The Mark Twain National Forest has also conducted surveys in partnership with others, or on its own such as:

- Annual mid-winter eagle surveys
- Annual eagle nest surveys
- Forest bat surveys (cave, fall, summer, winter, mist-net, harp-trap, Anabat)
- Missouri breeding bird atlas and survey routes
- Cave research foundation biological inventories
- Gardner & Gardner cave inventories
- Contracted botanical surveys
- Naiads survey 1980-82
- Periodic fish surveys

While not all of these surveys are relevant to the analysis for the East Fredericktown project area, they do provide information concerning suitable habitats and species distribution within the vicinity of the project area.

Additional information regarding species habitats and distributions within the project area was gathered from various publications and websites that are identified in the References and Data Sources section of this BE.

In sum, this analysis of effects upon RFSS and Species of Concern is based upon information obtained during the field surveys that have been conducted in the vicinity of this project, as well as an assumption that habitat for the species addressed in detail may exist within the project area.

## ENVIRONMENTAL BASELINE

### **Riparian-associated species**

**Including *Ophiogomphus westfalli*, *Carex sterilis*, *Dryopteris goldiana*, *Juglans cinerea*, *Phlox maculate pyramidalis*, and *Platanthera clavellata***

Species that prefer riparian habitat tend to be most dependent upon periodic flooding to maintain their habitat. As a result, these species are generally limited to the transition zone between the stream or river's edge and the bottom of slopes. These species tend to prefer damp, rich soils, or the washed, scoured surface of streambanks. In some cases, the break in canopy created naturally by the stream or river corridor is a preferred element of this habitat.

**Occurrence within project area** – Six species that are frequently associated with riparian habitat have been documented within or adjacent to the project area.

*Ophiogomphus westfalli* has been found at one site in the project area, along the Castor River. This species was collected in June 2000 in Madison County, in Compartment 539 on private land.

*Carex sterilis* was found in St. Genevieve and Madison counties on National Forest within the project area by Alan Brant during his field surveys of the project area. The St. Genevieve County site occurs along Johns Creek, in Compartment 583, Stand 15. This site contained 50 clumps of fertile plants. The Madison County site occurs along a tributary of Grounds Creek, in a forested fen located in Compartment 541, Stand 3, and contained about 100 clumps of fertile plants.

*Dryopteris goldiana* has been documented in Bollinger County along the edge of Spring Branch. This site was found in 1972 in on National Forest in Compartment 528, Stand 8. A collection of the plants was made from the site, which was located at the base of a north-facing hill, just a few feet from the edge of Spring Branch.

*Juglans cinerea* was found a several sites within the project area by Alan Brant during his field surveys of the project area in 2003. Many of these sites were on National Forest along Bidwell Creek, where several individual trees were found scattered in the floodplain. Other individuals were located on National Forest in Compartment 578, Stand 18, along Coldwater Creek, and on private land in Compartment 532, along Wash Creek. All of the specimens observed during these surveys were either diseased or dead.

*Phlox maculate pyramidalis* was located in St. Genevieve county at a site in Compartment 585 on private land within the project area. However, this site was found in 1936 and has not been re-found since, despite surveys by botanists in 1986 and 1993. The site was reportedly along Spring Branch of Coldwater Creek, growing in marshy ground among sedges.

*Platanthera clavellata* has been recorded from 2 sites within the project area and 1 site near the project area. One site in the project area is in St. Francois county, where it was found in 1993 by Alan Brant on private lands in Compartment 577. This site contained nearly 30 plants, 15 of which were in fruit, growing along Coldwater Creek in a deep muck fen that had been disturbed by a powerline corridor. Alan Brant found a second site for this species in Madison County during his field surveys of the project area in June 2003. This second site was found on National Forest in Compartment 541, Stands 18 and 33, along a tributary to Grounds Creek. Another site in Madison County is known from a 1994 survey conducted by Alan Brant. This survey found 2 stems growing on private land about 3.5 miles outside of the project area in the highly disturbed Clevenger fen.

According to BE Program, some riparian-associated species have potential habitat in the project area. However, based upon a review of the MTNF Heritage CD (6/24/03 ver. 1.2) and results of field surveys conducted for this project, none of these species are known within the project area. Suitable habitat, as calculated by the BE Program for some of these species, does occur in the project area as follows:

Riparian Species	Total Acres Suitable Habitat in Project Area (based upon BE Program)	Acres Suitable Habitat in Project Area by LTA (based upon BE Program)			
		LTA HA	LTA HC	LTA HD	LTA PA
<i>Phlox maculate pyramidalis</i>	64	0	64	0	0
<i>Dendroica cerulea</i>	120	0	120	0	0
<i>Parnassia grandifolia</i>	972	0	972	0	0
<i>Vitis rupestris</i>	878	0	572	186	120

(BE Program Report 2, run 7/24/03)

One other species has been reported by MoFWIS as known or likely in one of the four counties within the project area, but this species has not been documented in the project area. This species is *Draba aprica*.

### **Stream/River-associated species Including *Ophiogomphus westfalli* and *Stenonema bednariki***

The species dependent upon streams or rivers are primarily aquatic organisms such as fish, mussels, and amphibians. These species spend all or most of their life cycle in aquatic environment. As a result, these species are most susceptible to activities that threaten the water quality of these streams by altering the temperature, oxygen or pH levels of the stream, as well as other factors. Many cold and warm water streams form the boundaries and intersect the Mark Twain National Forest

**Occurrence within project area** – Two species that are frequently associated with riparian habitat have been documented within or adjacent to the project area. One of these species is *Ophiogomphus westfalli*, which is discussed under the Riparian-associated species section.

*Stenonema bendnariki* has been documented in Madison County, where it was found in 1999 and 2000 on coarse substrate of the Castor River. The species was found on state land in the project area, in Compartment 556, at the Amidon Memorial Conservation Area.

According to BE Program, some stream/river-associated species have potential habitat in the project area. However, based upon a review of the MTNF Heritage CD (6/24/03 ver. 1.2) and results of field surveys conducted for this project, none of these species are known within the project area. Suitable habitat, as calculated by the BE Program for some of these species, does occur in the project area as follows:

Stream/River Species	Total Acres Suitable Habitat in Project Area (based upon BE Program)	Acres Suitable Habitat in Project Area by LTA (based upon BE Program)			
		LTA HA	LTA HC	LTA HD	LTA PA
<i>Notropis heterolepis</i>	357	0	0	357	0
<i>Quadrula cylindrica</i>	105	105	0	0	0
<i>Orconectes quadruncus</i>	105	105	0	0	0
<i>Orconectes peruncus</i>	110	110	0	0	0

(BE Program Report 2, run 7/24/03)

Other species have been reported by MoFWIS as known or likely in one of the four counties within the project area, but these species have not been documented in the project area. These species are *Etheostoma clarium*, *Notropis ozarcanus*, *Percina nasuta*, *Epiplatys triquetra*, *Toxolasma lividus*, *Orconectes harrisonii*, *Platygobio gracilis*, *Etheostoma histrio*, and *Notropis maculates*.

### **Forest/Slope-associated species Including *Juglans cinerea***

These species can be found generally throughout areas that are comprised of large tracts of mature forest. It is difficult to characterize the slope habitat preferred by some of these species. In general, these species prefer the transitional elements between the drier upland forest and the more shaded, damper, bottomland forest. Slopes, unless comprised of glades and exposed bluffs or rock outcrops, tend to have deeper soils than upland forests, yet be drier than soils found in bottomlands. The understory layer on these slopes tends to be diverse and often multi-layered.

**Occurrence within project area** – Besides *Juglans cinerea*, which has been discussed under the Riparian-associated species section, no species frequently associated specifically with forest slopes have been documented within the project area. The BE program did identify potential habitat for one forest/slope-associated species.

Forest/Slope Species	Total Acres Suitable Habitat in Project Area (based upon BE Program)	Acres Suitable Habitat in Project Area by LTA (based upon BE Program)			
		LTA HA	LTA HC	LTA HD	LTA PA
<i>Dendroica cerulea</i>	120	0	120	0	0

(BE Program Report 2, run 7/24/03)

MoFWIS also identified *Dendroica cerulea* as the only forest/slope-associated species known or likely to occur within the project area. Some other forest/slope-associated species, however, are known to occur on the Potosi-Fredericktown District, and because

there is substantial habitat for these species in the project area, this habitat group is being addressed.

### **Grassland-associated species Including *Spilogale putorius interrupta***

Habitat for these species generally occurs in the form of large areas of tall grass and prairie. Many of these species could be considered prairie species, and occur on the Mark Twain National Forest in prairie remnants and woodland environments that have a very grassy, open understory. Occasionally, these species are found in glades that have been maintained in a grassy condition, however, for the most part, these species need larger expanses of open grass habitat than is typically provided in a glade.

**Occurrence within project area** – One species that is frequently associated with grassland habitat has been documented within or adjacent to the project area.

*Spilogale putorius interrupta* has been reported from a site in Madison County, on private lands in Compartment 518. This report came from a trapper who stated that he found a spotted skunk in his trapline. No other details regarding this report are known, other than the trapline was supposedly in the vicinity of Cottoner Mountain.

According to BE Program, some grassland-associated species have potential habitat in the project area. However, based upon a review of the MTNF Heritage CD (6/24/03 ver. 1.2) and results of field surveys conducted for this project, none of these species are known within the project area. Suitable habitat, as calculated by the BE Program for some of these species, does occur in the project area as follows:

Grassland Species	Total Acres Suitable Habitat in Project Area (based upon BE Program)	Acres Suitable Habitat in Project Area by LTA (based upon BE Program)			
		LTA HA	LTA HC	LTA HD	LTA PA
<i>Lanius ludovicianus migrans</i>	24	0	0	0	24
<i>Echinacea simulate</i>	17	17	0	0	0

(BE Program Report 2, run 7/24/03)

Other species have been reported by MoFWIS as known or likely in one of the four counties within the project area, but these species have not been documented in the project area. These species are *Aimophila aestivalis*, *Circus cyaneus*, and *Tyto alba*.

### **Glade-associated species**

Glade species are generally restricted to the limestone and igneous glade complexes. These glade complexes are characterized by exposed bedrock, shallow soils, and herbaceous vegetation. These glade habitats were likely historically maintained in an open, grassy condition by periodic fire, but today, many are being overtaken by woody

vegetation as a result of decades of fire suppression. The plant community that occupies these glades is often influenced by the geology of the bedrock, with igneous glades often supporting different plant communities than limestone glades.

**Occurrence within project area** – No RFSS or Species of Concern frequently associated with glades have been documented in the project area.

According to BE Program, some glade-associated species have potential habitat in the project area. However, based upon a review of the MTNF Heritage CD (6/24/03 ver. 1.2) and results of field surveys conducted for this project, none of these species are known within the project area. Suitable habitat, as calculated by the BE Program for some of these species, does occur in the project area as follows:

Glade Species	Total Acres Suitable Habitat in Project Area (based upon BE Program)	Acres Suitable Habitat in Project Area by LTA (based upon BE Program)			
		LTA HA	LTA HC	LTA HD	LTA PA
<i>Echinacea simulate</i>	17	17	0	0	0
<i>Solidago gattererii</i>	0	0	0	0	0

(BE Program Report 2, run 7/24/03)

Other species have been reported by MoFWIS as known or likely in one of the four counties within the project area, but these species have not been documented in the project area. These species are *Aimophila aestivalis*, and *Vallerianella ozarkana*.

**Seep/Fen-associated species**  
**Including *Carex sterilis*, *Dryopteris goldiana*,**  
***Phlox maculate pyramidalis*, and *Platanthera clavellata***

The seep habitat required by these species can often be found at the heads of perennial streams and around the edges of fens or springs. These seeps are characterized by the presence of groundwater leaching to the soil surface. They are similar to spring and fen habitats, but generally are much smaller in size and more shaded than fens and have slower moving water over a larger area than springs. In some cases, these seeps occur in acid soils, while others occur in calcareous soils. The acidic seeps frequently have a different plant community than calcareous seeps.

A fen could be considered a type of wetland. It is dominated by grass or grass-like plants and fed primarily by water from a mineral source. They are nearly always located adjacent to perennial streams in bottomland areas. The water flow through these fens is often slow and flowing through dense vegetation. The fen habitats are often adjacent to forest edge. Many fens are becoming dominated by encroaching woody vegetation, and have been classified as either “forested, deep muck, or prairie” fens. This classification is often a reflection of the level of hardwood encroachment that has occurred historically in a fen. It is theorized that the grassy condition of these fens may be maintained by periodic flooding or fire.

**Occurrence within project area** – Four species frequently associated with seeps have been documented in the project area. These species are *Carex sterilis*, *Dryopteris goldiana*, *Phlox maculate pyramidalis*, and *Platanthera clavellata*. Their specific locations and habitats within the project area are discussed under the riparian-associated species section.

According to BE Program, some seep-associated species have potential habitat in the project area. However, based upon a review of the MTNF Heritage CD (6/24/03 ver. 1.2) and results of field surveys conducted for this project, none of these species are known within the project area. Suitable habitat, as calculated by the BE Program for some of these species, does occur in the project area as follows:

Seep/Fen Species	Total Acres Suitable Habitat in Project Area (based upon BE Program)	Acres Suitable Habitat in Project Area by LTA (based upon BE Program)			
		LTA HA	LTA HC	LTA HD	LTA PA
<i>Phlox maculate pyramidalis</i>	64	0	64	0	0
<i>Parnassia grandifolia</i>	972	0	972	0	0

(BE Program Report 2, run 7/24/03)

One other species has been reported by MoFWIS as known or likely in one of the four counties within the project area, but this species has not been documented in the project area. This species is *Carex decomposita*.

### Bluff-associated species

In Missouri, most cliffs, or bluffs as they are commonly called, were formed in drainages by the cutting of streams and rivers through the substrates. Bluffs may also be created by the collapse of cave systems. Many species associated with these bluffs tend to prefer the shaded, moist, sheltered microclimate created by overhanging bluffs. Other species prefer the other extreme and occupy the dry, shallow soil on exposed rock. Some animal species associated with bluff occupy the sheltered, cave-like crevices and openings within the rock itself.

**Occurrence within project area** – No RFSS or Species of Concern frequently associated with bluffs have been documented in the project area.

The BE program did not identify any potential habitat for bluff-associated species within the project area.

Two species have been reported by MoFWIS as known or likely in one of the four counties within the project area, but these species have not been documented in the project area. These species are *Aster furcatus* and *Draba aprica*.

## EFFECTS OF PROPOSED MANAGEMENT ACTION

### Riparian-associated species

Including *Ophiogomphus westfalli*, *Carex sterilis*, *Dryopteris goldiana*, *Juglans cinerea*, *Phlox maculate pyramidalis*, and *Platanthera clavellata*

#### Direct Effects

**Alternatives 1 and 2-** There is some potential that the *Dryopteris goldiana* site may be impacted by the timber stand improvement activities proposed in Compartment 528, Stand 8 because this stand contains a site known to support this species. However, it is possible that this *Dryopteris goldiana* site was mis-mapped and actually occurs on private land downstream from this stand. Should it be determined during project implementation that the site is within the timber stand improvement area, it will be identified on the ground and protected by implementation of existing protective measures that limit the amount of ground disturbance and timber felling within 100 feet of seeps, fens, springs, and other special features and habitats. It is most likely, also, that the designated no cut zones in riparian areas would also provide some protection for this species.

Some *Juglan cinerea* individuals may also be impacted by prescribed burning. These individuals are located along Bidwell Creek in Compartment 576, Stand 1. These and other known trees in the project area are diseased and would not likely survive longterm, regardless of whether they are impacted by prescribed burning activities or not. Other sites for this species are located in stands that would not be directly or indirectly affected by activities proposed in Alternative 1. These remaining sites occur either on private lands or in stands that have not been designated for any activities or are designated for old growth or special area protection (8.1 management areas).

Sites where the other riparian-associated species are known to occur within the project area (*Ophiogomphus westfalli*, *Carex sterilis*, *Dryopteris goldiana*, *Phlox maculate pyramidalis*, and *Platanthera clavellata*) would not be directly or indirectly impacted by activities proposed in this Alternative. These sites are located either on private land, or in stands that are not proposed for any activity. Many of these sites are in stands proposed for old growth or special area (8.1 management area) designation.

**Alternative 3-** This alternative would not be expected to have any direct effect upon riparian-associated species because it would not involve any activities within riparian habitat.

#### Indirect Effects

**Alternative 1-** Generally speaking, none of the activities proposed in Alternative 1 should have an indirect impact upon riparian habitat for these species because of protective measures that have been incorporated into the proposed project. With implementation of this protective measure, a no cut zone will be designated within riparian zones along perennial and intermittent streams. This “no cut” zone would be at

least 50 feet in width and would likely adequately protect any plants that occupy the riparian habitat from indirect effects associated with timber stand improvement activities. Other protective measures will minimize impacts to unique habitats that frequently occur in riparian zones, such as seeps, fens.

There is potential for some riparian habitat to be indirectly affected by prescribed burning proposed in this alternative since some of this burning and dozer line construction will occur in riparian areas. Generally, these riparian areas are not directly fired unless necessary for reinforcement of control lines. If not directly fired, these riparian areas would be less impacted since the fires would generally “back” down the slope into the riparian zones and self-extinguish. Even if directly fired, however, the riparian zones should not be heavily impacted since firing would not occur on extreme fire weather days when fires would burn hottest and be most likely to damage riparian systems. Sites known to be occupied by a RFSS species will be avoided during fireline construction.

**Alternative 2-** The indirect effects of this alternative would be expected to be similar to those described for Alternative 1.

**Alternative 3-** With implementation of Alternative 3, there may be an increased risk in insect infestations within riparian areas, because no activities would occur that would improve the resistance of forest stands that may currently be in an unhealthy condition. As stands become infested by insects or disease, they would gradually become more open and likely create a change in riparian conditions, creating more open, drier habitats. However, this would not be expected to have a measurable impact upon riparian habitat within the project area because most of the stands susceptible to oak decline and insect infestations are in upland areas, and not within riparian zones.

The anticipated die-off of trees due to lack of treatment may also contribute to more intense wildfires within the project area. Fuels would build-up within forest stands as they succumb to disease and insects. Intense wildfires would have the potential of creating large areas of little canopy cover, which would likely impact riparian species. Exclusion of controlled burns within these stands would also increase the potential for wildfires to become intense and difficult to control.

Overall, however, Alternative 3 is not expected to improve nor degrade habitat conditions for riparian species.

### **Cumulative Effects**

**Alternatives 1, 2 & 3-** While once likely widespread across Missouri, high quality habitat for riparian species continues to decrease as riparian zones along streams on private lands continue to be converted to agriculture and urban development. The cumulative effect of riparian corridor development and management unfavorable to the RFSS riparian species could result in a net loss of suitable habitat for these species. Implementation of Alternative 3, however, would not likely contribute to the cumulative effect of loss of suitable habitat.

## Quantification of Habitat Acres Affected

The following table quantifies the number of acres of suitable habitat that would be *directly* affected by Alternatives 1 and 2. Because Alternative 3 would not involve any management activities that would directly alter the forest condition, it has been assumed that the acres of suitable habitat within the project area for these species are not directly affected by this alternative. These numbers are based solely upon the Mark Twain National Forest BE Program, Report 7, run on 6 August 2003.

Only species identified by the BE Program as having suitable habitat within the project area are listed.

Riparian Species	Total Acres Suitable Habitat in Project Area	Acres of Suitable Habitat in Project Area Affected by Alternative									
		Destroyed		Reduced		Created		Enhanced		Maintained	
		Alt. 1	Alt. 2	Alt. 1	Alt. 2	Alt. 1	Alt. 2	Alt. 1	Alt. 2	Alt. 1	Alt. 2
<i>Phlox maculate pyramidalis</i>	64	0	0	0	0	0	0	0	0	30	30
<i>Dendroica cerulea</i>	120	0	0	0	0	0	0	0	0	210	210
<i>Parnassia grandifolia</i>	972	0	0	0	0	0	0	0	0	77	56
<i>Vitis rupestris</i>	878	0	0	0	0	0	0	0	0	939	891

## Determination of Effect and Rationale

**Alternatives 1 and 2-** The activities proposed in Alternatives 1 and 2 *may impact individuals of the following species but are not likely to cause a loss of viability or a trend toward federal listing:* *Juglans cinerea*, *Dryopteris goldiana*. These species are known to occur in the project area and are within stands proposed for activities that may impact them or their occupied habitat.

The activities proposed in Alternatives 1 and 2 may also impact suitable potential habitat for other riparian-associated RFSS or Species of Concern because they involve prescribed burning and some soil disturbance within riparian zones.

**Alternative 3-** The implementation of Alternative 3 is expected to have *no impact* upon any riparian-associated RFSS and Species of Concern because it would involve no direct or indirect disturbance to riparian habitats within the project area.

## **Stream/River-associated species**

### **Including *Ophiogomphus westfalli* and *Stenonema bednariki***

#### **Direct Effects**

**Alternatives 1 & 2-** Neither of these alternatives would be expected to have a direct impact upon *Ophiogomphus westfalli*, *Stenonema bednariki*, or any other RFSS stream/river associated species because none of these species have been documented from National Forest lands in which proposed activities would occur in Alternatives 1 and 2. The only known sites for *Ophiogomphus westfalli* and *Stenonema bednariki* in the project area are > 1 mile and 2.5 miles, respectively, from any stands in which activities are proposed.

**Alternative 3-** This alternative would have no direct impact upon any stream/river-associated RFSS or Species of Concern because it does not involve implementation of any activities.

#### **Indirect Effects**

**Alternatives 1 and 2-** Aquatic RFSS and Species of Concern that occupy or may occupy the Castor River and other perennial streams within the project area are most susceptible to the effects that activities occurring within their watersheds may have upon water quality. Activities with the greatest potential for impacts upon water quality involve those activities that would disturb the soil surface. In Alternative 1, these activities include the construction of dozerlines, vernal pond construction, erosion control activities, and reconstruction of trails. In Alternative 2, these activities include temporary road construction, road reconditioning, skidding and dragging associated with commercial removal of merchantable timber, the construction of dozerlines, and, to a lesser degree, vernal pond construction, erosion control activities, glade restoration, and reconstruction of trails.

The mechanical treatment of stands for timber stand improvement activities proposed in Alternative 1 would not be expected to significantly disturb the soil surface because these activities would be conducted using no heavy equipment and would not require any temporary road construction or road reconditioning (J.Walker, pers.comm).

However, several protective measures have been incorporated into Alternatives 1 and 2 that would minimize any potential for soil movement from dozerlines and trail reconstruction activity areas, as well as areas being treated mechanically. With implementation of these protective measures, no soil movement is expected to occur at rates that would adversely affect the water quality of adjacent streams, and therefore, the habitat stream/river-associated species. Past monitoring of similar projects on the MTNF has indicated that soil movement levels were well within the allowable soil loss established in the Forest Plan (U.S. Forest Service 2002).

Because Alternative 1 proposes several hundred acres of mechanical treatment of timber stands, in which trees would be cut but not removed, there is some increased potential for

a severe wildfire within the project area. The heavy fuel loads left in these stands following mechanical treatment would increase this potential. Heavy fuel loads could contribute to an intense, hard to control wildfire in the project area. Such a wildfire has the potential of negatively impacting the water quality with the project area by increasing the amount of water and soil run-off. However, the chances of such a wildfire occurring would be hard to predict and therefore, these indirect effects may not be “reasonably certain to occur”.

Some of the activities proposed in both alternatives may also have an indirect beneficial effect upon potential habitat for stream/river-associated species. In both alternatives, some activities would occur that may enhance the water quality of streams within the project area, and therefore, improve water quality in the streams and rivers within the project area. Activities that would improve water quality include dump removal (some of which are located near streams), erosion control activities along perennial streams and Castor River, and relocation of a section of trail to an area outside the Bidwell Creek floodplain. The designation of 1,608 acres of old growth habitat would also occur under this alternative and benefit potential habitat for aquatic species, because much of this old growth would be designated within riparian areas and along streamcourses. All of these proposed activities would improve potential habitat for aquatic species.

**Alternative 3-** Under Alternative 3, there may be an indirect effect upon habitat for aquatic species. The anticipated die-off of trees due to lack of treatment may contribute to more intense wildfires within the project area. Fuels would build-up within the forested stands as they succumb to disease and insects. Should an intense wildfire occur within the project area as a result of lack of treatment of forest stands, it could contribute to increased soil loss and sedimentation of streams and rivers within the project area. Exclusion of controlled prescribed burning within these stands would also increase the potential for wildfires to become intense and difficult to control. The chances of a wildfire occurring within the project area, however, are virtually impossible to predict, and so, these possible indirect effects may be considered speculative and are not considered “reasonably certain to occur”.

Alternative 3 would also not implement any activities, such as erosion control, old growth designation, dump removal, and trail relocation, which could have an indirect beneficial effect upon the water quality of some streams within the project area.

### **Cumulative Effects**

**Alternatives 1 and 2-** In addition to activities occurring as part of this project, aquatic species are also vulnerable to practices that cause soil movement on private and public lands, as this soil movement often leads to increases in sediment loads within the streams and rivers, and can adversely impact the species. The continued development of private land for homes, recreation residences, unmanaged timber harvests, and other uses may (if not done conscientiously) contribute to sediment and pollution loads in the watersheds occupied by the species.

Within the project area, approximately 20% of the land base has been developed for agricultural and residential uses, which typically have the greatest potential for soil

movement and disturbance. With the remaining 80% representing either National Forest or forested private lands, it does not appear that conversion from forested to unforested conditions is contributing significantly to deterioration of the watersheds within the project area. However, much of the 20% not in forested conditions does occur in bottomlands and along riparian areas, since these are often the most easily cultivated and developed areas, therefore, activities within this 20% of the land base may be having more of an effect upon the watersheds than may be presented by simple comparison of percentage of forest versus non-forest within the project area.

The activities that are planned in Alternatives 1 and 2 are designed and implemented in a manner to minimize soil movement off-site, and would not be expected to contribute to any deterioration of habitat for these species. Because these activities would occur within the 80% of the forested area and are primarily within upland areas, and not bottomlands, they would not be expected to contribute to any cumulative effects being created by activities occurring on private lands that may impact aquatic RFSS or Species of Concern or their habitat.

**Alternative 3-** Aquatic species are vulnerable to practices that cause soil movement on private and public lands, as this soil movement often leads to increases in sediment loads within the streams and rivers, and can adversely impact the species. The continued development of private land for homes, recreation residences, unmanaged timber harvests, and other uses may (if not done conscientiously) contribute to sediment and pollution loads in the watersheds occupied by the species.

Under Alternative 3, no new activities would contribute to the cumulative effect of soil movement into streams. However, the current effects occurring within the watershed as the result of existing erosion from unregulated roads, streambank destabilization, and water contamination from garbage dumps would also not be minimized under Alternative 3. Therefore, while there are not any anticipated cumulative adverse effects resulting from the implementation of Alternative 3, there also are no anticipated cumulative beneficial effects, either, because this alternative would not involve a change in the existing conditions within the watersheds.

### **Quantification of Habitat Acres Affected**

The following table quantifies the number of acres of suitable habitat that would be *directly* affected by Alternatives 1 and 2. Because Alternative 3 would not involve any management activities that would directly alter the forest condition, it has been assumed that the acres of suitable habitat within the project area for these species are not directly affected by this alternative. These numbers are based solely upon the Mark Twain National Forest BE Program, Report 7, run on 6 August 2003.

Only species identified by the BE Program as having suitable habitat within the project area are listed.

Stream/River Species	Total Acres Suitable Habitat in Project Area	Acres of Suitable Habitat in Project Area Affected by Alternative									
		Destroyed		Reduced		Created		Enhanced		Maintained	
		Alt. 1	Alt. 2	Alt. 1	Alt. 2	Alt. 1	Alt. 2	Alt. 1	Alt. 2	Alt. 1	Alt. 2
<i>Notropis heterolepis</i>	357	0	0	0	0	0	0	0	0	217	241
<i>Quadrula cylindrica</i>	105	0	0	0	0	0	0	0	0	38	38
<i>Orconectes quadruncus</i>	105	0	0	0	0	0	0	0	0	38	38
<i>Orconectes peruncus</i>	110	0	0	0	0	0	0	0	0	38	38

### **Determination of Effect and Rationale**

**Alternatives 1 and 2-** The activities proposed in Alternatives 1 and 2 are expected to have *no impact* upon stream/river-associated RFSS and Species of Concern because none of these species have been documented within or adjacent to stands proposed for treatments and their aquatic habitat is likely to be adequately protected by protective measures that have been incorporated into the Proposed Actions for these two alternatives.

**Alternative 3-** The implementation of Alternative 3 is expected to have *no impact* upon any stream/river-associated RFSS and Species of Concern because it would not likely lead to or involve any disturbance to aquatic habitats within the project area.

### **Forest/Slope-associated species**

#### **Direct and Indirect Effects**

**Alternatives 1 and 2-** Alternatives 1 and 2 are expected to have no direct or indirect impact upon any known sites of forest/slope-associated RFSS or Species of Concern because none have been documented from within the stands proposed for treatment in these alternatives. However, there is substantial habitat for forest/slope-associated species within the project area. Much of this habitat occurs in stands proposed for activities such as mechanical treatment and/or timber harvesting and stand improvement. Also proposed in both alternatives is prescribed burning of much of this forest/slope habitat. These activities have the potential of disturbing suitable habitat for these species. Should *Juglan cinerea* occur within one of these forested stands, it may be inadvertently damaged or felled during routine timber felling or prescribed burning operations, although protective measures have been incorporated into the proposed action to minimize this impact. Activities that reduce or disturb the forest overstory and midstory have the potential of disturbing nesting or foraging individuals of *Dendroica cerulea*, as well, if these activities occur during the spring and summer.

**Alternative 3-** This alternative would not be expected to have any impact upon forest/slope-associated species or their potential habitat. Under Alternative 3, no change in the availability or suitability of existing habitat for these species within the project area would occur. There is some potential for an increase in insect and disease outbreaks within the project area if Alternative 3 is implemented, which could affect forest/slope habitat by increasing the intensity of wildfires and/or contribute to a loss of large areas of forest overstory, however, this potential is difficult to predict.

**Cumulative Effects**

**Alternatives 1, 2 and 3-** Based upon past, present and foreseeable events, the implementation of Alternatives 1, 2, and 3 would not have any adverse cumulative impact upon forest/slope-associated species or their habitats. Similar forested slope habitat occurs extensively within the project area and throughout the southeast Ozarks. Therefore, the implementation of Alternatives 1 and 2 would not be expected to contribute to a significant loss of suitable habitat for these species and does not limit or impede ongoing or future restoration, creation, or maintenance of their habitat.

**Quantification of Habitat Acres Affected**

The following table quantifies the number of acres of suitable habitat that would be *directly* affected by Alternatives 1 and 2. Because Alternative 3 would not involve any management activities that would directly alter the forest condition, it has been assumed that the acres of suitable habitat within the project area for these species are not directly affected by this alternative. These numbers are based solely upon the Mark Twain National Forest BE Program, Report 7, run on 6 August 2003.

Only one species was identified by the BE Program as having suitable habitat within the project area.

Forest/Slope Species	Total Acres Suitable Habitat in Project Area	Acres of Suitable Habitat in Project Area Affected by Alternative									
		Destroyed		Reduced		Created		Enhanced		Maintained	
		Alt. 1	Alt. 2	Alt. 1	Alt. 2	Alt. 1	Alt. 2	Alt. 1	Alt. 2	Alt. 1	Alt. 2
<i>Dendroica cerulea</i>	120	0	0	0	0	0	0	0	0	210	210

**Determination of Effect and Rationale**

**Alternatives 1 and 2-** The activities proposed in Alternatives 1 and 2 *may impact individuals of the following species but are not likely to cause a loss of viability or a trend toward federal listing: Juglans cinerea.* This species is known to occur in the

project area and is within stands proposed for activities that may impact it or its occupied habitat.

The activities proposed in Alternatives 1 and 2 may also impact suitable potential habitat for other forest/slope-associated RFSS or Species of Concern because they involve activities that would disturb the soil and vegetation comprising this habitat.

**Alternative 3-** The implementation of Alternative 3 is expected to have *no impact* upon any forest/slope-associated RFSS and Species of Concern because it would not likely lead to or involve any disturbance to forest/slope habitats within the project area.

## **Grassland-associated species Including *Spilogale putorius interrupta***

### **Direct Effects**

**Alternatives 1 and 2-** Aside from *Spilogale putorius interrupta*, no grassland-associated RFSS or Species of Concern have been documented from within stands proposed for treatments under these two alternatives. Because the only documentation of *Spilogale putorius interrupta* comes from private lands located approximated 2 miles west of National Forest, any activities proposed on National Forest in Alternatives 1 and 2 would be expected to have no impact upon this species.

**Alternative 3:** This alternative would be expected to have no impact upon any grassland-associated RFSS or Species of Concern because it does not involve any activities that may impact habitat or known sites for these species.

### **Indirect Effects**

**Alternatives 1 and 2-** Generally speaking, implementation of Alternatives 1 and 2 would not contribute to any indirect impact upon habitat for grassland-associated species, aside from perhaps slightly enhancing their habitat through the use of prescribed burning. Prescribed burning, as proposed in these two alternatives, could lead to an increase in the abundance of grasses and forbs in the forest understory, which would indirectly benefit some grassland species that also occur in open forests, such as *Spilogale putorius interrupta*. However, many grassland-species, such as *Lanius ludovicianus migrans*, would not necessarily be affected by prescribed burning because they tend to occur in unforested grassland areas. The most suitable habitat for all the grassland species within the project area occur on private lands in the form of pastures and fields and would not be indirectly affected by Alternatives 1 or 2. None of the activities proposed in Alternatives 1 and 2 would be expected to have an adverse indirect impact upon habitat for grassland-associated species.

**Alternative 3-** This alternative would have no indirect effect upon grassland-associated species or their potential habitat because it would not involve any activities that would disturb or enhance grassland habitat. There is some potential for an increase in insect and disease outbreaks within the project area if Alternative 3 is implemented, which could

enhance grassland habitat by increasing the intensity of wildfires and/or contribute to a loss of large areas of forest overstory, however, this potential is difficult to predict.

**Cumulative Effects**

**All Alternatives-** Grassland habitat that is suitable for these species tends to occur in large areas of prairie, pasture, and old fields. Within the project area, these habitats occur almost exclusively on private lands and not on National Forest lands that would be affected by Alternatives 1, 2 or 3. The implementation of any of these 3 alternatives would not contribute measurably to an increase or decrease in grassland habitat within the project area and would not be expected to have a cumulative effect upon the species that are likely to occupy such habitats. Based upon past, present and foreseeable events, the implementation of Alternatives 1, 2, and 3 would not have any adverse cumulative impact upon grassland-associated species or their habitats.

**Quantification of Habitat Acres Affected**

The following table quantifies the number of acres of suitable habitat that would be *directly* affected by Alternatives 1 and 2. Because Alternative 3 would not involve any management activities that would directly alter the forest condition, it has been assumed that the acres of suitable habitat within the project area for these species are not directly affected by this alternative. These numbers are based solely upon the Mark Twain National Forest BE Program, Report 7, run on 6 August 2003.

Only species identified by the BE Program as having suitable habitat within the project area are listed.

Grassland Species	Total Acres Suitable Habitat in Project Area	Acres of Suitable Habitat in Project Area Affected by Alternative									
		Destroyed		Reduced		Created		Enhanced		Maintained	
		Alt. 1	Alt. 2	Alt. 1	Alt. 2	Alt. 1	Alt. 2	Alt. 1	Alt. 2	Alt. 1	Alt. 2
<i>Lanius ludovicianus migrans</i>	24	0	0	0	0	0	0	0	0	0	0
<i>Echinacea simulate</i>	17	0	0	0	0	0	0	0	0	0	0

None of the alternatives would affect habitat considered by the BE Program as suitable for *Lanius ludovicianus migrans* or *Echinacea simulate*.

**Determination of Effect and Rationale**

**Alternatives 1 and 2-** The activities proposed in Alternatives 1 and 2 are expected to have *no impact* upon grassland-associated RFSS and Species of Concern because none of these species have been documented within or adjacent to stands proposed for treatments

and no suitable habitat for these species is likely to be measurably affected by activities proposed in these alternatives.

**Alternative 3-** The implementation of Alternative 3 is expected to have *no impact* upon any grassland-associated RFSS and Species of Concern because no activities are proposed that are likely to impact these species or their habitat.

## Glade-associated species

### Direct Effects

**Alternative 1** – There are no glade-associated RFSS or Species of Concern sites documented within stands proposed for treatment in this Alternative, and therefore, there are expected to be no impacts upon these species with implementation of this alternative. However, there are many stands proposed for activities in this alternative that contain suitable glade habitat for some of these species and this habitat would be directly impacted by activities such as prescribed burning. Prescribed burning would likely benefit any RFSS or species of concern that occupies these glades by improving the conditions of the glade and reducing competition from encroaching vegetation within the glade, particularly red cedars. Other activities proposed in this alternative would not be expected to impact glade habitat due to the incorporation of protective measures into the proposed action. These protective measures would protect glades from soil disturbance and other activities that could negatively impact any RFSS or Species of Concern within them.

**Alternative 2-** Direct effects upon glade-associated species would be the same as those described in Alternative 1. In addition to the impacts described for Alternative 1, Alternative 2 would further impact suitable habitat for these species by implementing restoration activities within selected glades. These restoration activities would involve removal of encroaching vegetation within the glades using mechanical methods. These impacts would most likely benefit any glade-associated RFSS or Species of Concern that may occupy these glades.

**Alternative 3-** This alternative would be expected to have no impact upon any glade-associated RFSS or Species of Concern because it does not involve any activities that would directly impact habitat or known sites for these species. Under Alternative 3, there would be no implementation of activities that would benefit glade species, such as glade restoration or prescribed burning.

### Indirect Effects

**Alternatives 1-** Because Alternative 1 proposes several hundred acres of mechanical treatment of timber stands, in which trees would be cut but not removed, there is some increased potential for a severe wildfire within the project area. This potential would be increased by the heavy fuel loads left in these stands following mechanical treatment. Heavy fuel loads could contribute to an intense, hard to control wildfire in the project area. Such a wildfire has the potential of improving habitat for glade species throughout

the project area. However, the chances of such a wildfire occurring would be hard to predict and therefore, these indirect effects may not be “reasonably certain to occur”.

**Alternative 2-** Activities proposed in Alternative 2 would not be expected to have any indirect effects upon known populations of glade species or their potential habitat.

**Alternative 3-** With implementation of Alternative 3, there may be an increased risk in insect infestations within the project area, because no activities would occur that would improve the resistance of forest stands that may currently be in an unhealthy condition. As insects or disease infest stands, they would gradually become more open and likely create favorable short-term conditions for glade species.

The anticipated die-off of trees due to lack of treatment may also contribute to more intense wildfires within the project area. Fuels would build-up with the forested stands as they succumb to disease and insects. Intense wildfires would have the potential burning over glades within and adjacent to the project area. This burning would most likely improve habitat conditions for this species, unless it occurred during a period of excessive drought or was of such intensity that it damaged the soils and root systems within the glade. However, the chances of such a wildfire occurring would be hard to predict and therefore, these indirect effects may not be “reasonably certain to occur”.

### **Cumulative Effects**

**Alternatives 1, 2 and 3-** Based upon known past, present, and foreseeable effects, these alternatives are not expected to have a cumulative effect upon glade-associated species or their habitat. Much of the habitat that may be or once was occupied by glade-associated RFSS and Species of Concern is under the control of private landowners or other agencies, and therefore, there is the possibility that actions by those groups could negatively impact habitat occupied by this species. The loss of original prairie habitat to agricultural uses, coupled with decades of fire-suppression in habitats formerly fire-maintained, as well as widespread use of herbicides and insecticides, may continue to contribute to the loss of glade-associated species. If this occurs, there is potential for lands within the National Forest and within the project area to become more important for these species’ recovery. However, since none of these alternatives will involve activities that would reduce or destroy habitat that may be used by this species, they would not be expected to contribute to this potential cumulative effect.

### **Quantification of Habitat Acres Affected**

The following table quantifies the number of acres of suitable habitat that would be *directly* affected by Alternatives 1 and 2. Because Alternative 3 would not involve any management activities that would directly alter the forest condition, it has been assumed that the acres of suitable habitat within the project area for these species are not directly affected by this alternative. These numbers are based solely upon the Mark Twain National Forest BE Program, Report 7, run on 6 August 2003.

Glade Species	Total Acres Suitable Habitat in Project Area	Acres of Suitable Habitat in Project Area Affected by Alternative									
		Destroyed		Reduced		Created		Enhanced		Maintained	
		Alt. 1	Alt. 2	Alt. 1	Alt. 2	Alt. 1	Alt. 2	Alt. 1	Alt. 2	Alt. 1	Alt. 2
<i>Echinacea simulate</i>	17	0	0	0	0	0	0	0	0	0	0
<i>Solidago gattingerii</i>	0	0	0	0	0	0	0	0	0	0	0

None of the alternatives would affect suitable habitat, as determined by the BE Program, for *Echinacea simulate* or *Solidago gattingerii*.

### **Determination of Effect and Rationale**

**Alternatives 1 and 2-** The activities proposed in Alternatives 1 and 2 would have *no impact* upon any known sites occupied by glade-associated RFSS or Species of Concern. However, the prescribed burning and/or glade restoration activities proposed in these alternatives would impact potential suitable habitat for these species, and therefore, may impact individuals should they occur in these habitats (not all suitable sites have been surveyed). While these activities *may impact individuals, these impacts are not likely to cause a loss of viability or a trend toward federal listing.*

**Alternative 3-** The implementation of Alternative 3 is expected to have *no impact* upon any glade-associated RFSS and Species of Concern because it would not likely lead to or involve any disturbance to glade habitats within the project area.

### **Seep/Fen-associated species Including *Carex sterilis*, *Dryopteris goldiana*, *Phlox maculate pyramidalis*, and *Platanthera clavellata***

### **Direct Effects**

**Alternatives 1 and 2-** The only activities proposed in Alternatives 1 and 2 that would have a potential direct effect upon seep/fen species is prescribed burning. There are several fens and seeps located within some of the prescribed burning units. However, prescribed burning would not occur at times when these seeps and fens are likely to be adversely impacted by this activity (that is, on days when the fens or seeps are completely dry) because prescribed burns are not typically done during periods of extreme dry weather that would create these conditions. More than likely, burning would occur when the fens still have some wet soil, creating a “top” burn of vegetation but leaving the substrate and root systems intact. Such a burn could have a rejuvenating effect upon the fens and seeps and could increase the availability of suitable habitat for seep/fen-associated species, because many of these fens are being overtaken by encroaching

woody vegetation. To benefit many of these species, fens should be maintained in a grassy, open condition, and this condition may be maintained by periodic burning.

Other than prescribed burning, the remaining activities associated with these two alternatives would not be expected to have any direct impact upon fens or seeps because of protective measures that have been incorporated into the Proposed Action for these alternatives. These protective measures would restrict potentially damaging activities from occurring within 100 feet of a known fen or seep.

The known sites for *Carex sterilis*, *Dryopteris goldiana*, *Phlox maculate pyramidalis*, and *Platanthera clavellata* would not be directly impacted by these alternatives because they do not occur in stands that are proposed for management activities. The known locations on National Forest within the project area for *Carex sterilis*, *Dryopteris goldiana*, and *Platanthera clavellata* are proposed for old growth and/or special area (8.1 management area) designation under both alternatives.

**Alternative 3-** Alternative 3 would not implement any activities that are expected to have a direct effect upon seep/fen-associated RFSS or species of concern.

### **Indirect Effects**

**Alternatives 1 and 2-** Although botanical surveys identifying the location of fens and other rare habitats have been completed within the project area, there is always a slight potential that an undiscovered fen occurs in the project area and could be indirectly affected by activities occurring within 100 feet of it, prior to its discovery. Such activities could be the felling of trees during mechanical timber treatments or construction of dozer line, etc. However, this potential for indirect effects upon an undiscovered fen is considered very low since most of the area has been thoroughly surveyed by a botanist and others.

Potential habitat for seep/fen-associated species could also be indirectly affected by activities that may change the water quality or alter the waterflow through fens. In this alternative, activities such as the construction of dozerlines, vernal pond construction, erosion control activities, and reconstruction of trails have the potential of disturbing soils which may lead to increased sedimentation of adjacent streamcourses or fens. By restricting these activities within 100 feet of a fen, however, it is expected that the water quality within the fens will be protected by the 100 foot buffer that would act as a filter strip.

Mechanical timber treatments and harvest that result in the removal of the majority of the overstory could increase the amount of water movement on and beneath the soil surface, since few trees would be available to absorb this water through their root systems. Such changes in water movement and availability could potentially have an indirect adverse effect upon nearby seeps and fens. This increase in water would be offset, somewhat, however, by the proliferation of stump sprouts originating from the cut trees and more open, drier conditions created by overstory removal, as well as by the 100 foot buffer zone.

However, several protective measures have been incorporated into this alternative that will minimize the potential for soil movement from dozerlines and trail reconstruction activity areas, as well as areas being treated mechanically. With implementation of these protective measures, no soil movement is expected to occur at rates that would adversely affect the water quality of adjacent seeps and fens. Past monitoring of similar projects on the MTNF has indicated that soil movement levels were well within the allowable soil loss established in the Forest Plan (U.S. Forest Service 2002). By restricting mechanical treatments and other activities within 100' of a seep or fen, the potential for waterflow alteration is expected to be minimized.

Because Alternative 1 proposes several hundred acres of mechanical treatment of timber stands, in which trees would be cut but not removed, there is some increased potential for a severe wildfire within the project area. This potential would be increased by the heavy fuel loads left in these stands following mechanical treatment. Heavy fuel loads could contribute to an intense, hard to control wildfire in the project area. Such a wildfire has the potential of improving habitat for some seep/fen-associated species throughout the project area, but could also lead to increased soil and water run-off near fens. However, the chances of such a wildfire occurring would be hard to predict and therefore, these indirect effects may not be "reasonably certain to occur".

No other indirect effects upon potential habitat for seep/fen-associated RFSS or Species of Concern are expected with implementation of Alternatives 1 or 2.

**Alternative 3-** Under Alternative 3, there may be an indirect effect upon potential habitat for these species. The anticipated die-off of trees due to lack of treatment may contribute to more intense wildfires within the project area. Fuels would build-up with the forested stands as they succumb to disease and insects. Intense wildfires would have the potential burning over fens within and adjacent to the project area. This burning would most likely improve habitat conditions for these species, unless it occurred during a period of excessive drought or was of such intensity that it damaged the soils and root systems within the fen.

Potential habitat for seep/fen-associated species can also be indirectly affected by intense wildfires that change the water quality or alter the waterflow through fens. Should an intense wildfire occur within the project area as a result of lack of treatment of forest stands, it could contribute to increased soil loss and sedimentation of fens in the project area. Changes in water movement and availability could potentially have an indirect adverse effect upon nearby fens. Exclusion of controlled prescribed burning within these stands would also increase the potential for wildfires to become intense and difficult to control. The chances of a wildfire occurring within the project area, however, are virtually impossible to predict, and so, these possible indirect effects may be considered speculative and are not considered "reasonably certain to occur".

### **Cumulative Effects**

**All Alternatives-** Because of its dependence upon wetlands, fens, and similar habitats, the seep/fen-associated species are most vulnerable to activities that may result in the destruction of these habitats, alter the hydrology of the habitats, or contaminate their

water sources. Many such activities are occurring on lands controlled by private landowners and on both private and public lands by individuals who refuse to follow restrictions developed in order to protect these habitats. Implementation of Alternatives 1, 2 and 3, however, would not result in any disturbance or degradation of habitat known to be occupied by seep/fen-associated RFSS or Species of Concern, and therefore, is not expected to contribute to any cumulative adverse effects upon these species.

### **Quantification of Habitat Acres Affected**

The following table quantifies the number of acres of suitable habitat that would be *directly* affected by Alternatives 1 and 2. Because Alternative 3 would not involve any management activities that would directly alter the forest condition, it has been assumed that the acres of suitable habitat within the project area for these species are not directly affected by this alternative. These numbers are based solely upon the Mark Twain National Forest BE Program, Report 7, run on 6 August 2003.

Seep/Fen Species	Total Acres Suitable Habitat in Project Area	Acres of Suitable Habitat in Project Area Affected by Alternative									
		Destroyed		Reduced		Created		Enhanced		Maintained	
		Alt. 1	Alt. 2	Alt. 1	Alt. 2	Alt. 1	Alt. 2	Alt. 1	Alt. 2	Alt. 1	Alt. 2
<i>Phlox maculate pyramidalis</i>	64	0	0	0	0	0	0	0	0	30	30
<i>Parnassia grandifolia</i>	972	0	0	0	0	0	0	0	0	77	56

### **Determination of Effect and Rationale**

**Alternatives 1 and 2-** The activities proposed in Alternatives 1 and 2 would have *no impact* upon any known sites occupied by seep/fen-associated RFSS or Species of Concern. However, the prescribed burning activities proposed in these alternatives would impact potential suitable habitat for these species, and therefore, may impact individuals should they occur in these habitats (not all suitable sites have been surveyed). While these and other activities *may impact individuals, these impacts are not likely to cause a loss of viability or a trend toward federal listing.*

**Alternative 3-** The implementation of Alternative 3 is expected to have *no impact* upon any seep/fen-associated RFSS or Species of Concern because it does not implement activities that are likely to disturb known sites or potential habitat for these species.

## Bluff-associated species

### Direct Effects

**Alternatives 1, 2, and 3-** No bluff-associated RFSS or Species of Concern are known from within the project area, and so, no direct impacts upon sites known to be occupied by these species are expected with implementation of Alternatives 1, 2 or 3.

### Indirect Effects

**Alternatives 1 and 2-** Within the project area, several stands that are proposed for activities in Alternatives 1 and/or 2 may offer habitat for bluff-associated species. This habitat could be impacted by activities that disturb the vegetation and soils around the bluff, particularly within 100 feet of the bluff. Some of these potentially disturbing activities include timber felling/removal, prescribed burning, pond construction, temporary road construction, and fireline construction. The removal of overstory around these bluffs could impact the micro-climate created by bluff overhangs. This micro-climate change may benefit species restricted to the upper edges of the bluffs, since these species tend to prefer dry, open habitats, but may also have a negative effect upon species that are sheltered by the shaded bluff overhangs below the bluff. Opening up of the forest overstory could increase drying of these bluffs and competition from less desirable, more tolerant plant species. Prescribed burning would be expected to have less of an impact upon these bluff species than removal of the overstory because it would not create a dramatic change in the vegetative character of these bluffs. However, some plants, especially those below the bluff, could be negatively impacted by burning activities. Species above the bluff, however, may be benefited by the more open conditions typically created by prescribed burning.

Activities that have the potential to disturb the soil immediately adjacent to bluffs may disturb some plant species by dislodging the plants and their root systems.

**Alternative 3-** With implementation of Alternative 3, there may be an increased risk in insect infestations within the project area, because no activities would occur that would improve the resistance of forest stands that may currently be in an unhealthy condition. As insects or disease infest stands, they would gradually become more open and likely create favorable short-term conditions for some bluff-associated species, while have a negative impact upon others.

The anticipated die-off of trees due to lack of treatment may also contribute to more intense wildfires within the project area. Fuels would build-up with the forested stands as they succumb to disease and insects. Intense wildfires would have the potential of burning over bluffs within and adjacent to the project area. This burning would most likely improve habitat conditions for species that occupy the upper edges of bluffs, unless it occurred during a period of excessive drought or was of such intensity that it damaged their soils and root systems. Species below the bluff, however, are less likely to benefit from any burning since they tend to be less tolerant of burning and dry conditions.

However, the chances of such a wildfire occurring would be hard to predict and therefore, these indirect effects may not be “reasonably certain to occur”.

### **Cumulative Effects**

**All Alternatives-** Because of their dependence upon exposed vertical rock faces and similar habitats, the bluff-associated species are most vulnerable to activities that may result in the destruction of this habitat by altering the hydrology and vegetation immediately surrounding the bluff. Many such activities are occurring on lands controlled by private landowners and on both private and public lands by individuals who fail to protect these habitats. Implementation of Alternatives 1, 2 and 3, however, would not result in any disturbance or degradation of habitat known to be occupied by bluff-associated RFSS or Species of Concern, and therefore, is not expected to contribute to any cumulative adverse effects upon these species.

### **Quantification of Habitat Acres Affected**

The BE program did not identify any suitable habitat within the project area for bluff-associated species and so, effects to their habitat are not quantified.

### **Determination of Effect and Rationale**

**Alternatives 1 and 2-** The activities proposed in Alternatives 1 and 2 would have *no impact* upon any known sites occupied by bluff-associated RFSS or Species of Concern. However, some of the activities proposed in these alternatives would impact potential suitable habitat for these species, and therefore, may impact individuals should they occur in these habitats (not all suitable sites have been surveyed). While these and other activities *may impact individuals, these impacts are not likely to cause a loss of viability or a trend toward federal listing.*

**Alternative 3-** The implementation of Alternative 3 is expected to have *no impact* upon any bluff-associated RFSS or Species of Concern because it does not implement activities that are likely to disturb known sites or potential habitat for these species.

## SUMMARY OF DETERMINATIONS

The summary of determinations below is based upon the proposed management action as described in this evaluation. *Should any significant change in the proposed management action as outlined in this evaluation occur after the date that this evaluation is signed, all effects upon these species may warrant re-evaluation before project implementation may continue.* Changes that would require a re-evaluation of effects upon these species include but may not be limited to:

- any change in the proposed action that may increase the potential for adverse effects upon RFSS or Species of Concern beyond what has been disclosed in this evaluation;
- unknown or previously unaddressed RFSS or Species of Concern are discovered in the project area.

Species Habitat Group	Species documented from project area?	Habitat present in project area?	Habitat affected by proposed action?	Determination		
				Alternative 1	Alternative 2	Alternative 3
<b>Riparian-associated Species</b>	Yes	Yes	Alternatives 1 & 2- Not likely Alternative 3 - No	May impact individuals or habitat but will not likely contribute to a trend towards federal listing or loss of population viability	May impact individuals or habitat but will not likely contribute to a trend towards federal listing or loss of population viability	No impact
<b>Stream/River-associated Species</b>	Yes	Yes	Alternatives 1 & 2- Not likely Alternative 3 - No	No impact	No impact	No impact
<b>Forest/Slope-associated Species</b>	No	Yes	Alternatives 1 & 2 – Yes; Alternative 3 – No	May impact individuals or habitat but will not likely contribute to a trend towards federal listing or loss of population viability	May impact individuals or habitat but will not likely contribute to a trend towards federal listing or loss of population viability	No impact
<b>Grassland-associated Species</b>	Yes	Yes	Alternatives 1, 2 & 3 – Not likely	No impact	No impact	No impact
<b>Glade-associated Species</b>	No	Yes	Alternatives 1 & 2 – Yes; Alternative 3 – No	May impact individuals or habitat but will not likely contribute to a trend towards federal listing or loss of population viability	May impact individuals or habitat but will not likely contribute to a trend towards federal listing or loss of population viability	No impact
<b>Seep/Fen-associated Species</b>	Yes	Yes	Alternatives 1 & 2 – Yes; Alternative 3 – No	May impact individuals or habitat but will not likely contribute to a trend towards federal listing or loss of population viability	May impact individuals or habitat but will not likely contribute to a trend towards federal listing or loss of population viability	No impact
<b>Bluff-associated Species</b>	No	Yes	Alternatives 1 & 2 – Yes; Alternative 3 – No	May impact individuals or habitat but will not likely contribute to a trend towards federal listing or loss of population viability	May impact individuals or habitat but will not likely contribute to a trend towards federal listing or loss of population viability	No impact
<b>Cave-associated Species</b>	No	None known	Alternatives 1, 2 & 3 - No	No impact	No impact	No impact
<b>Wetland-associated Species</b>	No	None known	Alternatives 1, 2 & 3 - No	No impact	No impact	No impact

## CONSULTATION WITH OTHERS

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*16 September 2003*

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- US Forest Service, 2002. Final Environmental Impact Statement, Oak Decline and Forest Health. Mark Twain National Forest.

### DATABASES

- Potosi/Fredericktown Ranger District CDS database
- Missouri Department of Conservation, Missouri Fish & Wildlife Information System, 2001. <http://www.conservations.state.mo.us/nathiso/mofwis>
- Missouri Department of Conservation, Missouri Natural Heritage Database. 2003 data transfer to the Mark Twain National Forest.
- Mark Twain National Forest Computerized BE Program.

## APPENDIX A - TABLES

<b>TABLE 1A . Regional Forester Sensitive Species for the Mark Twain National Forest as of 29 February 2000 plus 4 species proposed for addition on 2/27/03</b>				
<b>RFS Species by Status</b>				
Scientific Name	Common Name	Status	Species Group	Trend
<i>Agalinus auriculata</i>	Earleaf foxglove	RFS	Plant	Stable
<i>Agalinus skinneriana</i>	Purple false foxglove	RFS	Plant	Stable
<i>Aimophila aestivalis</i>	Bachman's sparrow	RFS	Bird	Decreasing
<i>Allocrangonyx hubrichti</i>	Central Missouri cave amphipod	RFS	Crustacean	Unknown
<i>Ammodramus henslowii</i>	Henslow's sparrow	RFS	Bird	Stable
<i>Anemone quinquefolia</i>	Wood anemone	RFS	Plant	Unknown
<i>Antrobia culveri</i>	Tumbling creek cavesnail	FE	Mollusc	Declining-federal endangered
<i>Aster dumosus</i> var. <i>strictior</i>	Tradescant aster	RFS	Plant	Stable
<i>Aster furcatus</i>	Forked aster	RFS	Plant	Stable
<i>Aster macropyllus</i>	Large-leaf aster	RFS	Plant	Unknown
<i>Berberis canadensis</i>	American barberry	RFS	Plant	Stable
<i>Caecidotea dimorpha</i>	Isopod	RFS	Crustacean	Unknown
<i>Calamagrostis porteri</i> <i>insperata</i>	Ofer Hollow reedgrass	RFS	Plant	Stable
<i>Callirhoe bushii</i>	Bush's poppy mallow	RFS	Plant	Stable
<i>Cambarus hubrichti</i>	Salem cave crayfish	RFS	Crustacean	Unknown
<i>Cambarus setosus</i>	Bristly cave crayfish	RFS	Crustacean	Unknown
<i>Campanula aparinoides</i>	Marsh bellflower	RFS	Plant	Stable
<i>Campylium stellatum</i>	Yellow starry fen moss	RFS	Nonvasc Plant	Unknown
<i>Carex buxbaumii</i>	Buxbaum's sedge	RFS	Plant	Stable
<i>Carex cherokeensis</i>	Cherokee sedge	RFS	Plant	Stable
<i>Carex communis</i>	Fibrous-root sedge	RFS	Plant	Stable
<i>Carex decomposita</i>	Epiphytic sedge	RFS	Plant	Stable
<i>Carex fissa</i> var. <i>fissa</i>	Sedge	RFS	Plant	Unknown
<i>Carex gigantea</i>	Large sedge	RFS	Plant	Stable
<i>Carex oklahomensis</i>	Oklahoma sedge	RFS	Plant	Stable
<i>Carex oxylepis</i> var. <i>pubescens</i>	Sedge	RFS	Plant	Stable
<i>Carex sterilis</i>	Dioecious sedge	RFS	Plant	Unknown
<i>Carex straminea</i>	Straw sedge	RFS	Plant	Unknown
<i>Carex stricta</i>	Tussuck sedge	RFS	Plant	Stable
<i>Carex tetanica</i>	Ridged sedge	RFS	Plant	Unknown
<i>Carex triangularis</i>	Fox sedge	RFS	Plant	Stable
<i>Castanea pumila</i> var. <i>ozarkensis</i>	Ozark chinquapin	RFS	Plant	Declining
<i>Cayaponia grandifolia</i>	Southern cayaponia	RFS	Plant	Stable
<i>Chryptobranchus alleganiensis</i> <i>bishopi</i>	Ozark hellbender	RFS	Amphibian	Decreasing

<i>Cissus incisa</i>	Ivy treebine	RFS	Plant	Stable
<i>Cottus hypselurus</i>	Ozark sculpin	RFS	Fish	Stable
<i>Cryptobranchus alleganiensis</i>	Eastern hellbender	RFS	Amphibian	Decreasing
<i>Crystallaria asprella</i>	Crystal darter	RFS	Fish	Decreasing
<i>Cumberlandia monodonta</i>	Spectacle case	RFS	Mollusc	Believed stable
<i>Cycleptus elongatus</i>	Blue sucker	RFS-P	Fish	
<i>Cyprogenia aberti</i>	Western fanshell	RFS	Mollusc	Believed decreasing
<i>Delphinium treleasei</i>	Trelease's larkspur	RFS	Plant	Stable
<i>Dendroica cerulea</i>	Cerulean warbler	RFS	Bird	Stable
<i>Dichanthelium yadkinense</i>	Panic grass	RFS	Plant	Unknown
<i>Dichelyma capillaceum</i>	Moss	RFS	Nonvasc Plant	Unknown
<i>Draba aprica</i>	Open ground Whitlow grass	RFS	Plant	Stable
<i>Dryopteris celsa</i>	Log fern	RFS	Plant	Stable
<i>Dryopteris goldiana</i>	Goldie's woodfern	RFS	Plant	Stable
<i>Echinacea paradox var paradox</i>	Yellow coneflower	RFS	Plant	Stable
<i>Echinacea simulata</i>	Wavy-leaf purple coneflower	RFS	Plant	Stable
<i>Epioblasma triquetra</i>	Snuffbox	RFS	Mollusc	Decreasing
<i>Etheostoma burri</i>	Brook darter	RFS	Fish	Believed stable
<i>Etheostoma clarium</i>	Western sand darter	RFS	Fish	Believed decreasing
<i>Etheostoma uniporum</i>	Current darter	RFS	Fish	Believed stable
<i>Eupatorium semiserratum</i>	Small-flower thoroughwort	RFS	Plant	Stable
<i>Falco peregrinus anatum</i>	Peregrine falcon	RFS	Bird	Increasing
<i>Geum virginianum</i>	Pale avens	RFS	Plant	Unknown
<i>Hottonia inflata</i>	Featherfoil	RFS	Plant	Stable
<i>Hydrocotyl verticillata var verticillata</i>	Whorled pennywort	RFS	Plant	Stable
<i>Isotria verticillata</i>	Large whorled pogonia	RFS	Plant	Stable
<i>Juglans cinerea</i>	Butternut	RFS	Plant	Declining
<i>Juncus debilis</i>	Weak rush	RFS	Plant	Unknown
<i>Lanius ludovicianus migrans</i>	Migrant loggerhead shrike	RFS	Bird	Decreasing
<i>Limnothlypis swainsonii</i>	Swainson's warbler	RFS	Bird	Stable
<i>Ludwigia microcarpa</i>	Small-fruit seedbox	RFS	Plant	Stable
<i>Macrolemys temminckii</i>	Alligator snapping turtle	RFS	Reptile	Believed stable
<i>Matelea baldwyniana</i>	Baldwin's milkvine	RFS	Plant	Stable
<i>Menyanthes trifoliata</i>	Bog bean	RFS	Plant	Stable
<i>Metzgeria furcata</i>	Liverwort	RFS	Nonvasc Plant	Unknown
<i>Myotis leibii</i>	Eastern small-footed bat	RFS	Mammal	Unknown
<i>Notropis heterolepis</i>	Blacknose shiner	RFS	Fish	Decreasing
<i>Notropis ozarcanus</i>	Ozark shiner	RFS	Fish	Decreasing

<i>Notropis sabiniae</i>	Sabine shiner	RFS	Fish	Believed stable
<i>Obovaria jacksoniana</i>	Southern hickorynut	RFS	Mollusc	Believed decreasing
<i>Ochrotrichia contorta</i>	Micro caddisfly	RFS	Insect	Unknown
<i>Ophiogomphus westfalli</i>	Ozark snaketail dragonfly	RFS-P	Insect	
<i>Orconectes eupunctus</i>	Coldwater crayfish	RFS	Crustacean	Declining
<i>Orconectes harrisonii</i>	Big River Belted crayfish	RFS	Crustacean	Unknown
<i>Orconectes meeki</i>	Crayfish	RFS	Crustacean	Unknown
<i>Orconectes peruncus</i>	Big Creek crayfish	RFS	Crustacean	Declining
<i>Orconectes quadruncus</i>	St. Francis River crayfish	RFS	Crustacean	Declining
<i>Orconectes williamsi</i>	White River midget crayfish	RFS	Crustacean	Believed declining
<i>Parnassia grandifolia</i>	Large-leaved grass of parnassus	RFS	Plant	Stable
<i>Percina cymatotaenia</i>	Bluestripe darter	RFS	Fish	Stable
<i>Percina nasuta</i>	Longnose darter	RFS	Fish	Believed decreasing
<i>Percina uranidea</i>	Stargazing darter	RFS	Fish	Stable
<i>Phlox carolina carolina</i>	Carolina phlox	RFS	Plant	Unknown
<i>Phlox maculata pyramidalis</i>	Spotted phlox	RFS	Plant	Stable
<i>Phyllanthus polygonoides</i>	Knotweed leaf-flower	RFS	Plant	Declining
<i>Pimephales tenellus parviceps</i>	Eastern slim minnow	RFS	Fish	Decreasing
<i>Platanthera ciliaris</i>	Yellow-fringed orchid	RFS	Plant	Stable
<i>Platanthera clavellata</i>	Small green woodland orchid	RFS	Plant	Stable
<i>Platanthera flava flava</i>	Southern rein orchid	RFS	Plant	Stable
<i>Platanthera flava var herbiola</i>	Pale green orchid	RFS	Plant	Stable
<i>Plethobasus cyphus</i>	Sheepnose	RFS	Mollusc	Decreasing
<i>Polygonum arifolium</i>	Halberd-leaf tearthumb	RFS	Plant	Stable
<i>Potamogeton pulcher</i>	Spotted pondweed	RFS	Plant	Stable
<i>Pseudosinella espana</i>	Springtail	RFS	Insect	Unknown
<i>Ptychobranchus occidentalis</i>	Ouachita kidneyshell	RFS	Mollusc	Unknown
<i>Quadrula cylindrica</i>	Rabbitsfoot	RFS	Mollusc	Decreasing
<i>Quercus texana</i>	Nuttall's oak	RFS	Plant	Stable
<i>Rhynchospora harveyi</i>	Harvey's beakrush	RFS	Plant	Stable
<i>Rudbeckia fulgida var speciosa</i>	Orange coneflower	RFS	Plant	Stable
<i>Sabacon cavernicolens</i>	Cave species	RFS-P		
<i>Sabatia brachiata</i>	Narrow-leaf pink	RFS	Plant	Stable
<i>Sacciolepis striata</i>	Gibbous panic grass	RFS	Plant	Unknown
<i>Scirpus etuberculatus</i>	Canby's bulrush	RFS	Plant	Unknown
<i>Scirpus halli</i>	Hall's bulrush	RFS	Plant	Stable
<i>Scirpus pushianus</i>	Weakstalk bulrush	RFS	Plant	Increasing
<i>Scurtellaria bushii</i>	Bush's skullcap	RFS	Plant	Stable
<i>Seligeria donniana</i>	Moss	RFS	Nonvasc	Unknown

			Plant	
<i>Silene regia</i>	Royal catchfly	RFS	Plant	Stable
<i>Solidago gattingerii</i>	Gattinger's goldenrod	RFS	Plant	Stable
<i>Sphagnum angustifolium</i>	Narroleaf peatmoss	RFS	Nonvasc Plant	Unknown
<i>Sphagnum centrale</i>	Sphagnum	RFS	Nonvasc Plant	Unknown
<i>Spiranthes ovalis</i> var <i>erostellata</i>	Ladies tresses	RFS	Plant	Increasing
<i>Stenonema bednariki</i>	Heptogenid mayfly	RFS-P	Insect	
<i>Stygobromus</i> <i>onondagaensis</i>	Onondaga cave amphipod	RFS	Crustacean	Unknown
<i>Sullivantia sullivantii</i>	Sullivantia	RFS	Plant	Stable
<i>Torreyochloa pallida</i>	Pale manna grass	RFS	Plant	Increasing
<i>Toxolasma lividus</i>	Purple lilliput	RFS	Mollusc	Unknown
<i>Tradescantia ozarkana</i>	Ozark spiderwort	RFS	Plant	Stable
<i>Trillium pusillum</i> var <i>ozarkanum</i>	Ozark trillium	RFS	Plant	Stable
<i>Triosteum angustifolium</i> var <i>earnesii</i>	Yellowleaf tinker's weed	RFS	Plant	Unknown
<i>Typhlichthys subterraneus</i>	Southern cavefish	RFS	Fish	Believed stable
<i>Vallerianella ozarkana</i>	Ozark cornsalad	RFS	Plant	Increasing
<i>Vertigo meramecensis</i>	Bluff vertigo	RFS	Mollusc	Unknown
<i>Viburnum recognitum</i>	Northern arrow-wood	RFS	Plant	Stable
<i>Vitis rupestris</i>	Sand grape	RFS	Plant	Stable
<i>Waldsteinia fragarioides</i>	Barren strawberry	RFS	Plant	Stable
<i>Woodwardia areolata</i>	Netted chainfern	RFS	Plant	Stable

**Table 2A . Regional Forester Sensitive Species Likely or Known to Occur on Potosi-Fredericktown District**

Common Name	Scientific Name	Species Group	Habitat Group
Eastern hellbender	Cryptobranchus alleganiensis	Amphibian	STREAMS
Bachman's sparrow	Aimophila aestivalis	Bird	GLADE, GRASSLAND
Cerulean warbler	Dendroica cerulea	Bird	RIPARIAN
Migrant loggerhead shrike	Lanius ludovicianus migrans	Bird	GRASSLAND
Swainson's warbler	Limnothlypis swainsonii	Bird	RIPARIAN
Onondaga cave amphipod	Stygobromus onondagaensis	Crustacean	CAVE
Big Creek crayfish	Orconectes peruncus	Crustacean	STREAMS
Big River Belted crayfish	Orconectes harrisonii	Crustacean	STREAMS
Salem cave crayfish	Cambarus hubrichti	Crustacean	CAVE
Central Missouri cave amphipod	Allocrangonyx hubrichti	Crustacean	CAVE
St. Francis River crayfish	Orconectes quadruncus	Crustacean	STREAMS
Longnose darter	Percina nasuta	Fish	STREAMS
Eastern slim minnow	Pimephales tenellus parviceps	Fish	STREAMS
Ozark shiner	Notropis ozarcanus	Fish	STREAMS
Ozark sculpin	Cottus hypselurus	Fish	STREAMS
Western sand darter	Etheostoma clarium	Fish	STREAMS
Crystal darter	Crystallaria asprella	Fish	STREAMS
Southern cavefish	Typhlichthys subterraneus	Fish	CAVE
Brook darter	Etheostoma burri	Fish	STREAMS
Ozark snaketail dragonfly	Ophiogomphus westfalli	Insect	RIPARIAN
Eastern small-footed bat	Myotis leibii	Mammal	CAVE, BLUFF
Rabbitsfoot	Quadrula cylindrica	Mollusc	STREAMS
Sheepnose	Plethobasus cyphus	Mollusc	STREAMS
Snuffbox	Epioblasma triquetra	Mollusc	STREAMS
Western fanshell	Cyprogenia aberti	Mollusc	STREAMS
Spectacle case	Cumberlandia monodonta	Mollusc	STREAMS
Bluff vertigo	Vertigo meramecensis	Mollusc	CAVE, BLUFF
Yellow starry fen moss	Campylium stellatum	Nonvasc Plant	WETLAND
Liverwort	Metzgeria furcata	Nonvasc Plant	GLADE
Sphagnum	Sphagnum centrale	Nonvasc Plant	WETLAND, RIPARIAN
Moss	Seligeria donniana	Nonvasc Plant	BLUFF

**Table 2A . Regional Forester Sensitive Species Likely or Known to Occur on Potosi-Fredericktown District**

Common Name	Scientific Name	Species Group	Habitat Group
Narroleaf peatmoss	Sphagnum angustifolium	Nonvasc Plant	WETLAND, RIPARIAN
Spotted phlox	Phlox maculata pyramidalis	Plant	WETLAND
Netted chainfern	Woodwardia areolata	Plant	WETLAND
Sand grape	Vitus rupestris	Plant	RIPARIAN
Pale manna grass	Torreyochloa pallida	Plant	WETLAND
Ladies tresses	Spiranthes ovalis var erostellata	Plant	RIPARIAN
Gattinger's goldenrod	Solidago gattingerii	Plant	GLADE
Royal catchfly	Silene regia	Plant	GLADE, RIPARIAN
Weakstalk bulrush	Scirpus pushianus	Plant	WETLAND
Orange coneflower	Rudbeckia fulgida var speciosa	Plant	GLADE, GRASSLAND, WETLAND
Spotted pondweed	Potamogeton pulcher	Plant	WETLAND
Purple false foxglove	Agalinus skinneriana	Plant	GLADE
Yellow-fringed orchid	Platanthera ciliaris	Plant	WETLAND
Dioecious sedge	Carex sterilis	Plant	WETLAND
Large-leaved grass of parnassus	Parnassia grandifolia	Plant	WETLAND
Bog bean	Menyanthes trifoliata	Plant	WETLAND
Butternut	Juglans cinerea	Plant	RIPARIAN, SLOPES
Large whorled pogonia	Isotria verticillata	Plant	RIPARIAN, SLOPES
Wavy-leaf purple coneflower	Echinacea simulata	Plant	GLADE, GRASSLAND
Goldie's woodfern	Dryopteris goldiana	Plant	WETLAND
Open ground Whitlow grass	Draba aprica	Plant	RIPARIAN, SLOPES, BLUFF
Panic grass	Dichanthelium yadkinense	Plant	GLADE
Ridged sedge	Carex tetanica	Plant	WETLAND
Tussuck sedge	Carex stricta	Plant	WETLAND
Small green woodland orchid	Platanthera clavellata	Plant	WETLAND
Alligator snapping turtle	Macrolemys temminckii	Reptile	STREAMS

<b>TABLE 3A . Additional Species of Concern in Missouri</b>			
<b>Common Name</b>	<b>Scientific Name</b>	<b>Species Group</b>	<b>Habitat Group</b>
<b>Spring cavefish</b>	<i>Chologaster agassizi</i>	FISH	CAVE
<b>Mountain lion</b>	<i>Felis concolor</i>	MAMMAL	FOREST
<b>Northern harrier</b>	<i>Circus cyaneus</i>	BIRD	GRASSLAND
<b>Barn owl</b>	<i>Tyto alba</i>	BIRD	GRASSLAND
<b>Spotted skunk</b>	<i>Spilogale putorius interrupta</i>	MAMMAL	GRASSLAND
<b>Greater prairie chicken</b>	<i>Tympanuchus cupido</i>	BIRD	GRASSLAND
<b>Black-tailed jackrabbit</b>	<i>Lepus californicus melanotis</i>	MAMMAL	GRASSLAND
<b>Goldstripe darter</b>	<i>Etheostoma parvipinne</i>	FISH	STREAM/RIVER
<b>Harlequin darter</b>	<i>Etheostoma histrio</i>	FISH	STREAM/RIVER
<b>Niangua darter</b>	<i>Etheostoma niangua</i>	FISH	STREAM/RIVER
<b>Redfin darter</b>	<i>Etheostoma whipplei</i>	FISH	STREAM/RIVER
<b>Swamp darter</b>	<i>Etheostoma fusiforme</i>	FISH	STREAM/RIVER
<b>Ebonyshell</b>	<i>Fusconaia ebena</i>	MUSSEL	STREAM/RIVER
<b>Mountain madtom</b>	<i>Noturus eleutherus</i>	FISH	STREAM/RIVER
<b>Neosho madtom</b>	<i>Noturus placidus</i>	FISH	STREAM/RIVER
<b>Taillight shiner</b>	<i>Notropis maculatus</i>	FISH	STREAM/RIVER
<b>Flathead chub</b>	<i>Platygobio gracilis</i>	FISH	STREAM/RIVER
<b>Elephant ear</b>	<i>Elliptio crassidens</i>	MUSSEL	STREAM/RIVER
<b>Central mudminnow</b>	<i>Umbra limi</i>	FISH	STREAM/RIVER
<b>Cypress minnow</b>	<i>Hybognathus hayi</i>	FISH	STREAM/RIVER/SWAMP
<b>Yellow mud turtle</b>	<i>Kinosternon flavescens</i>	REPTILE	STREAM/RIVER/WETLAND/SWAMPS
<b>Illinois mud turtle</b>	<i>Kinosternon flavescens spooneri</i>	REPTILE	STREAM/RIVER/WETLAND/SWAMPS
<b>Lake sturgeon</b>	<i>Acipenser fulvescens</i>	FISH	STREAM/RIVER
<b>American bittern</b>	<i>Botaurus lentiginosus</i>	BIRD	WETLAND
<b>Snowy egret</b>	<i>Egretta thula</i>	BIRD	WETLAND
<b>King rail</b>	<i>Rallus elegans</i>	BIRD	WETLAND
<b>Blanding's turtle</b>	<i>Emydoidea blandingii</i>	REPTILE	WETLAND
<b>Western fox snake</b>	<i>Elaphe vulpina vulpina</i>	REPTILE	WETLAND/GRASSLAND
<b>Mississippi green water snake</b>	<i>Nerodia cyclopion cylopion</i>	REPTILE	WETLAND/SWAMPS
<b>Western chicken turtle</b>	<i>Deirochelys reticularia</i>	REPTILE	WETLAND/SWAMPS

## **APPENDIX B-MAPS**

# East Fredericktown Project Fredericktown Ranger District Project Area

