United States
Department of
Agriculture

Forest Service

Mark Twain
National Forest

September 2005

2005 Land and Resource Management Plan**

2005 Forest Plan

As Amended 2007 - 2014

Mark Twain
National Forest

Abstract

This 2005 Land and Resource Management Plan (2005 Forest Plan) was prepared according to Department of Agriculture regulations (36 CFR 219 - 1982 regulations), which are based on the Forest and Rangeland Renewable Resources Planning Act (RPA), as amended by the National Forest Management Act of 1976 (NFMA). This plan was also developed in accordance with regulations (40 CFR 1500) for implementing the National Environmental Policy Act of 1969 (NEPA).

A Final Environmental Impact Statement (FEIS) has been prepared as required by NEPA and 36CFR219 (1982 Planning Regulations.) The FEIS the analysis of five alternatives developed for management of the Mark Twain NF, and displays the environmental effects at a programmatic level. Alternative 3 is identified in the FEIS as the selected alternative.

If any provision of this plan or its application to any person or circumstances is found to be invalid, the remainder of the plan and its applicability to other persons or circumstances will not be affected.

Cover photo: Bell Mountain Wilderness, Mark Twain National Forest, USDA Forest Service

Photographer: Paul Nelson

2005
Forest Plan

Barry, Bollinger, Boone, Butler, Callaway, Carter, Christian, Crawford, Dent, Douglas, Howell, Iron, Laclede, Madison, Oregon, Ozark, Phelps, Pulaski, Reynolds, Ripley, Saint Francois, Sainte Genevieve, Shannon, Stone, Taney, Texas, Washington, Wayne, and Wright Counties, Missouri.

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Mark Twain
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Cover photo: Canoeists on a crystal clear Ozark River, Missouri Department of Conservation
Photographer: Jim Rathert

Preface

Understanding the 2005 Forest Plan

Purpose of the Forest Plan

The Mark Twain National Forest Land and Resource Management Plan (Forest Plan) was prepared in accordance with the Forest and Rangeland Renewable Resources Planning Act of 1974 as amended by the1976 National Forest Management Act (NFMA), the 1969 National Environmental Policy Act (NEPA), and other laws and associated regulations. This is a revision of the Mark Twain Forest Plan released in 1986.

The Forest Plan provides guidance for all resource management activities on the Mark Twain National Forest. It establishes: forestwide multiple-use goals and implementing objectives; forestwide management requirements (known as Forestwide Standards and Guidelines); Management Area direction, including area-specific standards and guidelines, desired future conditions and management practices; identification of lands suited/not suited for timber management; monitoring and evaluation requirements, and recommendations to Congress for additional Wilderness.

Relationship of the Forest Plan to Other Documents

The planning process and analysis procedures used to develop the Forest Plan are described in Appendix B of the accompanying Final Environmental Impact Statement (FEIS). Several alternatives were developed as the 1986 Forest Plan was revised, in accordance with NFMA and NEPA. The Forest Plan represents the Selected Alternative, Alternative 3 in the Draft Environmental Impact Statement (DEIS), and is identified as the Selected Alternative in the FEIS. An extensive analysis of the alternatives is described in the FEIS.

Based on the analysis in the DEIS, public comments, and FEIS, the Regional Forester selected Alternative 3 as the 2005 Forest Plan. The Regional Forester documented the rationale for the selection in a Record of Decision accompanying the Final EIS.

Site-specific project environmental analyses that implement the Forest Plan will be tiered to the FEIS. That is, the broader analysis and conclusions from the Final EIS for the Selected Alternative can be used as a starting point for site-specific project planning. Each projects' environmental effects analysis document will incorporate, by reference, the information found in the Final EIS without the need to repeat it.

A Reader's Guide to the 2005 Forest Plan

The Forest Plan is organized as follows:

- Preface
- Chapter 1—Forestwide Goals and Objectives
- Chapter 2—Forestwide Standards and Guidelines
- Chapter 3—Management Prescriptions
- Chapter 4—Monitoring and Evaluation
- Appendices

Chapter 1—Forestwide Goals and Objectives

Provides overall management direction for the Forest. Goals describe desired future conditions and are normally expressed in general terms. Forest Plan goals link broad agency goals as set forth in law, executive orders, regulations, agency directives, and the Resources Planning Act (RPA) program. Achievement of goals is not mandatory, and there is no established timeframe for accomplishment. Objectives are statements of measurable desired results intended to promote the achievement of Forest Plan goals. Objectives include, for the next planning decade (or longer): (1) desired resource conditions within the planning area; and (2) desired goods and services that the planning area is expected to produce.

Chapter 2—Forestwide Standards and Guidelines

Provides resource management direction and guidance that is applicable (for the most part) across the Forest. Standards are required courses of action or levels of attainment that promote the achievement of Forest Plan goals and objectives. Standards are developed when: (1) unacceptable impacts are expected (without the standard); (2) they are critical to Forest Plan objectives; and/or (3) laws or policies do not address a proposed course of action, or when they need further clarification. Standards are mandatory. A Forest Plan amendment is required if proposed management would deviate from an established standard.

Guidelines are also required courses of action or levels of attainment that promote the achievement of Forest Plan goals and objectives, but they can be adjusted or modified if site-specific project conditions warrant a deviation. Guidelines are developed when: (1) professional expertise is needed to address resource management questions; (2) site conditions are variable; and (3) they contribute to the achievement of goals. A project-level analysis and a signed decision (by the responsible official) are required if proposed management activities would deviate from an established guideline.

Management direction in the Forest Service Directive System, including the Forest Service Manual (FSM), and the Forest Service Handbook (FSH) is part of forest plan management direction and is not repeated in the Forest Plan document. Management Direction also includes applicable laws, regulations and policies, although they are not necessarily restated in the plan.

Chapter 3—Management Prescriptions

Provides direction that applies to individual Forest Management Areas (see Management Area Maps). Taken together, the following items comprise each management area prescription:

- Theme
- Goals
- Desired Condition
- Management Area Standards and Guidelines

Chapter 4—Monitoring and Evaluation

Provides a strategy for answering three monitoring questions:

- Is Forest Plan direction being put into action?
- Is the direction included in the Plan effective?
- Were our assumptions valid when we prepared Forest Plan direction?

Based on monitoring activities answering those questions, amendments to the Forest Plan will be completed to adapt Plan direction to new information and changed conditions. Forest Plan goals and objectives are used to develop specific monitoring questions, which in turn, will be used to develop annual forestwide monitoring plans in the future.

Appendices

The following appendices are included with the Forest Plan:

Appendix A – Terrestrial Natural Communities

Appendix B – Soils

Appendix C – Minerals Management

Appendix D – Harvest Methods

Appendix E – Goods, Services, and Probable Management Practices

Appendix F – Recreation Opportunity Spectrum

Appendix G – Visual Management System

Appendix H – District Management Area Maps

Chapter 1

Forestwide Goals and Objectives

Cover photo: Piney River viewed from Cabbagehead

Photographer: Gary Schmidgal, Retired Forest Service

Chapter 1

Forestwide Goals and Objectives

Introduction

A goal is a concise statement that describes a desired condition to be achieved sometime in the future. Goals can be developed for the Forest as a whole or for specific management prescriptions. They are broad and general in scope with no specific timeframe. Forest Plan goals link broad agency goals as set forth in law, executive orders, regulations, agency directives, and the Resources Planning Act (RPA) program. Achievement of goals is not mandatory, and there is no established timeframe for accomplishment.

Objectives are more specific and concrete than goals. An objective is a concise, time-specific statement of measurable planned results needed to achieve Forest Plan goals. The key words are measurable and time-specific: attainment can be measured, monitored and evaluated. Objectives can be developed either forest-wide or for specific management prescriptions. Objectives describe:

(1) Desired resource conditions within the planning area for the next decade (or longer); and

(2) Desired amounts of goods and services that the planning area is capable of producing within the next decade.

The law requires compliance with all management direction. Some goals, however, are not achievable during the life of the Forest Plan, which is generally 10 to 15 years. While objectives are designed to be achievable during the plan period, factors such as lack of funding, unexpected natural events, or even drastic changes in National policy may preclude the Forest from meeting any give objective.

The Forest complies with the goals and objectives by using them as the basis for project-level planning. Site-specific, on-the-ground projects move the Forest towards achievement of the multiple-use and resource-management goals and objectives described in this chapter and in the individual management prescriptions. The goals and objectives are the foundation on which the purpose and need for site-specific projects is built.

Goal 1 – Promote Ecosystem Health and Sustainability

Goal 1.1 – Terrestrial Natural Communities

Maintain, enhance, or restore site-appropriate natural communities, including the full range of vegetation composition and structural conditions.

Objective 1.1a

Within Management Prescription 1.1 areas, apply management activities to move natural communities towards restoration in the amounts shown in Table 1-1. (See Appendix A for a description of the characteristics of natural communities).

Percentages are applied to the total amount of National Forest System lands within the respective ecological subsection. (See Appendix D of FEIS for more information on subsections)

Table 1-1. Desired percentage of NFS lands treated to restore natural community types in Management Prescription 1.1 areas.

	Natural Community Types (NCT)					
Subsection	Savanna	Open woodland	Closed Woodland	Upland Forest	Ozark Fen	Glade
Current River Hills	0-1%	6-7%	9-10%	0-4%	683 ac (9 areas)	13 ac
Meramec River Hills	0-1%	3-4%	5-6%	0-2%	0	5 ac
Black River Ozark Border	1-18%	13-26%	10-20%	0-3%	0	<1ac
Central Plateau	1-8%	3-4%	14-19%	0-6%	0	7 ac
White River Hills	4%	15-17%	11-12%	0-6%	0	15-17%
St. Francis Knobs and Basins	0-2%	13-17%	15-20%	0-16%	0	140 ac
Gasconade River Hills	3-5%	9-17%	4-8%	0-1%	15 ac (1 area)	10 ac
Claypan Till Plains	0-1%	0-1%	7-25%	0-30%	0	<1 ac

Prairie natural community types are less than 1% for all subsections.

Objective 1.1b

Within Management Prescription 1.2 areas, apply management activities to move natural communities towards restoration in the amounts shown in Table 1-2. (See Appendix A for a description of the characteristics of natural communities).

Percentages are applied to the total amount of National Forest System lands within the respective ecological subsection. (See Appendix D of FEIS for more information on subsections)

Table 1-2. Desired percentage of NFS lands treated to restore natural community types in Management Prescription 1.2 areas.

	Natural Community Types (NCT)					
Subsection	Savanna	Open woodland	Closed Woodland	Upland Forest	Ozark Fen	Glade
Meramec River Hills	0-4%	4-6%	3-5%	0-1%	0	5 ac
Central Plateau	0-1%	0-1%	3-7%	0-28%	0	5 ac
White River Hills	4-5%	19-21%	14-15%	6-7%	0	19-21%
St. Francis Knobs and Basins	0%	5-6%	9-11%	11-15%	0	100 ac
Gasconade River Hills	3-5%	4-8%	1-3%	0-1%	191 ac (1 areas)	9 ac

Prairie natural community types are less than 1% for all subsections.

Goal 1.2 – Non-Native Invasive Species

Maintain desired ecosystems throughout the forest with few occurrences of non-native invasive species.

Prevent new invasions and control or reduce existing occurrences of non-native invasive species.

Objective 1.2a

Control a minimum of 2,000 acres of existing noxious or non-native invasive species over the plan period.

Goal 1.3 – Soils, Watersheds, and Water Quality

Minimize erosion and compaction.

Restore and maintain soil productivity and nutrient retention capacity.

Protect the water quality and integrity of the watershed on Forest lands.

Maintain healthy, sustainable, and diverse natural communities.

Prevent wetland degradation and loss, and restore and enhance wetlands when possible.

Establish and maintain riparian management and watercourse protection zones to:

- Maintain, restore, and enhance the inherent ecological processes and functions of the associated aquatic, riparian, and upland components within the riparian corridor.
- Maintain streams in normal function within natural ranges of flow, sediment movement, temperature, and other variables.
- Restore or maintain impaired waters as classified by the section 303 (d) of the Federal Clean Water Act.
- Protect and improve state and national outstanding resource waters.

Objective 1.3a

Stabilize ten miles or more of stream reaches.

Objective 1.3b

Restore or enhance 125 acres of bottomland hardwood forest.

Objective 1.3c

Increase loading in 3 miles or more in a stream or river to 100 to 300 pieces of large woody material (LWM) per stream mile.

Objective 1.3d

Protect and improve 900 acres of wetlands.

Goal 1.4 – Wildlife and Aquatic Habitat

Provide the range of natural habitats necessary to support populations of existing native plant and animal species.

Restore and manage natural communities as the primary means of providing quality terrestrial, karst, and aquatic wildlife and rare plant habitat.

Support recovery of Federal and State listed species, protection and management of habitat for regionally listed species, and protection and management of habitat for other identified species of concern.

Provide specialized habitats that are a healthy, functioning part of the larger landscape and require no special protection or additional management considerations. Provide specialized

habitat components (such as standing dead trees, cavity and den trees, downed woody material, temporary pools, ephemeral springs and seeps) across the landscape in amounts and types commensurate with the natural communities in which they occur.

Encourage habitat that responds to demand for both consumptive and non-consumptive fish and wildlife use.

Maintain native and desired non-native fish populations through habitat protection and enhancement and stocking programs.

Objective 1.4a

Improve open woodland conditions on at least 10,500 acres to provide habitat for summer tanager, northern bobwhite, Bachman's sparrow, and eastern red bat.

Objective 1.4b

Increase the proportion of managed native grasslands to that of exotic cool season grasses from the current 46% native grass to 55% native grass to provide habitat for northern bobwhite.

Objective 1.4c

Maintain forest, closed woodland or open woodland cover over 85% or greater of Mark Twain National Forest acres to provide habitat for worm-eating warbler.

Objective 1.4d

Treat at least 4,000 acres of glades to reduce woody vegetation to provide habitat for Bachman's sparrow.

Objective 1.4e

Designate permanent old growth on 8% to 12% of each 2.1 and 6.2 management area, and on 15% - 20% of each 6.1 management area.

Goal 2 – Provide a Variety of Uses, Values, Products, and Services

Goal 2.1 – Public Values

Within the capability of sustainable ecosystems, offer multiple benefits that contribute to the social and economic well-being of local and regional communities by providing a variety of uses, values, products, and services in a cost effective manner for present and future generations.

Provide accessibility of the full range of uses, values, products, and services to members of underserved and low-income populations.

Goal 2.2 – Prescribed Fire, Fuels, and Wildland Fire Management

Re-establish the role of fire in the natural communities of the Ozarks by emulating the historic fire regime.

Restore fire regime condition class two or three lands to condition class one.

Reduce hazardous fuels.

Reduce wildland fire risk to communities.

Manage prescribed fires so that emissions do not hinder the State's progress toward attaining air quality standards and visibility goals.

Provide well-planned and executed fire protection and fire-use programs that are responsive to values at risk and management area objectives.

Objective 2.2a

In addition to the traditional late-winter through early-spring burn season, facilitate restoration treatments *that* emulate range of natural variability for historical fire regimes in glades, savannas, and pine woodlands by:

- Prescribe burning up to 20% of total projected burn acres from May through September, and
- Prescribe burning up to 40% of total projected burn acres from September through December.

Objective 2.2b

Use prescribed fire to reduce hazardous fuels and improve Fire Regime Condition Class on 45,000 acres or more per year.

Objective 2.2c

Treat those fuels that pose moderate to high risk to communities or community infrastructure, and threatened and endangered species.

Objective 2.2d

Develop a suppression strategy to respond to communities or community infrastructures and threatened and endangered species that are at high risk.

Objective 2.2e

Develop fire management units and wildland fire implementation plans for wildland fire use.

Goal 2.3 – Transportation System

Develop and maintain a transportation system which provides the minimum permanent road access needed to meet resource management objectives.

Provide temporary road access that complements the permanent road system for effective resource management.

Provide off-road vehicle use in a way that minimizes impacts to other resources.

Decommission unneeded roads.

Goal 2.4 – Timber Management

Use timber management, where appropriate, to restore or enhance degraded natural communities, sustain healthy and productive forests, and reduce hazardous fuels to reach the desired condition of the forest.

Respond to disturbance events (storms, wildfires, disease, or insect attacks, etc) in a timely manner. Salvage damaged forest resources when compatible with management prescriptions.

Provide timber and wood products `to help support sustainable local industry and economic interests.

Goal 2.5 – Geology and Minerals Management

Provide for mineral prospecting and mineral development while complementing other resource management objectives.

Goal 2.6 – Land Adjustment Program

Consolidate National Forest System lands to improve effectiveness of management and enhance public benefits.

Emphasize disposal of isolated tracts of National Forest System lands.

Provide public access to National Forest System lands to allow the public to engage in a variety of uses, values, products, and services.

Objective 2.6

Acquire lands, or interests in lands, needed to support specific resource management objectives or to consolidate National Forest System ownership patterns.

Acquire right-of-ways or fee simple title in lands, as appropriate, to meet access needs.

Goal 2.7 – Range Management

Within the capability of sustainable ecosystems, provide range forage on open lands in response to demand.

Encourage the restoration, establishment, and management of native grass communities on ecologically appropriate sites.

Restore and sustain the distribution and quality of native vegetation in range management units by increasing species diversity and eliminating the spread of non-native invasive species.

Manage cool season pastures to provide quality forage that includes a variety of cool season grasses and forbs.

Goal 2.8 – Recreation Opportunities

Provide a diversity of recreational opportunities and benefits through a variety of settings.

Contribute to local, regional, and national economies by providing recreational opportunities in a socially and environmentally acceptable manner.

Goal 2.9 – Visual Management

Maintain or enhance the quality of scenic resources to provide desired landscape character.

Goal 2.10 – Heritage Resources

Support preservation of the cultural heritage of Missouri by identifying, protecting, managing, and interpreting heritage sites on the Forest.

Objective 2.10a

Plan for completion of the Forest heritage resource inventory and evaluations of heritage resources according to provisions set forth in Section 110 of the National Historic Preservation Act of 1966, as amended (NHPA).

Objective 2.10b

Complete formal determinations of eligibility for evaluated sites.

Goal 2.11 – Wilderness Opportunities

Implement the Wilderness Opportunity Spectrum (WOS) as the primary system for characterizing, locating, and managing the Wilderness resource.

Establish management policies that ensure protection of the Wilderness resource while complementing user objectives.

Provide for the use of prescribed fire as a management tool to perpetuate fire dependent ecosystems found within the Hercules Glade Wilderness when approved by the Chief of the Forest Service through a change in, or exception to, the National Wilderness Policy.

Chapter 2

Forestwide Standards and Guidelines

Cover photo: Barred owl

Photographer: Gary Schmidgall, retired USFS

Chapter 2

Forestwide Standards and Guidelines

Introduction

Standards and guidelines are permissions or limitations that apply to on the ground implementation of management practices. The standards and guidelines in this Chapter apply to all management practices for the entire Mark Twain National Forest. Additional standards and guidelines, shown in Chapter 3, apply to each management prescription. Where Forestwide standards and guidelines are different from those for a management prescription, the management prescription standard applies. If a specific resource is not addressed in a management prescription, then only the Forestwide Standards and Guidelines apply. In addition, federal and state laws, regulations, and the Forest Service directives system always apply even though they may not be cited in the management prescription.

A Standard is defined as a course of action or a level of attainment that must be reached to achieve Forestwide goals. In general, standards limit project-related activities—not compel or require them. Deviations from Standards requires a Forest Plan amendment and must be analyzed and documented in an environmental analysis.

Standards are written in the imperative sentence structure (for example, “Maintain a minimum of 10% of the harvested stand in reserve trees and or reserve tree groups in all even-aged regeneration harvests”). Standards use verbs that convey mandatory compliance such as “must,” “must not,” “shall,” or “shall not.” In this Forest Plan, **standards are displayed in bold text**.

A Guideline is a course of action that should be followed in most circumstances. However, Guidelines relate to activities where site-specific factors may require some flexibility. Deviations from a Guideline must be analyzed and documented in a project level analysis but do not require a Forest Plan amendment.

Guidelines use words and phrases that convey more discretionary guidance, such as “should,” “should not,” “may,” “as needed,” and “where possible.” Guidelines may also provide specific exceptions to Standards. In this Forest Plan, guidelines are displayed as normal text.

This set of Standards and Guidelines is designed to be specific to the Mark Twain National Forest. Both Forestwide and Management Area prescription standards and guidelines apply to the site-specific decision-making process for projects and activities on the Mark Twain. These standards and guidelines are written to meet, at a minimum, all requirements of applicable laws, regulations, Forest Service directives, and State standards. Existing laws, regulations and directives are generally not repeated in the Forest Plan, although references to particular laws or directives may be included to provide needed emphasis for the protection and management of specific resources. Most standards and guidelines serve as mitigation measures to reduce or eliminate adverse effects. Singularly and collectively, they avoid, rectify, reduce, or eliminate the potential negative environmental effects of future management actions. Programmatic direction may be altered at the site-specific level to require additional environmental protection, as necessary.

Standards and Guidelines apply to normal activities. When needed to deal with catastrophic events, actions that deviate from standards may be implemented, with Forest Supervisor approval.

Vegetation Management

Additional vegetation management direction can be found in Forest Service Manual 2070.

Mimic ecosystem dynamics, patterns, and disturbance processes to achieve desired conditions except where ecological recovery is unlikely or unfeasible.

Plan salvage activities to retain 10-15% of the affected area, unless the area presents an unacceptable risk to public health or safety, or threatens forest health. These areas should be in a variety of patch sizes and distributions on the landscape.

Do not exceed the soil's nutrient retention capacity when applying fertilizer.

Non-Native Invasive Species (NNIS) Management

Additional direction for NNIS management can be found in Forest Service Manual 2080.

Prioritize areas of NNIS for treatment based on threats to resources, species status, relationship to boundaries, size of the infestation, potential for further spread and effectiveness of available control measures.

Include NNIS control and prevention clauses in contracts and permits as needed.

Revegetate soils disturbed by National Forest management activities by allowing growth of existing on-site vegetation where possible and desirable.

Where on-site vegetation is not desirable, or not likely to quickly revegetate the site, use one or more of the following methods:

- **Fertilize to encourage growth of desirable on-site vegetation;**
- **Apply local surrounding organic mulch (i.e., leaf litter and pine needles) or covering with sterile weed-free straw to promote reestablishment of native vegetation;**
- **Reseed or replant with native species appropriate to the site or sterile annuals (wheat, rye, etc.) and fertilizing if necessary; or**
- **Scarify to establish seed bed.**

Although the use of native plants is preferred, non-native, non-invasive species may be used in areas such as recreation areas, administrative sites, artificial openings, and improved cool season pastures.

Use weed-free plant materials when restoring natural communities or planting warm season/cool season grasslands.

Grazing of *cattle, horses, and other livestock* may be used for biological control of NNIS.

Water and Soil Resource Management

Additional management direction for water and soil resources can be found in Forest Service Manual 2510, 2520, 2530, 2540,and 2550 as well as Forest Service Handbooks 2509.13 through 2509.18.

Riparian Management Zone (RMZ)

Definition

Multiple features, used to delineate the Riparian Management Zone (RMZ) boundaries, include the following characteristics:

- Landform—floodplains, toe slope to toe slope as well as other natural breaks or man-made barriers (i.e., a road could be a break point used to delineate a boundary);
- Associated current and potential terrestrial natural communities—stream edge, sand bar, gravel wash, river front forest, wet bottomland forest, wet-mesic bottomland forest, swamp, marsh, fen, and in some cases, dry-mesic and mesic bottomland forest;
- Soils—soils formed in alluvial parent materials (see Appendix B); and
- Hydrology—the actual stream routes (flowing as well as some losing stream reaches), springs, water bodies, some wetlands, and seeps that are adjacent to the stream course as well as the area critical to the functionality of the riparian area (i.e. area that dissipates flood waters).

Delineate the RMZs at the project level, using the best available information for landform, terrestrial natural communities, soils, and hydrology for each location.

In cases where the RMZ boundary cannot be effectively determined using the characteristics described above, set the RMZ boundary at least 100 feet horizontal distance from the top of each bank.

The RMZ continues upstream until a well-defined floodplain, continuous flow, or permanent pools cease to exist or the riparian natural communities are no longer present.

Management

See Standards and Guidelines for specific activities for more information.

Allow vegetation management within the RMZ only to move toward the desired condition.

Close and rehabilitate existing wildlife food plots in the RMZ.

Within the RMZ the following activities are prohibited:

- **Pond fertilization;**
- **Mechanical constructed firelines for prescribed burns;**
- **Grazing within 100 feet of streambanks;**
- **Fertilization;**
- **Construction of sanitation facilities;**
- **New roads, unless no feasible alternatives;**
- **New motorized trails (except at designated crossings);**
- **Timber management (unless needed to move toward desired condition, or for some salvage);**
- **Drilling and associated structures;**
- **Servicing of equipment;**

- **New man-made impoundments, mine tailing ponds, and water diversion structures;**
- **Maintenance of existing wildlife food plots;**
- **Construction of new wildlife food plots;**
- **Maintenance of existing wildlife openings (unless naturally occurring);**
- **Construction of new wildlife openings;**
- **Wildlife pond construction;**
- **Log landings; and**
- **Use of chemicals (unless needed to move towards desired condition).**

Within the RMZ the following activities should be avoided whenever possible:

- Placement of livestock distribution tools (water tanks, salt blocks, etc.);
- New recreational facilities and opportunities;
- Equipment operation;
- Mechanically constructed firelines for suppression;
- Temporary roads;
- Stream channel crossings;
- Removal of mineral material from stream channels; and
- Modification of beaver-created impoundments.

Watercourse Protection Zone (WPZ)

Definition

Watercourse Protection Zones (WPZ) are delineated along all stream channels that have defined banks and streambed, show signs of annual scour, have accumulated sediment and gravel of various sizes within the streambed, and are not included in the RMZ.

The WPZ extends 100 feet horizontal distance from each side of the stream channel (measured from the upper break of the stream bank or channel edge), or to the break of the adjacent ridge, whichever is closer.

Management

See Standards and Guidelines covering specific activities for more information.

Close and rehabilitate existing wildlife food plots in the WPZ.

Within the WPZ the following activities are prohibited:

- **Fertilization;**
- **Timber management within 25 feet of stream *unless necessary to move the area towards the desired condition or to facilitate designated crossings;***
- **Servicing of equipment**
- **Log landings;**
- **New roads, unless no feasible alternative;**
- **Temporary roads except at designated locations;**
- **Maintenance of existing wildlife food plots;**

- **Construction of new wildlife food plots;**
- **Maintenance of wildlife openings, unless naturally occurring;**
- **Wildlife pond construction; and**
- **Use of chemicals (unless needed to move towards the desired condition).**

Within the WPZ the following activities should be avoided whenever possible:

- Mechanically constructed firelines for prescribed burns;
- Placement of livestock distribution tools (water tanks, salt blocks, etc.);
- New recreational facilities and opportunities;
- Construction of sanitation facilities;
- Drilling and associated structures;
- New man-made impoundments, mine tailings ponds and water diversions structures;
- Equipment operation;
- Mechanically constructed firelines for suppression;
- Stream channel crossings;
- Use of chemicals (unless needed to move towards the desired condition), and
- Modification of beaver-created impoundments.

Soil Productivity

Design all ground disturbing activities to prevent or minimize rutting, erosion, compaction, rapid runoff, disruption of water movement, and distribution or loss of water and soil quality.

Prevent or minimize sedimentation by employing adequate erosion control measures where earth-moving activities unavoidably expose areas of soil for extended periods of time.

Minimize ground-disturbing activities on soils highly subject to compaction during wet periods.

Water Management

Prohibit permanent stream channelization on National Forest System lands.

Prohibit new constructed impoundments, mine tailing ponds, and water diversions within the RMZ.

Whenever possible, avoid new manmade impoundments, mine tailing ponds and water diversions within the WPZ.

Beaver-created impoundments should not be modified, except where human health and safety; private property; threatened, endangered, and sensitive species and their habitat; other riparian resources, or improvements such as roads, regulated dam spillways, bridges, or campgrounds are threatened.

Limit in-stream use of heavy equipment to the minimal amount of time necessary for completion of the project.

Design hydrologic control structures to mimic as much as possible the appearance and function of natural habitat features in the RMZ and WPZ.

Terrestrial and Aquatic Habitat Management

Additional management direction for wildlife, fish, plants and threatened, endangered and sensitive species resources can be found in Forest Service Manual 2600, Forest Service Handbook 2609.13, Executive Order 13186, and Missouri Code of State Regulations 10 CSR 20-7.

Threatened, Endangered, and Sensitive species (TES)

Carry out Forest Service responsibilities for the conservation of endangered and threatened species and habitat identified through interagency consultation with the U.S. Fish and Wildlife Service.

Manage federally listed species in accordance with approved species recovery plans (FSM 2672.21). Manage Regional Forester Sensitive Species (RFSS) in accordance with approved Conservation Agreements and Strategies.

Issue permits for the collection of federally listed threatened and endangered plant and animal species only if collector has a current U.S. Fish and Wildlife Service collecting permit.

Issue permits for collection of RFSS and state endangered plant and animal species only for scientific research.

Prohibit mechanical disturbance to rare plant sites.

Bald Eagle

Maintain suitable habitat for nesting, roosting, and foraging bald eagles. Protect all occupied nest sites from disturbance from January through July (or during active breeding, incubation, and brood rearing periods).

Conduct management activities planned near known nesting sites in a manner that protects the existing nest site, maintains suitable alternate nesting habitat, and occurs outside of the breeding, incubation, and brood rearing periods (approximately January through July).

In cooperation with U.S. Fish and Wildlife Service and Missouri Department of Conservation, develop educational signs regarding appropriate behavior near occupied bald eagle nests or near roosting eagles. Post signs at accesses on rivers or lakes where eagles may be present.

Designate a ¼ mile permanent old growth corridor along the waters' edge of Table Rock Lake and Lake Wappapello (traditional bald eagle wintering areas).

All TES Bat Species

Maintain trees with characteristics of suitable roosts (i.e., dead or dying with exfoliating bark or large living trees with flaking bark) wherever possible with regard for public safety and accomplishment of overall resource goals and objectives.

Identify and remove hazard trees between November 1 and April 1 whenever possible.

Using the current, accepted technology, determine the location of summer roost trees and foraging areas for **all TES** female bats.

Hibernacula

Prohibit removal of suitable roost trees and prescribed burning within the 20 acres of old growth and 130 acres of *mature* forest or mature woodland surrounding **a threatened, endangered, candidate, proposed, or rare species of bat hibernacula during the swarming and staging periods. Determine dates individually for each cave (normally between September 1 and November 1 and between March 15 and April 30 respectively.)**

The area around **TES bat caves is a smoke-sensitive area. Develop prescribed burn plans to avoid or minimize smoke influences at or near these caves. Give the U.S. Fish and Wildlife Service an opportunity to review and comment on prescribed burn plans within these areas.**

Other Roosting Structures

Conduct an evaluation for the presence of **threatened, endangered, candidate, proposed, or rare species of bats prior to any decision to remove a building or bridge.**

Bridges proposed for construction or reconstruction across streams that are 40 or more feet wide should be designed of concrete with girders or chambers to provide suitable bat roosting space underneath whenever possible.

****Where populations of bats become a hazard or significant nuisance to human use of Forest Service facilities, exclusion techniques recommended by a biologist will be employed outside of the maternity season. If roost habitat is considered limiting in the area, bat boxes could be used to provide alternate habitat. ****

Indiana Bat

Maternity Colonies

If occupied Indiana bat maternity roost trees are discovered, protect them from physical disturbance until they naturally fall to the ground.

Based on site-specific consultation, designate an area of use (foraging and roosting) based on site conditions, radio-tracking or other survey information, and best available information regarding maternity habitat needs.

Minimize human disturbance in the maternity colony areas of use until the colony has left the maternity area for hibernation.

Conduct prescribed burning within the maternity colony area of use only during the hibernation season.

Maintain or enhance the character of the site year-round by:

- **maintaining an adequate number of snags, including known roost trees;**
- **maintaining large live trees to provide future roosting opportunities; and**
- **maintaining small canopy gaps (and/or opening the mid-story) to provide a continual supply of foraging habitat.**

Male Roost Trees

Protect known male roost trees from physical disturbance until they naturally fall to the ground.

Protect occupied Indiana bat male roost trees discovered during the summer season (not migration), from physical disturbance by designating a 75-foot radius buffer zone around the tree(s). The buffer zone shall remain in place until hibernation season begins (around November 1.)

Prohibit ground-disturbing activity or timber harvest within the buffer zone.

Prescribed burning may be done within the buffer zone if a fireline is manually constructed no less than 25 feet from, and completely around, the tree to prevent it from catching fire.

Hine's Emerald Dragonfly

Control non-native invasive and/or undesirable plant species in fen habitats through the most effective means while protecting water quality.

Restore local hydrology by eliminating old drainage ditches or other water diversionary structures when possible if such activities would not result in a loss of habitat.

Fens that harbor known populations of Hine's emerald dragonfly should be prescribe burned to control invasion of woody species or as part of larger landscape restoration and enhancement projects.

Prescribed burns on fens that harbor known or suspected populations of Hine's emerald dragonfly must be scheduled to occur from November through April.

Prohibit vehicle and heavy equipment use in fens, unless needed to improve HED habitat.

Control unauthorized vehicle access to fens.

TES Aquatic Species

For **all projects where in-stream **or streambank** work, **including but not limited to construction or maintenance of boat launches, river access structures** low-water crossings, or fords are proposed:**

- **Determine if suitable habitat for threatened, endangered or rare **aquatic** species is present **at or within 5 miles of the project site** before initiating any in-stream work.**
- **If suitable habitat is present, conduct specific biological surveys to determine the presence or absence of threatened, endangered or rare **aquatic** species.**
- **If threatened, endangered, or rare **aquatic** species are discovered during pre-work surveys, modify or re-locate the project to avoid or minimize impacts to **these species.****
- **If threatened, endangered, or rare aquatic species are discovered during pre-work surveys, implement projects outside of appropriate breeding seasons when necessary.**
- **Design fish management projects to minimize impacts on host species for threatened and endangered mussel species.**
- ****Heavy equipment operation is prohibited at threatened, endangered, or rare aquatic species sites unless needed to implement a project approved by the U.S. Fish and Wildlife Service.****

**Running Buffalo Clover

A running buffalo clover site is any area that contains one or more living RBC plants in close proximity to each other, and includes all the area within 50 feet of the outermost rooted crowns. Under consultation with the Forest botanist/ecologist, a site may be delineated with a radius other than 50 feet if site-specific conditions warrant.

Schedule prescribed burns at running buffalo clover sites to occur outside the season when plants are flowering and setting seed.

Prescribed burns at running buffalo clover sites should occur at intervals of 5 years or greater unless site specific monitoring by the Forest botanist indicates that a shorter burn interval may be needed to maintain running buffalo clover viability at the site.

Allow grazing on running buffalo clover sites only if needed to control vegetation competing with running buffalo clover.

The District or Forest wildlife biologist must approve the grazing schedule prior to any livestock use.

Allow mowing, plowing, disking, grazing, or other activities that disrupt running buffalo clover plants only after seed has set.

Timber harvests at running buffalo clover sites must use individual tree harvest methods.

Total basal area at a running buffalo clover site should not be reduced by more than 30 basal area in a single harvest.

Timber harvests at running buffalo clover sites should occur at least 10 years apart.**

Terrestrial Wildlife Habitat

Key habitat components to support the range of native terrestrial wildlife species are:

- Old growth habitat;
- Shrub, grass, or forb habitat (regeneration openings, savannas, open woodlands); and
- Grassland habitats.

Old Growth Habitat

The amount of old growth habitat to be provided is described in individual Management Prescriptions.

Use the following criteria when designating areas of permanent old growth:

- **A minimum of 15 acres in size, and preferably over 100 acres in size;**
- **Represent all forest, woodland, and savanna natural community types;**

- Normally include the oldest or largest average diameter stands that are at least 70 years old;
- Avoid designating permanent old growth in isolated National Forest tracts or in areas known to be old pine plantations;
- Give preference to habitat near management areas with limited vegetation management or along the edges of MA 1.1 and 1.2 to maximize the amount of contiguous area in old growth habitat; and
- **Designate as permanent old growth all stands or groupings of trees at least two acres in size and greater than 175 years old.**

Apply management activities in old growth only when the objective is enhancement of natural communities and old growth characteristics.

Salvage in designated old growth shall only occur when the area presents an unacceptable risk to public health or safety, or threatens forest health. The area treated must be the minimum necessary to mitigate the risk.

Regeneration Habitat

Intermediate harvests should generally leave the oldest and or largest trees to meet basal area objectives.

All even-aged regeneration harvests shall retain a minimum of 7%-10% of the harvest unit in reserve trees and/or reserve tree groups.

Reserve trees, or reserve tree groups, should include a combination of:

- The largest, long-lived species occurring on the site (pine, white oak, post oak, hickory, black gum);
- Standing dead trees; and
- Cavity or den trees.

Reserve trees and reserve tree groups should be spaced to mimic natural community structure and composition.

Reserve tree groups should include a combination of at least five trees. Where opportunities permit, locate some reserve tree groups within drainages.

Leave downed woody material on-site whenever possible.

Grassland Habitats

Natural Grasslands (glades, native prairies, and seeded or planted native grass on appropriate sites)

Emphasize the maintenance and improvement of natural grasslands as the preferred means of providing openland habitat.

Manage natural grasslands to enhance ground flora species diversity and abundance and minimize woody encroachment (see Desired Condition Chart in Appendix A).

When converting non-native openlands to natural grassland, at least 30% of the seed mix shall consist of a variety of native forbs appropriate to the site.

Maintain openlands within the WPZ and RMZ only if they are naturally occurring.

Minimize surface disturbing activities within 100 feet of the border of glades.

For fire suppression, use manually constructed firelines on and within 100 feet of glades unless mechanically constructed firelines are needed to protect life, private property, structures, public health, or firefighter safety.

Artificial Openlands (old fields, abandoned pastures, cool-season pastures, food plots)

Maintain or improve artificial openlands only where:

- they currently exist on NFS lands, or
- they exist on lands acquired in the future;

and where:

- conversion to natural grassland is not currently feasible,
- project-specific analysis shows a need for that habitat type, or
- they are needed to meet other resource objectives (i.e., rangeland forage or pastoral scenes).

Maintain or restore wildlife food plots only if they already exist, and are outside the WPZ or RMZ.

Close and rehabilitate existing wildlife food plots in the WPZ and RMZ.

Aquatic Habitat

Fishing Impoundments

Implement joint Missouri Department of Conservation (MDC) and Mark Twain National Forests Fisheries Management Plans for Beaver, Council Bluff, Crane, Fourche, Loggers, Pinewoods, and Ripley lakes.

Where determined to be a problem, aquatic species may be chemically controlled only when mechanical or biological control is impractical or not likely to be effective.

Streams and Rivers

Design aquatic habitat enhancement structures using natural appearing materials and placement to mimic the appearance and function of natural habitat features.

Use of heavy equipment to facilitate in-stream aquatic habitat improvement should be limited to the minimal amount of time essential for project completion.

Fish or other aquatic organism passage in streams shall not be blocked or prevented unless done in conjunction with prescribed fish-management objectives. Design fish management projects to minimize impacts on host species for threatened and endangered mussel species.

Remove large woody material from streams or streamsides only if it poses an immediate risk to water quality, degrades habitat for aquatic and riparian-associated wildlife species, or poses a public safety risk or a threat to private property or Forest Service infrastructures (i.e., bridges).

If suitable habitat is present, conduct specific biological surveys to determine the presence or absence of threatened, endangered or rare **aquatic species.**

Streams Identified by the State as Cold-water Stream Fisheries

Manage for naturalized trout species, including stocked trout, only in the cold-water streams listed in Table 2-1 (where management existed as of August 2002).

Table 2-1. Naturalized trout species managed in cold-water streams (where management existed as of August 2002).

Stream	Segment
Eleven Point River	Greer Spring Branch to Turner Mill
Eleven Point River	Turner Mill to Highway 160
Little Piney River	Phelps-Dent county line to Milldam Hollow Access
Little Piney River	Milldam Hollow Access to CR 7400
Spring Creek	Relfe Spring to Big Piney River
Mill Creek	Yelton Spring to Little Piney River
North Fork of the White River	Rainbow Spring to Forest Boundary
Roaring River	Roaring River State Park Boundary to Table Rock Lake
Stone Mill Spring	Entire length of spring

Manage only for native fish species in those cold-water streams not listed above (where trout did not exist as of August 2002). Do not introduce trout into these streams.

Timber harvest is prohibited in RMZs along self-sustaining trout streams.

Maintain, where possible, a canopy closure of 75-100% on all trout streams less than 25 feet wide.

Prohibit in-stream activities that could adversely affect trout spawning between November 15 and February 15 within self-sustaining trout streams.

Cool- and Warm-water Stream Fisheries

Manage cool-water streams to achieve self-sustaining smallmouth bass, goggle eye, and other naturally reproducing aquatic populations or other populations maintained by releases of hatchery-reared fish.

Manage warm-water streams to achieve a self-sustaining largemouth bass, bluegill, and other naturally reproducing aquatic populations.

Maintain a canopy closure of 50-100% on all permanent streams less than 25 feet wide, where possible.

Minimize in-stream management activities between March 15 to June 15 that could increase sedimentation and adversely affect spawning.

Geological Features

Caves and Abandoned Mines

Physical Protection and Management

Mechanically constructed firelines for prescribed burns shall be located at least 100 feet from known cave and abandoned mine entrances. Hand constructed firelines shall be located at least 50 feet from cave and abandoned mine entrances.

Designate an area of at least 10 acres completely surrounding a cave or abandoned mine entrance(s) as permanent old growth. This area should include the area above known or

suspected cave passages where possible. Vegetation management may occur only as part of natural community management to reach desired conditions (Appendix A).

All structures placed at cave entrances must permit bats to pass with minimal danger and must not alter airflow into or out of the cave, regardless if federally listed bats currently occupy the cave.

Evaluate abandoned mines for use by bats prior to permanent closure.

Prohibit the following within 100 feet of caves and abandoned mine openings:

- **Storing construction waste, debris, and excess materials;**
- **Refueling equipment; and**
- **Applying fertilizers.**

Prohibit timber harvest activities within 100 feet of the edge of a cave entrance.

Recreation

Except for regularly scheduled population monitoring, or other legitimate scientific purposes, do not allow or permit human entrance to Indiana bat hibernacula during the fall swarming, hibernation, and spring emergence period.

Except for regularly scheduled population monitoring or other legitimate scientific purposes do not allow or permit human entrance to gray bat hibernacula or summer caves during the periods of use by bats.

Locate new trails at least 100 feet from a cave entrance unless the trail leads to an overlook or other interpretive opportunity regarding the cave. When reconstructing or maintaining existing trails near caves, consider relocating the trail away from the cave.

Do not allow camping within caves or within 100 feet of a cave entrance.

TES Management

Maintain, and replace as needed, existing gates at occupied **threatened, endangered, candidate, proposed, or rare species of ** bat caves.

Designate an area of at least 20 acres completely surrounding **threatened, endangered, candidate, proposed, or rare species of ** bat cave entrance(s)—including the area above known or suspected cave or mine passages, foraging corridor(s), ridge tops, and side slopes around the cave for permanent old growth management. Within this area, only vegetation management activities needed to reach the desired condition are allowed.

Maintain an additional 130 acres of mature forest or mature woodland around each occupied **threatened, endangered, candidate, proposed, or rare species of ** bat cave.

Maintain or restore a mature forested corridor at least 100 feet wide and with at least 70% canopy closure between a cave used by gray bats and their foraging areas (streams and rivers). Within the corridor, allow only vegetation management activities needed to restore, enhance, or maintain mature forest or woodland natural communities.

The area around occupied **threatened, endangered, candidate, proposed, or rare species of ** bat caves is a smoke-sensitive area. Develop prescribed burn plans to avoid or minimize smoke influences at or near these caves. Give the U.S. Fish and Wildlife Service an opportunity to review and comment on prescribed burn plans within these areas.

Periodically assess all occupied **threatened, endangered, candidate, proposed, or rare species of ** bat caves to determine needs for physical protection of the cave entrance.

Periodically monitor all cave gates and protective structures to detect trespass, vandalism, or other situations that render those structures ineffective.

Mineral Management

Prohibit core drilling or other surface disturbing mineral operations over known caves and in the 20 acres designated **for permanent old growth management and the additional 130 acres maintained as mature forest or mature woodland around each occupied threatened, endangered, candidate, or proposed species of bat cave.**

Cliffs, Rock Bluffs, and Outcrops

Designate cliffs, rock bluffs, and outcrops as Management Prescription 8.1 areas when listed or qualified for listing in the Missouri Department of Conservation (MDC) Natural Heritage Database as a significant, exceptional, or notable natural feature.

Protect cliffs, rock bluffs, and outcrops from ground disturbing activities, unless those activities are needed to meet desired condition or to conduct safe fire suppression operations.

Minimize surface disturbance within 100 feet of cliffs, rock bluffs, and outcrops.

Locate new trails at least 100 feet from cliffs, rock bluffs, or outcrops unless the trail leads to an overlook or other interpretive opportunity regarding the natural feature. Consider relocating the trail away from these features when reconstructing or maintaining existing trails.

Springs, Seeps, Fens, Sinkholes, and Shrub Swamps

Designate springs, seeps, fens, sinkholes, and shrub swamps as 8.1 Management Prescription areas when the feature is listed or qualifies for listing in the MDC Natural Heritage Database as a significant, exceptional, or notable natural feature site.

Evaluate newly discovered fens and seeps and consider them for inclusion in the Missouri Department of Conservation (MDC) Natural Heritage Database.

Prohibit all mechanical disturbances on springs, seeps, fens, sinkholes, and shrub swamps, regardless of size.

Establish a buffer zone of 100 feet in radius from the outside edge of:

- **Small, isolated fens less than 400-square feet in size;**
- **Seeps greater than 200-square feet in size or which support associated natural communities;**
- **Springs;**
- **Sinkholes; and**
- **Shrub swamps.**

For fens greater than 400-square feet in area, and not designated as 8.1, establish a buffer zone of 300 feet on the lateral and downstream sides and 500 feet on the upstream side.

Within these buffer zones, prohibit the following activities, unless needed to meet specific restoration objectives:

- **Rangeland management, including grazing;**
- **Significant soil disturbance;**

- **Use of chemicals;**
- **Construction of new facilities or roads;**
- **Vehicle and heavy equipment use;**
- **Timber management activities;**
- **Storage of construction waste, material, debris or excess materials;**
- **Refueling of equipment; and**
- **Fertilizer application.**

Locate new trails within these buffer zones at least 100 feet from the feature's edge, unless the trail leads to an overlook or other interpretive opportunity regarding the wetland. When reconstructing or maintaining existing trails near these habitats, consider relocating the trail away from the wetland.

When a feature within these buffer zones has high public use, consider adding or improving trails to concentrate foot traffic or closing the area to public use.

Design roads so the runoff does not change natural hydrologic functioning of springs, seeps, fens, sinkholes, and shrub swamps.

If existing roads interfere with the natural flow of groundwater seepage and springs associated with adjacent fens and seeps, where feasible restore the natural hydrologic flow if such activities would not result in a loss of habitat.

Manage wetland natural communities that are fire-dependent (see Appendix A) with a fire regime (timing and intensity) similar to that with which the communities evolved.

Constructed Waterholes and Wildlife Ponds

Construct waterholes only where natural or constructed water sources are limited or lacking.

Manage and rehabilitate existing waterholes as a priority over constructing new ones.

When rehabilitating waterholes they should be irregular in shape and natural in appearance.

Place one or more brush piles or rock piles along the north bank of artificial ponds as needed to provide amphibian habitat.

Maintain several large (at least 4-inch dbh) pieces of downed woody material (logs, stumps, and large branches) along the north bank of constructed ponds, partially submerged in the water.

Remove trees and shrubs along the pond bank only if needed to prevent roots from penetrating the dam.

Prohibit wildlife pond construction within the RMZ or WPZ.

Prohibit pond fertilization within the RMZ.

Snags, Dens, Cavity Trees, and Downed Woody Debris

Whenever vegetation management is undertaken, leave standing dead trees, cavity or den trees, and downed woody material whenever possible, while providing for public safety and the achievement of resource management goals and objectives.

Prescribed Fire, Fuels, and Wildland Fire Management

Prescribed Fire

Additional management direction for prescribed fire can be found in Forest Service Manual 5140 and 5150, and the Forest Fire Management Plan.

Acres to be treated for hazardous fuel reduction must be near or adjacent to interface or intermix communities, in lands classified as fire regime 1, 2, or 3, and condition class II or III. Maintain lands classified as condition class I.

Emphasize large burns using year-round prescribed burning to meet management direction as appropriate to ecosystems involved and project objectives.

Allow fire to burn into all natural community types on compartment-size (or larger) prescribed burns. Allow fire to burn through sensitive natural communities, in designated old growth areas, and toward streams and drainages. Fires should be allowed to extinguish naturally within these areas unless otherwise needed to meet project specific objectives.

Threatened and Endangered Species

Fens that harbor known populations of Hine's emerald dragonfly should be prescribe burned to control invasion of woody species or as part of larger landscape restoration or enhancement projects.

Prescribed burns on fens that harbor known or suspected populations of Hine's emerald dragonfly must be scheduled to occur from November through April.

The area around occupied **threatened, endangered, candidate, proposed, or rare species of ** bat caves is a smoke-sensitive area. Develop prescribed burn plans to avoid or minimize smoke influences at or near these caves. Give the U.S. Fish and Wildlife Service an opportunity to review and comment on prescribed burn plans within these areas.

Prescribed burning may be done within the buffer zone for occupied Indiana bat male roost trees, if a fireline is manually constructed no less than 25 feet from, and completely around, the tree to prevent it from catching fire. (Reference Standards and Guidelines for Indiana bat in the Threatened, Endangered, and Sensitive species section of Terrestrial and Aquatic Wildlife.)

Firelines—Prescribed Fire

Where practical and safe for firefighters and the public, utilize existing natural or manmade barriers, such as drainages, cliffs, streams, roads, and trails instead of constructed firelines.

Encourage hand-constructed firelines where feasible and practical.

Locate firelines to minimize the need to remove standing dead trees before, during, or after prescribed burn operations.

Implement adequate erosion control measures (water bars, rolling dips, etc.) as shown in Table 2.2 on all constructed firelines where necessary to reduce the amount of sediment leaving a given area.

Table 2-2. Recommended spacing between drainage features.

Fire-line grade (%)	Distance between features (feet)
5 to 10	125
10 to 20	60
20 to 30	40
30 to 35	30

Firelines and water diversion structures must not drain directly into stream channels, sinkholes, or other specialized habitats.

Revegetate soils disturbed by constructed firelines by encouraging growth of existing on-site vegetation where possible.

Where on-site vegetation is not desirable, or not likely to quickly revegetate the site, use one or more of the following methods:

- **Fertilize to encourage growth of desirable on-site vegetation;**
- **Apply local surrounding organic mulch (i.e., leaf litter and pine needles) or cover with sterile weed-free straw to promote reestablishment of native vegetation;**
- **Reseed or replant with native species appropriate to the site or sterile annuals (wheat, rye, etc.) and fertilizing if necessary; or**
- **Scarifying to establish seedbed.**

Hand-constructed firelines shall be located at least 50 feet from cave and abandoned mine entrances.

Mechanically constructed firelines for prescribed fires are prohibited in the following areas:

- **Above known cave passages;**
- **On slopes greater than 35%, except for short runs with low erosion potential (for example, coming off of a road grade);**
- **Within 100 feet of known cave and abandoned mine entrances;**
- **Within 100 feet from the upslope break or crest of the sinkhole;**
- **Within 100 feet of sinkhole ponds, springs, seeps, fens, shrub swamps, rock bluffs, outcrops, cliffs, and glades,**
- **Within the RMZ; and**
- **Within known heritage resource sites.**

Mechanically constructed firelines for prescribed burns should avoid the WPZ whenever possible. When there is no feasible alternative, lines crossing these areas should not disturb the ground (i.e., lift the blade) for 50 feet on each side of the channel.

Mechanically constructed firelines for prescribed burns should avoid fragipan soils where feasible. For a list of fragipan soils See Appendix B.

If heritage resources or human remains are discovered during project implementation, halt the work near the find until a professional archaeologist assesses the situation.

Wildland Fire Suppression

Base wildfire prevention, detection, and suppression on the forest wide forest risk assessment. Base value-at-risk on the following criteria:

- **Ignition probability;**
- **Proximity to Urban Interface or Intermix;**
- **Density of structures within the forest protection boundary;**
- **Response times;**
- **Fuel models; and**
- **Proximity to sensitive resources.**

Define suppression action that is compatible with management area objectives and fire suppression action plans in cooperative agreements with other agencies. Reference Table 2-3.

When the value-at-risk is low, and the Fire Intensity Level (FIL) is two or less, suppression activities should be the least impacting that still achieve the objective, such as allowing the fire to burn to a natural or manmade fuel break. When the value-at-risk is medium to high, a variety of suppression activities may be used including, but not limited to construction of fire lines.

Each wildfire requires an appropriate suppression response.

Table 2-3. Mark Twain National Forest fire management direction.

Management Prescription	**Wildland Fire** ***Unplanned Ignitions***						**Prescribed Fire** ***Planned Ignitions***
	Wildland fire use authorized in fire management units with approved plans	Must be managed as unwanted wildland fires if either: human caused and approved fire use plan does not exist OR when fire presents unacceptable threat to human safety or values to be protected.					May be implemented by management action authorized by approved plans
		STRATEGIES AND TACTICAL OPTIONS					
		Perimeter Strategy	Area Strategy				
		Control	Confine or Contain	Monitor[6]	*ME*	*AR*	*Prescription Strategy*
1.1	X	X	X	X	X	X	X
1.2	X	X	X	X	X	X	X
2.1	X	X	X	X	X	X	X
5.1	X[1]	X[2]	X	X[2]	X[2, 3]		X[1]
6.1	X	X	X	X	X[4]	X	X
6.2	X	X	X	X	X	X	X
6.3	X	X	X	X	X[4,5]		X
7.1		X			X[4]		X
8.1	X[5]	X	X	X	X[5]		X[5]

X = Allowed;
ME = Motorized Equipment
AR = Aerial retardant application
[1] *Allowable only when approved in a signed Wilderness Fire Management Plan.*
[2] *Forest Supervisor must approve motorized equipment such as chainsaws, leaf blowers, mechanical transport and helicopter water drops.*
[3] *The Regional Forest must approve the use of tractor plows and or dozers.*
[4] *Requires District Ranger approval.*
[5] *See standards and guides for each specific area.*
[6] *Only when authorized for use in a designated fire management unit with an approved plan.*

Coordinate banning of open burning on National Forest System lands with the Missouri Department of Conservation and the Ozark National Scenic Riverways.

For fires originating on private lands inside the Forest's fire protection boundary as defined under agreement with the Missouri Department of Conservation, provide the same suppression strategies as NFS land unless suppression measures are specifically qualified by the protection agreement.

Firelines—Suppression

Use existing natural or manmade barriers—such as drainages, cliffs, streams, roads, and trails—instead of constructed firelines for suppression activities when the value-at-risk is low and where practical and safe for firefighters and the public.

Avoid mechanical construction of firelines in natural areas whenever possible.

Standing dead trees that constitute a safety hazard for the public or for safe fire suppression operations may be cut or removed as necessary.

Implement adequate erosion control measures (water bars, rolling dips, etc.) on all constructed firelines where necessary to reduce the amount of sediment leaving a given area as shown in Table 2-4. Erosion control should occur as soon as possible after suppression activity is complete.

Table 2-4. Recommended spacing between drainage features.

Fire-line grade (%)	Distance between features (feet)
5 to 10	125
10 to 20	60
20 to 30	40
30 to 35	30

Revegetate soils disturbed by constructed firelines by allowing growth of existing on-site vegetation where possible and desirable.

Where on-site vegetation is not desirable, or not likely to quickly revegetate the site, use one or more of the following methods:

- **Fertilize to encourage growth of desirable on-site vegetation;**
- **Apply local surrounding organic mulch (i.e., leaf litter, pine needles, etc.) or covering with sterile weed-free straw to promote reestablishment of native vegetation;**
- **Reseed with native species appropriate to the site or sterile annuals (wheat, rye, etc.) and fertilizing if necessary; or**
- **Scarify to establish seedbed.**

Hand constructed firelines shall be located at least 50 feet from cave and abandoned mine entrances.

Unless necessary to protect life, structures, private property, or to maintain public and firefighter safety mechanically constructed firelines for suppression are prohibited:

- **On slopes over 35% except for short runs with low erosion potential, (for example, coming off a road grade);**
- **Above known cave passages;**
- **Within 100 feet of known cave and abandoned mine entrances;**

- **Within 100 feet from the upslope break or crest of the sinkhole;**
- **Within 100 feet of sinkhole ponds, springs, seeps, fens, shrub swamps, rock bluffs, outcrops, cliffs, and glades; and**
- **Within known heritage resource sites.**

Mechanically constructed firelines for suppression should avoid WPZ and RMZ, unless there is no feasible alternative. Firelines crossing these zones should not disturb the ground (i.e., lift the blade) for 50 feet on each side of the channel, unless necessary to protect life, structures, private property, or to maintain public and firefighter safety.

When using heavy equipment for suppression activities, cross stream channels at right angles. Stabilize and revegetate the crossing as soon as possible after the fire is controlled.

Do not apply fire retardants directly over water bodies unless needed for firefighter or public safety.

Water withdrawals are not permitted from natural sinkhole ponds.

Smoke Management

Use best available smoke management practices to minimize adverse effects on public health, public safety, or visibility from prescribed fire.

Conduct prescribed burning in, or adjacent to, counties with forecasted high Air Quality Index (AQI) values (AQI = orange or higher) only if meteorological conditions indicate that smoke will be carried away from the high AQI area.

Minimize the impact of smoke for each prescribed fire by identifying smoke-sensitive areas, using best available control measures, monitoring smoke impacts, and following applicable guidance.

Hazardous Materials

Additional management direction for handling of hazardous materials can be found in Forest Service Manual 2160, and in the Health and Safety Code Handbook (Forest Service Handbook 6709.11).

Any suspected uncontrolled or abandoned hazardous materials, sites, or contamination found on or near National Forest System lands shall be reported promptly to the Forest Service Law Enforcement and Investigation personnel.

Contracts, leases, and permits for occupancy of National Forest System lands shall contain clauses that prohibit or regulate the production, use, disposal, or storage of hazardous materials.

Pesticide Use

Additional management direction for pesticide use can be found in Forest Service Manual 2150 and Forest Service handbooks 2109.14, (Pesticide Use Management and Coordination Handbook), 6709.11 (Health and Safety Code Handbook), and 7109.11.

Include clauses requiring Forest Service approval of pesticide use in contracts and permits as needed.

Use pesticides only after alternative analysis clearly demonstrates that pesticide use is the most effective means to meet overall management objectives.

The use of pesticides must comply with the product label.

Areas treated with pesticides shall be signed, as appropriate, to ensure users are informed of possible exposure.

Aerial application of pesticide shall not be allowed unless approved by the Forest Supervisor based on an environmental analysis that has shown it is the only environmentally sound and biologically effective method practicable.

Use the least impacting application method needed for effective control of the target species.

Wash and rinse equipment used in the mixing and application of pesticides and fertilizers in areas where runoff will not reach surface waters, wetlands, fens, sinks, or special other habitats.

When using pesticides within the RMZ, WPZ, and within 100 feet of sinkholes, springs, wetlands, and cave openings adhere to the following:

- **Minimize the use of pesticides, herbicides, fertilizers, or hazardous materials;**
- **Use only pesticides labeled for use in or near aquatic systems; and**
- **Use only hand application and single plant application of herbicides and pesticides, unless other methods are approved by the forest supervisor based on environmental analysis that has shown they are environmentally sound and the most biologically effective method practicable.**

Rangeland Management

Additional management direction for rangeland resources can be found in Forest Service Manual 2200, as well as Forest Service Handbooks 2209.11 through 2209.15.

Modify allotment plans to accomplish Management Area goals.

Control the timing, duration, and intensity of livestock grazing to achieve desired structure and species composition objectives.

Modify or terminate permitted use when necessary to ensure native open woodlands and glades reach desired conditions as described in Appendix A.

Grazing permits should be adjusted to allow fuel buildup prior to prescribed burning.

Do not issue grazing permits for livestock other than cattle and horses.

Allow grazing only in those areas with adequate fencing for control and management of livestock.

Grazing is not allowed within 100 feet of springs, significant seeps, fens, other wetland features or the break of a sinkhole basin.

Grazing is allowed within the RMZ only under the following conditions:

- **Grazing may continue on existing improved pastures that are under an active permit as of September 2005;**
- **Livestock are fenced at least 100 feet away from stream banks; and**
- **Grazing on these allotments must be foreclosed at the earliest opportunity.**

Grazing shall not be allowed to degrade the RMZ or WPZ, or their functionality.

Reduce livestock impacts and achieve desired structure and species composition objectives within the WPZ and RMZ by using tools such as hardened crossings, fencing, and controlled timing, duration, and intensity of grazing.

Place livestock distribution tools such as feeding troughs, water troughs, salt and mineral blocks outside the RMZ, unless there is no other feasible alternative. Where there is no other feasible alternative, place livestock distribution tools so as to minimize use with the RMZ, unless needed to meet specific restoration objectives or desired conditions.

Place livestock distribution tools to minimize use within the WPZ, unless needed to meet specific restoration objectives or desired conditions.

Haying is allowed within the RMZ and WPZ only if it meets the management area direction and contributes toward meeting the desired condition.

Fertilization shall not be allowed within RMZ, WPZ, on glades or other natural communities.

Fertilization on cool season pastures should be done primarily for desirable legume establishment and maintenance.

Within allotments, retain all living shagbark hickory and shellbark hickory, white oak, lightning struck trees and cavity trees with a diameter 12 inches or more, unless necessary to protect structures, private property or to maintain public and firefighter safety.

Recreation Management

Additional management direction for recreation resources can be found in Forest Service Manual 2300, 2710, 2720, as well as Forest Service Handbooks 2309.18, 2309.23, and 2709.11.

Dispersed and developed recreation uses and resource management activities shall conform to the Recreation Opportunity Spectrum (ROS) classification for the management area in which it occurs. Occasionally, small structures that are out of character with the ROS class may be needed to provide for safety, resource protection, or visitor management needs.

Regulate use only to stay within the following carrying capacity, prevent site deterioration, maintain the ROS settings classification, protect sensitive resources, or provide for public health, safety, and enjoyment.

Manage visitor use to comply with the carrying capacities shown in Table 2-5:

Table 2-5. ROS Class Carrying Capacity

ROS Class	Recreation Visitor Days (RVDs)/acre/year	
	Dispersed Recreation	Developed Recreation
Primitive	1.6	N/A
Semi-primitive Non-motorized	1.8	0.0
Semi-primitive Motorized (Terrestrial)	3.7	187.0
Semi-primitive Motorized (Water)	94.0	N/A
Roaded Natural (Terrestrial)	4.2	223.0
Roaded Natural (Water)	111.0	N/A
Rural (Terrestrial)	39.6	224.0
Rural (Water)	112.0	N/A

Make investments in recreation management as needed to meet the needs and desires of the public being served or targeted to be served at the facility, protect the site, follow riparian guidelines, and meet ROS classification objectives.

Provide recreation facilities only if needed to protect public health and safety; for site protection within ROS capacity levels; and, to meet documented demands of existing or targeted users.

Design facilities in conformance with the Visual Quality Objectives (VQOs) and the ROS classification of the site.

Landscaping projects in recreation areas and administrative facilities may use a wide variety of plant materials, including non-native species (providing these are not invasive species), although the use of native plants is preferred.

Drop fees and remove signs when services or facilities are not available or if collection of fees is not cost effective.

Encourage donations in areas where a fee system is not appropriate only if it is economically feasible or beneficial.

Apply the pack-in/pack-out philosophy to non-fee campgrounds, day use only developments, and dispersed activity areas whenever its success is likely.

Emphasize low-impact or no-trace camping in dispersed areas.

Do not allow camping within caves and 100 feet of a cave entrance.

Remove hazard trees between November 1 and April 1 whenever possible.

Allow use of metal detectors to search for treasure troves, and locating historical and prehistoric artifacts and features, only under a special-use permit.

Use of a hand-held metal detector as a recreational pursuit in search of coins of recent vintage (less than 50 years) and small objects having no historical value does not require a special-use permit when conducted on areas which possess no historic or prehistoric resources.

Periodically inspect sites and stabilize as needed using appropriate revegetation, traffic control, hardening, or site closure.

Riparian Management Zone (RMZ) and Watercourse Protection Zone (WPZ)

Avoid development of new recreation facilities and opportunities within the RMZ and WPZ.

If suitable locations outside the RMZ and WPZ are not feasible:

- Locate, construct, and maintain recreation facilities to minimize impacts on streams and riparian values and functions;
- Design new recreation development and improvements to existing facilities (including all types of trails) to minimize impacts on ecosystems;
- Plan recreation facilities improvements to be low-cost or flood-resistant in order to endure occasional flooding; and
- Avoid locating new sanitation facilities within the WPZ. If toilets are installed in the WPZ, the vaults must resist flooding and prevent leakage of waste water.

Within the RMZ:

- **Restrict facilities to low cost or flood resistant developments (i.e., boat ramps and trail and road crossings);**
- **As existing facilities are being replaced, evaluate them and relocate when possible;**
- **Prohibit construction of sanitation facilities;**
- **Prohibit new motorized trails except at designated crossings; and**
- **Locate stream crossings in areas that have a well-defined stream channel, minimal channel width, a low stream gradient, stable approaches, and stable banks on both sides of the proposed crossing.**

Rivers

The following direction applies to all waterways that are floatable for all or part of the year. This direction is further restricted if the waterway has been given a special classification (See Management Prescription 8.1) or is a candidate for special classification (See Management Prescription 6.3).

Protect and enhance recreational and scenery resources on National Forest System lands within at least one-quarter mile of the waterway, and on more distant lands that can be seen by water travelers.

When implementing management activities, make provisions so that the area remains natural appearing, practices or structures blend with the environment, and other applicable Forest Plan standards are met.

Trails

Emphasize completion of the National Forest portions of the Ozark Trail.

Evaluate trails for potential as national trails.

Design and designate trails to provide a variety of experiences.

Base decisions regarding trail development and management on documented demands.

Minimize trail signing, especially regulatory signs.

Develop trailheads to the minimum standard that serves the established use. Place primary emphasis on public safety by providing adequate parking space off roadways.

Decommission user-defined trails that are causing resource damage.

Locate new trails at least 100 feet from a cave entrance or wetland, unless the trail leads to an overlook or other interpretive opportunity regarding the natural feature. When reconstructing or maintaining existing trails near karst or wetland features, consider relocating the trail away from the feature.

When a wetland area has high public use, consider adding or improving trails to concentrate foot traffic, or closing the area to public use.

Off-Road Vehicles (ORVs)

Off-road vehicles that comply with State and local laws are allowed on all National Forest System roads that are open and have a National Forest System road number.

Other use of off-road vehicles on National Forest System lands is prohibited unless on designated off-road vehicle trails or the Chadwick Motorcycle Special Use area. Show motorized trails in the Transportation Atlas.

Visual Management

Additional management direction for visual management can be found in Forest Service Manual 2380.

Determine the Visual Quality Objective (VQO) for a specific area by referring to the visual quality matrix found in the standards and guidelines for each management prescription. Use variety classes and sensitivity levels as mapped for each district. They may be changed based on field conditions. Criteria for determining variety class and sensitivity level are documented in Forest Plan, Appendix G.

Resource management activities must meet or exceed the established VQO.

Allow a short-term reduction, the equivalent of one VQO, for central hardwood regeneration or similarly impacting activities**. Foreground sensitivity level 1 (fg1) or foreground sensitivity level 2 (fg2) areas must not be reduced below modification. Retain the original VQO for adjusted areas, and meet it within 20 years after initial entry into the corridor or viewshed. Residue treatment requirements must meet those specified for the original VQO.**

Within fg1 and fg2 areas with a VQO of retention or partial retention:

- **Mitigate negative visual impacts concurrently with or immediately after each phase or activity;**
- **Complete mitigating measures for each cutting unit or project area before beginning activities in the next sequential block or project area in the same corridor or viewshed; and**
- **Complete obligations specified by a contract or a project prescription within one year from initiation of activities for any single cutting unit or project area. Emphasize completing all work within these areas in a systematic manner within the shortest practical time.**

Within fg1 and fg2 areas with a VQO of modification, the standards are the same as above except the total lapsed time from initiation of activities to completion of obligations specified by a contract or a project prescription shall not exceed two years for any sale block or project area.

Where possible and feasible, rehabilitate undesirable landscapes to meet VQO. Prioritize projects as follows:

(1) Sensitivity Level 1 travelway foreground areas

(2) Developed Recreation Sites

(3) Administrative Sites

(4) Sensitivity Level 2 travelway foreground areas

Where possible and feasible, enhance visual variety in monotonous landscapes. Prioritize projects by sensitivity levels and distance zones.

Totally remove or chip and scatter residues generated within the near foreground (Nfg) zone in administrative or developed recreation sites.

Determine the Nfg zone for each project on a site-specific basis. Base the depth of this zone, which may extend up to 300 feet from the observation point, on the actual seen area, considering landform and vegetative screening.

Use secondary zones as needed to provide further visual mitigation for residue treatment. This secondary zone starts wherever the Nfg zone ends and extends up to the end point of foreground visual concern, but not greater than 600 feet in depth from the observation point.

Use the following travel speed classes to determine residue treatment needs:

0-10 MPH	Hiking and riding trails, occupancy sites, and use areas.
11-35 MPH	Low speed roads and motor vehicle trails.
36-55 MPH	Moderate to high speed roads.

Table 2-6. Maximum residue treatment heights (above ground surface) for designated travelways and use areas by sensitivity levels.

Visual Quality Objective - VQO	Distance Zone	Travel Speed MPH	Sensitivity Level 1 (Mandatory)	Sensitivity Level 2 (Mandatory)	Sensitivity Level 3 (Optional)
Retention - R	Nfg (0-300')	0-10 11-35 36-55	18 inches 24 inches 30 inches	N.A.	N.A.
	Secondary Zones (up to 600')	0-10 11-35 36-55	6 feet 8 feet 8 feet		
Partial Retention - PR	Nfg (0-300')	0-10 11-35 36-55	18 inches *30* inches *36* inches	30 inches 30 inches 36 inches	36 inches 36 inches 48 inches
	Secondary Zones (up to 600')	0-10 11-35 36-55	8 feet 8 feet 12 feet	10 feet 10 feet 12 feet	12 feet 12 feet 12 feet
Modification - M	Nfg (0-300')	0-10 11-35 36-55	N.A.	36 inches 48 inches 48 inches	48 inches 48 inches 48 inches
	Secondary Zones (up to 600')	All Speeds	N.A.	12 feet	N.A.
Maximum Modification - MM	Nfg (0-300')	All Speeds	N.A.	N.A.	48 inches
	Secondary Zones (up to 600')	All Speeds	N.A.	N.A.	N.A.

Heritage Resources

Additional management direction for recreation resources can be found in Forest Service Manual 2300 and FSH 2309.24, National Historic Preservation Act of 1966, as amended, and its implementing regulations found in 36 CFR 800 (NHPA).

Regulatory Compliance and Consultation

Comply with current Memorandum of Understanding (between the State Historic Preservation Office (SHPO) and Mark Twain National Forest), Programmatic Agreements, or other requirements regarding implementation of the forest heritage program.

Consult with the State Historic Preservation Office and Advisory Council on Historic Preservation regarding mitigation or treatment of significant heritage resources for which an adverse effect from forest projects is anticipated.

Consult with Native American groups and appropriate cultural or ethnic groups who may have a potential interest in heritage resources, including traditional cultural properties and sacred sites.

Inventory and Evaluation

Ensure that adequate heritage surveys are complete and assess project effects on significant heritage resources prior to decisions related to management activities.

Project activities should avoid known potentially significant heritage resources whenever possible, including sites which have not been evaluated or which have been determined to be eligible for listing in the National Register of Historic Places.

Where avoidance is not possible, consider project deferral or relocation as a means of protecting heritage resources.

Evaluate sites which cannot be avoided, or when project cannot be deferred or relocated.

Protection measures for sites determined to be eligible for the National Register must be developed and overseen by professional archaeologists.

If heritage resources or human remains are discovered during project implementation, the work shall be halted near the find until a professional archaeologist assesses the situation.

National Register Nominations

To ensure continued protection, designate as Management Prescription 8.1 significant heritage resources listed on the National Register of Historic Places.

Protection

Preserve and protect human remains in their original interred location.

If unintentional discovery of human remains occurs, follow provisions set forth in the Native American Graves Protection and Repatriation Act of 1990 and Provisions set forth in Chapter 214, Cemeteries, and Chapter 194, Unmarked Human Burials, Revised Statutes of Missouri.

Prior to any decision to remove a building or bridge, conduct an evaluation for the presence of **threatened, endangered, candidate, proposed, or rare species of bats.**

Timber Management

Additional management direction for timber management can be found in Forest Service Manual 2400, as well as Forest Service Handbooks 2409.11 through 2409.19.

Harvesting

Use silvicultural systems, harvest methods, and intermediate treatments to move the forest towards the desired condition. Base the decision on which type of systems, methods, and treatments to use on a particular site on management objectives, natural community type, stand conditions, and the silvical characteristics of the species present or desired. For a discussion of these practices and their application see Appendix D.

Designate as permanent old growth all stands or groupings of trees at least two acres in size and greater than 175 years old.

Apply management activities in old growth only when the objective is enhancement of natural communities and old growth characteristics.

Provide for sufficient shade and large woody material recruitment to meet WPZ objectives when developing silvicultural prescriptions.

Intermediate harvests should generally leave the oldest and or largest trees to meet basal area objectives.

All even-aged regeneration harvests shall retain at least 7%-10% of the harvest unit in reserve trees and/or reserve tree groups.

Reserve trees and reserve tree groups should include a combination of the following:

- The largest, long-lived species occurring on the site (pine, white oak, post oak, hickory, black gum);
- Standing dead trees; and
- Cavity or den trees.

Space reserve trees and reserve tree groups to mimic natural community structure and composition.

Include a combination of at least five trees in reserve tree groups. Where opportunities permit, locate some reserve tree groups within drainages.

Leave downed woody material on site whenever possible.

Rotation Ages

With the exception of Management Prescriptions 1.1 and 1.2, the following rotation ages should normally apply:

- 70 years for Red, Black, and Scarlet oak;
- 70 years for Shortleaf pine; and
- 90 years for Post and White oak.

Temporary Openings Created by Even-aged Regeneration Harvest

The maximum size of a temporary opening created by an even-aged regeneration harvest is 40 acres except as provided for in Management Prescriptions 1.1 and 1.2 or as noted below.

Temporary openings created by even-aged regeneration harvest in excess of the maximum size allowed by management prescription standards and guidelines may occur if one of the following applies:

- On an individual sale basis after 60 days public notice and review by the Regional Forester; and
- In areas of salvage or sanitation activities resulting from disturbance events caused by fires, weather events, or outbreaks of disease or insect attacks.

A temporary opening created by even-aged regeneration harvest is:

- **a clearcut,**
- **a seed tree cut, or**
- **a shelterwood cut with a total basal area (including reserve trees) of less than 50.**

Although not defined as a temporary opening, shelterwoods with a total basal area greater than 50 should be 40 acres or less in size.

Do not locate new even-aged regeneration harvest temporary openings adjacent to existing temporary openings when the combined total of the areas exceeds the maximum opening size.

Separate temporary openings by a stand of at least manageable size and configuration (normally 10 acres or larger).

Temporary openings should be at least 330 feet apart.

A temporary opening shall no longer be considered a temporary opening when the stand has reached a height of 15 feet.

Not more than 10 chains (660 feet) of temporary opening may occur along any 40 chains (0.5 miles) of a hiker or horse trail (including the Ozark Trail) during a decade.

Reforestation

When shortleaf pine seeding or planting is prescribed, use genetically improved seed or stock developed from native Mark Twain National Forest superior trees.

Adequate advanced regeneration should be present in oak types where a final regeneration harvest is prescribed.

Mechanical site preparation that exposes bare soil on more than 25% of the treated area is not allowed.

Timber Stand Improvement

Release treatments for even-aged management should be made only once per rotation. The treatments should be made no later than 10 years of age for pine stands, and no later than 15 years of age for hardwood or hardwood-pine stands.

Precommercial thinning for even-aged management should only be scheduled in stands that will not be merchantable within 10 years.

Apply precommercial treatments to each entry to achieve structural objectives for stands managed under uneven-aged silvicultural systems.

Management objectives should be met through commercial practices or through firewood cuts when feasible.

Salvage

Salvage timber resources damaged by natural or man-caused disturbance events when salvage activities are compatible with overall resource goals and objectives, management prescriptions, or to protect public safety.

Plan salvage activities to leave at least 10%-15% of the affected area, unless the area presents an unacceptable risk to public health or safety, or threatens forest health. These areas should be in a variety of patch sizes and distributions on the landscape.

Salvage of dead or dying timber and other sanitation removals may occur in the RMZ, when the riparian values are protected and the activities are needed to protect public safety, resource values, and maintain the health of the forest.

Salvage in designated old growth shall only occur when the area presents an unacceptable risk to public health or safety, or threatens forest health. The area treated must be the smallest amount necessary to mitigate the risk.

Sale Preparation and Administration

Design and implement all ground-disturbing activities to prevent or minimize soil dislocation, compaction, rapid runoff, disruption of water movement, and distribution or loss of water and soil quality.

If heritage resources or human remains are discovered during project implementation, halt the work near the find until a professional archaeologist assesses the situation.

Prohibit timber harvest activities within 100 feet of the edge of a sinkhole, cave entrance, or within the buffer zone for wetland features. (Reference: Forestwide Standards and Guidelines for Geological Features under Terrestrial and Aquatic Wildlife management.)

Allow timber management activities within the RMZ only to move the area towards the desired condition.

Restrict equipment operation within the WPZ and RMZ to designated crossings or other approved locations.

Mechanized equipment may make one to two passes off designated skid trails within the WPZ when needed to facilitate management activities, but not within the 25-foot buffer zone.

Ensure all equipment used for harvesting and hauling operations is serviced outside of the RMZ and WPZ.

Within 25 feet of a WPZ stream channel:

- **Do not cut trees, unless necessary to move the area towards the desired condition or to facilitate designated crossings; and**
- **Do not operate mechanized equipment, except at designated skid trail locations.**

When possible, avoid cutting trees that are anchoring the banks of all drainages, including those that are not within the RMZ or WPZ. If these trees must be cut, the stump and root system should be left in place and intact whenever possible.

Remove tops from drainages within the RMZ and WPZ, and avoid concentrations of tops and slash in drainages outside the RMZ and WPZ.

National Recreation Trails

Restrict logging activity to leaf-off periods within the near foreground of National Recreation Trails.

Prohibit vehicles on National Recreation Trails except at approved trail crossings.

Leave flowering and colorful vegetation species within the near foreground zone of National Recreation Trails whenever feasible.

Where feasible, place paint marks used for identification of project work on the side of the tree away from the trail so marks are not visible from the trail.

Temporary Roads

Temporary road management direction is documented under Forestwide Standards and Guidelines for Transportation System.

Skidding and Skid Trails

Suspend operations during wet periods when excessive rutting and soil displacement are anticipated.

When removing felled trees from areas of soils with high rutting or compaction potential, methods must be used which minimize rutting or displacing soil (i.e., use of low ground pressure skidders, operate when the ground is dry or frozen). Soils with a high compaction potential are listed in Appendix B.

Skidder operation is prohibited on slopes over 35%.

Do not use stream channels or drainages as skid trails or temporary logging roads.

Skid trails should not drain directly into roads, areas of disturbed mineral soil, sinkholes, fens, springs, or watercourses.

Do not use recreation trails as skid trails or temporary logging roads.

Where skidding across a recreation trail is unavoidable, it shall be at a right angle and at designated locations.

Prohibit skid trails within 100 feet of the edge of a sinkhole, cave entrance, or other karst feature, or within the buffer zone for wetland features. (Reference Forest-wide Standards and Guidelines for Geological Features under Terrestrial and Aquatic Wildlife management.)

Keep erosion control work as up to date as practical.

Implement adequate erosion control measures on skid trails to reduce the amount of sediment leaving a given area (see table 2-7).

Table 2-7. Recommended spacing between drainage features.

Skid-trail grade (%)	Distance between features (feet)
5 to 10	125
10 to 20	60
20 to 30	40
30 to 35	30

National Recreation Trails

Provide at least 600 feet between skid trails crossing National Recreation Trails, except where topography requires occasional approval of closer trails.

Revegetation

Revegetate soils disturbed by National Forest management activities by allowing growth of existing on-site vegetation where possible and desirable.

Where on-site vegetation is not desirable, or not likely to quickly revegetate the site, use one or more of the following methods:

- **Fertilize to encourage growth of desirable on-site vegetation;**
- **Apply local surrounding organic mulch (i.e., leaf litter and pine needles) or covering with sterile weed-free straw to promote reestablishment of native vegetation;**

- **Reseed or replant with native species appropriate to the site or sterile annuals (wheat, rye, etc.) and fertilizing if necessary; or**
- **Scarify to establish seedbed.**

Landings

Log landings are prohibited within 100 feet of a recreational trail.

Locate log-decking areas so they are not visible from National Recreation Trails.

Locate log landings outside of the WPZ and RMZ.

Special Uses Management

Additional management direction for Special Uses can be found in Forest Service Manuals 2710, 2720, 2730, 2770 and Forest Service Handbooks 2709.11, 2709.12, 2709.15 and 36 CFR 251 subpart B and C.

Permit special uses only when they comply with standards and guidelines for the management area prescription; do not result in environmental or resource degradation; do not preclude opportunities for ecosystem management; and where locations on non-National Forest System lands are not reasonably available.

Competitive and Organized Events

Do not permit motor vehicle events with speed as the determining factor.

Permit competitive events only if they are skilled events and are sanctioned by a State, regional, or national association.

Permit competitive events only in areas of the forest or at times of the year that do not conflict with recreation or other management considerations.

Research

Permits are required for collecting non-listed plants and animals for scientific research.

Permits for the collection of federally listed threatened and endangered plant and animal species shall not be issued unless the collector has a current U. S. Fish and Wildlife Service collecting permit.

Permits for collection of Regional Forester Sensitive Species and State endangered plant and animal species shall only be given for scientific research.

Transportation System Uses

When issuing special use road permits, use the Transportation Atlas to determine the type of special use road permit or easement to be issued.

The Forest Service should perform maintenance of National Forest System roads used for access to private property unless the maintenance schedule will not meet the minimum needs of the private user, in which case:

- County maintenance by agreement should be negotiated by the user;
- Should these negotiations fail a temporary permit may be issued for maintenance in cases requiring infrequent maintenance; or

- **If frequent maintenance is required, issue an easement or permit to provide for maintenance by the landowner. Cancel the permit when Forest Service maintenance meets the user's needs, the road no longer requires frequent maintenance, or the County assumes maintenance responsibility.**

Do not authorize use of pesticides by permittees for maintenance of special use roads.

Permits or easements on unclassified roads

Use of the road may include construction, reconstruction, or maintenance of existing roads not included as a part of the National Forest System road network.

The permittee shall be responsible for road construction, reconstruction, or maintenance.

The road may be closed to public use.

Design and maintenance standards shall meet the permittee's minimum needs and minimize adverse impacts to other National Forest resources.

Permits for construction or reconstruction on National Forest System roads

Issue permits only for construction or reconstruction of National Forest System roads.

Construction or reconstruction shall be in accordance with Forest Service design standards.

Terminate the permit when construction has been completed and approved by the Forest Engineer or his designee.

Roads should be open to public use.

Utility Transmission and Distribution Line Corridors

Bury all telephone lines, utility lines, and power transmission lines whenever practical. Where burial of facilities is not practical, emphasize rerouting or screening.

Require permittees to remove abandoned facilities in a timely fashion.

To the extent possible, place utility developments within road rights-of-way, transportation corridors, or existing utility corridors

Multi-facility corridor width shall be less than one-quarter mile.

Provide utility company personnel access on roads closed to public with approval by a Forest Service representative as appropriate to meet utility maintenance needs.

The Right of Way (ROW) permittee shall be responsible for all maintenance.

All utility line ROWs 40 feet or more in width should be managed to enhance wildlife habitat diversity by providing openland habitat as specified by the District or Forest Wildlife Biologist.

Permittee shall revegetate soils disturbed by management activities by encouraging growth of existing on-site vegetation where possible.

Where on-site vegetation is not desirable, or not likely to quickly revegetate the site, use one or more of the following methods:

- **Fertilize to encourage growth of desirable on-site vegetation;**

- **Apply local surrounding organic mulch (i.e., leaf litter and pine needles) or covering with sterile weed-free straw to promote reestablishment of native vegetation;**
- **Reseed or replant with native species appropriate to the site or sterile annuals (wheat, rye, etc.) and fertilizing if necessary; or**
- **Scarify to establish seedbed.**

Maintain pipeline ROW vegetation by encouraging low, native shrubs along the ROW edges.

Use prescribed fire for maintaining pipeline ROWs only when they are not transporting flammable substances.

Minerals

Additional management direction regarding federal minerals can be found in Forest Service Manual 2800.

General

All lands are available for non-surface disturbing mineral activities.

Surface disturbing exploration may be permitted where it is compatible with the management area direction. The reason for closing an area to land-disturbing exploration must be supportable and documented.

Forest Service consent to both lease requests and subsequent operating plans for mineral extraction must be determined individually, based on the relative value of the surface and subsurface resources and on compliance with the standards and guidelines as determined by a site specific analysis for each action.

Apply additional stipulations to the U.S. Department of the Interior (USDI), Bureau of Land Management (BLM) permits, or leases as needed to meet the management area objectives.

All surface-disturbing mineral activities must have a Forest Service approved Plan of Operation or Surface Use Plan that includes a reclamation plan.

Approval of significant surface impacts must be based on reasonable and verifiable proof that the mineral values justify the proposed operation.

Reclamation on any mineral operation site should commence as soon as impacts on any part of the site are completed. Consequently, reclamation should keep pace with ongoing mineral activity.

After mineral operations have been completed, all facilities shall be removed from the site. The disturbed area shall be reclaimed to prevent erosion and sedimentation. The site shall be re-contoured when necessary. The site shall be revegetated to meet management area objectives.

Revegetate soils disturbed by minerals activities by allowing growth of existing on-site vegetation where possible and desirable.

Where on-site vegetation is not desirable, or not likely to quickly revegetate the site, use one or more of the following methods:

- **Fertilize to encourage growth of desirable on-site vegetation;**

- **Apply local surrounding organic mulch (i.e., leaf litter and pine needles) or covering with sterile weed-free straw to promote reestablishment of native vegetation;**
- **Reseed or replant with native species appropriate to the site or sterile annuals (wheat, rye, etc.) and fertilizing if necessary; or**
- **Scarify to establish seedbed.**

Conduct and document routine compliance inspections as necessary.

Issue required road use permits and other special use permits. See special uses management, Transportation System Uses.

Temporary road management standards are documented under Forestwide Standards and Guidelines for Transportation System Management.

Merchantable timber removed from the sites must be paid for at appraised rates.

Avoid drilling, drill pad construction, and structures within the WPZ when possible.

Drilling, drill pad construction, and structures are prohibited within the RMZ.

Restrict equipment operation within the WPZ and RMZ to designated crossings or other approved locations.

Prohibit surface-disturbing mineral activities within 100 feet of the edge of a cave entrance, spring, seep, fen, sinkhole, or shrub swamp.

Land management decisions must not preclude the ability of private mineral owners to make reasonable use of the surface as defined by deed and public law.

Recreational collection is generally not allowed in leased or permitted areas, natural areas, or caves.

Gold panning may involve the pan only. Picks, shovels, mechanical and motorized equipment is prohibited. Disturbance of stream banks is prohibited.

If heritage resources or human remains are discovered during project implementation, halt the work near the find until a professional archaeologist assesses the situation.

Hardrock Leasable Minerals

Do not allow surface disturbing mineral operations on administrative sites, within developed recreation sites, on known endangered and threatened species sites, on National Trails Systems or over known caves or sinkholes.

Require standard and site-specific stipulations for all permits and leases. Standard Stipulations are described in Appendix C.

Salables: Common Variety Mineral Materials

Limit the use of common variety minerals to the needs of the Forest Service, and other public agencies, when the proposed action benefits National Forest management. Private personal uses are exceptions when quantities are minor and removal is compatible with management area direction.

When consistent with management area direction, allow the low-volume removal of surface stone for personal use at a minimum price or appraised price on Contract for Mineral Material, form 2800-9.

Do not use caves, sinkholes, and other karst features when locating new common variety disposal locations or pits.

Only allow common variety mineral operations if consistent with Management Area direction and no other resource areas are available on private land.

Removal of mineral materials, such as sand and gravel, from stream channels or RMZ's is prohibited, unless needed for protection of infrastructure or for public health and safety.

Law Enforcement

Management direction for Law Enforcement can be found in Forest Service Manual 5300 Law Enforcement, Forest Service Handbook 5309.11, Law Enforcement handbook, 36 CFRs 261, closure orders, and the Forest Law Enforcement Plan.

Landownership

Additional management direction for Lands can be found in Forest Service Manual 5400, 5500, 7150, and Forest Service Handbooks 2709.12, 2709.15, 5409.13 and 5409.17.

Surface Ownership

Land Adjustment

Allocate all acquired lands to the Management Prescription of the surrounding NFS lands.

Land purchase or exchange must satisfy one or more of the following:

- **Accomplish objectives of public law or regulation;**
- **Meet demand for National Forest System resources;**
- **Result in more efficient landownership patterns; or**
- **Result in lower resource management costs.**

Acquire fee title to lands whenever possible. If fee title purchase is not possible, purchase partial interests when it serves long-term resource management objectives.

Acquisitions should generally be on a willing seller basis. Exceptions may be necessary to:

- Acquire critical rights-of-way;
- Meet legislative requirements; or
- Acquire land or interest in land essential to manage and protect important public resources.

Any proposal for condemnation of fee title lands in these categories shall require public involvement to determine the importance of National Forest management over the lands in question.

To achieve more efficient landownership and lower resource management costs, consider as high priority for exchange or disposal isolated Federal tracts located in areas where private land use precludes future consolidation.

Land acquired through exchanges or purchase programs should generally be confined to tracts within areas of predominately NFS lands.

Acquisition

Lands acquired under the authority of the Weeks Act with purchase funds and the land for timber exchange program should meet one or more of the following criteria:

- Adjacent to other National Forest land;
- Eliminate property lines and corners;
- Eliminate needed road rights-of-way;
- Resolve trespass;
- Eliminate special use permits or anticipated permits;
- Unimproved property or improvement value is less than 10% of the total appraised value;
- Relocation costs are less than 10% of the total appraised value;
- Have no or minimal reservations; or
- Have minimal title problems.

Prioritize lands and interests in lands acquired under the Land and Water Conservation Fund Act as follows:

1. Located within a Congressional designated area;
2. Located within management areas having high priority for river recreation acquisition;
3. Includes habitat for threatened and endangered species; or
4. Tracts primarily valuable for outdoor recreation purposes and to conserve fish, wildlife, and plants.

Exchange Program

To be included in the land for land exchange program, the proposal shall meet the following criteria:

- **Be recommended in writing by the District Ranger specifying advantages, disadvantages, and justification, and approved by the Forest Supervisor;**
- **Authorized by an exchange act; and**
- **At a minimum proponent should, be willing to pay costs for title work, publishing exchange notice in local newspaper, any necessary surveys of the non-federal tract and willing to provide additional land or cash to equalize the exchange.**

Rank proposals meeting the above criteria according to the following:

- Are isolated tracts located in areas where consolidation is doubtful;
- Eliminate trespass;
- Are within a special management area;
- Eliminate needed road rights-of-way;
- Eliminate special use permits; or
- Eliminate property lines and corners.

On Federal lands having exchange potential, hold investments to the lowest level that meets resource protection needs and responds to unavoidable management requirements. Use

existing and temporary access to the extent possible. Restrict new road development to roads needed for other ownerships, or to meet associated objectives of retained lands. Invest in resource management only to the degree it is profitable on the short-term.

Avoid encumbering National Forest System land available for exchange with public or private uses that reduce exchange opportunities.

Access

Acquire temporary right of way only where there is an immediate need for access to National Forest System lands, or where the need does not justify the expenditure to provide permanent public access.

Property Lines

Additional direction is found in FSM 7150.

Handle each occupancy encroachment case as promptly as time and funds permit to protect the interest of the United States and to grant appropriate administrative relief for valid title claims.

When there is mutual agreement regarding the property line and ownership, but an encroachment is evident, pursue one of the following:

- If no improvements are present have the property vacated;
- If minor improvements are present, have the property vacated only if it serves the public interest;
- If disposal of tracts with minor improvements best serves the public interest, evaluate them for eligibility to sell or interchange under the Small Tracts Act; or
- If significant improvements are present on a tract, evaluate it for eligibility to sell or interchange under the Small Tracts Act.

Subsurface Ownership

Consider subordination or acquisition of subsurface rights when all of the following are met:

- Conflicts between surface values and mineral activities cannot be mutually resolved; and
- The public benefits from the surface values exceed the cost of acquiring subsurface rights.

Reserve subsurface rights in land exchanges only when high potential for mineral deposits occur in the vicinity.

Acquire subsurface rights in all fee purchases and exchanges if possible. Important acquisitions for surface objectives should not be foregone if subsurface rights are not offered for sale.

When acquiring property with subsurface reservations minimize the commodities reserved and the time period of the reservation.

Transportation System

Additional management direction for roads can be found in 36 CFR212.1, Forest Service Manual 7700, and Forest Service Handbooks 7709.55 through 7709.59.

The Transportation Atlas shows the current road network on the forest. Any management activity that modifies the transportation atlas, such as adding new National Forest System roads or decommissioning unclassified roads, should be informed by a roads analysis, according to FSM 7710.

Motorized use of National Forest System roads is allowed in accordance with State law and closure orders.

Restrict vehicle travel on roads as needed due to environmental concerns, lack of funding, user conflicts, or to achieve ROS objectives.

Commercial users of roads shall perform their share of road maintenance, per Forest Service Manual 7732.

If heritage resources or human remains are discovered during project implementation, halt the work near the find until a professional archaeologist assesses the situation.

National Forest System Roads

Planning and Design

Use minimum road construction, reconstruction, and maintenance standards necessary to meet management area objectives, protect area resources, accommodate design vehicles, and provide safe and efficient travel.

Schedule road construction, reconstruction, and maintenance to take advantage of favorable weather and ground conditions, and to avoid high stream flows.

Existing roads should be used in preference to the construction of new ones.

Locate new roads outside the RMZ and WPZ, unless there is no feasible alternative.

Design local roads to conform to natural contours of the land and meet the needs of the design vehicle, utilizing broad based dips and outslopes for drainage in lieu of culverts. Justify higher local road standards on a case-by-case basis.

Design roads so the runoff does not change natural hydrologic functioning of karst or wetland features.

Determine location of new roads near fens containing known or suspected habitat for Hine's emerald dragonfly during consultation with U.S. Fish and Wildlife Service.

Whenever possible, avoid road construction:

- Above known cave passages;
- Within 100 feet of known cave and abandoned mine entrances;
- Within 100 feet from the upslope break or crest of the sinkhole, other karst feature, rock bluffs, outcrops, or cliffs;
- Within 100 feet of glades;

- Within the buffer zone for wetland features, (Reference Forestwide Standards and Guidelines for Geological Features under Terrestrial and Aquatic Wildlife management.); and
- Within, or near, collapsed features or losing streams.

If existing roads interfere with the natural flow of groundwater seepage and springs associated with adjacent fens and seeps, restore the natural hydrologic flow where feasible if such activities would not result in a loss of habitat.

Reconstruction or Construction

Construct road grades at less than 10%, although steeper grades may be suitable for short sections of road.

Design and construct drainage features so that run-off water is spread, retained, or infiltrated below or beyond drainage features. Install drainage features at appropriate intervals to prevent erosion.

Where feasible, relocate roads away from known cave entrances during road reconstruction or maintenance activities.

Construct temporary pools at the end of outlet ditches whenever possible.

Bridges proposed for construction or reconstruction across streams that are 40 or more feet wide should be designed of concrete with girders or chambers to provide suitable bat roosting space underneath whenever possible.

Revegetate soils disturbed by National Forest management activities by allowing growth of existing on-site vegetation where possible and desirable.

Where on-site vegetation is not desirable, or not likely to quickly revegetate the site, use one or more of the following methods:

- **Fertilize to encourage growth of desirable on-site vegetation;**
- **Apply local surrounding organic mulch (i.e., leaf litter and pine needles) or covering with sterile weed-free straw to promote reestablishment of native vegetation;**
- **Reseed or replant with native species appropriate to the site or sterile annuals (wheat, rye, etc.) and fertilizing if necessary; or**
- **Scarify to establish seedbed.**

Maintenance

Determine maintenance level by functional class, traffic volume, management area guidelines, associated resource outputs, and available funding.

Maintain roads to a level necessary for Forest generated traffic. When public traffic is generated by non-forest activities, contact and work with the appropriate county to assume their share of maintenance responsibilities.

Maintain roads to at least Maintenance Level III if passenger car travel is intended. Maintain all roads in a condition that protects the Government investment unless an economic analysis determines that deterioration and future reconstruction is more cost-effective.

Hazard trees should be identified and removed between November 1 and April 1 whenever possible.

Stream Crossings within WPZ or RMZ

Consider fords only where permanent roads receive low or intermittent use, and use is restricted to low-flow periods.

Fords should only be used where stream bottom conditions can support this use.

Where stream crossings are necessary, roads should cross at right angles, perpendicular to the flow of water, with minimal disturbance of the stream banks and bed.

A stream crossing must include mitigating measures, which protect the channel from disturbance and the road from storm-flow.

Design crossings to:

- Allow passage of large woody material, bed load and floating debris, when possible;
- **Maintain stable channel configurations, native local substrates, and native vegetation;**
- **Carry expected storm flows; and**
- **Provide passage for aquatic and semi-aquatic organisms (i.e., fish, crayfish, shellfish, salamanders, and turtles).**

Whenever possible, conduct in-stream construction activities from August through October and avoid the period between March and June, to avoid disrupting aquatic species during spawning season.

Allow equipment operation within the RMZ only at designated crossings or other approved locations.

If suitable habitat is present, conduct specific biological surveys to determine the presence or absence of threatened, endangered or rare **aquatic species prior to initiating work.**

Temporary Roads

Stream channels and drainages shall not be used as travel ways for any mechanized equipment.

Temporary roads are prohibited within the RMZ and WPZ except at designated locations.

Minimize stream channel crossings by temporary roads within the RMZ or WPZ.

Locate stream channel crossings within a stable reach and harden if needed.

Remove hardening material and restore the original contours of the banks and approaches when practical and as needed.

The Forest Service must approve layouts of any temporary access under permit, lease, or contract before construction.

Whenever possible, avoid temporary road construction:

- Above known cave passages;
- Within 100 feet of known cave and abandoned mine entrances;
- Within 100 feet from the upslope break or crest of sinkholes, other karst features, rock bluffs, outcrops, or cliffs;
- Within 100 feet of glades;

- Within the buffer zone for wetland features (reference: Forest-wide Standards and Guidelines for Geological Features under Terrestrial and Aquatic Wildlife management); and
- Within or near collapsed features or losing streams.

Intermittent springs and seeps that appear during or after construction of temporary roads may be drained to avoid erosion during the period they are in use.

Temporary roads should be designed and located so they do not change natural hydrologic functioning of karst or wetland features.

Temporary roads should not drain directly into roads, areas of disturbed mineral soil, sinkholes, fens, springs, other small wetlands, or watercourses. Install drainage features at appropriate intervals to prevent erosion.

Erosion control work should be kept up to date to minimize soil movement.

Decommission temporary accesses when no longer needed for the purpose for which it was developed.

Unneeded Roads

All unneeded roads under Forest Service jurisdiction should be decommissioned.

Priority for decommissioning shall be given to those roads that pose the greatest risk to public safety or where use is causing unacceptable resource damage.

Chapter 3
Management Prescriptions

Cover photo: One of many springs on the Mark Twain National Forest, USDA Forest Service
Photographer: Lori Wilson

Chapter 3

Management Prescriptions

Introduction

Management prescriptions provide direction to help achieve goals and objectives expressed at the forestwide level. Management prescriptions define where differing types of opportunities and experiences are available to the public, and where differing management practices may be carried out. They identify proposed and probable practices and actions appropriate to achieve the desired conditions. All management prescriptions provide multiple uses, even though their titles may imply a single use.

This chapter presents each management prescription separately. A specific resource not addressed in a management prescription indicates that the Forestwide Standards and Guidelines provide adequate direction. In addition, Federal and State laws, regulations, and the Forest Service Directives System always apply, although they are not specifically identified in management prescription direction.

Each management prescription includes the following elements:

Theme – a short summary of management emphasis.

Goals – concise statements that describe the primary purpose or aim for the management prescription. Goals are broad and general in scope with no specific timeframe.

Desired Condition – a narrative description of the desired characteristics and conditions expected because of the prescribed management. They provide a snapshot of what the forest or management area will look like when goals, objectives, standards, and guidelines are met. Desired conditions can apply to the present or the future and do not consider costs.

Standards and Guidelines – direction that applies to a particular management prescription, in addition to the Forestwide Standards and Guidelines. Where Forestwide standards and guidelines are different from those for a management prescription, the management prescription standard applies.

The revised Forest Plan includes nine management prescriptions. These management prescriptions achieve a desired future forest condition with resulting outputs of goods, services, uses, and environmental enhancements. They are specifically designed to respond to the issues and need for change items identified through the plan revision process.

Management prescriptions are applied to geographical units on the ground, which are called Management Areas. Management prescriptions typically apply to more than one management area, in multiple locations, on the Forests.

The following table shows the management prescription assignments in terms of thousands of acres and percent of Forest. They are based on mapped GIS acreages for each management area, using 2004 ownership. Forest Plan maps for each unit showing the location of the management areas are located in Appendix H.

Table 3-1. Management prescription assignment of Forest Plan.

Management Prescription	Total Acres (in 1000s)	Percent of NFS Lands
1.1 Natural Community Restoration, Roaded Natural ROS	**374.9**	25.1
1.2 Natural Community Restoration, Semi-Primitive Motorized ROS	62.2	4.2
2.1 General Forest, Roaded Natural ROS	**669.8**	44.8
5.1 Designated Wilderness, Primitive ROS	64.1	4.3
6.1 Semi-Primitive Non-Motorized ROS	**74.0**	4.9
6.2 Semi-Primitive Motorized ROS	196.4	13.1
6.3 Candidate Wild, Scenic, Recreation Rivers	**16.9**	**1.1**
7.1 Developed Recreation Areas	5.9	0.4
8.1 Designated “Special Areas” Other Than Wilderness	**31.9**	**2.1**
Total	1,496.1	100.0

Management Prescription 1.1
Natural Community Restoration, Roaded Natural ROS

Theme

This prescription emphasizes restoration of natural communities while providing a roaded natural recreation experience. MP 1.1 consists of biologically distinctive ecological areas, each differing with respect to flora, fauna, natural communities, watersheds, and landform. The desired condition will vary based on the characteristics of respective natural community types as described for each management area. The intensity of natural community management may vary according to resource quality and type, access, land ownership patterns and capability to respond to management activities.

Goals

- Focus restoration efforts in areas that collectively represent irreplaceable concentrations of distinctive biota, and that represent the highest quality natural communities in Missouri.
- Restore, enhance and maintain the structure, composition and function of distinctive terrestrial and aquatic natural communities.
- Restore the ecological role of fire in natural communities.
- Provide a variety of uses, products and values by managing in support of desired ecological conditions.

Desired Condition

Ecosystems are healthy, resilient, and resistant to diseases, insect infestations, and non-native species invasion. Natural communities are present in the amounts, distributions, and variability characteristic of Missouri's presettlement landscape. Management activities mimic natural patterns and the range of variability of resident natural communities, resulting in a natural-appearing landscape. Additional information is found in Appendix A.

Plant species distributional patterns, abundance, and diversity increase following management activities. Natural communities exhibit the desired composition, patch size, canopy structure, understory, shrub layer, and ground cover characteristics.

Prescribed fire emulates historical fire regimes, creating variable patterns of vegetation structure and abundance that meet habitat needs for associated wildlife.

Standards and Guidelines

Vegetation Management

Distribute activities across the landscape to emulate the historical vegetation patterns and quantities of natural communities based on available information.

Emphasize treatment of under-represented natural communities as described in Appendix A for each individual management prescription 1.1 areas.

On isolated tracts or in areas with low potential for ecological restoration, emphasize production of timber resources rather than ecological restoration.

Provide a gradual transition in vegetation density and composition from one stand to the next when possible.

When seeding or planting vegetation other than shortleaf pine is prescribed for restoration, use seed or plant materials from local sources unless a local source is not available or cannot be developed. If a local seed source is not available, a botanist or ecologist must approve the seed source.

Remove, control, or contain occurrences of non-native invasive species in existing native prairies upon discovery and in other natural communities as feasible.

Terrestrial and Aquatic Habitat Management

Distribute activities across the landscape so that the full range of variable conditions (from regeneration openings to areas exhibiting old growth characteristics) is present for each natural community.

The predominant age of areas representing old growth character should be greater than 25% above the rotation age used for timber management.

New wildlife waterholes shall only be constructed if site-specific analysis demonstrates a long-term, landscape-level viability concern for TES, RFSS, or species groups (such as herptofauna), and such concerns cannot be addressed through waterhole construction in other areas of the Forest (i.e., 2.1 Management Prescription).

No new wildlife food plots shall be created.

Close and rehabilitate existing wildlife food plots.

Rangeland Management

Permit grazing only on existing improved pastures. Pastures on lands acquired in the future may be grazed only after an analysis comparing the suitability for grazing and the potential to contribute to natural community restoration.

Control timing, duration, and intensity of livestock grazing to achieve desired structure and species composition.

Ensure that timing, intensity and frequency of grazing maintains and/or increases sensitive plant species populations and rare plant communities.

Close all areas that contain glade and natural woodlands when the current permit expires. Until the permit expires, control the timing, duration, and intensity of livestock grazing to achieve desired structure and species composition objectives.

Recreation Management

Recreation Opportunities

Manage area to meet, as a minimum, roaded natural ROS objectives.

Visual Management

All resource management activities shall meet, as the minimum, the Visual Quality Objectives displayed below:

Table 3-2. Visual Quality Objective for Management Prescription 1.1.

	Sensitivity Level and Distance Zone						
	Most Sensitive			Sensitive			Least Sensitive
Variety Class	fg1	mg1	bg1	fg2	mg2	bg2	3
Distinctive-Class A	R	PR	PR	PR	M	M	M
Common-Class B	PR	M	M	PR	M	MM	MM
Minimal-Class C	PR	M	M	M	MM	MM	MM

Distance Zones: fg-foreground; mg-middleground; bg-background
VQO: R-Retention; PR-Partial Retention; M-Modification; MM-Maximum Modification

Timber Management

The following rotation ages should normally apply:

- 100 years for shortleaf pine;
- 120 years for post and white oak; and
- 80 years for red, black, and scarlet oak.

Even-age silvicultural methods may be used to restore and maintain open natural communities, glades and savannas by creating forest openings greater than 40 acres, but not to exceed 500 acres, within the Ava, Cassville, Houston, Rolla, and Willow Spring units.

Landownership

Land Adjustments

Priority in land adjustments should be given to consolidating land and filling inholdings with emphasis given to protecting riparian zones in emphasis watersheds, high integrity natural communities and simplifying prescribed burn units.

Management Prescription 1.2
Natural Community Restoration, Semi-Primitive Motorized ROS

Theme

This prescription emphasizes restoration of natural communities while providing semi-primitive motorized dispersed recreation experiences. MP 1.2 consists of biologically distinctive ecological areas, each differing with respect to flora, fauna, natural communities, watersheds, and landform. The desired condition will vary based on the characteristics of respective natural community types as described for each management area. The intensity of natural community management may vary according to resource quality and type, access, land ownership patterns and capability to respond to management activities.

Goals

- Focus restoration efforts in areas that collectively represent irreplaceable concentrations of distinctive biota, and that represent the highest quality natural communities in Missouri.
- Restore, enhance, and maintain the structure, composition, and function of distinctive terrestrial and aquatic natural communities.
- Restore the ecological role of fire in natural communities.
- Provide a variety of uses, products, and values by managing in support of desired ecological conditions.
- Provide dispersed recreation opportunities emphasizing a semi-primitive motorized setting.

Desired Condition

Ecosystems are healthy, resilient, and resistant to diseases, insect infestations, and non-native species invasion. Natural communities are present in the amounts, distributions, and variability characteristic of Missouri's presettlement landscape. Management activities mimic natural patterns and the range of variability of resident natural communities, resulting in a natural-appearing landscape. Additional information is found in Appendix A.

Plant species distributional patterns, abundance, and diversity increase following management activities. Natural communities exhibit the appropriate composition, patch size, canopy structure, understory, shrub layer, and ground cover characteristics.

Prescribed fire emulates historical fire regimes, creating variable patterns of vegetation structure and abundance that meet habitat needs for associated wildlife.

The natural appearing setting has moderately dominant alterations, but these alterations do not draw the attention of motorized observers from trails or primitive roads.

Standards and Guidelines

Vegetation Management

Distribute activities across the landscape to emulate the historical vegetation patterns and quantities of natural communities based on available information.

Emphasize treatment of under-represented natural communities as described in Appendix A for each individual management areas managed under prescription 1.2.

On isolated tracts or in areas with low potential for ecological restoration, emphasize production of timber resources rather than ecological restoration.

Even-age silvicultural methods may be used to restore and maintain open natural communities, glades, and savannas by creating forest openings greater than 40 acres, but not to exceed 500 acres within the Ava, Cassville, Houston, Rolla, and Willow Spring units.

Provide a gradual transition in vegetation density and composition from one stand to the next when possible.

When seeding or planting vegetation other than shortleaf pine is prescribed for restoration, use seed or plant materials from local sources unless a local source is not available or cannot be developed. If a local source is not available, a botanist or ecologist must approve a seed source.

Remove, control, or contain occurrences of non-native invasive species in existing native prairies upon discovery, and in other natural communities as feasible.

Terrestrial and Aquatic Habitat Management

Distribute activities across the landscape to so that the full range of variable conditions (from regeneration openings to areas exhibiting old growth characteristics) is present for each natural community.

The predominant age of areas representing old growth character should be greater than 25% above the rotation age used for timber management.

New wildlife waterholes shall only be constructed if site-specific analysis demonstrates a long-term, landscape-level viability concern for TES, RFSS, or species groups (such as herptofauna), and such concerns cannot be addressed through waterhole construction in other areas of the Forest (i.e., 2.1 Management Prescription).

No new wildlife food plots shall be created.

Close and rehabilitate existing wildlife food plots.

Rangeland Management

Permit grazing only on existing improved pastures. Pastures on lands acquired in the future may be grazed only after an analysis comparing the suitability for grazing and the potential to contribute to natural community restoration.

Control timing, duration, and intensity of livestock grazing to achieve desired structure and species composition.

Ensure that timing, intensity and frequency of grazing maintains and/or increases sensitive plant species populations and rare plant communities.

Close all areas that contain glade and natural woodlands when the current permit expires. Until the permit expires, control the timing, duration, and intensity of livestock grazing to achieve desired structure and species composition objectives.

Recreation Management

Recreation Opportunities

Manage area to meet, as a minimum, semi-primitive motorized ROS objectives, except as noted below:

- **Manage the Upper St. Francois Mountains Management Area (also known as Lower Rock Creek) to meet, at a minimum, semi-primitive non-motorized ROS objectives, except for the Wolf Hollow Area, which may be managed for semi-primitive motorized objectives. (See Fredericktown Unit Map in Appendix H for delineation of Wolf Hollow Area.)**

Recreation Management

Hold investment in recreation management to the minimum necessary to meet resource protection needs.

Trails

Density for all types of trails should not exceed an average of 1.5 miles per square mile of National Forest System land.

Visual Management

All resource management activities shall meet, as the minimum, the Visual Quality Objectives displayed below:

Table 3-3. Visual Quality Objective for Management Prescription 1.2.

	Sensitivity Level and Distance Zone						
	Most Sensitive			Sensitive			Least Sensitive
Variety Class	fg1	mg1	bg1	fg2	mg2	bg2	3
Distinctive-Class A	R	R	R	PR	PR	PR	PR
Common-Class B	R	PR	PR	PR	M	M	MM
Minimal-Class C	PR	PR	M	M	M	MM	MM

Distance Zones: fg-foreground; mg-middleground; bg-background
VQO: R-Retention; PR-Partial Retention; M-Modification; MM-Maximum Modification

Timber Management

The following rotation ages should normally apply:

- 100 years for shortleaf pine;
- 120 years for post and white oak; and
- 80 years for red, black, and scarlet oak.

Schedule no more than 20% of an individual management area for timber harvest during each decade of the plan period.

Salvage harvests are not subject to the 20% limit on timber harvest.

Even-age silvicultural methods may be used to restore and maintain open natural communities, glades and savannas by creating forest openings greater than 40 acres, but not to exceed 500 acres, within the Ava, Cassville, Houston, Rolla, and Willow Spring units.

Special Uses

Allow the use of National Forest System lands only when subject to existing rights, within existing sites or corridors, or when no other alternative is available.

Minerals

Mineral Exploration

Minimize excavation at drill sites.

Common Variety Minerals

Permit removal of common variety minerals only from isolated, visually screened locations.

Landownership

Land Adjustments

Give priority in land adjustments to consolidating land and filling inholdings with emphasis given to protecting riparian zones in emphasis watersheds, high integrity natural communities and simplifying prescribed burn units.

Transportation System

Manage National Forest System roads to meet, as a minimum, semi-primitive motorized ROS criteria, except as noted below:

- **Manage the Upper St. Francois Mountains Management Area (also known as Lower Rock Creek) to meet, at a minimum, semi-primitive non-motorized ROS objectives, except for the Wolf Hollow Area, which may be managed for semi-primitive motorized objectives. (See Fredericktown Unit Map in Appendix H for delineation of Wolf Hollow Area.)**

Management Prescription 2.1
General Forest, Roaded Natural ROS

Theme

This prescription emphasizes multiple use resource objectives while allowing for the enhancement of natural communities, improvement of forest health conditions, and roaded natural recreation experiences.

Multiple use resource objectives provide a wide variety of goods, uses, and services including wood products, forage, other products, visual quality, developed and dispersed recreation opportunities, and habitat for a variety of terrestrial and aquatic wildlife, fish, and other biota.

Ecological subsections will serve as the framework from which to distribute management activities across the forest to meet the goals and objectives for this management prescription.

Goals

- Provide a variety of uses, products, and values by managing within the capability and resource potential appropriate to natural communities and the landscape.
- Manage terrestrial and aquatic natural communities to enhance and retain their characteristic ecological elements.
- Provide a wide diversity of habitats to meet the needs of plants, fish, and wildlife species distributed across the Forest.

Desired Condition

Vegetation consists of a variety of stand sizes, shapes, crown closures, and age structures in patterns that simulate the structural variability of natural communities. (See Appendix A, Table A-2.)

Areas exhibiting old growth characteristics comprise 8% to 12% of the management area.

Regeneration openings comprise 8% to 15% of each management area. From 1% to 5% of these regeneration openings are ≤ 2 acres in size.

Natural communities are distributed similar to historical vegetation patterns.

Recreational opportunities provide for interaction between users ranging from moderate to high depending on the specific location.

Standards and Guidelines

Terrestrial and Aquatic Habitat Management

Distribute regeneration openings across the landscape proportionately to ELT's and natural communities present in the area.

Recreation Management

Recreation Opportunities

Manage area to meet, as a minimum, roaded natural ROS objectives.

Visual Management

All resource management activities shall meet, as the minimum, the Visual Quality Objectives displayed below:

Table 3-4. Visual Quality Objective for Management Prescription 2.1.

	Sensitivity Level and Distance Zone						
	Most Sensitive			Sensitive			Least Sensitive
Variety Class	fg1	mg1	bg1	fg2	mg2	bg2	3
Distinctive-Class A	R	PR	PR	PR	M	M	M
Common-Class B	PR	M	M	PR	M	MM	MM
Minimal-Class C	PR	M	M	M	MM	MM	MM

Distance Zones: fg-foreground; mg-middleground; bg-background
VQO: R-Retention; PR-Partial Retention; M-Modification; MM-Maximum Modification

Management Prescription 5.1
Designated Wilderness

NOTE: This prescription has not been revised. Management direction remains the same as in the 1986 Forest Plan.

Theme

This prescription applies to Wilderness.

Goals

Administer Wilderness for use and enjoyment by people in a manner that leaves the areas natural characteristics unimpaired.

Desired Condition

Wildernesses provide outstanding opportunities for solitude and primitive or unconfined types of recreation. They may contain exceptional ecological situations or features of scientific, educational, scenic, or historic value. Plant and animal diversity will depend entirely on the forces of nature. Vegetation ranges from glades to central hardwoods, mixed hardwood/shortleaf pine and shortleaf pine forests. Animals will predominantly be species that are associated with late successional stages of vegetation. No motorized use will be permitted except as authorized by Law and Regulation. Access will normally be by horse or foot traffic only. There will normally be no developed facilities other than trails. No transmission lines, pipelines, or other facilities will be permitted, except as authorized by law. Interaction between users will be low. Evidence of other uses and man's work will be substantially unnoticeable. Mineral exploration requiring surface disturbance is not permitted. Any private rights within these areas will be acquired when available. A brief description of the conditions of each Wilderness upon designation is given below.

Table 3-5. Description of wilderness areas.

Wilderness Area Name	Net Acres	Ranger District	Designation Date
Hercules Glades	12,314	Ava	10/19/76
Bell Mountain	8,777	Potosi	12/22/80
Piney Creek	7,927	Cassville	12/22/80
Rock Pile Mountain	4,159	Fredericktown	12/22/80
Devils Backbone	6,595	Willow Springs	12/22/80
Paddy Creek	6,728	Houston	01/03/83
Irish	16,500	Doniphan	05/21/84

Hercules Glades Wilderness

The Hercules Glades Wilderness is within the geological sub-province called the Springfield Plateau. It is characterized by cherty dolomite rocks of Ordovician age. Some of the higher knobs are capped with Mississippian age limestones. The Ordovician Cotter Formation is the primary bedrock. Open glades are found on this formation. Elevations range from 700 feet where the Wilderness borders Beaver Creek, to 1340 feet near the old Hercules Fire Tower site. There are three high knobs that stand out from the other high ridges in the area: Upper and Lower Pilot Knobs, and Coy Bald.

Hercules Glades Wilderness is in the Cedar Glades ecosystem as defined by A. W. Kuchler.

The thinnest soils (Gasconade) have prairie vegetation, intermingled with eastern redcedar, smoke tree, winged elm, aromatic sumac, chinkapin, and post oak. As the soils become deeper (Opequon), larger trees dominate with a mixture of chinkapin oak, white ash, post oak, blackjack oak, and eastern redcedar. An oak and hickory association is found on the deeper Clarksville soils. There is a shortleaf pine plantation planted during the late 1930's.

The glade areas support grass species common to the great prairies. Big and little bluestem, Indian grass, prairie dropseed, sideoats grama and switch grass are common grasses with an occasional remnant of eastern gama grass occurring. Associated forbs include black-eyed susan, several species of cone flower, goldenrod, shooting star, Missouri primrose and prairie clover. Common shrubs and vines are aromatic sumac, supplejack, and redbud.

Most wildlife found in the glade country is commonly found in the Hercules Glade Wilderness. In the Ozarks, many of these species are only found in the glade country because of their relation to the prairie grass communities. Examples of these species are the collared lizard, stinging scorpion, roadrunner, and the Bachman sparrow.

The Long Creek drainage generally runs east to west through the middle of the Wilderness. Portions of Long Creek contain water all year.

Evidence of man's activities remain in the form of 41 miles of woods roads, numerous house foundations, two spring houses, rock fences, concrete spring tanks, watering ponds and some wire fencing.

There is a three-acre tract of private land within the Wilderness in Section 8, Township 23N, Range 18W. Access to this tract is through the Wilderness.

The Hercules Glades is the only "Class 1" airshed on the Forest.

Bell Mountain Wilderness

Bell Mountain Wilderness is part of the St. Francois Mountains, one of the oldest landforms in North America. Elevations range from 1,702 feet at Bell Mountain to 970 feet in the Joe's Creek drainage. Local relief is about 600 feet and is characterized by steep felsite and rhyolite outcroppings. Both Bell Mountain and Lindsey Mountain are located within the Wilderness and offer outstanding views of the surrounding area. The associated granite glades provide a variety of interesting plant and animal life.

The area is within the oak-hickory-pine ecosystem as delineated by A. W. Kuchler. Oak and hickory are the predominant tree species with some areas of natural oak-pine and some shortleaf pine plantations. Upland brush and redcedar make up a small portion of the vegetative component. Blackjack oak, winged elm, hickories, sumac, and natural grasses are found on the rock exposure. Lichens abound on the exposed surface rock.

In 1980, it was estimated that one percent of the Wilderness was classified as open.

Shut-in Creek crosses the area. It is a perennial spring-fed stream with several "shut-ins" or gorges along its course. Steep talus slopes intersect the stream course at several locations. Joe's Creek is another small perennial stream within the Wilderness.

The wildlife in the area is typical of the Missouri Ozarks. Present populations are at moderate levels. Big game consists of white-tailed deer and wild turkey. Small game animals include squirrels and rabbits. Bird life ranges from large birds such as hawks, owls, turkey, vultures, and pileated woodpeckers to the small songbirds.

Evidences of man's activities can be seen. There are three miles of unimproved road and more woods roads. A utility line crosses the area for .96 miles. Wildlife ponds are scattered throughout. The foundation of an old fire tower and a mine tunnel entrance can be seen. Silver was once mined along Shut-in Creek.

There is a 40-acre and a 10-acre tract of private land within the boundary. Right-of-way through the Wilderness to these private ownerships exists.

Piney Creek Wilderness

The Piney Creek Wilderness has a deeply dissected landform with narrow ridge tops separated from narrow hollows by long, steep slopes. The ridge tops are approximately 400 feet above the streams. The area is underlain by limestone formations. Piney Creek, about five miles long, is the principal stream and the entire watershed is within the Piney Creek Wilderness. Piney Creek flows easterly into the James River arm of Table Rock Reservoir. Small springs can be found along Piney Creek. In the early part of the year, the intermittent drainages carry surface water run-off before drying up in late summer.

Piney Creek is within the cedar glades ecosystem as delineated by A. W. Kuchler. A variety of vegetation exists within the area. The ranges of many species of flora converge in this area. Influences from western, eastern, northern, and southern types exist. Some varieties are at the limits of their natural ranges. The area is ninety-nine percent forested, with oaks and hickories being the chief species. Black, red, white, post, and blackjack oaks, as well as other varieties, can be found. Other hardwoods such as sycamore, ash, and walnut occur on benches in the drainage. Shortleaf pine and redcedar are also present.

The Corps of Engineers has control over a 43-acre parcel along Piney Creek that is within the flood pool of Table Rock Lake.

Access to several private ownerships along Table Rock Lake is through the Wilderness.

The wildlife is typical of the Missouri Ozarks. Big game consists of white-tailed deer and wild turkey. Small game animals include squirrel, rabbit, coyotes, bobcat, fox, and raccoon. Bird life ranges from hawks, owls, turkey vultures, herons, and pileated woodpeckers, to the smaller songbirds. The roadrunner, a bird of the southwest, and the collared lizard, also common to the southwest, are residents of the area.

Evidence of man's activities can be seen in the form of 29 miles of woods roads, 9 wildlife ponds, 2 stock watering tanks, 1.5 miles of utility right-of-way along the boundary, some cross fencing, and some old fields in the flatter drainages.

Rock Pile Mountain Wilderness

The Rock Pile Mountain Wilderness is within the St. Francois Mountains portion of the Ozarks, one of the oldest landforms in North America. Rounded granite knobs overlying dolomitic limestone at lower elevations is the usual topography. Ridges are steep with rocky, wide slopes. Rock Pile Mountain is primarily a broken ridge running from Little Grass Mountain on the north to the National Forest boundary four miles to the south. Elevations range from 1,305 feet to 520 feet. Local relief is about 600 feet. The only public access is by the Faro Tower road on the north. The Wilderness is almost entirely surrounded by private land.

Scenic attractions include Rock Pile Mountain itself, the steep limestone bluffs, rock formations, and caves along the St. Francis River, the narrow gorges or "shut-ins," and the scattered granite glades with their own unique plant and animal communities. The mountain takes its name from an ancient circle of granite rocks piled by some earlier man on the top of the mountain.

The area is within the oak-hickory-pine ecosystem as delineated by A. W. Kuchler. Oak and pine trees dominate with hickory, redcedar, and miscellaneous hardwood species composing a relatively small component of the total vegetation. Mixed hardwoods of walnut, sugar maple, and basswood exist in a moist ravine.

No natural permanent water exists except for the St. Francis River, which touches the Wilderness along the southwest corner. Water in the drainages is intermittent, flowing in times of surplus precipitation. Runoff becomes a torrent in some of the small streams following periods of heavy rainfall because of the rapid runoff from the areas of steep rock. A few small springs exist. Five wildlife ponds provide a man-made source of year-round water.

The wildlife within the area is typical of the Missouri Ozarks. Big game consists of white-tailed deer and wild turkey. Small game animals include squirrels, rabbits, and various fur bearers.

Bird life ranges from owls, turkey vultures, and pileated woodpeckers to the smaller songbirds. Existing signs of man's activities include 15 miles of woods roads, wildlife ponds, wildlife food plots, and remains of a stone and concrete springhouse.

There are 40 acres of private land in one tract within the Wilderness boundary.

Devils Backbone Wilderness

Devils Backbone Wilderness is characterized by rugged topography with narrow ridges and hollows separated by long, steep slopes or bluffs. It takes its name from a geologic feature within the boundary - a long, narrow ridge known since early settlement as the Devil's Backbone. Elevations range from 1,020 feet to about 680 feet along the North Fork of the White River which flows through the Wilderness for approximately 1 ½ miles.

The area is within the oak-hickory ecosystem as delineated by A. W. Kuchler. A heavy forest cover of oak, hickory, and shortleaf pine predominates. A variety of vegetation exists, including an abundance of smaller trees, shrubs, grasses, and herbaceous plants. Wild azaleas occur along the North Fork River. There are small-scattered limestone glades.

The principal water feature is the North Fork of the White River, a high quality stream. Blue Spring, McGarr Spring, and Amber Spring are permanent water sources. The natural water in the area is of very high quality. Eighteen manmade wildlife water holes provide a source of water in upland areas where natural water sources are deficient.

The wildlife species are the typical forest-associated species found throughout the Ozarks. This includes white-tailed deer and eastern wild turkey as big game species. Smaller species include fox, raccoon, bobcat, skunk, squirrel and rabbit as well as lesser species. Beaver, muskrat, and other water-associated species can be found along the North Fork River.

Bird life ranges from hawks, owls, turkey vultures, and pileated woodpeckers to the small songbirds. Ruffed grouse inhabit the area. Blue heron, green heron, and other water-associated birds are found along the North Fork River.

The North Fork River provides a good stream fishery of large and smallmouth bass and smaller fish. In addition, it contains rainbow and German brown trout.

Canoeing is a popular use.

Evidence of man's activities can be seen in the form of 24 miles of woods roads, wildlife ponds, wildlife food plots, and segments of utility right-of-ways.

Paddy Creek Wilderness

The Paddy Creek Wilderness is located in the Salem Plateau region of the Ozarks, with its characteristic rolling topography. Within the area itself, streams cutting through the plateau have exposed sedimentary bedrock formations of sandstone and limestone, creating a dissected, rugged area. Elevation ranges from 1,480 feet to 900 feet. Local relief is about 250 feet.

This area is within the oak-hickory-pine ecosystem as delineated by A. W. Kuchler. The vegetation of the area is predominantly that of a forest community composed of red and white oaks, hickories, and shortleaf pine. There are 109 acres of scattered grass-covered openings and old fields along the creeks.

The area is drained by Big Paddy and Little Paddy Creeks, which converge within the Wilderness. They are both perennial streams. There are approximately 53 small springs that feed the two streams.

The wildlife is typical of the Missouri Ozarks. Big game consists of white-tailed deer and wild turkey. Small game animals include squirrels, rabbits, fox, and bobcat. The streams attract water-associated species such as mink and beaver. Several beaver colonies are present.

Bird life ranges from hawks, owls, turkey vultures, and pileated woodpeckers to the smaller songbirds.

Evidence of man's activities remain in the form of 28 miles of woods road, a segment of utility line and water line, wildlife ponds, wildlife food plots, and fencing. Fourteen miles of the Paddy Creek Trail are within the area, as well as 1.9 miles of a nature trail.

There are 40 acres of private land in one tract within the Wilderness boundary.

Irish Wilderness

This 16,500-acre area in the Ozark Highlands is characterized by a rolling to steep topography with many karst features such as sinkholes, disappearing stream segments, and caves. White's Creek Cave, one of the significant karst features, is a spacious walk-in cavern about 900 feet long, which contains numerous crystalline formations. Elevations in the area range from 900 to 500 feet.

The Wilderness lies in the oak-hickory-pine ecosystem as delineated by A. W. Kuchler. The predominant plant community is oak-hickory forest with scattered shortleaf pine and a great variety of ground vegetation. The few river bottom silt-loam soils have some black walnut and associated bottomland species. The shallow glade soils in the unit support patches of tall grass, prairie plants, and eastern redcedar. The forest vegetation is in a variety of age classes. The majority of the trees are about 30 to 40 years old. In rough areas, a few old growth stands exist.

The Wilderness abuts the Eleven Point National Scenic River corridor for approximately seven miles.

Intermittent streams are characteristic of the unit. White's Creek is the principal stream and is partially intermittent with some permanent pools. Streamflow generally moves into the underground drainage system to emerge at the numerous small springs of the region.

Wildlife species are typical of the Missouri Ozarks with both forest and upland game represented. Big game species include white-tailed deer and the eastern wild turkey. Huntable populations are present. Gray squirrels are the most popular small game animals. Also, there are rabbits, raccoons, foxes, coyotes, bobcats, and beaver. Lesser species of wildlife such as

weasels, and mice fill various niches in the total ecological system. Birdlife ranges from larger birds such as hawks, owls, turkey vultures, and pileated woodpeckers to smaller songbirds.

Evidence of man's activities include 41 miles of woods roads, 1.4 miles of utility right-of-ways, the masonary remnants of an old Civilian Conservation Corps camp and railroad grades. The Whites Creek Trail, 19.4 miles in length, traverses the area.

There are 240 acres of private land within the boundary. Right-of-way to this land exists through the Wilderness.

Standards and Guidelines

Vegetation Management

Vegetation will be affected by forces of nature with few minor exceptions as identified by these guidelines.

Control of noxious farm weeds by grubbing or with chemicals when they threaten lands outside Wilderness or are spreading within the Wilderness, provided control can be affected without serious adverse impacts on Wilderness values.

No man-caused vegetative manipulation will be permitted beyond the minimum needed for trails and signs. Exceptions are: (1) physical facilities and uses permitted under the establishing legislation, (2) vegetation may be removed to control man-caused wildfires and those natural wildfires and insect and disease outbreaks which threaten to spread beyond the Wilderness, (3) vegetation may be removed when absolutely necessary for rescue operations.

When approved by the Regional Forester thru a change in, or exception to, National Wilderness Policy, prescribed fire will be used where it can be determined that a certain frequency of fire is essential to aid, maintain, or restore natural plant communities or threatened and endangered plant species.

Existing vegetation communities, for example, legumes, food plots, fescue pastures, or pine plantations, which differ from the natural communities for a particular site, shall be allowed to revert to natural vegetation communities.

Only native or naturalized species and natural materials will be used for restoration work.

Environmental Management

Air Quality

Protect Hercules Glades Wilderness as the only Class I air quality area on the Forest.

In cooperation with the State identify and quantify the indicators for Class I air quality to be used as the limits of acceptable change (LAC) for Air Quality Related Values (AQRV). This LAC will then be incorporated into the monitoring of the Hercules Glades Wilderness.

Protect Piney Creek, Devils Backbone, Bell Mountain, Paddy Creek, Irish, and Rock Pile Wildernesses as Class II air quality areas.

Pesticide Use

Use pesticides in Wilderness only when necessary to prevent the loss of significant aspects of the Wilderness or to prevent significant losses to resource values on private or public lands bordering the Wilderness.

Obtain Regional Forester approval for all pesticide applications in Wilderness.

Catastrophic Hazard Response

Accept the effects of flood, wind, pests, erosion, and other natural forces as part of the Wilderness experience and environment except as needed to prevent unnatural loss of the Wilderness resource; unacceptable damage to resources on adjacent lands; or pose a threat to continued use and activities of the area.

Rangeland Management

Grazing will not be permitted.

Recreation Management

Recreation Opportunities

Apply ROS class Primitive to Wilderness. Within ROS class Primitive, the Wilderness Opportunity Spectrum (WOS) will be used to stratify each Wilderness into units for application of different management actions to preserve a range of Wilderness opportunities and options for users. Reference Wilderness Maps found at the end of this Management Prescription.

Transition WOS will be characterized by the following:

- Evidence of past use.
- Solitude in proximity to trails interrupted by sometimes frequent party encounters.
- Opportunities for challenge, risk, and self-reliance available but must be actively sought along trail.
- High level of on-site public safety (well defined and marked trails with necessary signing since a low level of woodsmanship skills is assumed).
- High degree of public information.
- High degree of ranger and public contact.
- Facilities to protect resource.
- Visual Quality Objective of Retention.

Remote WOS will be characterized by the following:

- Evidence of past use.
- Solitude in proximity to trail interrupted on occasion by encounters with other parties.
- Opportunities for challenge, risk, and self reliance available in off-trail areas and at most times along travel corridors.
- Moderate level of on-site public safety.
- High degree of public information.

- Moderate degree of ranger and public contact.
- Facilities to protect resource.
- Visual Quality Objectives of Preservation or Retention.

Pristine WOS will be characterized by the following:

- Little or no evidence of past use.
- Solitude seldom interrupted by contacts with other parties.
- Opportunities for challenge, risk and self reliance found throughout area.
- Low level of on-site public safety.
- Low degree of public information.
- Low degree of ranger and public contact.
- No facilities.
- Visual Quality Objective of Preservation.

The limit of acceptable change concept will be implemented by evaluating the following indicators:

Table 3-6. Indicators of acceptable change.

Categories	Indicators	Standards
Trails (Biological)	Soil loss	An increase in excess of 0.3 square foot per year in cross sectional area.
Water (Biological)	Quality reduction	A measurable decrease from current quality.
Visitor Contact (Social)	Exit contact will be made in the spring and fall. A total of six days will be used including a holiday and different weekdays.	20% or more with a negative impression.
Use (Social)	Annual report.	Reach 50% of capacity.

When any of the above standards are reached, an assessment will determine the causes and possible remedies to prevent the loss of Wilderness character.

Motorized equipment and mechanized transport for recreation use is prohibited.

Regulation of use may be necessary where demand exceeds carrying capacity, where needed to prevent site deterioration, or to maintain WOS classification. A permit system may be implemented as a last resort if necessary to hold use within established limits.

The use of self registration is permissible.

No more than 10 individuals shall travel or camp together as one group. Camping will be permitted anywhere except within 100 feet of a trail, water, cave, rock shelter, other occupied campsite, or other areas as designated that are easily impacted by or subject to concentrated use.

Off-trail horse and mule use is permitted in Wilderness.

Horse and mule use of trails is limited to those designated for such use as shown on the Wilderness maps.

Tying stock directly to live trees is prohibited.

Horses or mules will not be picketed within 100 feet of water or trails.

Limit recreation facilities to trails and signs consistent with Wilderness character, except as otherwise authorized by the act establishing the area.

Camping conveniences such as toilets, tables, fire rings, hitch racks, or corrals, will not be provided.

Trails

The planned trail system for each Wilderness is shown on its map.

Construct tread only if required to delineate trails, protect fragile adjacent resources, correct poor alignment or location, or to route user away from hazardous areas. All of the proposed trails are either existing "woods roads" or have already been constructed. Deviations will be made when justified on a case-by-case basis.

Major trailhead development will be limited to:

Hercules Glades:	Tower Site
Devils Backbone:	North Fork Campground
Irish:	Camp Five Pond Whites Creek Float Camp
Paddy Creek:	Paddy Creek Campground Roby Lake Big Piney Trail Camp

Minor trailhead development will be limited to:

Hercules Glades:	Blair Ridge West Side Access
Piney Creek:	Piney View Tower South Side Access
Devils Backbone:	Northwest Access South Access
Bell Mountain:	A Highway FT-12 Access
Rock Pile Mountain:	Little Grass Mountain

Trailhead facilities will be located outside Wilderness.

At major trailhead locations, minor additional facilities may be developed to provide parking, toilets, camping, picnicking, horse facilities, and signing.

Development at minor trailhead locations will be limited to parking, minimum signing, and minor facilities to accommodate use.

Trail identification will only be provided at termini and road or trail intersections.

Signs primarily for the convenience of visitors such as extensive direction, information, interpretation, and mileage will not be provided.

Signs should be as small as possible using ¾" or 1" letters and 1 line preferred with 3 lines the maximum. The materials used will not detract from the Wilderness experience.

Utilize off-site techniques for use control such as guides, maps, brochures, or travel logs.

Off-Road Vehicles (ORV)

ORV use will not be permitted.

Heritage Resources

Heritage resources are available for scientific study. Study or management will not normally include any excavation, restoration, or interpretation activities.

Heritage resource values may be stabilized and preserved when these values are compatible with and enhance Wilderness values.

Visual Management

Attain Visual Quality Objective (VQO) of Preservation for each Wilderness.

Man-caused impacts or improvements will meet the Visual Quality Objective of Retention (R).

Visual Absorption Capacity (VAC) assessments for ecological landtype will be utilized in guiding locations of authorized impacts or improvements to minimize environmental impacts and costs.

Timber Management

Silvicultural Systems

Silvicultural systems are not applicable to this management prescription.

Harvesting

Timber is not harvested under this management prescription.

Management Intensity and Utilization

Use growing trees as sources of natural gene pools.

Scions and seed may be collected by methods compatible with Wilderness.

Superior trees will not receive any special treatment that noticeably disturbs the surrounding vegetation or draws undue attention to them.

Water and Soil Resource Management

There will be no investment for soil productivity improvement.

Man-caused accelerated soil erosion will be controlled. The preferred method shall be to remove the cause and let the forces of nature repair the damage. Where this method is not satisfactory measures such as natural appearing site hardening or revegetation with appropriate species shall be used.

In those unusual situations where mechanical equipment is used any soil disturbance that reasonably cannot be expected to heal itself through the forces of nature within three years will be immediately restored.

Design all soil-disturbing activities to limit degree of duration of disturbances to the capability of the soil to recover.

Promptly restore areas of disturbed soil using appropriate naturalized plants and materials where necessary to prevent unacceptable adverse impacts on downstream areas and adjacent landowners.

No Forest Service activity shall degrade water quality below that level characteristic of the undisturbed Wilderness.

Where water quality unsuitable for Wilderness enters the area from outside, the situation will be referred to the Missouri Department of Natural Resources for resolution.

Wildlife Habitat Management

Wildlife

In some instances, wildlife species once native to the Wilderness have been forced from their original habitat by the encroachment of man and his activities. To the extent that these factors can be altered or managed within the intent of the Wilderness Act, species no longer part of the Wilderness scene may be reintroduced and managed as a part of the Wilderness resource when recognized by both the Forest Service and the Missouri Department of Conservation.

Wildlife habitat and plant and animal diversity may be manipulated for endangered or threatened species as permitted by legislation.

Fish

The Forest Service role in fish management is habitat protection and coordination with the Missouri Department of Conservation.

Endangered, Threatened, and Sensitive Species

Manage threatened and endangered species as warranted within the provisions of enabling legislation.

Projects involving manipulation of vegetative cover shall be approved by the Chief of the Forest Service on a project-by-project basis. All projects must have, as their objective, enhancement of the Wilderness resource. To qualify for approval habitat manipulation projects must satisfy:

- **The project can be accomplished with complete assurance that damage to watershed or Wilderness values of serious or lasting nature will not develop.**
- **There is reasonable assurance that the project will accomplish the desired objectives.**
- **The condition to be remedied is a result of man's influence.**
- **The project will promote the perpetuation of a threatened or endangered species.**

Special Use Management

Utility Transmission Corridors

Corridors for reservoirs, water conservation works, power projects, transmission lines, and other facilities are not permitted.

Other Special Uses

Commercial use will not be permitted. Special uses will not be permitted, except for access to surrounded private property.

Minerals

Mineral Exploration

Surface disturbing exploration (including core drilling) is not permitted, subject to valid existing rights.

Mineral Development

Mineral development is not permitted.

Research

Research to investigate scientific values may be conducted providing it is in accordance with the concept of Wilderness.

Where possible, research projects will be directed to areas outside Wilderness where similar sites are available.

Fire Management

Reference Forestwide Standard and Guidelines 2100 for Air Class I Maintenance Requirements.

The Forest Supervisor must approve the use of motorized equipment, including chain saws and mechanical transport, except tractors.

The Regional Forester must approve the use of tractors for fire suppression.

Evidence and damage resulting from vehicle travel will be obliterated or repaired as a cost of the fire.

The suppression strategy of control will be used for any wildfire with flame lengths in excess of four feet (fire intensity level 3+).

In the Hercules Glades, during either high or low damage period as stated in the Fire Management Action Guide and as modified by silviculturists, the suppression strategy of containment will be used for any wildfire with flame lengths of less than four feet (fire intensity level 0-2).

In other Wildernesses, during the high damage period as stated in the Fire Management Action Guide and as modified by silviculturists, the suppression strategy of containment will be used for any wildfire with flame lengths of less than three feet (fire intensity level 0-1). The suppression strategy of control will be used for any wildfire with flame lengths of three to four feet (fire intensity level 2).

Law Enforcement

Perform law enforcement in a manner that does not detract from the Wilderness experience of others.

Land Ownership

Acquisition of inholdings, outstanding subsurface rights, and adjacent tracts suitable for Wilderness will receive high priority when they become available from willing sellers.

Acquired inholdings and suitable adjacent lands, which would provide a more logical boundary, will be managed as Wilderness until they are classified as such by Congress.

Individuals and their successors in interest, who own land surrounded by Wilderness shall be given rights as may be necessary to ensure adequate access to that land. Adequate access is defined as the combination of routes and modes of travel which will, as determined by the Forest Service, cause the least lasting impact on the Wilderness resource, and at the same time serve the reasonable purposes for which the private land is held or used.

Property boundary lines separating Wilderness and private lands should be surveyed to standard. Line marking will be done in a manner that identifies the location while maintaining a visually pleasing setting.

Buildings and Structures

No buildings or structures will be constructed, except as authorized by the act establishing the Wilderness.

Public Health and Pollution Control Activities

Water Supply

Drinking water sources will not be developed.

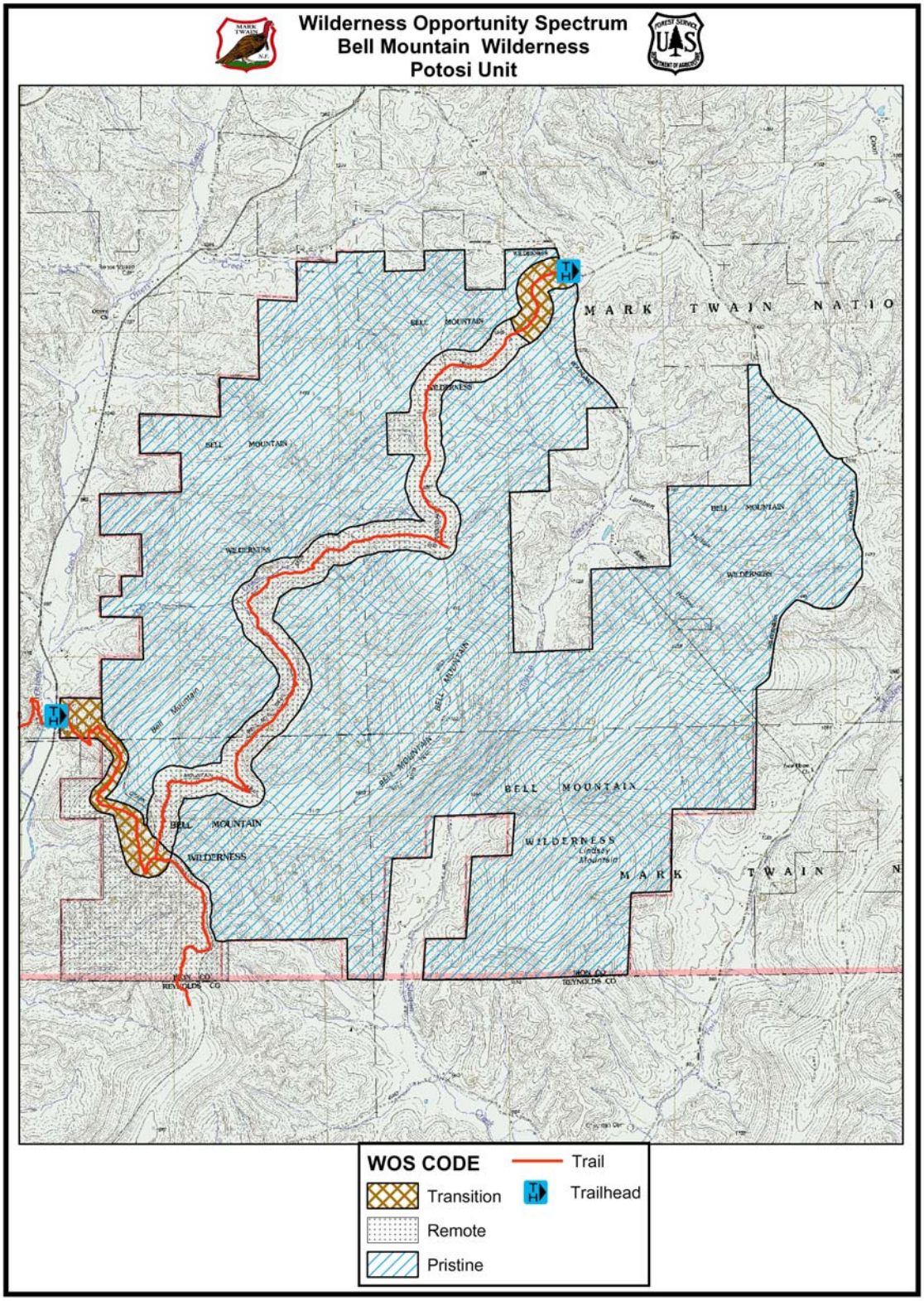
Solid Waste

Landfill disposal sites will not be provided.

Transportation System

Roads will not be provided, except as required by the act establishing the Wilderness.

Maintenance of authorized roads will be at the minimum level necessary to protect the resource and accommodate the authorized use.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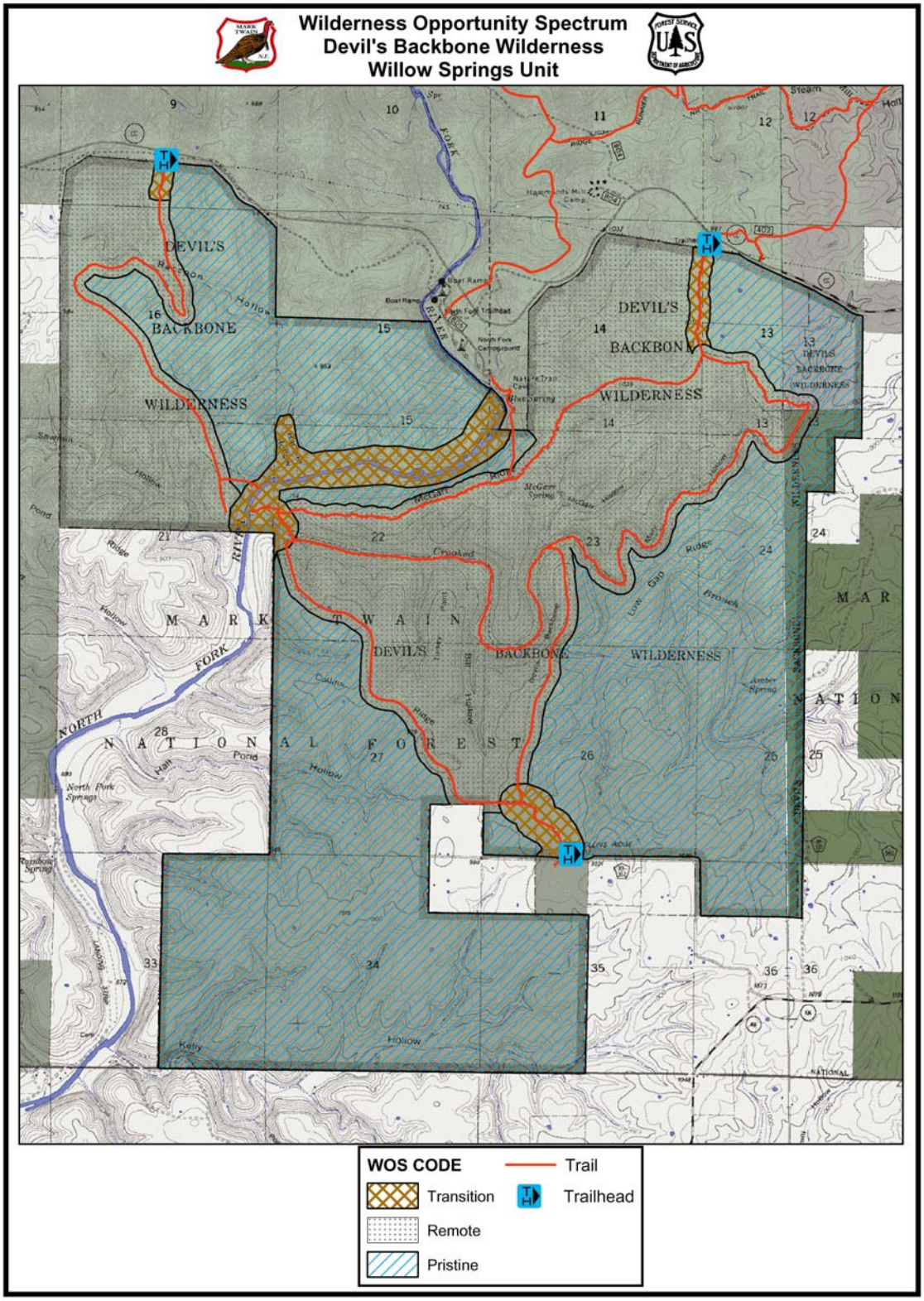
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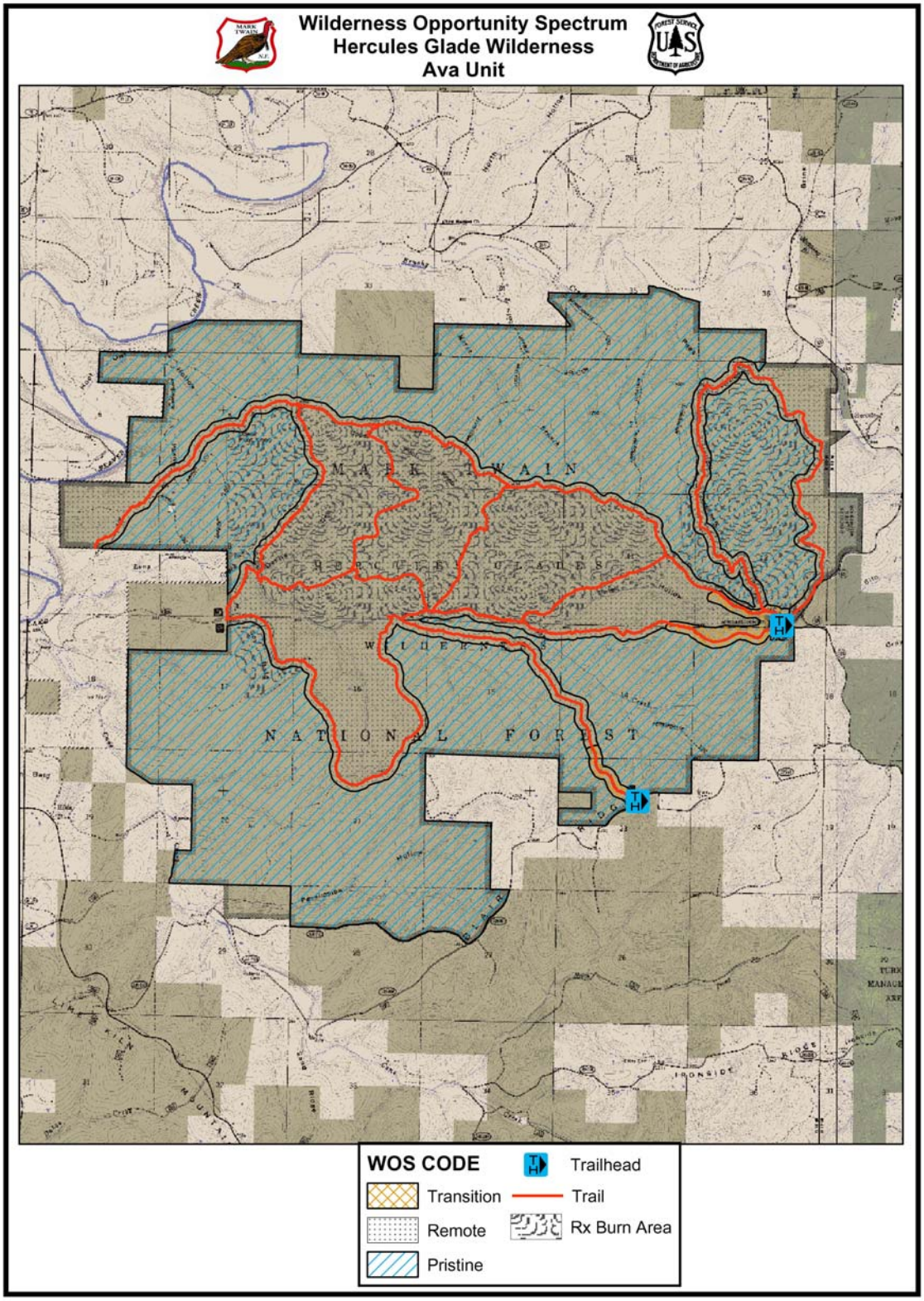
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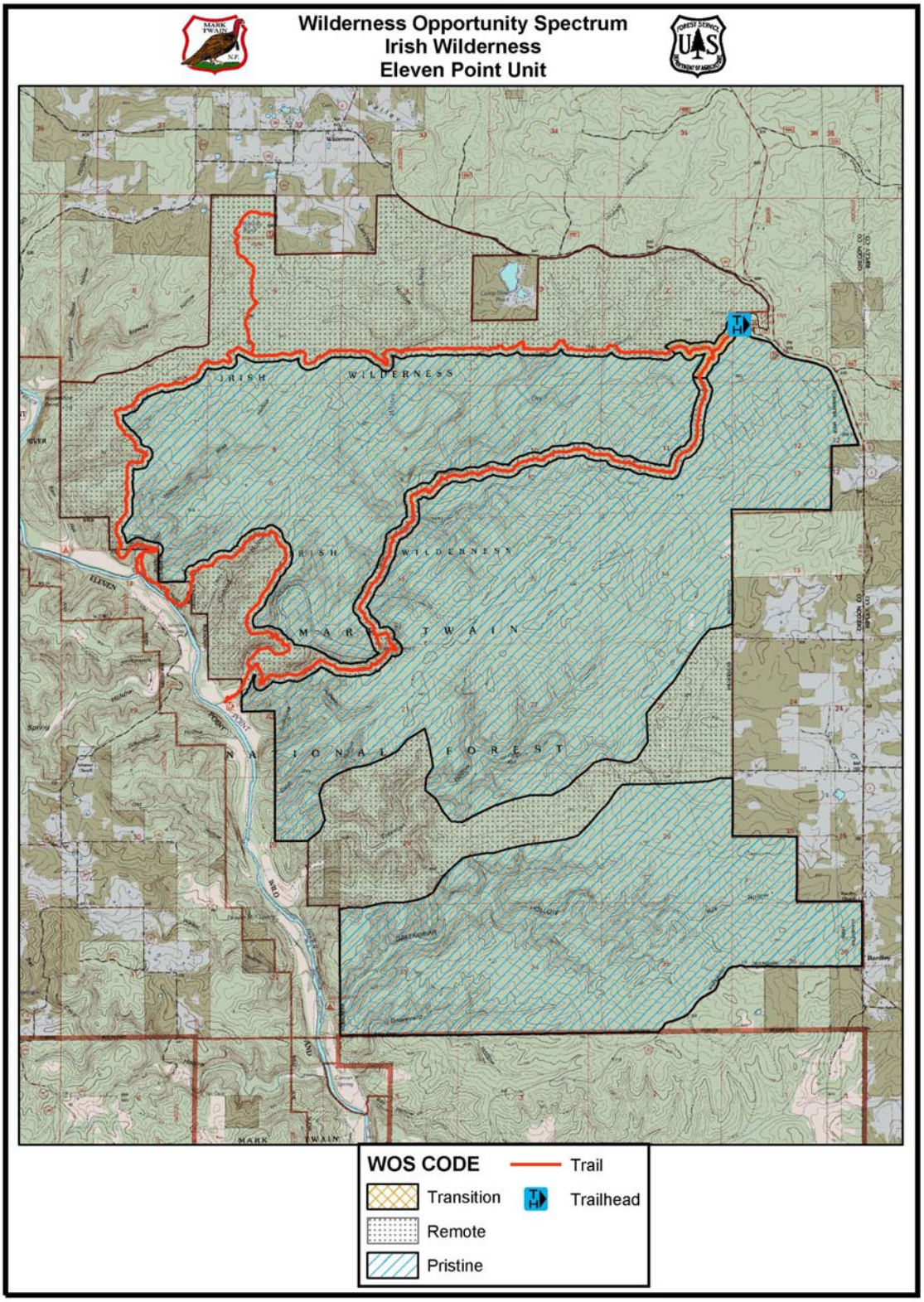
Wilderness Opportunity Spectrum
Irish Wilderness
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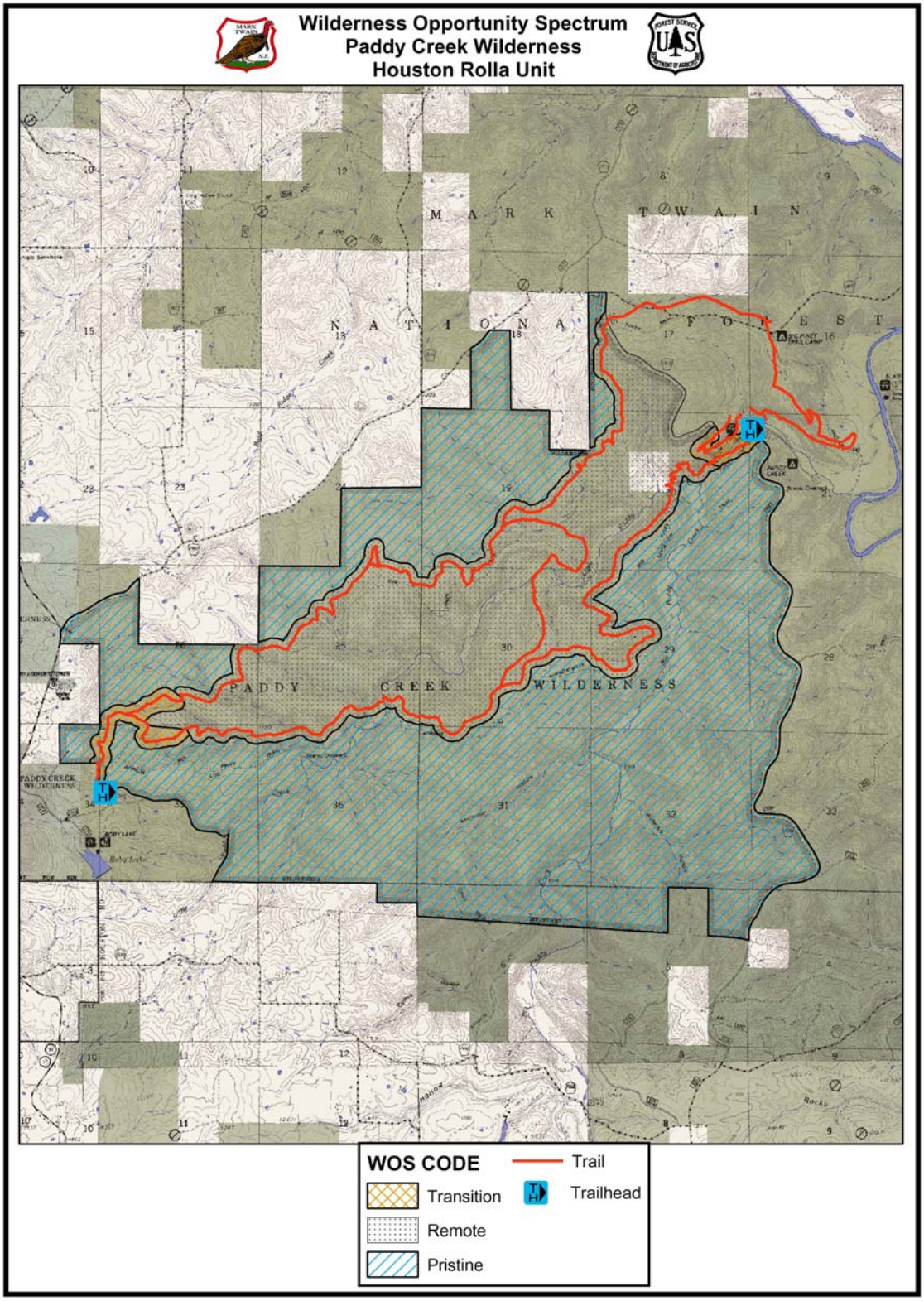
Trailhead


Wilderness Opportunity Spectrum
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Transition
Remote
Pristine
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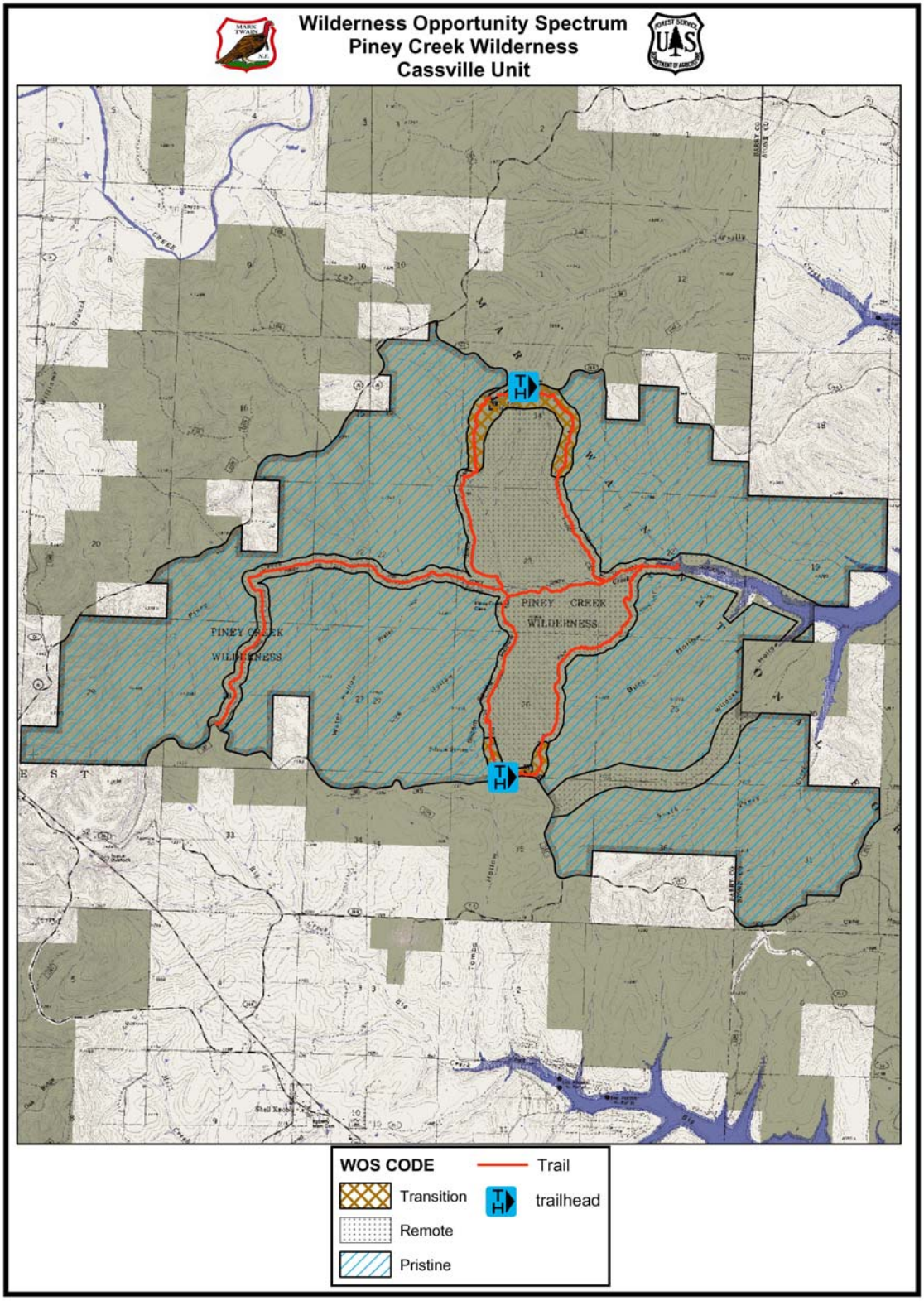
Wilderness Opportunity Spectrum
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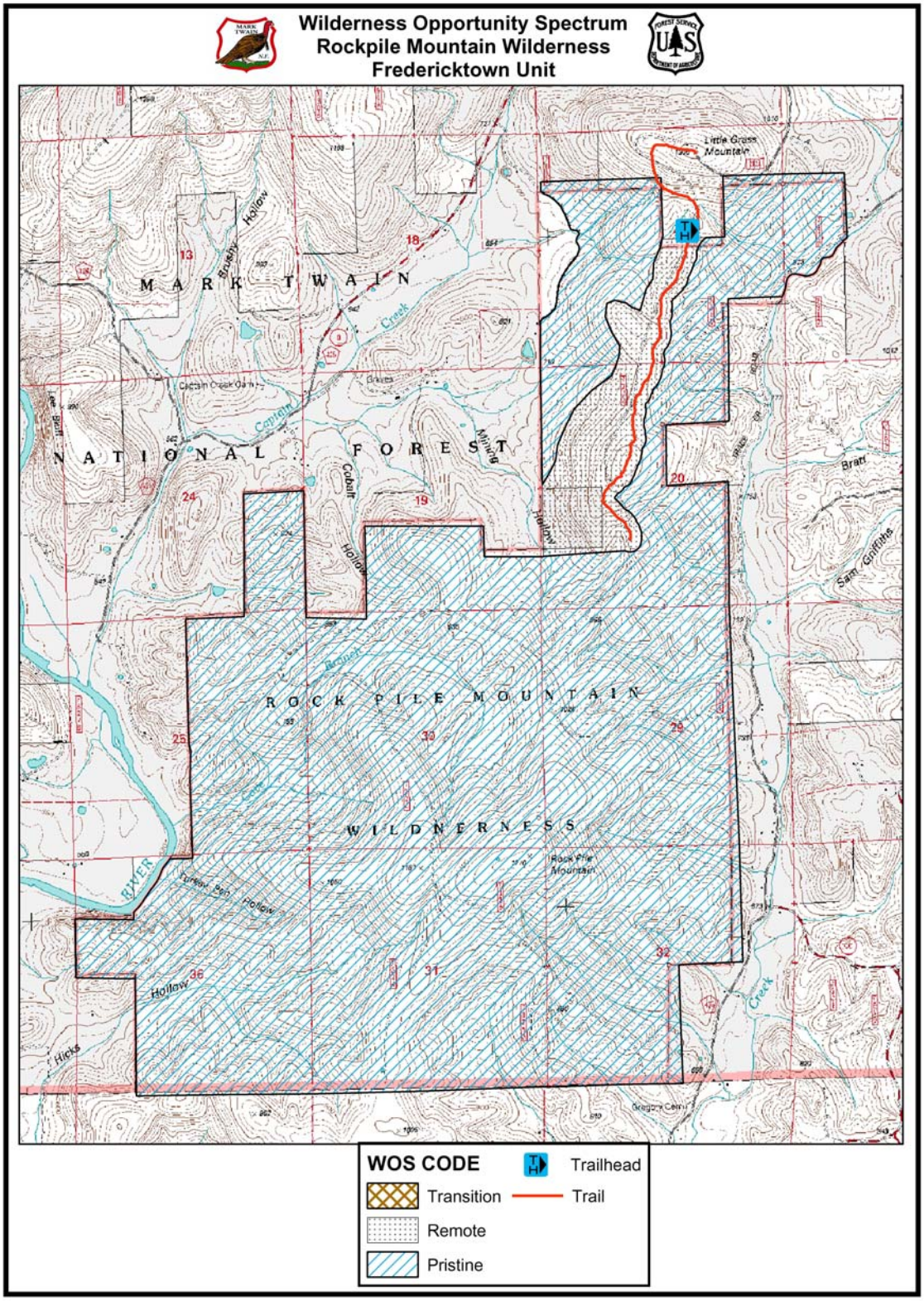

Wilderness Opportunity Spectrum
Rockpile Mountain Wilderness
Fredericktown Unit
MARK TWAIN
NATIONAL FOREST
ROCK PILE MOUNTAIN
WILDERNESS
Little Grass Mountain
Rock Pile Mountain
Captain Creek
Cobalt Hollow
Mining Hollow
Brushy Hollow
Turkey Den Hollow
Hicks Hollow
Sam Griffiths Creek
Brant Creek
Bruner Creek
13
18
19
20
24
25
29
30
31
32
36
WOS CODE
Transition
Remote
Pristine
Trailhead
Trail

Management Prescription 6.1
Semi-Primitive Non-Motorized ROS

Theme

This prescription features management of natural vegetative communities under limited investments to provide nonmotorized semi-primitive dispersed recreation.

Goals

Manage natural vegetative communities under limited investment.

Provide wildlife habitat diversity common to managed natural communities.

Provide dispersed recreation opportunities emphasizing Semi-Primitive Nonmotorized ROS objectives.

Provide for low to moderate production of other resources such as timber products, fish and wildlife, and forage where they do not substantially limit natural vegetative community management opportunities or dispersed semi-primitive non-motorized recreation objectives.

Desired Condition

These forest areas, normally 2,500 acres or larger, provide semi-primitive non-motorized recreation experiences, with emphasis on access by foot or horse trails.

There is no motorized vehicular access for recreational activities, and access for project activities is limited to temporary roads and skid trails. Existing roads not subject to existing rights or authorized exceptions are closed and allowed to revert to a natural condition.

Woody vegetation increases in abundance, age, and size across the landscape. Vegetation composition and structure for savannas, open woodlands and some glades may succeed to that which is different from their known historical condition, although their appearance may still look natural. (See Appendix A, Table A-2.)

Areas exhibiting old growth characteristics comprise 15% to 20% of each management area, and regeneration openings comprise 1% to 5% of each management area.

The natural-appearing setting has subtle modifications that could be noticed but would not draw the attention of an observer wandering through the area.

There are few, if any, facilities, structures, utility corridors, and developments.

Mineral activities are coordinated with other surface values.

Standards and Guidelines

Vegetation Management

Do not maintain existing vegetation communities that differ from the natural communities for a particular site (for example legumes, food plots, fescue pastures, or pine plantation).

Limit investments for vegetation management treatments to those necessary for restoration and/or maintenance of natural communities, or provides a specific resource output.

Terrestrial and Aquatic Habitat Management

Maintain existing waterholes.

Do not construct new waterholes within the of Swan Creek, Smith Creek, Van East Mountain, west Lower Rock Creek, Spring Creek, North Fork, and Big Springs Addition areas.

Distribute regeneration openings across the landscape proportionately to ELT's and natural communities present in the area. Sizes of openings should encompass the full range from ¼ to 15 acres.

Rangeland Management

Design natural grassland community management practices to enhance the visual, recreational, and wildlife values.

Invest only at low levels for grassland management.

Use livestock grazing only to maintain structural and/or species diversity on native grassland communities.

Recreation Management

Recreation Opportunities

Manage area to meet, as a minimum, semi-primitive non-motorized ROS objectives.

Recreation Management

Hold investment in recreation management to the minimum necessary to meet resource protection needs

Trails

Density for all types of trails should not exceed an average of 1.5 miles per square mile of National Forest System land. An exception is made for the Smith Creek Area, Cedar Creek Ranger District, where the trail density should not exceed an average of 2.4 miles per square mile of National Forest System land.

Motor vehicle trails are prohibited.

Visual Management

All resource management activities shall meet, as the minimum, the Visual Quality Objectives displayed below:

Table 3-7. Visual Quality Objectives for Management Prescription 6.1.

	Sensitivity Level and Distance Zone						
	Most Sensitive			Sensitive			Least Sensitive
Variety Class	fg1	mg1	bg1	fg2	mg2	bg2	3
Distinctive-Class A	R	R	R	PR	PR	PR	PR
Common-Class B	R	PR	PR	PR	M	M	MM
Minimal-Class C	PR	PR	M	M	M	MM	MM

Distance Zones: fg-foreground; mg-middleground; bg-background
VQO: R-Retention; PR-Partial Retention; M-Modification; MM-Maximum Modification

Timber Management

Harvesting

Schedule no more than 10% of an individual management area for timber harvest during each decade of the Plan period.

Salvage harvests are not subject to the 10% limit on timber harvest.

All lands within Swan Creek, Smith Creek, Van East Mountain, west Lower Rock Creek, Spring Creek, North Fork, and Big Springs Addition areas are classified as unsuitable for timber management.

If applying the uneven-aged system, use the group selection harvest method with openings ranging from 0.25 to 2 acres in size.

Improvement cuts may be made to achieve stand structure objectives when applying the uneven-aged silvicultural system.

Temporary Openings Created by the Application of Even-aged Silviculture

The maximum size of a temporary opening created by even-aged management is 15 acres.

Temporary openings are not permitted within 100 feet of a trail.

Management Intensity and Utilization

Emphasize achieving large stem size on lands managed under the uneven-aged silvicultural system.

Special Use Management

Permit facilities, structures, utility corridors, and developments only if subject to existing rights, or within existing sites or corridors.

Minerals

Mineral Exploration

Minimize excavation at drill sites.

Common Variety Minerals

Removal of common variety minerals should generally not be permitted.

Transportation System

Roads

Close and revegetate roads.

Permanent roads are prohibited except as follows:

- FR 516 (Loving Ridge Road) in Swan Creek to provide for high water access to adjacent private landowners. Open road to public use during modern firearm deer season.
- FR 498 to provide access to the Carroll Cemetery in the Spring Creek area.
- FR 2245 (Johnson Mountain Road). Gate road at the point it enters the 6.1 management area.

Manage National Forest System roads to meet the semi-primitive nonmotorized ROS criteria.

National forest system roads have a maintenance level no higher than 2. Limit road maintenance to those activities needed to prevent resource degradation within the area. Do not provide maintenance intended to provide for vehicle user comfort.

These roads should have limited access to protect the non-motorized setting.

Buildings and Structures

Buildings and structures should not normally be provided in support of resource management objectives.

Management Prescription 6.2
Semi-Primitive Motorized ROS

Theme

This prescription features the management of natural vegetative communities under limited investments to enhance the semi-primitive motorized dispersed recreation experience.

Goals

Manage natural vegetative communities and their successional stages under limited investment.

Provide wildlife habitat diversity common to managed natural communities.

Provide dispersed recreation opportunities emphasizing Semi-Primitive Motorized ROS objectives.

Provide for low to moderate production of other resources such as timber products, fish and wildlife, and forage where they do not limit natural vegetative community management opportunities or dispersed semi-primitive recreation objectives.

Desired Condition

These areas, normally 2,500 acres or larger, provide a semi-primitive motorized environment. Recreational opportunities provide for interaction between users ranging from low to moderate. There is limited motorized vehicular access for recreational activities.

Stand composition will somewhat reflect the character of historical natural communities with the landscape dominated by variable age tree species. The environment may be natural appearing, but structural characteristics of specific natural communities will be different than their known historical condition. (See Appendix A, Table A-2.)

Areas exhibiting old growth characteristics comprise 8 to 12% of each management area, and regeneration openings comprise 5% to 10 % of each management area.

The natural appearing setting has moderately dominant alterations, but these alterations do not draw the attention of motorized observers from trails or primitive roads.

Only those facilities, structures, utility corridors, and developments subject to existing rights are present.

Standards and Guidelines

Vegetation Management

Do not maintain existing vegetation communities, which differ from the natural communities for a particular site (for example legumes, food plots, fescue pastures, or pine plantation).

Limit investments for vegetation management treatments to those necessary for restoration and/or maintenance of natural communities, or provides a specific resource output.

Terrestrial and Aquatic Habitat Management

Distribute regeneration openings across the landscape proportionately to ELT's and natural communities present in the area. Sizes of openings should encompass the full range from ¼ to 15 acres.

Rangeland Management

Design natural grassland community management practices to enhance the visual, recreational, and wildlife values.

Invest only at low levels for grassland management.

Use livestock grazing only to maintain structural and/or species diversity on native grassland communities.

Recreation

Recreation Opportunities

Manage area to meet, as a minimum, semi-primitive motorized ROS objectives.

Recreation Management

Invest in recreation management only at minimum necessary to meet resource protection needs.

Trails

Density for all types of trails should not exceed an average of 1.5 miles per square mile of National Forest System land.

Visual Management

All resource management activities shall meet, as a minimum, the Visual Quality Objectives displayed below:

Table 3-8. Visual Quality Objective for Management Prescription 6.2

	Sensitivity Level and Distance Zone						
	Most Sensitive			Sensitive			Least Sensitive
Variety Class	fg1	mg1	bg1	fg2	mg2	bg2	3
Distinctive-Class A	R	R	R	PR	PR	PR	PR
Common-Class B	R	PR	PR	PR	M	M	MM
Minimal-Class C	PR	PR	M	M	M	MM	MM

Distance Zones: fg-foreground; mg-middleground; bg-background
VQO: R-Retention; PR-Partial Retention; M-Modification; MM-Maximum Modification

Timber Management

Harvesting

Prescribe no more than 20% of an individual management area for harvest during the 10 year Plan period.

Salvage harvests are not subject to the 20% limit on timber harvest.

Temporary Openings Created by the Application of Even-aged Silviculture

Limit the size a temporary opening created by even-aged management to a maximum of 15 acres.

Temporary openings must be a minimum of 100 feet from recreation trails.

Special Uses

Allow the use of National Forest System lands only when subject to existing rights, within existing sites or corridors, or when no other alternative is available.

Minerals

Mineral Exploration

Minimize excavation at drill sites.

Common Variety Minerals

Permit removal of common variety minerals only from isolated, visually screened locations.

Transportation System

Manage National Forest System roads to meet, as a minimum, the semi-primitive motorized ROS criteria.

Management Prescription 6.3
Candidate Wild, Scenic, Recreation Rivers

Theme

This prescription provides management for rivers identified as eligible for inclusion in the National Wild and Scenic Rivers System (NWSR).

Goals

Manage eligible rivers to maintain or enhance their outstandingly remarkable values, free-flowing character, and potential for recommended classification.

Desired Condition

Rivers eligible for National River status are managed under the provisions for National Scenic and Recreation River classification. The unique attributes of the eligible rivers are maintained or enhanced. Facility development is the minimum necessary to reach the objective and designed so as not to preclude the rivers eligibility. Evaluations of projects on, directly affecting or invading the corridors or diminishing the Outstandingly Remarkable Values of these river segments adhere to the guidance of the Interagency Wild and Scenic Rivers Coordination Council.

Standards and Guidelines

Scenic and Recreation Segments Classification

The management area boundaries for rivers in the 6.3 prescription are normally defined as National Forest System lands extending 0.25 mile in width from each bank of the river.

The following table lists those rivers located within the Forest boundaries that are identified as eligible for inclusion in the National Wild and Scenic Rivers System (NWSR), along with their best potential classification and outstandingly remarkable values by segment.

Table 3-9. Eligible Rivers located within forest boundaries.

River	Best Potential Classification	Segment	Segment Reach Description	Length (Miles)	Outstandingly Remarkable Values*
Gasconade	Scenic	1	State Highway O to Ozark Spring	66	S,R,G,F,W
Big Piney	Scenic	1	State Highway 17 Sec.31, T35N, R10W	52	S, R, G, F, W
	Scenic	3	North boundary of Ft. Leonard Wood to Sec.31, T36W, R10W	11	S, R, G, F, W
Black River	Recreation	1	Markham Springs recreation area to south district boundary	16	H, F
Huzzah Creek	Recreation	1	Entire length within Mark Twain N.F. boundary	28	H
North Fork of White River	Recreation	1	Mile Posts 18 to 30	12	F, W
St. Francis	Scenic	1	Entire length within Mark Twain N.F. boundary	17	S, R, G, H

**Outstandingly Remarkable Values: S=scenery (includes landform, vegetation, water features [color, type of flow, water quality), R= recreation (includes span of attraction [local, regional or national], water sports, exceptional interpretive opportunities) G=geology, F=fish, W=wildlife, P=prehistory, H=history, O=other e.g. botanical or ecological.*

Manage National Forest System lands associated with eligible river corridors to perpetuate their outstandingly remarkable values. Management activities may enhance conditions but must not degrade the present characteristics below the standards for the best potential classification as shown above.

Rivers not eligible for inclusion in the NWSR will continue to be managed as recreation segments in order to protect an outstanding or remarkable feature are Cedar Creek, Courtois Creek and the first eighteen miles of the North Fork of the White River (beginning at the district proclamation boundary).

Recreation Management

Recreation Opportunities – Scenic Segments

Manage area to meet, as a minimum, semi-primitive non-motorized ROS objectives.

Recreation Opportunities – Recreation Segments

Manage area to meet, as a minimum, roaded natural ROS objectives.

Recreation Management – Scenic Segments

Prohibit construction of major public use areas.

Prohibit substantial additions to existing improvements or structures.

Recreation Management – Recreation Segments

Provide recreation facilities as needed to protect the values of the river area and facilitate public use, in keeping with a natural setting.

Additions to existing improvements and structures are allowed.

Visual Management

Scenic Segments

Design management activities to meet, as a minimum, a Visual Quality Objective of Retention or Partial Retention to maintain current characteristic landscape.

Recreation Segments

Design management activities to meet, as a minimum, a visual Quality Objective of Retention or Partial Retention, with the exception of specific sites developed to accommodate public use, which shall not drop below a VQO of modification for the impacted area.

Timber Management

Scenic and Recreation Segments

These areas are not included in the suitable timber base.

Harvest no timber within the floodplain portion of the river corridor except as a tool to augment natural community restoration or for forest health.

Timber management must not detract from the outstandingly remarkable values of the river.

Use the uneven-aged silvicultural system for timber management within river corridors to the extent possible.

Timber management practices must not be visually apparent to over water travelers or users of developed facilities.

Confine management activities in the river corridor to the period of October 1 to March 31.

Special Uses Management

Scenic and Recreation Segments

Do not issue new special uses authorizing the construction of buildings or structures unless there is no reasonable alternative.

Modify existing permits to insure existing structures and improvements are maintained in a manner compatible with the river environment and the outstandingly remarkable values.

Allow redesign and reconstruction of existing special use buildings and structures only when needed to meet public safety objectives or protect resource needs.

Mineral Exploration

Scenic and Recreation Segments

Provide constraints on surface disturbing exploration (including core drilling) as needed to protect the outstandingly remarkable values of rivers.

Design mineral exploration activities so they are not visually apparent to over water travelers or users of developed facilities.

Confine mineral exploration activities to the period of October 1 to March 31.

Mineral Development

Scenic and Recreation Segments

Include a stipulation in mineral development leases to prohibit surface disturbance or occupancy for development and extraction of federally owned minerals.

Prohibit surface coal mining.

Water Storage and Transmission Management

Scenic and Recreation Segments

Allow no new dams, diversion works or other structures within portions of the waterway under National Forest jurisdiction.

Transportation System

Scenic and Recreation Segments

Construct and reconstruct roads and bridges only for uses that are permitted by the Wild and Scenic River Act, and as needed to meet public safety objectives and protect resources.

Limit road construction not associated with recreation development to temporary roads.

Avoid constructing temporary roads that parallel the river.

Scenic Segments

Manage National Forest System roads to meet, as a minimum, the semi-primitive motorized ROS criteria.

Management Prescription 7.1
Developed Recreation Areas

Theme

This prescription provides management for the following developed recreation areas: Council Bluff, Sutton Bluff, Big Bay, Shell Knob, Watercress, Markham Springs, Pinewoods, Cobb Ridge, Pine Ridge, Lane Spring, Marble Creek, Loggers Lake, and North Fork.

Goals

Emphasize recreation activities such as camping, picnicking, group activities, and other recreation opportunities.

Recognize existing recreation facilities and the future need to provide sites for highly developed recreation intended to serve various user groups.

Encourage development of interpretation and environmental education opportunities.

Desired Condition

Recreation areas have motorized access and a moderate to high level of developed recreation facilities and structures that may dominate the landscape. These areas have a substantially modified natural environment. Resources are modified and used primarily to enhance specific recreational activities and to maintain vegetative cover and prevent soil loss. Surrounding areas provide complementary recreation opportunities such as hiking, boating, fishing, and/or trail riding. These recreation areas are characterized by the Rural ROS classification.

The areas vary in size and ownership patterns. The recreation emphasis continues and the Forest meets public demand for a variety of developed recreation opportunities. Design buildings, materials, and placement of facilities to visually blend with the environment. Developed recreation facilities are safe for visitors and may be accessible to visitors with disabilities in accordance with Section 504 of the Rehabilitation Act of 1973 (Section 504). Areas remain open for use on a regular seasonal or year-round basis, as determined by Forest policy.

Cleaning, mowing, and other needed maintenance is done on a regular and frequent basis. Facilities that are worn or vandalized are replaced or rehabilitated as needed. Maintenance and rehabilitation are prompt and thorough.

Utility corridors and other special uses, if present, are compatible with the character of the area. The vegetation is managed to ensure that the safety and attractiveness of the area continues throughout the anticipated life of the development. Large numbers of users are present, human sights and sounds are evident, and a high degree of interaction between users is expected.

Interpretation emphasizes environmental education, heritage resources and National Forest management.

Depending upon the site and level of development, a wide variety of quality outdoor recreation activities compatible with the forested environment are available either in the developed area or immediately adjacent.

Standards and Guidelines

Public Involvement Programs

Provide orientation and informational signs, brochures, and maps as needed in recreation areas.

Vegetation Management

Manage vegetation as needed to meet wildlife viewing, recreation, safety, and visual quality objectives. Strive for mature trees with minimum risk for hazards or blow down.

Retain only healthy, sound trees, considering recreation benefits (shade, screening, etc) and safety of visitors.

Encourage a conifer component in hardwood ecosystems for diversity and color contrast. .

Landscaping projects in recreation areas may use a wide variety of plant materials, including non-native species, (providing these are not problematic invasives), although the use of native plants is preferred.

Water and Soil Resources Management

Reference Forest wide standards and guidelines for Recreation Management for additional direction related to activities in RMZ and WPZ

Environmental Management

Use pesticides only to reduce hazards to the public or to treat non-native invasive species.

Apply pesticides during periods of low visitor use when possible.

Rangeland Management

Design forage management practices (excluding grazing) to enhance recreation values and be compatible with the recreation use.

Recreation Management

Recreation Opportunities

Manage area to meet, as a minimum, rural ROS objectives.

Recreation Management

Locate recreational developments by giving priority to correcting health and safety problems, protecting the environment, complementing prescribed recreation opportunities, and meeting public demand.

Provide access control and greater visitor safety by designing developments with a single gated entry/exit road when possible.

Restrict public motor vehicle use to designated roads and trails, unless otherwise provided for by law, regulation, or special area management objectives for each area.

As much as possible, design sites to be pedestrian oriented, with pathway access from one facility to another as convenient as possible.

Temporarily close recreational developments when needed to allow for site rehabilitation.

Details of operation and maintenance work are found in area operation and maintenance plans.

Trails

Sign all trails to ensure customers are aware of the type of use allowed: foot travel, pack or stock, mountain bicycles, motorized use or other types of conveyance.

ATV/OHV Use

Prohibit ATV/OHV use in these areas, with the following exceptions:

- **Travel between designated ATV/OHV trails and developed campsites or parking areas,**
- **Administrative use, access by emergency vehicles or use authorized by permit of contract, or**
- **On designated motorized trails or in accordance with State or County law and regulations.**

Visual Management

Design resource management activities to visually blend with the environment.

Timber Management

This management area is not included in the timber base.

Allow commercial timber management activities only during off-season or when facilities are closed to public use.

Special Uses

Routinely permit only those facilities that are required to serve recreational or administrative needs. Consider exceptions on an individual basis. Encourage development of special uses that will enhance the availability of quality recreation opportunities within the area, in response to public service needs.

Minerals

Prohibit surface disturbing mineral activities.

Protect the character of the recreation sites by applying constraints on non-surface disturbing mineral activities. Consider hours of operation, season of operation, noise levels, protection of facilities, and public safety.

Public Health and Water Supply

Drinking water should normally be available at these sites during peak operating seasons.

Management Prescription 8.1
Designated "Special Areas" Other Than Wilderness

Theme

This prescription describes a variety of designated "special areas" other than Wilderness. They exist for the protection of unusual environmental, recreational, cultural, or historical resources, and for scientific or educational studies. New areas may be added to this prescription as they are evaluated.

Goals

Protect and appropriately manage areas of special scientific, biological, historical, ecological, geological, scenic, recreational, and educational significance.

Provide low to moderate production of other resources such as timber products, fish and wildlife, recreation, and forage where they are compatible with "special area" objective.

Maintain or enhance the outstandingly remarkable values within the Eleven Point National Scenic River. The outstandingly remarkable values include scenic (water features, landforms, and vegetation), recreation (national attraction, water sports), fishing, wildlife, prehistoric and historic resources, and geology.

Provide a variety of recreational opportunities with interactions between users ranging from low to high depending on the specific locations and ROS objectives.

Desired Condition

Officially classified areas of exceptional ecological, geological or other features of scientific, educational, scenic, or historical values (other than Wilderness) are protected. Such areas include designated Experimental Forests, Research Natural Areas, State Natural Areas, Heritage Resource Areas, National Trails, National Rivers, National Forest Scenic Byways, the Greer Spring Special Management Area, and other Forest Special Areas identified as having unique significance.

Vegetation management varies based on the specific management objective for each area. Management activities, facility development or motorized use are present only if compatible with area objectives. Interaction between users varies from high to low, based on the area objectives. Mineral activities requiring surface disruption do not normally occur.

Timber program outputs are low. The Sinkin Experimental Forest may provide some timber outputs.

Standards and Guidelines for All Areas in Management Prescription 8.1

These standards and guidelines apply to all areas in Management Prescription 8.1. They are followed by additional standards and guidelines specific to individual areas.

Vegetation Management

Manipulate vegetation to meet the intent of the law, order, or agreement designating the area.

Terrestrial and Aquatic Habitat Management

Limit habitat manipulation to restoration or enhancement of natural communities or the needs of threatened, endangered, rare or sensitive species and species of conservation concern.

Rangeland Management

Normally do not allow rangeland management on these areas due to their unique or special significance.

Special Areas

Areas having national recognition as of January 2005, other than Wildernesses, are:

Table 3-10. Areas with National recognition and designation.

Designation	Area	Unit
National Forest Scenic Byways	Blue Buck Knob	Willow Springs
	Glade Top Trail	Ava
	Sugar Camp	Cassville
National Recreation Trails	Berryman Trail	Potosi
	Crane Lake Trail	Fredericktown
	Ridge Runner Trail	Willow Springs
	*Ozark Trail	Multiple*
National Register of Historic Places	Decker Cave	Rolla
	Nova Scotia	Salem
	*Greer Mill	Eleven Point*
National Scenic River	Eleven Point River	Eleven Point
National Natural Landmark	Cupola Pond (also State Natural Area)	Doniphan
	Greer Spring (also Special Management Area)	Eleven Point
Society of American Foresters Natural Area (Open Glade)	Hayden Bald	Ava

Specific standards and guidelines for each of these nationally recognized areas are provided in this management prescription.

Table 3-11. State Natural Areas as of July **2012.**

Area	Unit
Bald Hill	Doniphan
Big Barren Creek	Doniphan
Blair Creek Raised Fen	Salem
Brushy Pond	Eleven Point
Butler Hollow Glades	Cassville
Carman Springs	Willow Springs
Coward's Hollow	Doniphan
Cupola Pond	Doniphan
Grasshopper Hollow Fen	Salem
Haney Pond	Doniphan
Hayden Bald	Ava
Marg Pond	Eleven Point
Mud Creek	Poplar Bluff
Overcup Oak Sink	Eleven Point
Red Maple Pond	Doniphan
Solomon Hollow Glades	Rolla
Tunnel Bluff Woods	Doniphan
Tupelo Gum Pond	Eleven Point
Wells Branch Fen	Doniphan
**Western Star Flatwoods	Houston/Rolla**

Coordinate selection of additional State natural areas with the Missouri Natural Areas Committee based on selection criteria, site design quality, geographic representation, and management needs.

Standards, guidelines, and management area objectives for each officially designated State Natural Area on the MTNF should normally be developed as part of the natural area nomination and are part of Forest Plan designation.

Specific management objectives and/or recommendations included in the natural area nomination take precedence over the general Management Prescription 8.1 direction.

Place and maintain signs at major points of public entry as needed, and where appropriate to delineate natural area boundaries.

Forest Special Areas are recognized as having unique features, but do not have national and State recognition. Emphasize protection and maintenance of the unique characteristics of the site in the management of these areas.

Set the management area boundary for sinkholes designated as 8.1 at least 50 feet to the outside of the crest or divide of the surface drainage basin of the sinkhole or complex of sinkholes.

Table 3-12. Forest Special Areas as of January, 2005

Area	Unit
Fens	
Bidwell Creek Bog	Fredericktown
Kaintuck Hollow Fen	Rolla
Mayfield Spring Wet Meadow	Houston
Medley Hollow Hanging Fen	Salem
Barton Fen	Potosi
Bates Hollow Fen	Salem
Blue Flag Fen	Eleven Point
Clear Creek Fen	Potosi
Swamp Hollow Fen	Salem
Wash Creek Alder Bog Fen	Fredericktown
Wet Hollow Fen	Salem
Sinkholes and Sinkhole Ponds	
Bear Pond	Eleven Point
Camp Eight Pond	Eleven Point
Charcoal Pond	Eleven Point
Dammed Sinkhole Pond	Eleven Point
Flat Pond	Eleven Point
Fox Pond	Eleven Point
FS Road 4147 sinkhole	Eleven Point
Grassy Pond	Eleven Point
Hwy C Sinkhole Pond	Eleven Point
King Sink	Rolla
McCormack Pond	Eleven Point
Mud Pond	Eleven Point
Old Kehres Pond	Eleven Point
Oldham Pond	Eleven Point
Otter Creek Ponds	Poplar Bluff

Table 3-12. Forest Special Areas as of January, 2005

Area	Unit
Pin Oak Pond	Eleven Point
Pine Pond	Eleven Point
Polecat Pond	Eleven Point
Tan Bark Pond	Eleven Point
Twin Ponds	Poplar Bluff
Victory Pond	Poplar Bluff
Whitten Church Pond	Eleven Point
Young Hollow	Eleven Point
Slaughter Sink	Rolla
The Gulf	Poplar Bluff
Other Special Areas	
Lower Current River	Eleven Point
Irish Wilderness Excluded Lands	Eleven Point
Recommended Wilderness Additions	Ava, Cassville, Rolla/Houston, Potosi, Fredericktown
Galloway Spring	Willow Springs
Indian Creek	Willow Springs
Natural Bridge	Rolla
Twin Sink Hollows	Willow Springs
Turtle Flatwoods	Salem
Pump Hollow	Poplar Bluff

Recreation Management

Recreation Opportunities

Unless otherwise stated, manage for, as a minimum, roaded natural ROS objectives within these areas.

Recreation Management

Keep investment in recreation facilities to the minimum necessary to protect the site, to meet development objectives, and to meet ROS classification objectives.

Trails

Trails must be consistent with the special area management objectives.

Visual Management

Provide for the protection of the unique visual qualities of each special area, consistent with the area's management objectives and the law, order or agreement of designation.

Unless modified by specific standards and guidelines for individual special areas, the Visual Quality Objectives are as follows:

Table 3-13. Visual Quality Objectives for Management Prescription 8.1.

Type of Area	Visual Quality Objective
National Designation	As defined by specific standards and guidelines.
State Natural Areas	Retention
Forest Special Areas	Retention
Lands Excluded from Irish Wilderness.	Retention
Sinkin Experimental Forest	Use VQOs as specified for Management Prescription 2.1.
National Forest Scenic Byways	Retention
Recommended Wilderness Additions	Retention

Timber Management

Normally do not schedule timber harvest in these areas; however, silvicultural methods may be appropriate in individual areas to restore or maintain desired ecological conditions or to meet law, order or agreement

Special Uses Management

Normally, do not authorize special uses.

Minerals

Normally do not allow surface disturbing mineral activities.

Common Variety Minerals

Do not permit removal of common variety minerals from any area.

Research

As of January 2005, there is no designated Research Natural Areas (RNA) on the Forest.

The North Central Research Station guides management of the Sinkin Experimental Forest. The Forest will continue the same cooperative role with North Central Forest Experiment Station in carrying out research projects on the 4,127 acres within the Sinkin Experimental Forest.

Land Ownership

The purchase of adjoining lands from willing sellers will be a high priority if needed to protect or enhance a “special area.”

Buildings and Structures

Limit buildings and structures within special area boundaries to those needed to support management objectives.

Standards and Guidelines Specific to the Eleven Point National Scenic River

A National Scenic River extending 44.4 miles in length on the Eleven Point River within the Eleven Point Ranger District. (Public Law 90-542).

Maintain or enhance the outstandingly remarkable values within the Eleven Point National Scenic River. The outstandingly remarkable values include scenic (water features, landforms, and vegetation), recreation (national attraction, water sports), fishing, wildlife, prehistoric and historic resources, and geology.

Terrestrial and Aquatic Habitat Management

Normally do not manipulate vegetation within the Eleven Point National Scenic River corridor for wildlife habitat purposes, except to perpetuate unique natural ecosystems or manage habitats for threatened, endangered, sensitive species, or species of concern.

Rangeland Management

National Forest System lands in The Eleven Point National Scenic River corridor shall not be managed for rangeland forage production.

Recreation Management

Recreation Opportunities

Manage area to meet, as a minimum, semi-primitive non-motorized ROS objectives in the terrestrial portion of the river corridor, except at developed motor vehicle facilities, which will be managed under semi-primitive motorized, roaded natural or rural ROS objectives, as determined by their development level. (See Table 3-14)

Manage for, as a minimum, semi-primitive motorized ROS objectives in the water travel zone of the river corridor.

Recreation Management

See also Forestwide standards and guides for recreation in RMZs.

Limit visitor use control, if needed, to restrictions on the timing of entry at specific access locations during peak use periods only.

Encourage visitor use at lesser used access points, particularly in peak use periods.

Provide vehicle access to the river at the following locations: Thomasville (FR3284), Cane Bluff (FR3189), Boom Hole (FR3155B), Greer Crossing (FR3188), Turner Mill North (FR3190), Turner Mill South (CR127), McDowell (FR4813), Whitten Church (FR4144), Riverton East (FR3285), and Highway 142 (FR3249). (See Regional Forester closure order, August 29, 1983.) Also provide vehicle access at Long Hollow (CR413), according to the Greer Spring Acquisition and Protection Act of 1991.

Use the following objectives for development level, ROS, and commercial use by outfitters when managing these vehicle access points.

Table 3-14. Objectives for development level, ROS, and commercial use by outfitters.

Access Point/Road	Recreation Development Level	ROS	Commercial Use
Thomasville/FR3284	3	Roaded Natural	Yes
Cane Bluff/FR3189	3	Roaded Natural	Yes
Boom Hole/FR3155B	2	Semi-Primitive Motorized	No
Greer/FR3188	4	Rural	Yes
Turner Mill North/FR3190	2	Semi-Primitive Motorized	No
Turner Mill South/CR127	3	Roaded Natural	Yes
McDowell/FR4813	2	Semi-Primitive Motorized	No
Whitten Church/FR4144	2	Semi-Primitive Motorized	Yes
Riverton East/FR3285	4	Rural	Yes
Highway 142/FR3249	4	Rural	Yes
Long Hollow/CR413	2	Semi-Primitive Motorized	No

Manage the Boom Hole (FR3155B), Turner Mill North (FR3190), McDowell (FR4813), and Long Hollow (CR413) accesses to encourage use by those wishing to avoid high user densities.

Keep facilities design to the minimum needed to protect the site and provide user needs at the least cost.

Design motor vehicle access points to provide vehicle parking in a manner that protects the river bank, screens the vehicle from the view of river travelers, facilitates authorized uses, and discourages tailgate camping.

Allow dispersed camping on National Forest System lands throughout the river corridor, except within areas associated with motor vehicle access sites or where use would damage a specific site.

Public camping is not allowed on private lands covered by scenic easement.

If existing float camps are retained, allow them decline to the criteria for Semi-Primitive Motorized ROS classification (Development Level 1.)

Do not develop new float camps.

Provide sanitation facilities within the river corridor only when needed for environmental protection.

Manage vegetation in the riverbank zone as needed to assist in meeting dispersed use objectives. This may include measures to protect or prevent use in environmentally sensitive sites or to facilitate use of acceptable sites.

Allow horse use outside of developed areas. Do not develop special horse use facilities in the river zone.

Keep signing to the minimum needed for user safety and area identification.

Prohibit any motorized vessel equipped with other than an outboard or electric motor.

Prohibit motorboats in excess of 25 horsepower (HP) or modified motors in excess of 25 HP as established by manufacturers rating.

Trails

Limit terrestrial trails within the Eleven Point National Scenic River corridor to non-motorized trails.

Limit use of the Greer Spring Trail to foot travel only.

Interpretive Services

Keep investments in site-specific interpretation to the minimum necessary to accomplish management prescription objectives.

Limit site interpretation to situations of high use or to protect the specific site.

Visual Quality

The portion of this special area within sight of access roads, developed sites, and water travelways are classed Sensitivity Level One Travelways.

Apply the Visual Quality Objective matrix for Management Prescription 6.2 – Variety Class A, to the entire river corridor.

Timber Management

These areas are not included in the suitable timber base.

Implement timber management practices on National Forest System lands within the Eleven Point National Scenic River corridor only if needed for public safety, to enhance the outstandingly remarkable values, or for salvage which does not detract from river management objectives.

Special Uses Management

Limit special use permits to canoe outfitter/guide permits.

Do not grant canoe outfitter permits for the use of Boomhole, McDowell, Turner Mill North, or Long Hollow access points.

Minerals

Permit mineral exploration within the Eleven Point National Scenic River corridor only if outside the area readily apparent to users of access roads, developed sites and over-water travel.

The 2,796 acres within the Scenic River Area corridor resulting from the Greer Spring Acquisition and Protection Act of 1991 is withdrawn by this Act from location, entry, and patent under the mining laws of the United States, and from the operation of the mineral and geothermal leasing laws of the United States.

Prohibit exploration operations on weekends or holidays from March 1 through the Thanksgiving Day weekend.

Minimize excavation at drill sites.

Prohibit drilling on slopes greater than 20%.

Use existing openings when available. Allow cutting of brush and trees up to five inches diameter breast height. Cut stumps flush with the ground.

Landownership

An occupancy use reservation of 110 acres is reserved by Louis S. Dennig, Jr. and Marie Dennig Gildehouse and their descendents for a term ending 5/2/2013. (See warranty deed to the United States dated January 12, 1993, Book 289, page 70, Oregon County records.)

Public Health and Water Supply

Provide drinking water only at Greer Campground.

Transportation System

Restrict public motorized access to the designated routes within the National Scenic River Area, as listed in the Regional Forester's Closure Order of August 29, 1983, and the Greer Spring Acquisition and Protection Act of 1991.

Regional Forester's Closure Order

The following roads are designated for public motor access:

Thomasville (FR3284), Cane Bluff (FR3189), Boom Hole (FR3155B), Greer Crossing (FR3188), Turner Mill North (FR3190), Turner Mill South (CR127), McDowell (FR4813), Whitten Church (FR4144), Riverton East (FR3285), and Highway 142 (FR3249).

Greer Springs Acquisition:

Terminate Oregon CR 413 (located on the west side of State Highway 19) at a point that is not visible from the Eleven Point River.

Terminate FR 4149 (2.7 miles) (located on the east side of State Highway 19) at the wild and scenic river boundary NS 4149.

Standards and Guidelines Specific to Decker Cave

Listed on National Register of Historic Landmarks as a National Archaeological Site of 82 acres located on the Rolla Ranger District.

Rangeland Management

Prohibit rangeland management.

Recreation Management

Recreation Opportunities

Manage area to meet, as a minimum, semi-primitive non-motorized ROS objectives.

Heritage Resources

A minimum of four documented visits during different seasons of the year will be made to determine that no vandalism, unauthorized digging or collecting is being done.

Only the minimum number of signs necessary showing the area classification will be erected and maintained.

Visual Quality

Manage this area to meet, as a minimum, the VQO of Retention.

Timber Management

Prohibit timber management.

Standards and Guidelines Specific to Cupola Pond

A National Natural Landmark, SAF Natural Area and Missouri Natural Area of 160 acres located on the Doniphan Ranger District.

Rangeland Management

Prohibit Rangeland management.

Recreation Management

Recreation Opportunities

Manage area to meet, as a minimum, roaded natural ROS objectives

Recreation Management

Erect and maintain only the number of signs necessary to show the area classification.

Regulate visitor use if needed to protect this site from overuse or botanical collecting.

Visual Quality

Manage this site to meet, as a minimum, a VQO of Retention.

Timber Management

Prohibit timber management.

Standards and Guidelines Specific to National Recreation Trails

The following are National Recreation Trails:

Table 3-15. National recreation trails.

Trail	Miles	District
Ridge Runner Trail	38	Willow Springs
Berryman Trail	24	Potosi Fredericktown
Crane Lake Trail	5	Across All Districts*
*Ozark Trail	342	

Recreation Management

Recreation Opportunities

Manage to meet, as a minimum, semi-primitive non-motorized ROS objectives within the trail corridor.

Recreation Management

Limit trailhead and parking area development to those currently established.

Prohibit campfires within 100 feet of the edge of the trail clearing.

Prohibit development of new facilities along trails.

Prohibit overnight camping at the Crane Lake recreation site.

Do not charge user fees for trail use.

Trails

Prohibit motor vehicle use.

"No Motor Vehicles" signs should be posted and maintained on the trail at every intersection with a system road open to the public.

Maintain trails to a level that complies with ROS objectives and provides for year around use.

Trails must not coincide with any road except where they intersect.

Assurance markers should be maintained.

Visual Quality

Manage the National trails as Sensitivity 1 Travelways.

Timber Management

Limit logging activity to leaf off periods within the near foreground.

Locate log decking areas so they are not visible from the trail.

Do not use trail as a skid trail or temporary logging road. Provide at least 600 feet between skid trails crossing the hiking trail, except where topography requires occasional approval of closer skid trails.

Prohibit vehicles within the trail clearing except at approved trail crossings.

Leave flowering and colorful vegetation species within the near foreground zone.

Where feasible, place paint marks used for identification of project work on the side of the tree away from the trail so marks are not visible from the trail.

Standards and Guidelines Specific to Hayden Bald

A Society of American Foresters Natural Area and Missouri Natural Area of 40 acres located on the Ava Ranger District.

Vegetation Management

Burn the site every 4 to 6 years.

Maintain fence on all four sides of the site.

Recreation Management

Recreation Opportunities

Manage area to meet, as a minimum, semi-primitive non-motorized ROS objectives.

Recreation Management

Limit access to foot travel.

Visual Quality

Manage area to meet, as a minimum, a VQO of Partial Retention.

Standards and Guidelines Specific to the Lower Current River Special Area

Total River Length - 16 miles

Certain National Forest System lands (NFSL) in proximity to that portion of the Current River bounded on the north by the Ozark National Scenic Riverway and on the south by Doniphan, Missouri, are classified as a Forest Special Area. The management objective for selected National Forest lands along the 16-mile stretch of river is to protect and enhance the recreation experience of river users. Those lands include National Forest lands immediately adjacent to the river (approximately one-quarter mile back from either bank) and those more distant areas readily seen by river travelers.

Terrestrial and Aquatic Habitat Management

Do not manipulate vegetation for wildlife habitat purposes, except to perpetuate unique natural ecosystems or manage habitats for threatened or endangered species or species of concern.

Rangeland Management

Permit grazing only on existing grazing allotments. No new allotments are allowed.

Recreation Management

Recreation management takes precedence over other management activities.

Recreation Opportunities

Manage area to meet, as a minimum, semi-primitive motorized ROS objectives, except within the boundaries of developed recreation sites.

Manage each developed recreation area under the ROS class appropriate for the development level assigned, as show below:

Table 3-16. Recreation area, development level, and ROS.

Recreation Area/Road	Development Level	ROS
Float Camp/FR 3210	3	Roaded Natural
Deer Leap/ FR 4349	3	Roaded Natural
Bay Nothing/FR 3140	2	Semi-Primitive Motorized

Recreation Management

Hold investment in recreation facilities to the minimum necessary to protect the site and meet ROS classification objectives.

Visual Management

Use the Visual Quality Objective Matrix for Management Prescription 6.2 - Variety Class A, Sensitivity Level One Travelways, for the portion of this special area within sight of access roads, developed sites and water travel. Apply the same matrix to other lands within this area, based on applicable sensitivity level.

Timber Management

This area is not included in the suitable timber base.

Prohibit timber management practices except as necessary for public safety, response to special wildlife habitat needs, to enhance visual resources, or salvage.

Special Uses Management

Limit special use permits to canoe and tube outfitters and special river oriented events whenever possible.

Minerals

Prohibit mineral exploration within the area readily apparent to users of access roads, developed sites and over water travel.

Prohibit operations on weekends or holidays from March 1 through the Thanksgiving Day weekend.

Minimize excavation at drill sites.

Prohibit drilling on slopes greater than 20%.

Public Health and Water Supply

Provide drinking water only at Float Camp campground and picnic area and Deer Leap campground.

Standards and Guidelines Specific to the Greer Spring Special Management Area

An area of approximately 4,098 acres established by the Greer Spring Acquisition and Protection Act of 1991 (P.L. 102-220.)

Manage this area in accordance with the Act and with provisions of law generally applicable to units of the National Forest System to the extent consistent with the Act.

Recreation

Recreation Opportunities

Manage area to meet, as a minimum, semi-primitive motorized ROS objectives.

Recreation Management

Allow hunting and fishing in accordance with applicable Federal and State law.

Provide foot access to Greer Spring from a location along State Highway 19 in a manner that conforms to and lies lightly upon the natural terrain, environment, vegetation and soil. To the extent practicable, maintain the path in an unsurfaced condition.

Timber Management

Allow the harvesting of timber only to control insects or disease, for public safety, for salvage sales, or to accomplish the objectives of the special management area, which are to provide for public outdoor recreation, to protect the natural, archaeological and scenic resources, and to provide for appropriate resource management.

To the extent practicable, conduct timber harvesting only by the individual tree selection method.

Minerals

Lands within the special management area are withdrawn by the establishing legislation from location, entry, and patent under the mining laws of the United States, and from the operation of the mineral and geothermal leasing laws of the United States.

Transportation System

Construct and maintain only those roads that are indicated on the map entitled "Dennig Property," as a part of the Act.

Terminate Oregon CR 413 (located on the west side of State Highway 19) at a point that is not visible from the Eleven Point River.

Terminate FR 4149 (2.7 miles) (located on the east side of State Highway 19) at the wild and scenic river boundary NS 4149.

Provide access to such roads (as shown on the "Dennig Property" map), or to timber harvesting in such a manner as to minimize environmental impact.

Maintain roads to a minimum standard necessary to allow passage of two-wheel- drive vehicles, except under exceptional weather conditions.

Standards and Guidelines Specific to National Forest Scenic Byways

Routes designated as scenic byways by the Chief of the Forest Service are covered under this management prescription. The primary objective for these routes is to enhance and protect the scenic condition along the near foreground and to regulate visual effect of some management activities beyond this buffer. A secondary objective is to interpret management activities within adjoining management prescriptions.

Table 3-17. National Forest Scenic Byways

Byway	Length	Segment	Unit	Jurisdiction	Date Designated
Blue Buck Knob	24.0	Begins at District boundary on State Highway 181, then on to State Route AP to its junction with State Highway 14.	Willow Springs	Missouri Highway and Transportation Department	12/21/92
Glade Top Trail	23.0	Begins at District boundary on FR 150 to junction with State Highway 125; On FR 147 from junction with FR 150 to junction with State Highway 95.	Ava	Mark Twain National Forest	7/14/89
Sugar Camp	28.1	Begins at District Boundary on State Highway 86 to junction with FR 197 on to junction with State Highway 112, then north on to District Boundary.	Cassville	Missouri Highway and Transportation Department and Mark Twain National Forest	11/3/95

Activities related to recreation, scenic quality, heritage resources travel and tourism will take priority within and adjacent to these routes. Other resource activities should enhance rather than detract from recreation or visual management.

Standards and Guidelines Specific to the Irish Wilderness Excluded Lands

An area on the Doniphan Ranger District of approximately 1,220acres set aside by Congress from the Irish Wilderness to permit mineral exploration. (Irish Wilderness Act of 1984, P.L. 98-289.)

Apply Management Prescription 5.1 Wilderness standards and guidelines common to the Irish Wilderness to this acreage except as modified for mineral exploration and development.

Visual Quality

Manage this area to meet, as a minimum, a VQO of Retention.

Minerals

Permit surface disturbing exploration (including core drilling) on this acreage under Management Area 8.1 and Forest-wide mineral exploration standards and guides with the following modifications:

- **Remove all cut vegetation to a designated area, or lop and scatter to a depth of no more than 18 inches.**
- **Cut stumps flush with the ground.**
- **Prohibit operations on weekends or holidays from March 1 through the Thanksgiving Day weekend.**
- **Allow drilling and associated activities and equipment only within the confines of the existing roads to the extent possible.**
- Upon the discovery of favorable geology in a core sample, the District Ranger may authorize, on a hole-by-hole basis, drilling at an off-road site when dictated by geologic formations to prove up the discovery.
- **Minimize excavation at drill sites.**
- **Prohibit exploratory drilling on slopes greater than 20 percent.**
- **Limit road rutting to a maximum depth of 4". Reclaim roads to an acceptable condition as soon as they serve their purpose.**
- **Limit the number of drill sites in use at any one time to no more than 6 drill sites per permit.**

Standards and Guidelines Specific to Recommended Wilderness Additions

Parcels of lands have been acquired since the designation of five Wilderness areas within the Mark Twain National Forest. These parcels were part of the Forest Roadless Area Inventory and are proposed additions to the following Wilderness Areas.

Table 3-18. Proposed additions to Wilderness Areas.

Wilderness	Parcel Number	Acres	Unit
Bell Mountain	950501	200	Potosi
	950502	10	
	950503	20	
Hercules Glade	952101	40	Ava
	952102	20	
	952103	20	
Paddy Creek	950301	40	Rolla/Houston
	950302	160	
Piney Creek	952104	20	Cassville
Rock Pile Mountain	950504	40	Fredericktown
	950505	80	
Total	11 parcels	650	

In addition, the Lands Excluded from the Irish Wilderness, totaling 1,220 acres will also be recommended to remove the exclusion for minerals exploration.

Apply Management Prescription 5.1 Wilderness standards and guidelines to these acreages, until recommendation process is completed.

Chapter 4

Monitoring and Evaluation

Cover photo: Controlled burn on Mark Twain National Forest, USDA Forest Service

Mark Twain National Forest photo on file

Chapter 4

Monitoring and Evaluation

Introduction

Monitoring and evaluation are separate, sequential activities required by National Forest Management Act (NFMA) regulations. Monitoring involves collecting data by observation or measurement. Evaluation involves analyzing and interpreting monitoring data. The information gained from monitoring and evaluation is used to determine how well the desired conditions, goals, objectives, and outcomes of the Forest Plan have been met. Monitoring and evaluation form the basis for continuous improvement of the plan, and provide the feedback mechanism for adaptive management. (Fig. 4-1). The results of monitoring and evaluation are used to identify when changes are needed to either the Forest Plan itself or the way it is implemented, and helps ensure the Forest Plan is kept up-to-date and responsive to changing conditions and issues.

The plan monitoring program sets out the plan monitoring questions and associated indicators. Monitoring questions and associated indicators are designed to inform the management of resources on the plan area, including by testing relevant assumptions, tracking relevant changes, and measuring management effectiveness and progress toward achieving or maintaining the plan's desired conditions or objectives.

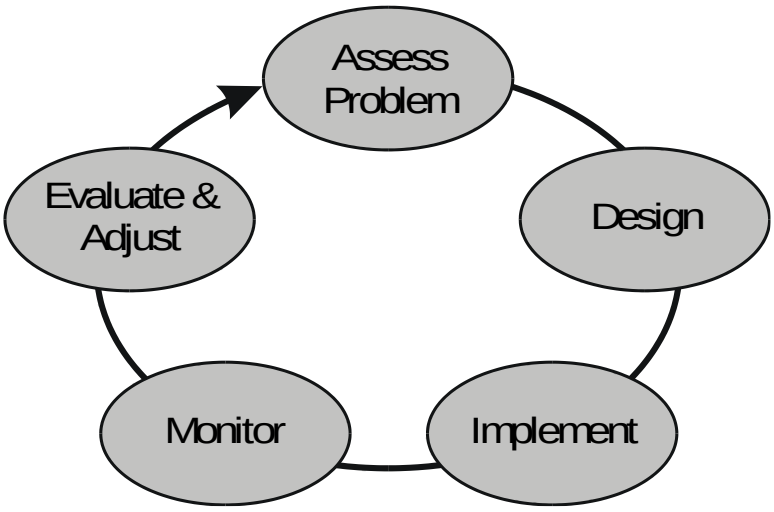


Figure 4-1. Evaluation and monitoring provide the feedback mechanism for adaptive forest management.

Monitoring Requirements

The 2012 Planning Rule (36 CFR 219.12) requires the monitoring program to address the following eight resource items with at least one monitoring question and associated indicator(s):

- The status of select watershed conditions.
- The status of select ecological conditions including key characteristics of terrestrial and aquatic ecosystems.
- The status of focal species to assess ecological conditions.
- The status of a select set of ecological conditions that contribute to the recovery of federally listed threatened and endangered species, conserve proposed and candidate species, and maintain a viable population of each species of conservation concern.
- The status of visitor use, visitor satisfaction, and progress toward meeting recreation objectives.
- Measureable changes on the plan area related to climate change and other stressors that may be affecting the plan area.
- Progress toward meeting the desired conditions and objectives in the plan, including for providing multiple use opportunities.
- The effects of each management system to determine that they do not substantially and permanently impair the productivity of the land (16 USA 1604(g)(3)c)).

Evaluation Requirements

The Forest Supervisor is responsible for conducting a biennial evaluation of information gathered through the plan monitoring program and any relevant information from broader-scale monitoring. Each biennial evaluation should build on the biennial evaluations that precede it. A written report summarizing the monitoring reports and evaluation will be produced and made available to the public (36 CFR 219.12 (d)(1)). The report must indicate whether a change to the plan, management activities, the monitoring program, or a new assessment may be warranted based on the new information. The report is not a decision document and is not subject to the objection process provisions of 36 CFR 219.12, Subpart B.

Monitoring Matrix

Monitoring and evaluation items are organized in Table 4-1. Monitoring items are organized by required Planning Rule topic areas, and include the following components:

- Monitoring Questions - Specific monitoring questions are developed to provide information essential to measuring accomplishment and effectiveness.
- Monitoring Indicators - A monitoring indicator is a quantitative or qualitative parameter that is measured to answer monitoring questions. One or more indicators can be associated with each question.

Table 1. Monitoring Matrix

2012 Planning Rule monitoring requirements	Monitoring Question Number	Monitoring Question	Indicators
Status of select watershed conditions (36 CFR 219.12(a)(5)(i)	1	To what extent is Forest management affecting water quality?	BMP Implementation and Effectiveness Monitoring (use National BMP protocols, evaluate % implemented; % effective)
	2	To what extent is Forest management affecting priority watershed condition?	Watershed Condition Class Score (25 indicators)
The status of select ecological conditions including key characteristics of the terrestrial and aquatic ecosystems (36 CFR 219.12(a)(5)(ii)	3	Are vegetation management practices moving conditions towards desired natural community type structural characteristics?	Table A-1 Parameters for NCs (% canopy, basal area, understory, shrub layer, ground cover)
	4	Are restoration activities increasing plant species richness and native plant cover for woodlands, glades and forests?	Change in native species richness and cover
	5	To what extent are prescribed fires used to mimic natural processes, maintain/improve vegetative conditions and/or restore natural processes and functions to ecosystems?	Acres of prescribed burn completed in Management Prescriptions 1.1, 1.2, 8.1 and 5.1
	6	To what extent are hazardous fuels being treated in the Wildland - Urban Interface (WUI) and/or in high risk areas?	Acres of prescribed burn and mechanical work completed in WUI Acres of prescribed burn and mechanical work completed in High Risk Areas designated in LRMP FEIS Appendix G - Fire Risk Assessment
	7	To what extent are fuel treatments affecting the successful suppression of wildfires?	Number of wildfires burned into fuel treatment units AND number of those with fire suppression/behavior impacts; OR percent of wildfires which burn into fuel treatment units where suppression or fire behavior changed due to fuel treatment
	8	Are lentic ecosystems providing habitat for fish and other aquatic species?	Number of lakes stocked Number of vernal pools constructed
	9	Are lotic ecosystems providing habitat for fish and other aquatic ecosystems?	Number of stream miles enhanced (AOP barriers removed, streams cleaned-up, large woody debris projects, etc)

2012 Planning Rule monitoring requirements	Monitoring Question Number	Monitoring Question	Indicators
The status of focal species to assess the ecological conditions required under 219.9 (36 CFR 219.12(a)(5)(iii)	10	To what extent is Forest management contributing to the maintenance and establishment of shortleaf pine and pine-oak woodlands as described in Appendix A?	Abundance of Eastern wood-pewee and Pine warbler in CFLR project area Nest success for Eastern wood-pewee and Pine warbler in CFLR project area
The status of select set of the ecological conditions required under 219.9 to contribute to the recovery of federally listed threatened and endangered species, conserve proposed and candidate species, and maintain a viable population of each species of conservation concern (36 CFR 219.12(a)(5)(iv)	11	To what extent is Forest management contributing to the conservation of threatened, endangered, and sensitive species and moving toward objectives for their habitat conditions? (NOTE: This question will be adjusted to include species of conservation concern when that list is determined by the Regional Forester)	Acres of key successional habitats provided (open lands, regeneration, etc. Specialized habitats (caves, fens, seeps, springs, cliffs, rock outcrops, wetlands, etc) being protected, maintained and restored. Summer roosting habitats for bats (snags) Bat caves gated
The status of visitor use, visitor satisfaction, and progress toward meeting recreation objectives. (36 CFR 219.12(a)(5)(v)	12	What is the status and trend of visitor use, visitor satisfaction, and progress toward meeting recreation objectives in the plan?	Annual visitation estimates by type of visit, day use, developed, general forest area Description of visit-- demographics, visit descriptions, activities Economic information--spending, substitute behavior, etc. Visitor Satisfaction
	13	To what extent do Forest recreation facilities and opportunities meet accessibility, health, safety, and maintenance requirements and achieve resource and social objectives?	Water quality at swimming beaches Facility inspections for compliance with critical and other standards from INFRA Water quality of drinking water
	14	To what extent are management activities meeting Recreation Opportunity Spectrum objectives?	Projects that are consistent with ROS objectives
	15	How are management activities affecting unauthorized OHV use?	Comparison of citations issued, documentation of resource damage, and public complaints to areas of management activities

2012 Planning Rule monitoring requirements	Monitoring Question Number	Monitoring Question	Indicators
Measureable changes on the plan area related to climate change and other stressors that may be affecting the plan area. (36 CFR 219.12(a)(5)(vi)	16	How is the occurrence of mortality across the plan area changing on an annual basis?	Acres of mortality
Progress toward meeting the desired conditions and objectives in the plan, including for providing multiple use opportunities. (36 CFR 219.12(a)(5)(vii)	17	How close are projected outputs and services to actual?	Timber volume sold, acres harvested, product mix
	18	What progress has been made towards meeting objectives in the plan?	Quantitative objectives from Chapter 1 of Forest Plan
The effects of each management system to determine that they do not substantially and permanently impair the productivity of the land (NFMA -- 16 U.S.C. 1604 (g) (3) C)) (36 CFR 219.12(a)(5)(viii)	19	Are the effects of forest management, including prescriptions, resulting in significant changes to productivity of the land?	Summary of results of monitoring using the National Soils protocols.

Appendix A

Terrestrial Natural Communities

Cover photo: Open Woodland Indicator Community, Department of Natural Resources

Photographer: Tom Nagel

Appendix A

Terrestrial Natural Communities

Introduction

Management Prescription 1.1 and 1.2 areas are distributed across the Forest, and in almost every subsection of the Ozark Highlands. General locations are shown below (see Appendix H: District Area Maps for area boundaries).

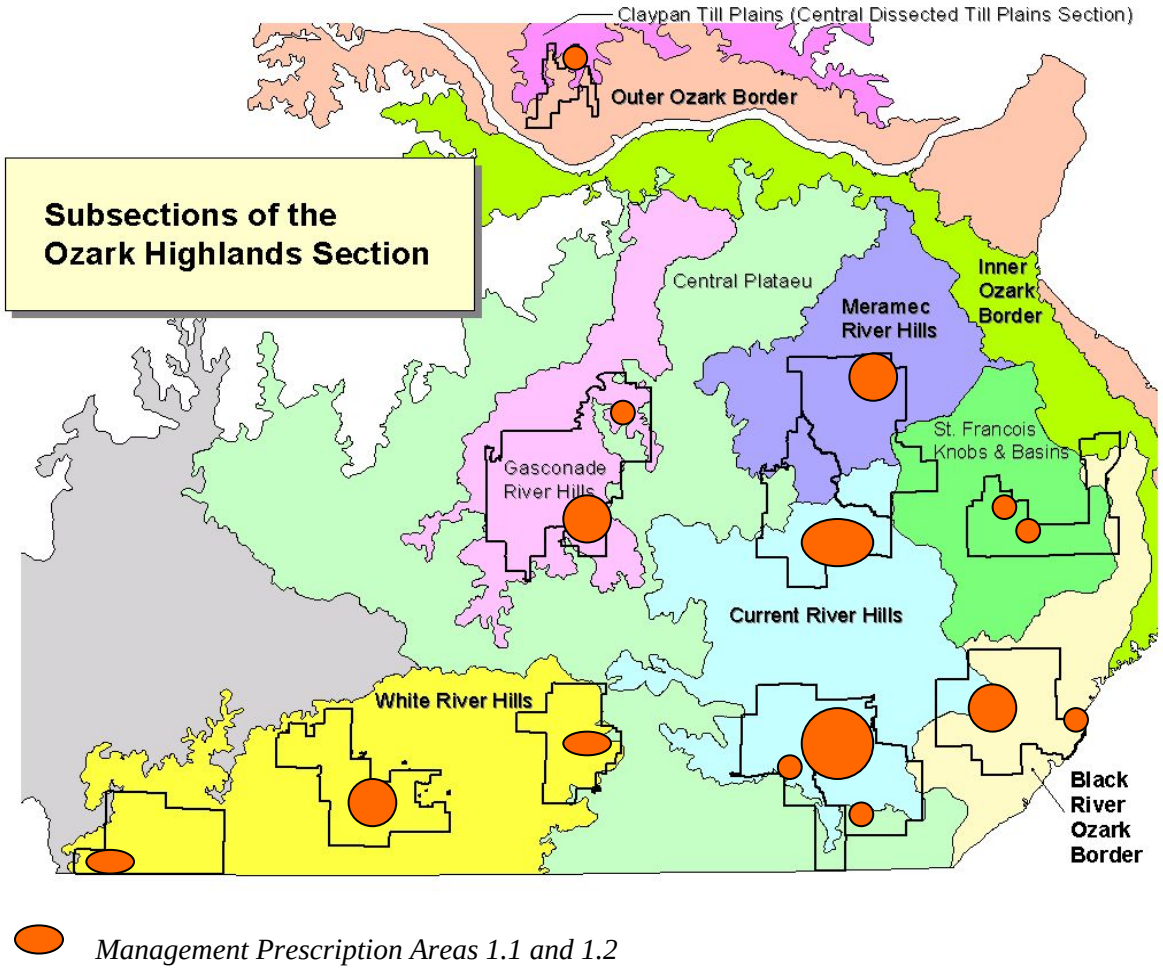


Figure A-1. Relationship of MP 1.1 and 1.2 Areas to Subsections of Ozark Highlands

Desired Conditions for Natural Community Types by Management Prescription

Table A-1 describes the general range of ecological parameters desired for respective natural communities in Management Prescription 1.1 and 1.2. Moving toward the desired condition may take 15 to 25 years for ground cover and more than 100 years for the composition and structure of respective canopy characteristics.

Table A-1. Range of Ecological Parameters for respective natural communities in Management Prescriptions 1.1 and 1.2

Natural Community Types	% canopy	Basal area	Canopy Gap Size	Understory	Aspect, slope, roughness	Shrub layer	Structural age/ growth stages per decade	Ground organic layer	% ground cover	Patch Size
Prairie	< 10	NA	NA	NA	All aspects; gentle slopes; plains	Sparse	Grassland with few scattered shrubs and trees	Grass, sedge and forb cover	90 – 100	10 to 200 acres
Savanna	10 – 30	<30	5-20 acres with 2 per 100 acres	scattered oaks and shrubs	Broad ridges; all aspects; gentle sloping	Dense; mostly scattered oaks and other shrubs	Shrub oak/pine covering 10-25% of area	Grassland, sedge and forb cover	90 – 100 grasses dominant	50 to over 1,000 acres
Open Woodland	30 - 50	30 - 50	10 acres with 1-3 per 100 acres	mixed shrubs, early-mid seral	southwest facing to upper ridges; gentle to steep; gentle plains and hills	dense; mostly scattered oaks and various shrubs	Shrub oak/pine covering 10-25% of area; even age stands	Grass, sedge and forb cover; little accumulated leaf litter	60 – 80 grasses dominant	10 to 100 acres
Closed woodland	50 – 80	50 - 90	3 acres with 1-5 per 100 acres	early-mid seral trees	Some upper ridges to base of north-facing slopes; gentle to steep; hills and breaks	sparse; mostly scattered oak and various shrubs	Shrub oak/pine in 5-10% of area; even age stands	Shallow leaf litter; mixed grasses, sedges and herbs	80 - 100	100 to over 1,000 acres
Upland forest	80 – 100	80 - 100	1% per year	shade tolerant shrubs and small trees	Generally north-facing slopes; steep to very steep; hills and breaks	Sparse; scattered; vines present	Oak/mixed species of variable age; small isolated gaps 1-5 acres	Moderately deep leaf litter	50 - 70	10 to 100 acres
Bottomland forest	80 - 100	90 - 100	1% per year	shade tolerant shrubs and small trees	North-facing slopes; very steep or broad-level floodplains; hills and breaks	Sparse; vines present	Multi-layered; uneven age; few gaps	Deep leaf litter; ephemeral herbs	50 - 70	10 to 500 acres
Fen	<10	NA	NA	NA	Toe slopes, ravines and floodplains	Dense to sparse or none; variable	Vary from shrub thickets to open herb/sedge meadows	Shallow marly to deep muck	90-100	<100 sq ft. to 15 acres
All glade types	<10	NA	NA	Small shrubs and trees restricted to rock outcrops and borders	Generally southwest-facing but all aspects on igneous and White River; steep to very steep; hills and breaks	Variable	Primarily grass or mixed herb cover with scattered shrubs	Sparse to dense cover of grasses; mineral soil often exposed	30 – 90 grasses dominant	½ to 300 acres

Management within the other Management areas will also use natural community characteristics in defining the desired condition. However, the range of ecological parameters desired for respective natural communities will not be as close to the ideal for the natural communities as those in MP 1.1 and 1.2.

Even so, achieving the desired condition may take 15 to 25 years for ground cover and more than 100 years for the composition/structure of respective canopy characteristics.

The following table shows the range of ecological parameters for use in Management Prescription 2.1, 6.1, 6.2, 6.3, and 8.1.

Table A-2. Desired conditions for natural community types in MP 2.1, 6.1, 6.2, 6.3, 8.1.

Natural Community Types (NCT)	Overstory Trees		Shrubs	Ground Cover Layer	
	% canopy	Basal area (sq. ft.)	Percent shrub layer	Ground organic layer	% ground cover
Prairie	< 10	NA	<10	Scattered grasses, sedges and forbs	90 - 100
Savanna	20 – 40	40 – 60	50	Scattered grasses, sedges and forbs; 60 – 80% leaf litter cover	30 - 50
Open Woodland	40 - 70	40 - 70	20-40	Scattered grasses, sedges and forbs; 30 –50% leaf litter cover	30 - 40
Closed woodland	70 - 90	80 - 100	5-10	Scattered sparse grasses, sedges and forbs; 100% leaf litter cover	20 - 30
Upland Forest	90 - 100	80 – 100	50% in 2 acre openings/wind gaps; < 5 % elsewhere	Moderately deep leaf litter; sparse ground cover	< 30
Bottomland forest	90 - 100	90 - 100	Multi-layered; uneven age; few gaps	Deep leaf litter; ephemeral herbs	50 - 70
Fen	<10	NA	Variable	Shallow marly to deep muck	90 – 100
All glade types	<20	NA	< 40	Sparse to dense thatch of grasses; mineral soil sometimes exposed	50 – 80

Shrubs are all native woody species including regenerating trees less than 10 feet tall generally consisting of multiple stems rising from the ground.

Management Prescription 1.1

Following are brief descriptions for each Management Prescription 1.1 area, including a list of under represented natural communities that will be the focus of restoration efforts. These communities have been identified based on historic land survey data and natural community descriptions. The general natural community type name from which the desired condition charts are derived (couched within the more specific natural community/plant association name) is noted in bold italics.

Big Creek Basin Glades – Ava unit, Ava/Cassville/Willow Springs Ranger District

Situated in the central White River Hills Subsection, this landscape is distinguished by Missouri's most extensive distribution of dolomite glades supporting many rare and endemic plant species, and desert-adapted animals at the easternmost extent of their geographic range. Prescribed burning, removal of red cedar and small diameter woody vegetation, and control of sericea lespedeza, crown vetch and spotted knapweed are primary management needs. Restoration practices shall strive to restore chinquapin and post oak as part of adjacent limestone/dolomite woodlands and a variety of dominant oak species in adjacent chert woodlands.

Dolomite ***Glade***

Limestone/dolomite ***Savanna***

Post Oak Chert ***Savanna***

Open *Dry Limestone/dolomite* ***Woodland***

Post Oak/Black Oak Open Dry Chert ***Woodland***

White Oak/Black Oak ***Open and Closed*** *Dry-mesic* ***Woodland***

Cassville Glades – Cassville unit, Ava/Cassville/Willow Springs Ranger District

A deeply dissected forested/woodland area along the western portion of the White River Hills Subsection, this area contains extensive glades interspersed over more deeply wooded and forested breaks. The area contains endemic and restricted species associated with both glades and mesic north-facing woodland slopes. A distinctive band of bench cliffs occurs on steep midslopes. Prescribed burning, removal of red cedar and small diameter woody vegetation and control of sericea lespedeza, crown vetch and spotted knapweed are primary management needs. Restoration practices shall strive to restore chinquapin and post oak as part of adjacent limestone/dolomite woodlands and a variety of dominant oak species in adjacent chert woodlands.

Dolomite ***Glade***

Chinquapin Oak Ash ***Open*** *Dry Limestone/Dolomite* ***Woodland***

White Oak Black Oak, Shortleaf Pine ***Open*** *Dry Chert* ***Woodland***

Post Oak Chert ***Savanna***

Post Oak Black Oak Dry ***Open*** *Chert* ***Woodland***

White Oak Black Oak ***Open*** *Dry-mesic* ***Woodland***

North Fork River – Willow Springs unit, Ava/Cassville/Willow Springs Ranger District

This area consists of both the deeply dissected hills/breaks and dissected plains encompassing a major portion of the North Fork White River basin. The upper portions of the watershed are moderately dissected and historically contained shortleaf pine and pine/oak woodland. This moderate dissection gives way to steep slopes of narrow, sinuous valleys lined with low cliffs and many seep/spring-fed moist cliffs and fens. Karst features are common, including caves, springs, fens and losing streams. Numerous rare terrestrial and aquatic species sites are associated with the North Fork River. Primary management needs include various thinning treatments to meet the desired conditions for woodland natural communities, prescribed burning and control of sericea lespedeza and multiflora rose. Restoration practices should strive to restore a mix of shortleaf pine and oak-codominated woodlands and savannas as patterned by variations in landforms. This unit provides one of the few opportunities on the Mark Twain National Forest to restore shortleaf pine/oak woodlands on plains and oak savannas.

*Post Oak Chert **Savanna***

*Shortleaf Pine-Oak/Bluestem (**Open**) Dry Chert and Sandstone **Woodland***

*Shortleaf Pine-Oak/Vaccinium (**Open**) Dry Chert and Sandstone **Woodland***

*White Oak-Black Oak-Shortleaf Pine (**Open**) Dry-Mesic Chert and Sandstone **Woodland***

*White oak-Black Oak (**Closed**) Dry-mesic Chert and Sandstone **Woodland***

*Mixed Oak-Hickory/Dogwood (Closed) Dry-mesic Chert and Sandstone **Forest***

*Mesic **Bottomland Forest***

*Ozark **Fen***

Big Piney South –Houston/Rolla/Cedar Creek Ranger District

Located in the Gasconade River Hills, the rugged, dissected portions of the upper Big Piney River becomes a focal point for a variety of woodland and forested natural communities owing to the dissected nature of the landscape through sandstone and dolomite rock substrates. The primary distinction for this unit is the inclusion of numerous outcrops of Roubidoux sandstone overlying the upper and lower Gasconade Formation. Shortleaf pine remains prominent, but diminishes toward the northern end of the management area where it intermixes with white oak, black oak, blackjack oak and hickory. Primary management needs include prescribed burning, red cedar removal on sandstone glades, various thinning treatments to meet desired conditions for woodland natural communities and reforestation of select bottomland forests.

*Shortleaf Pine-Oak/Bluestem (**Open**) Dry Chert and Sandstone **Woodland***

*Shortleaf Pine-Oak/Vaccinium (**Open**) Dry Chert and Sandstone **Woodland***

*White Oak-Black Oak-Shortleaf Pine (**Open**) Dry-mesic Chert and Sandstone **Woodland***

*White Oak-Shortleaf Pine/Mixed Oak (**Closed**) Dry-mesic Chert and Sandstone **Woodland***

*Mixed Oak-Hickory/Dogwood **(Closed)** Dry-mesic Chert **Forest***

*Sandstone **Glade***

Cane Ridge Pinery – Poplar Bluff Ranger District

This area of the Black River Ozark Border and small portion of the Current River subsections is distinguished by dominance of shortleaf pine mixed with some oak occupying a gently dissected plain capped in mixed Roubidoux sandstone residuum and loess soil. According to the land survey records, much of the area contained open barrens and shrublands dominated by scattered pine. A rich, distinctive assemblage of groundcover herbs and grasses occupies the dry-mesic sandy loam loess soils. Prescribed burning and thinning to meet desired conditions for shortleaf pine natural communities are primary management needs.

*Shortleaf Pine/Oak **Open** Dry and Dry-mesic **Woodland***

*Oak/Shortleaf Pine **Closed** Dry-mesic Chert **Woodland***

Sinkhole Pond Shrub Swamp

Current River Pinery – Doniphan/Eleven Point Ranger District

This area occurs within the natural range of shortleaf pine on the dissected plains of the southern Current River Hills. It is distinguished as Missouri's largest remaining and most extensive cover of shortleaf pine dry chert woodland interspersed with sinkhole ponds, losing streams and several caves that harbor many species of conservation concern. Prescribed burning and various silvicultural methods to meet desired conditions for shortleaf pine natural communities are primary management needs. Primary management needs include prescribed burning and various silvicultural methods to meet desired conditions to maintain large forest and woodland blocks for forest interior species.

*Shortleaf Pine/Oak/Bluestem (**Open**) Dry and Dry-mesic Chert **Woodland**.*

*Oak/Shortleaf Pine (**Closed**) Dry-mesic Chert **Woodland**.*

Sinkhole Pond Shrub Swamp

Cave

Eleven Point Breaks – Doniphan/Eleven Point Ranger District

Situated along the north side of the Eleven Point River, this small area of the Current River Hills Subsection consists of deeply dissected cherty hills with narrow ridges, steep sideslopes and narrow sinuous valleys. A very high concentration of sites for rare and endangered species occupy a wide assortment of small patch cliffs, springs, glades, caves, mixed woodlands and forests. The area also encompasses an extensive karst area with numerous subterranean aquatic stream systems and endemic cave species. Select prescribed burns and removal of red cedar on glades and adjacent woodlands, and cave protection are primary management needs.

*Dolomite **Glade***

*Shortleaf Pine, Oak/Blueberry (**Open**) Dry Chert **Woodland***

*Shortleaf Pine/Oak/Bluestem (**Open**) Dry and Dry-mesic Chert **Woodland***

*Mixed Oak-Hickory/Dogwood **(Closed)** Dry-mesic Chert **Forest***

Dry and Moist Limestone/Dolomite Cliffs

Cave

Bald Hill Glades/Woodland – Doniphan/Eleven Point Ranger District

This area contains the largest dolomite glade/dry woodland complex in this portion of the Central Plateau Subsection, and in the southeastern portion of the Ozarks. Remnant virgin stands of black, post, and chinquapin oak occur. Primary management needs include prescribed burning and thinning to meet desired conditions for oak woodland natural communities. Restoration activities shall strive to retain and restore structure to groupings of black, post and chinquapin oak (greater than 175 years old) associated with the following natural communities.

*Dolomite **Glade***

*Post Oak-Chinquapin Oak (**Open**) Dry Limestone/Dolomite **Woodland***

*Post Oak-Blackjack Oak (**Open**) Dry Chert **Woodland***

*White Oak-Black Oak (**Open**) Dry-mesic Chert **Woodland***

*White Oak-Mixed Oak (**Closed**) Dry-mesic Chert **Woodland***

Western Star Savanna/Woodland – Houston/Rolla/Cedar Creek Ranger District

The area contains Missouri's highest quality, largest example of a flatwoods natural community. Remnant pockets of virgin post oak still occupy the broad, flat ridgetops providing excellent opportunities to restore open post oak/bluestem woodland and savanna. Shortleaf pine is at the northernmost extent of its range, primarily restricted to Roubidoux sandstone outcrops along ridge and bluff tops. Large sinkholes are prominent. Caves, springs, and fens harbor rare invertebrate species. Primary management needs include prescribed burning and thinning to meet desired conditions for oak woodland, oak savanna, and glade natural communities

Post Oak Flatwoods

*Oak/Bluestem (**Open**) Dry Chert and Sandstone **Woodland***

*White Oak-Post Oak-Black Oak (**Open**) Dry-mesic Chert **Woodland***

*Mixed Oak Hickory/Dogwood (Closed) Dry-Mesic Chert and Sandstone **Forest***

Mud Creek Hardwoods – Poplar Bluff Ranger District

This represents the only area on the Mark Twain National Forest where dry upland cherty woodlands gradually transcend to wet bottomland forest and swamp across two very distinct ecological provinces: the Lower Mississippi Riverine Forest and the Ozark Broadleaf Forest provinces. Mud Creek Natural Area (in Management Prescription 8.1) is the opportunity core of this unit. Management needs should be consistent for both areas. Plant species (and several animals) that distinguish each province intermingle within a distance of several miles in two local watersheds. This intermingling makes for a very diverse biological area. Primary management needs include prescribed burning and some thinning to meet desired conditions for upland woodlands and forest, and control of illegal ATV trespass/exotic species in the bottomland forest.

*Wet **Bottomland Forest***

*Wet-mesic **Bottomland Forest***

*Mesic **Bottomland Forest***

*White Oak-Black Oak (**Open**) Dry-mesic Chert **Woodland***

*Post Oak-Black Oak-Scarlet Oak (**Open**) Dry Chert **Woodland***

*White Oak/Mixed Oak (**Closed**) Dry-mesic Chert **Woodland***

*Mixed Oak-Hickory/Dogwood (Closed) Dry-mesic Chert **Forest***

Lower St. Francois Mountains – Fredericktown unit of the Potosi

This area embraces the distinctive igneous knobs and basins of the volcanic-derived St. Francois Mountains along the lower St. Francis River. This major landform is restricted to the southeastern portion of the Potosi Ranger District including the Fredericktown unit. Target natural communities include dry to dry-mesic upland and bottomland woodlands, forests and igneous glades/barrens occurring over acidic igneous and chert substrates across landscapes that had a history of fire and other natural disturbances. This landscape is the best representation of an igneous system developed in granite. Prescribed burning and removal of undesirable woody vegetation from igneous glades and woodlands are primary management needs.

*Oak/Shortleaf Pine (**Open**) Dry-mesic Igneous and Chert **Woodland***

*Post Oak-Blackjack Oak/Bluestem (**Open**) Dry Igneous **Woodland***

*Post Oak-Black Oak-Scarlet Oak (**Open**) Dry Igneous **Woodland***

*Shortleaf Pine/Oak, Blueberry (**Open**) Dry Igneous **Woodland***

*White Oak/Dogwood **(Closed)** Dry-mesic Igneous **Forest***

*Igneous **Glade***

Current River Watershed – Salem and a small portion of the Potosi Ranger District

This area embraces Missouri's most deeply dissected hills and breaks found within the Current River Hills Subsection. This dissection, along with the presence of many permanent streams and rivers, likely restricted the spread and intensity of historic fires to the extent that both dry oak and oak pine woodlands and true forests prevailed. The unit is known for its many large fens, dolomitic spring seeps, limestone/dolomite cliffs, caves and a wide variety of forest/woodland plant associations. Many locations for rare and restricted plants and animals occur. Primary management needs include prescribed burning and various silvicultural methods to meet desired conditions, respond to areas of oak decline and maintain large forested blocks for forest interior species.

*Dolomite **Glade***

*Post Oak-Ash-Chinquapin Oak/Bluestem (**Open**) Dry Limestone/dolomite **Woodland***

*White Oak-Black Oak/Shortleaf Pine (**Open**) Dry Chert **Woodland***

*Shortleaf Pine/Oak/Blueberry (**Open**) Dry Chert **Woodland***

*Mixed Oak-Hickory/Dogwood **(Closed)** Dry-mesic Chert **Forest***

*Mesic **Bottomland Forest***

*Ozark **Fen***

Meramec River Hills East – Potosi Ranger District

This area contains a highly variable mixture of natural communities associated with the deeply dissected streams draining into the Meramec River basin. Karst, losing streams and large springs are characteristic. A variety of woodland natural communities occurs. Small fens, springs and seeps are common in headwater stream valleys. Shortleaf pine is at the

northeastern extent of its natural range here. Primary management needs include intermediate harvests and prescribed burns to restore woodlands, especially on mixed oak/shortleaf pine plains.

*Shortleaf Pine-Oak/Bluestem (**Open**) Dry Chert **Woodland***

*Post Oak-Black Oak-Scarlet Oak (**Open**) Dry Chert **Woodland***

*Mixed Oak-Hickory/Dogwood (**Closed**) Dry-mesic Chert **Woodland***

*White Oak/Dogwood **(Closed)** Dry-mesic Chert **Forest***

Red Oak-White Oak-Sugar Maple Mesic Limestone/Dolomite

*Dolomite **Glades***

*Chinquapin Oak/Ash/Little Bluestem Dry and Dry-mesic Limestone/Dolomite **Open** Woodland*

Cedar Creek Prairie -- Cedar Creek unit

This very small area contains the Mark Twain National Forest's only currently known opportunity to restore and maintain still intact northern Missouri loess/glacial till prairie relicts and adjacent former savannas. Many relict prairie plants remain. Prairie once dominated some 800,000 acres of the nearly level to rolling "Grand Prairie" situated immediately north of this area. Today, less than 200 acres remains (Tucker Prairie) attesting to the importance of the Cedar Creek Unit. Primary management needs include extensive thinning, brush control, prescribed burning, and control of sericea lespedeza.

*Dry-mesic Loess/Glacial Till Bluestem **Prairie***

*Bur Oak Loess/Glacial Till **Savanna***

*White Oak (**Open**) Dry-mesic Loess/Glacial Till **Woodland***

Management Prescription 1.2

Following are brief descriptions for each Management Prescription 1.2 area, including a list of under represented natural communities that will be the focus of restoration efforts. These communities have been identified based on historic land survey data and natural community descriptions. The general natural community type name (couched within the more specific natural community/plant association name) is noted in bold italics.

Ava Glades – Ava unit, Ava/Cassville/Willow Springs Ranger District

Situated in the central White River Hills Subsection, this landscape is distinguished by Missouri's most extensive distribution of dolomite glades supporting many rare and endemic plant species, and desert-adapted animals at the easternmost extent of their geographic range. Prescribed burning, removal of red cedar and small diameter woody vegetation, and control of sericea lespedeza, crown vetch and spotted knapweed are primary management needs. Restoration practices shall strive to restore chinquapin and post oak as part of adjacent limestone/dolomite woodlands and a variety of dominant oak species in adjacent chert woodlands.

*Dolomite **Glade***

*Limestone/dolomite **Savanna***

*Post Oak Chert **Savanna***

Open** Dry Limestone/dolomite **Woodland

*Post Oak/Black Oak Dry Chert **Woodland***

*White Oak/Black Oak **Open** and Closed Dry-mesic **Woodland***

Big Piney North – Houston/Rolla/Cedar Creek Ranger District

Located in the Gasconade River Hills, the rugged, dissected portions of the upper Big Piney River becomes a focal point for a variety of woodland and forest natural communities, owing to the dissected nature of the landscape through sandstone and dolomite rock substrates. The primary distinction for this unit is the inclusion of numerous outcrops of Roubidoux sandstone overlying the upper and lower Gasconade Formation. Shortleaf pine remains prominent, but diminishes toward the northern end of the management area where it intermixes with white oak, black oak, blackjack oak and hickory. Primary management needs include prescribed burning, red cedar removal on sandstone glades, various thinning treatments to meet desired conditions for woodland natural communities and reforestation of select bottomland forests.

*Shortleaf Pine-Oak/Bluestem (**Open**) Dry Chert and Sandstone **Woodland***

*Shortleaf Pine-Oak/Vaccinium (**Open**) Dry Chert and Sandstone **Woodland***

*White Oak-Black Oak-Shortleaf Pine (**Open**) Dry-mesic Chert and Sandstone **Woodland***

*White Oak-Shortleaf Pine/Mixed Oak (**Closed**) Dry-mesic Chert and Sandstone **Woodland***

*Mixed Oak-Hickory/Dogwood (Closed) Dry-mesic Chert **Forest***

*Sandstone **Glade***

Kaintuck Hollow – Houston/Rolla/Cedar Creek Ranger District

The area contains significant, good quality, and restorable open post oak woodlands, and a large, deep muck fen complex. Remnant pockets of virgin post oak still occupy the broad, flat ridgetops providing excellent opportunities to restore open post oak/bluestem woodland and savanna. Shortleaf pine is at the northernmost extent of its range, primarily restricted to Roubidoux sandstone outcrops along ridge and bluff tops. Large sinkholes are prominent. Caves, springs, and fens harbor rare invertebrate species. Primary management needs include prescribed burning and thinning to meet desired conditions for oak woodland, oak savanna,

*Oak/Bluestem (**Open**) Dry Chert and Sandstone **Woodland***

*White Oak-Post Oak-Black Oak (**Open**) Dry-mesic Chert **Woodland***

*Ozark **Fen***

*Mixed Oak Hickory/Dogwood **(Closed)** Dry-Mesic Chert and Sandstone **Forest***

Upper St. Francois Mountains – Fredericktown unit of the Potosi

Dominant natural communities include dry to dry-mesic woodlands, forests, and igneous glades/barrens occurring over acidic igneous and chert substrates across landscapes that had a history of fire and other natural disturbances. This portion of the St. Francois Mountains is dominated by rhyolitic igneous rock while the Lower St. Francois Mountains MA 1.2 area is confined to granitic igneous rock. Prescribed burning and removal of undesirable woody vegetation from igneous glades and open woodlands are primary management needs.

*Oak/Shortleaf Pine (**Open**) Dry-mesic Igneous and Chert **Woodland***

*Post Oak-Blackjack Oak/Bluestem (**Open**) Dry Igneous **Woodland***

*Post Oak-Black Oak-Scarlet Oak (**Open**) Dry Igneous **Woodland***

*Shortleaf Pine/Oak, Blueberry (**Open**) Dry Igneous **Woodland***

White Oak/Dogwood (Closed) Dry-mesic Igneous ***Forest***

Igneous ***Glade***

Meramec River Hills West – Potosi Ranger District

This area contains a highly variable mixture of natural communities associated with the deeply dissected streams draining into the Meramec River basin. Karst, losing streams and large springs are characteristic. A variety of woodland natural communities occurs. Small fens, springs and seeps are common in headwater stream valleys. Shortleaf pine is at the northeastern extent of its natural range here. Primary management needs include intermediate harvests and prescribed burns to restore woodland and forest types.

*Shortleaf Pine-Oak/Bluestem (**Open**) Dry Chert* ***Woodland***

*Post Oak-Black Oak-Scarlet Oak (**Open**) Dry Chert* ***Woodland***

*Mixed Oak-Hickory/Dogwood (**Closed**) Dry-mesic Chert* ***Woodland***

White Oak/Dogwood (Closed) Dry-mesic Chert ***Forest***

Red Oak-White Oak-Sugar Maple Mesic Limestone/Dolomite Forest

Appendix B

Soils

Mark Twain
National Forest
Forest Plan

Cover photo: Oak flatwoods on Mark Twain National Forest, USDA Forest Service

Photographer: Paul Nelson

Appendix B

Soils

Introduction

The purpose of this Appendix is to provide additional information regarding specific soils on the Mark Twain NF.

Riparian Soils

Following is a listing of the soil series on the Mark Twain National Forest that are formed of alluvial material. Use these soil series in determining the extent of the riparian management zone when project level analysis determines these soils are present.

Amagon silt loam
Ashton silt loam
Atkins loam
Auxvasse silt loam
Batcave gravelly loam
Bearthicket silt loam
Belknap silt loam
Bloomsdale silt loam
Britwater gravelly silt loam
Calhoun silt loam
Cedargap gravelly silt loam
Dameron silt loam
Dapue silt loam
Deible silt loam
Dunning silty clay loam
Elk silt loam
Elkins silt loam (series was made inactive in 1979)
Elsah silt loam
Farewell silt loam
Freeburg silt loam
Gabriel silt loam
Gladden loam
Hartville silt loam
Haymond silt loam
Hercules gravelly loam
Higdon silt loam
Hontas silt loam
Horsecreek silt loam
Huntington silt loam
Huzzah silt loam
Jamesfin silt loam
Kaintuck fine sandy loam
Kickapoo fine sandy loam
Kobel silty clay
Landes fine sandy loam
Lostpond silt loam
Melvin silt loam
Midco cherty loam
Moniteau silt loam
Newark silt loam
Nolin silt loam
Perche loam
Pinerun very gravelly silt loam
Pope fine sandy loam
Possumtrot fine sandy loam
Racket silt loam
Racoon silt loam
Raftville silt loam
Razort silt loam
Relfe very gravelly loam
Riverwash (not an actual series name)
Sandbur fine sandy loam
Secesh loam
Spitlimb silt loam
Stultz very cobbly loam
Tanglenook silt loam
Tilk very gravelly coarse sandy loam
Waben very gravelly silt loam
Wakeland silt loam
Westerville silt loam
Wideman fine sand
Wiota silty clay loam
Zanoni fine sandy loam

Highly Compactable Soils

Following is a listing of the soil series on the Mark Twain National Forest that have the potential to be highly compactable. Implement standards and guidelines created for highly compactable soils when project level analysis determines these soils are present.

Aaron silt loam	Caneyville silt loam	Fanchon silt loam
Adler silt loam	Captina silt loam	Firebaugh silt
Alluvial land	Carr fine sandy loam	Foley silt loam
Alred	Cedargap silt loam (variant)	Fourche silt loam
Amagon silt loam	Claiborne silt loam	Freeburg silt loam
Armster loam	Clarksville	Frenchmill very cobbly silt loam
Armstrong loam	Cornwall silt loam	Gabriel silt loam
Ashton silt loam	Coulstone/Bender/Gatewood	Gasconade
Aslinger silt loam	Courtois silt loam	Gatewood
Auxvasse silt loam	Creldon silt loam	Gepp cherty silt loam
Bado silt loam	Crider silt loam	Gerald silt loam
Bardley gravelly silt loam	Crowley silt loam	Gladden loam
Bearthicket silt loam	Dameron silt loam	Glensted silt loam
Beemont gravelly silt loam	Dapue silt loam	Gorin silt loam
Belknap silt loam	Deible silt loam	Gosport silt loam
Bloomsdale silt loam	Delassus silt loam	Goss gravelly silt loam
Blueye gravelly silt loam	Doniphan very cherty silt loam	Grable very fine sandy loam
Bolivar fine sandy loam	Dubbs silt loam	Grandgulf silt loam
Booker silty clay	Dunning	Gravois silt loam
Branson silt loam	Dupo silt loam	Gressy/Viraton silt loams
Britwater gravelly silt loam	Egyptgrove gravelly silt loam	Gunlock silt loam
Broseley loamy fine sand	Elk silt loam	Hailey gravelly silt loam/Nixa gravelly silt loam
Brussels	Elkins silt loam	Hartville silt loam
Calhoun silt loam	Elsah silt loam	Hassler- Hassler silt loam/ Syenite
Calwoods silt loam	Eudy silt loam	Hatton silt loam
Haymond silt loam	Lowell silt loam	Sandbur fine sandy loam
Hercules gravelly loam	Macedonia silt loam	Scholten
Higdon silt loam	Mano	Secesh (various)
Hildebrecht silt loam	Marion silt loam	Sharon silt loam
Hoberg silt loam	Marquand silt loam	Skrainka silt loam
Hobson loam	Melvin silt loam	Snead silty clay loam
Hodge fine sandy loam	Menfro silt loam	Soncac very cobbly silt loam
Hogcreek silt loam	Mexico silt loam	Sowcoon silt loam
Hontas silt loam	Midco cherty loam	Splitlimb silt loam
Hootentown silt loam	Minnith silt loam	Sturkie silt loam
Horneybuck silt loam	Moko	Swiss gravelly silt loam

Horsecreek silt loam	Moniteau silt loam	Syenite silt loam
Houlka silty clay loam	Mudlick/Irondale/Killarney	Tanglenook silt loam
Huntington silt loam	Needleye silt loam	Taterhill silt loam
Huzzah silt loam	Nevin silty clay loam	Taumsauk very cobbly silt loam
Irondale very cobbly loam	Newark silt loam	Tiff cobbly clay (at lower rock contents)
Jamesfin silt loam	Nicholson silt loam	Tonti
Jerktail silt loam	Nixa very gravelly silt loam	Topazmill
Jonca silt loam	Nolin silt loam	Trackler silt loam
Kaintuck (various)	Oakimeter	Tuckerman loam
Keeno very gravelly silt loam	Ocie gravelly silt loam	Union silt loam
Kenaga/Egyptgrove/Tonti	Opequon silty clay (can be very rocky)	Useful silt loam
Keswick silt loam	Parson/Carytown/Barden silt loams	Viburnum silt loam
Kickapoo fine sandy loam	Pembroke silt loam	Viraton silt loam
Killarney very cobbly silt loam	Peridge silt loam	Wabash silty clay
Knobtop silt loam	Plato silt loam	Wakeland silt loam
Kobel clay	Pomme silt loam	Waldron silty clay
Lafe silt loam	Pope fine sandy loam	Wasola silt loam
Lamotte silt loam	Portia sandy loam	Weingarten silt loam
Landes loam	Poynor gravelly silt loam	Weller silt loam
Lebanon silt loam	Putnam silt loam	Westerville silt loam
Lecoma silt loam	Racket silt loam	Wideman
Leta silty clay loam	Racoon silt loam	Wilbur silt loam
Lily loam	Raftville silt loam	Wilderness gravelly silt loam
Lindley loam	Razort silt loam	Winfield silt loam
Loring silt loam	Reuter ashy sandy loam	Winnipeg silt loam
Lostpond silt loam	Rosati silt loam	Wiota silt loam
Loughboro silt loam	Roselle silt loam	Wrenagate silt loam
Lowassie silt loam	Ross silt loam	Yelton silt loam
		Zanoni fine sandy loam

Highly Erodible Soils

Following is a listing of the soil series on the Mark Twain National Forest that have the potential to be highly erodible. Implement standards and guidelines created for highly erodible soils when project level analysis determines these soils are present.

Very Highly Erodible Soils

Soil Mapping Unit	% Slope
Brussels-Rock outcrop	50 – 90 %
Brussels-Gasconade-Rock outcrop	30 – 90 %, very bouldery
Gasconade-Rock outcrop complex	50 – 90 %
Lenzburg Channery silty clay loam	10– 70 %
Moko-Rock outcrop complex	50 – 90 %, extremely stony
Rock outcrop – Moko	50 – 95 %

Highly Erodible Soils

Soil Mapping Unit	% Slope
Alred-Wrengart	14 – 35 %
Bender – Poynor	15 – 50 %
Bender –rock outcrop complex	35 – 65 %, extremely stony
Bender-Alred-Rock outcrop	15 – 60 %
Borrow pits	all
Clarksville very cherty silt loam or very gravelly silt loam	30 % and up
Clarksville-Doniphan or Baxter	30 – 50 %
Clarksville-Rock outcrop-Moko	35 - 60 %
Clarksville-Scholten	15 – 45 %, very stony
Clickenbeard-Gasconade-Rock outcrop	35 – 70 %, extremely stony
Coulstone very gravelly silt loam	35 – 60 %
Coulstone-Clarksville	30 – 50 %
Coulstone-Clarksville-Rock land	35 – 60 %
Gasconade	35 – 50 %
Gepp-Rock outcrop	35 – 60 %
Knobby-Rock outcrop-Bardley	35 – 65 %
Hailey-Rock outcrop-Moko	35 – 60 %
Menfro silt loam	20 – 45 %
Mine spoils	all
Moko	50 – 80 %
Ocie-Gatewood complex	15 – 50 %
Opequon rocky silty clay loam	35 – 60 %
Poynor cherty silt loam	35 – 60 %
Rochefort-Bonnefemme complex	25 – 40 %
Rock outcrop	35 – 60 %
Rock outcrop-Gasconade	30 % and up
Rueter very gravelly silt loam	35 – 65 %, very stony
Rueter-Bardley	35 – 60 %
Rueter-Hailey complex	35 – 60 %
Rueter-Gasconade-rock outcrop	35 – 60 %
Sonsac – Rueter	35 – 70 %, very rocky
Taumsaukk-Irondale-rock outcrop	15 – 45 %
Tick extremely silt loam	15 – 50 %, stony
Winfield silt loam, karst	14 – 45 %
Winnegan loam	20 – 35 %

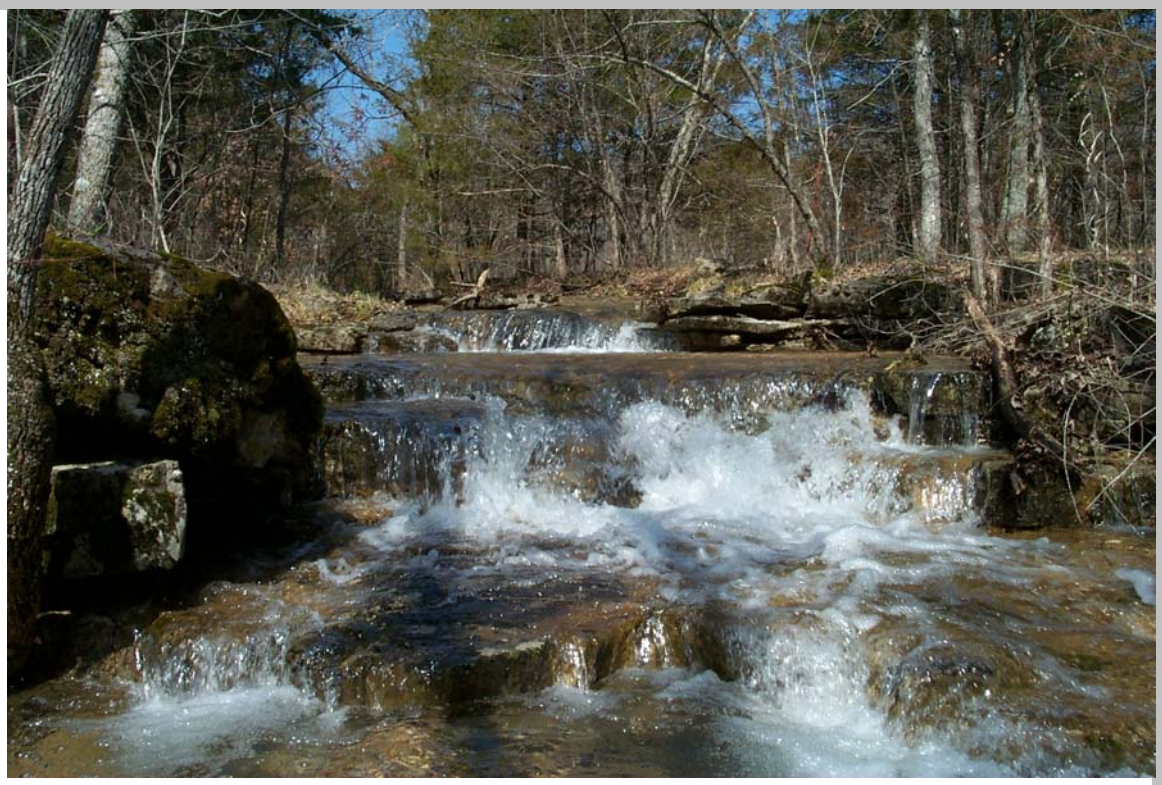
Fragipan Soils

Following is a listing of the soil series on the Mark Twain National Forest that are fragipans. Implement standards and guidelines created for fragipan soils when project level analysis determines these soils are present.

Bado silt loam	Hobson loam	Plato silt loam
Captina silt loam	Hogcreek silt loam	Rosati silt loam
Celt silt loam	Jonca silt loam	Scholten gravelly silt loam
Creldon silt loam	Keeno gravelly silt loam	Tonti gravelly silt loam
Delassus silt loam	Lebanon silt loam	Union silt loam
Gerald silt loam	Needleye silt loam	Viraton silt loam
Hildebrecht silt loam	Nicholson silt loam	Wilderness gravelly silt loam
Hoberg silt loam	Nixa very gravelly silt loam	Yelton silt loam

Appendix C

Minerals Management



Cover photo: Intermittent waterfall near Rock Creek on the Mark Twain National Forest, USDA Forest Service
Photographer: Lori Wilson

Appendix C

Minerals Management

Introduction

This Appendix describes the guidance and direction for Federal minerals operations on the Mark Twain National Forest. Exploration and development of federally owned leasable minerals, gas, oil, and mineral materials will be allowed on all National Forest lands where this use is compatible with the management areas. Operations will be subject to the following:

(A) Leasing notices or stipulations,

(B) Special notifications for lead mining operations, and

(C) Conditions of approval.

Leasing Notices and Stipulations

Hardrock Permit and Leasing Notices and Stipulations

The following standard stipulations apply to all permits:

R9-2800-6a (3/83)

USDA – FOREST SERVICE
STANDARD STIPULATIONS - PERMIT
(FSM 2820)

Serial No.: _____
Permittee: _____
National Forest: _____

The permittee is notified and agrees:

All work and any operations authorized under this permit shall be done according to an approved operating plan on file with the _____ at _____
_____Plans generally require a minimum of 45 days for Forest Service review. Bureau of Land Management must also review and also approve.

Operating plan will contain information the Forest Officer determines reasonable for assessment of (1) public safety, (2) environmental damage, and (3) protection for surface resources. Content of such plans will vary according to location and type of activity and may contain:

1. Steps taken to provide public safety.
2. Location and extent of areas to be occupied during operations.
3. Operation methods including size and type of equipment.
4. Capacity, character, standards of construction and size of all structures and facilities to be built.
5. Location and size of areas where vegetation will be destroyed or soil lay bare.
6. Steps taken to prevent and control soil erosion.
7. Steps taken to prevent water pollution.
8. Character, amount, and time of use of explosives or fire, including safety precautions during their use.
9. Program proposed for rehabilitation and revegetation of disturbed land.

Copies of all permits obtained from State or Federal agencies pertaining to work might be required. Archeological studies, if required, will accompany plan.

The Forest Supervisor or his/her designated agent has authority to temporarily suspend or modify operations in whole or in part due to emergency forest conditions such as high fire danger or other unsafe situations.

The permitee must keep the _____informed about progress of operations to the extent reasonably necessary for assuring public safety. This is especially important with geophysical inventory and testing activities because of their mobile nature. The _____ will alert the permittee to circumstances, which may affect safe and efficient conduct of work activities.

Terms of this lease are considered violated if not done according to these stipulations.
See Special Stipulations & Notifications

_____
Permittee

R9-2800-6b (3/83)

Attach the following special stipulation only to prospecting permits that state no mineral development on permit area until another analysis for mining is conducted.

R9 FSM 2822.42 – Exhibit 1
SPECIAL STIPULATION

Pursuant to the provisions of the Act of March 4, 1917 (16 USC 520), Section 402 of the Re-Organization Plan No. 3 of July 16, 1946 (60 Stat. 1097, 1099), the Act of August 7, 1947 (30 USC 352), and the National Environmental Policy Act of 1969 (42 USC 4321 et seq.) as said authorities have been or may hereafter be amended, no mineral development of any type is authorized hereby, and consent to the issuance of this prospecting permit as required by law and regulation (43 CFR 3500.9-1(b)) is given subject to the express stipulation that no mineral lease may be issued for the land under permit without the prior consent of the Forest Service, USDA and the proper rendition of an environmental analysis in accordance with the National Environmental Policy Act of 1969, the findings of which shall determine whether and under what terms and conditions for the protection of the land involved the lease may issue.

The following standard stipulations should be attached to all leases:

USDA – FOREST SERVICE
STANDARD STIPULATIONS - LEASE
(FSM 2820)

Serial No.: _____
Lessee: _____
National Forest: _____

The lessee is notified and agrees:

All work and any operations authorized under this permit shall be done according to an approved operating plan on file with the _____ at _____

_____Plans generally require a minimum of 45 days for Forest Service review. Bureau of Land Management must also review and also approve.

Operating plan will contain information the Forest Officer determines reasonable for assessment of (1) public safety, (2) environmental damage, and (3) protection for surface resources. Content of such plans will vary according to location and type of activity and may contain:

1. Steps taken to provide public safety.
2. Location and extent of areas to be occupied during operations.
3. Operation methods including size and type of equipment.
4. Capacity, character, standards of construction and size of all structures and facilities to be built.
5. Location and size of areas where vegetation will be destroyed or soil lay bare.
6. Steps taken to prevent and control soil erosion.
7. Steps taken to prevent water pollution.
8. Character, amount, and time of use of explosives or fire, including safety precautions during their use.
9. Program proposed for rehabilitation and revegetation of disturbed land.

Copies of all permits obtained from State or Federal agencies pertaining to work might be required. Archeological studies, if required, will accompany plan.

The Forest Supervisor or his/her designated agent has authority to temporarily suspend or modify operations in whole or in part due to emergency forest conditions such as high fire danger or other unsafe situations.

The lessee must keep the _____informed about progress of operations to the extent reasonably necessary for assuring public safety. This is especially important with geophysical inventory and testing activities because of their mobile nature. The _____ will alert the lessee to circumstances, which may affect safe and efficient conduct of work activities.

Terms of this lease are considered violated if not done according to these stipulations.

See Special Stipulations & Notifications

Attach the following special stipulation to applicable leases:

Special Stipulation for Leasing

Pursuant to the provisions of the Act of March 4, 1917 (16 USC Sec. 520), Section 402 of the Reorganization Plan No. 3 of July 16, 1946 (60 Stat. 1097, 1099), the Act of August 7, 1947 (30 USC sec. 352), and the National Environmental Policy Act of 1969 (42 USC Sec. 4321 et seq.) as said authorities have been or may hereafter be amended, consent to this preference right lease as required by law and regulation (43 CFR Sec. 3501.2-6(a) is given subject to the express stipulation that the lessee is prohibited from using the surface of the lease area for the construction of tailings ponds or other forms of mine waste disposal, and/or construction of a mill or a main mine shaft without the prior approval of the USDA Forest Service and the proper rendition of an environmental analysis in accordance with the National Environmental Policy Act of 1969, the findings of which shall determine whether or not and under what terms and conditions these facilities may be developed.

Special Notifications for Lead Mining Operations

The following special notifications provide guidance and direction for lead mining operations. These notifications will become part of the permit or lease to ensure compliance with the Forest Plan.

1. All activities authorized on the lease area are subject to the Mark Twain National Forest Management Plan, as amended.

2. Heritage resource surveys are required prior to any earth disturbing activities.

   If the lessee decides to provide a heritage resource survey, the lease's archaeological contractor must obtain from the Mark Twain National Forest (MTNF) a Special Use Permit for Heritage Resources Investigations. The permit must be obtained prior to the initiation of any heritage resource investigations on the Forest. All regulations and policies of the MTNF must be followed with respect to the issuance of the Special Use Permit to the lease's archaeological contractor. The archaeological contractor will submit the report on the investigations to the Forest Archaeologist following the conditions of the Special Use Permit, and the MTNF will initiate and carry to completion all regulatory consultation with the Missouri State Preservation Officer as required by the National Historic Preservations Act of 1966, as amended through 1992, and the accompanying regulations as found in 36 CFR 800.

3. To further define and clarify the interaction between the lessee and the authorized Forest Officer that is necessary to protect and restore the surface resources and maintain an acceptable environmental situation within the lease area, the following is required:

a. Site Avoidance: Archaeological, historic, and architectural sites that are eligible for inclusion in the National Register of Historic Places, as well as sites whose National Register significance has not been evaluated, will be avoided and protected from all project activities. Avoidance of heritage resources will be understood to require the retention of such properties in place and their protection from effects resulting from the undertaking (Memorandum of Understanding between the Mark Twain National Forest and the Missouri State Historic Preservation officer, June, 1995).

b. Discovery of Heritage Resources during Project Implementation: Pursuant to the provisions found in 36 CFR 800.11, should any previously unrecorded heritage resources be discovered during project implementation, activities that adversely affect that resource will be stopped immediately. A professional archaeologist will evaluate the resource. Consultation will be initiated with the Missouri State Historic Preservation Officer (SHPO), as well as with the Advisory Council on Historic Preservation, if required, to determine appropriate actions for protecting the resource, and for mitigating the adverse effects on the resource. Project activities will not be resumed until the resource is adequately protected and agreed-upon mitigation actions are implemented with SHPO approval.

c. Prior approval from the authorized Forest Officer for use of existing roads.

d. Prior approval from the authorized Forest Officer for the locations and specifications of all roads to be constructed and for the relocation of existing roads. This approval shall ensure that temporary roads are located so as to limit views into clearings.

e. Prior approval from the authorized Forest Officer for all drill site and vent shaft locations and other use areas.

f. As required by the authorized Forest Officer, topsoil will be stock piled for reclamation, from drill sites and vent shaft locations.

g. As required by the authorized Forest Officer, drill sites will be restored to original contours insofar as possible, topsoil replaced, and the site revegetated.

h. As directed by the authorized Forest Officer, all roads, drill and vent shaft sites will be closed and revegetated at the close of operations.

i. Drilling mud will not be allowed to flow into intermittent or live stream courses, or into sinkholes.

j. Trees and shrubs cut or pushed over during construction shall be disposed of as prescribed by the authorized Forest Officer Resource. Management activities must meet, as a minimum, the Visual Quality Objective (VQO).

k. As required by the authorized Forest Officer, drill sites will be water barred and ditched to provide proper drainage into filter strips.

l. Drilling is prohibited within buffer zones associated with perennial streams, springs, or wetlands. On slopes greater than 12%, drilling is prohibited within 50 feet of the stream bank plus four times the percent slope. The location of floodplains, filter strips, and buffer zones for riparian areas will be determined by field investigation as needed.

m. Any scrap material or litter will be removed from the site.

n. Spot surfacing such as gravel, planking or mats will be allowed and removed if the Authorized Officer deems necessary.

4. There are exclusion and/or constraint areas within the lease area that require special considerations and operation procedures to protect the unique values for which each has been established. The lessee must contact the authorized Forest Officer to determine the specific locations and requirements of each such area that will be affected. These requirements must then be incorporated in the Operation Plan required in Section 2(c) of these leases.

5. Air vent facilities constructed within the lease areas shall have sound barriers, deflectors, or other such devices necessary to minimize adverse impact on the surface environment, including measures to protect wildlife from the downdraft of vent shafts. The motor/fan may be above ground for a short period of time, after which the unit will be at underground mine level. Surface discharge will be vertical; Vent shafts will be grouted, as needed, to prevent excessive leakage of groundwater into the mine.

6. Surface disturbing activities must comply with the Forest Plan regarding endangered and/or threatened species habitat, and with the most recent Biological Opinion on the impacts of MTNF management activities issued by the U.S. Fish and Wildlife Service.

7. Hydrological assessments will be made on a lease-by-lease basis based upon the situation within the lease area. The authorized Forest Officer will review the situation with the company prior to the assessment.

8. All temporary roads, drill sites, and vent shafts shall meet the Visual Quality Objectives designated for the area by the Forest Plan.

9. Following the completion of all drilling, the drill casing shall be removed and down-hole wood and cement plugs shall be placed in the drill holes. Plugging procedures outlined in the Missouri State Code of Regulations (10 CSR 20-7.010) shall be followed. Separate plugs shall be set at the base of the Davis Formation and at the base of the overburden to separate and isolate groundwater aquifers and prevent down-hole contamination.

10. These notifications are subject to changes/amendments based on operations.

_____ _____

Authorized Representative Date

Conditions of Approval

These Conditions of Approval (COA) have been developed to provide guidance and direction for all mineral operations. The COA's may become part of the permit, lease or operating plan to ensure compliance with the Forest Plan. It is encouraged that these conditions apply to private mineral operations.

The following conditions may be used in part or in their entirety, depending on the recommendations of the site-specific analysis. These conditions should supplement not duplicate conditions in the Surface Use Plan of Operations (SUPO, oil and gas) or a submitted operating plan (hardrock or common variety) for a permit or lease.

Conditions of Approval Applicable to all Mineral Operations

COA-1. Permittee/operator will notify the authorized Forest officer immediately of any change in address, point of contact or ownership.

COA-2. Permittee/operator will comply with all applicable federal, state and local laws, regulations, standards and other relevant environmental laws, including public health and safety.

COA-3. The Permittee/operator shall maintain the improvements and permit area to standards of repair, orderliness, neatness, sanitation, and safety acceptable to the authorized Forest officer and consistent with other provisions of this authorization. If requested, the holder shall comply with inspection requirements deemed appropriate by the authorized officer.

COA-4: The Permittee/operator has a continuing responsibility to identify all hazardous conditions on the permit area which would affect the improvements, resources, or pose a risk of injury to individuals. Any non-emergency actions to abate such hazards shall be performed after consultation with the authorized officer. In emergency situations, the Permittee/operator shall notify the authorized officer of its actions as soon as possible, but not more than 48 hours, after such actions have been taken.

COA-5: The Permittee/operator shall be responsible for the prevention and control of soil erosion or other resource damage on the area covered by this permit and lands adjacent thereto, and shall provide preventive measures as required by the authorized Forest Officer and made a part of this permit/lease.

COA-6: No waste or by-products shall be discharged containing any substances in concentrations which may result in significant harm to fish and wildlife, or to human water supplies. Storage facilities for materials capable of causing water pollution, if accidentally discharged, shall be located so as to prevent any spillage into waters, or to channels leading into water, that would result in significant harm to fish and wildlife or to human water supplies.

COA-7: The Permittee/operator shall protect the scenic esthetic values of the area under this permit, and the adjacent land, associated with the authorized use, during construction, operation and maintenance of the improvements.

COA-8: All access roads will be built on locations and to specifications approved in advance of construction by the authorized Forest officer.

COA-9: The authorized operation may be temporarily suspended due to excessively wet soil conditions when unacceptable resource damage is anticipated or occurring as determined by the authorized officer.

COA-10: No member or delegate of Congress shall be admitted to any share or part of this agreement or to any benefit that may arise here from unless it is made with a corporation for its general benefit. This does not apply to outstanding minerals.

COA-11: The Permittee/operator shall fully and currently repair all damage other than ordinary wear and tear to national forest roads and trails caused by the Permittee/operator in the exercise of the privilege granted by this permit.

COA-12: If prior to or during excavation work, items of archeological, paleontological, or historic value are reported or discovered, or an unknown deposit of such items is disturbed, the Permittee/operator will immediately cease excavation in the area and notify the Forest Service. Operations will not resume work until written approval is given by the authorized officer.

COA-13: The Permittee/operator or an authorized representative will: Immediately after site construction and as needed throughout the life of the authorization, install or construct erosion devices where appropriate. The following will be accomplished as directed by the authorized Forest officer:

- Sediment dams in gullies, etc.
- Contour terraces on areas which exceed three percent gradient
- Diversion terraces if the potential exists for heavy water flow onto or across the site.
- Erosion control blankets on all cut or fill slopes that cannot be shaped to a 3:1 gradient or less.
- Fences around treated areas on sensitive soils until new vegetation is firmly established.

COA-14: Prior to drilling associated water well(s), the operator will provide the district ranger with the appropriate approved State permits authorizing such a well(s).

COA-15: Notify the district ranger at least five working days in advance of all work which will result in surface disturbance for a pre-operations inspection.

COA-16: Obtain the district ranger’s approval for any changes in a approved site plan which would result in additional surface disturbance.

COA-17: Notify any subcontractors of required permits for activity not covered under the terms and conditions of this permit.

COA-18: Fencing the site will be required. The Permittee/operator may choose the type of fencing, but the design and material must be approved by the Forest officer.

COA-19: Stockpile the surface soil from the entire area to be disturbed in approved locations. Stockpiles should be leveled or rounded on top and smoothed on the sides to 3:1 slope and vegetated as specified by the authorized Forest Officer.

COA-20: Brush, slash, and other debris may only be burned if authorized by Forest officer, or otherwise will be disposed of as directed.

COA-21: Stumps and woody material will not be buried in pits or fill areas, unless approved by the authorized Forest Officer.

COA-22: Follow these sanitation guidelines:

- All litter and garbage deposited on and off the site as a result of this project will be kept in a container and disposed of as necessary.
- Portable toilets will be used, and waste will be hauled to an approved disposal facility.

- In lieu of portables, flush toilets such as those in trailers used for office space or crew quarters may be used — when connected to a closed sewage system. Tanks will be pumped prior to reaching system capacity. Wastes will be hauled to an approved disposal facility.

COA-23: Coordinate the proposed site surfacing (boards or gravel) with the Forest officer in the planning phase. No changes should be made without approval of the Forest officer.

COA-24: Remove all surfacing material (gravel) from the areas not needed for production operations; reseed according to Forest standards within 30 days unless otherwise directed by the authorized Forest officer.

COA-25: Roads and operating areas will be adequately maintained during the life of the authorization. This maintenance shall include blading and shaping to smooth surfaces and pull surfacing material back onto roadway, resurfacing, spot graveling, ditch work, and culvert repair or additional work as specified. This work shall be conducted as needed or as directed by the authorized Forest officer.

COA-26: Except for the driving surface, the road right-of-way will be revegetated according to Forest standards.

COA-27: The road may be left for the use of the Forest Service at the district ranger's discretion.

COA-28: Upon termination of operations, if the district ranger wants the road closed, the Permittee/operator or his authorized representative will:

- Remove all surfacing, bridging and water-handling materials and unless otherwise authorized by the district ranger, remove from national forest land.
- Recontour the abandoned roadway as nearly as practical to original condition.
- Revegetate the abandoned roadway according to Forest Service standards.

COA-29: Use of roads other than those constructed by the Permittee/operator may be subject to additional requirements. Inquiry will be made to the Forest officer prior to use of preexisting roads

COA-30: A permanent vegetation cover will be established on all disturbed areas where bare mineral soil is exposed. The following are procedures recommended and commonly used to accomplish this reclamation.

- Except for those areas needed for access and / or production, areas where soil has been disturbed shall not ordinarily be left unseeded for more than 30 days. If it is anticipated the area will be left exposed for a longer period, seeding should occur immediately — before 30 days have elapsed.
- Seeding areas include cut and fill slopes, all ditches, shoulders, and any other areas exposed by the project.
- Sites such as pit walls and topsoil stockpiles, that will be exposed only one fall growing season, will be seeded according to the forest officer.
- Stockpile soil—during initial clearing for the project, the topsoil (to a depth determined by the Forest officer at the pre-operations meeting) from the site will be removed and stockpiled for later use in restoration. Remove woody material prior to stockpiling soil.
- Waterbars and terraces—during occupancy and restoration, slopes or gradients 3 percent or greater will require waterbars and / or terraces to be constructed and maintained. The Forest officer will instruct where these structures will be placed.

- Baled hay and silt fence for erosion control—Temporary erosion, sediment, and water pollution control measures will be required as determined by the authorized Forest Officer.
- Seedbed preparation—spread stockpiled soil evenly over the site, to produce about 2 to 5 inches of loose soil, seed and fertilize as directed by the authorized Forest Officer. Rip subsoil on pads and roads prior to spreading topsoil as directed by the Forest officer.

COA-31: Reclamation may be approved not earlier than one year following the successful establishment of vegetative cover. Vegetative cover over at least 70 percent of the entire disturbed area will be considered successful establishment, if no gullies or other erosion related problems exist.

COA-32: All equipment or rubbish must be removed prior to Forest Service acceptance of the site as restored.

COA-33: Performance bonds (if applicable) will not be released until satisfactory reclamation is complete.

COA-34: Pesticides, including herbicides, may not be used to control undesirable woody and herbaceous vegetation, aquatic plants, insects, rodents, or trash fish without prior written approval of the Forest officer. A request for approval of planned uses and schedule of applications of pesticides will be submitted annually by the Permittee/operator. Exceptions to this schedule may be allowed only when unexpected outbreaks of pest require control measures which were not anticipated at the time the annual report was submitted At that time an emergency request and approval may be made.

COA-35: Only those materials registered by the U.S. Environmental Protection Agency for the specific purpose planned will be considered for use on national forest land. Label instructions will be strictly followed in the application of pesticides and disposal of excess materials and containers.

COA-36: Any chemicals stored on site will have prominent labeling and stored off the ground out of direct sunlight.

COA-37: A list of chemicals (including MSOS sheets) on site will be provided to the district ranger’s office for emergency response planning.

COA-38: Site access roads will be gated only upon the approval of the Forest officer. Gate specifications must also be approved by the Forest officer. Gates shall be signed and comply with the Manual of Uniform Traffic Control Devices (MUTCD).

COA-39: Signs restricting public access will be placed only with the approval of the district ranger. All signs will be removed by the Permittee/operator at the conclusion of operations.

COA-40: All vehicles used on the construction sites will be equipped with a fire extinguisher.

COA-41: All gasoline- and diesel-powered equipment must have Forest Service approved spark arrestors/mufflers.

COA-42: Take all reasonable action to prevent and suppress forest fires and require all employees to do likewise.

COA-43: Pay for the cost of suppressing forest fires and damages to government property caused by fires resulting from acts of the Permittee/operator, his subcontractors, operators, or his employees.

COA-44: Notify the district ranger in case of fire and take immediate action to control the fire. The district ranger will provide the Permittee/operator with phone numbers where fires shall be reported.

COA-45: The permittee/operator shall protect, in place, all public land survey monuments, private property corners, and Forest boundary markers. In the event that any such land markers or monuments are destroyed in the exercise of the privileges authorized by this permit, depending on the type of monument destroyed, the holder shall see that they are reestablished or referenced in accordance with (1) the procedures outlined in the Manual of Instructions for the Survey of the Public Land of the United States, (2) the specifications of the county surveyor, or (3) the specifications of the Forest Service.

Conditions of Approval Specific to Oil/gas Operations

COA-46: Locate the well site on the most level upland location that will accommodate the intended use, away from drainages and riparian areas. Site layout will be oriented to conform to the best topographic situation given the geologic target and any safety considerations. The site will be staked and reviewed to determine its compliance with environmental analysis documentation. Any timber cutting will be done in accordance with and under the direction of the authorized Forest Officer.

COA-47: The method of disposal of drilling fluids and cuttings must be approved by the authorized officer.

COA-48: Construct mud/reserve pits so that they will not leak, break, or allow any discharge of liquids. The need for lining production pits and other types of pits with either an impervious clay material or an artificial liner will be determined by the Forest officer. If a liner is required, it will be installed along the bottom and sides of pits and be equivalent to 3 continuous feet of recompacted or natural clay. Such liners include:

- Natural liner
- Soil mixture liner
- Recompacted clay liner
- Manufactured liners
- Combination liners

COA-49: Pits are not to be located in stream channels. At least 50 percent of the pit should be constructed in an excavation (cut) of the pad site. Pit walls shall be smoothed and keyed. Side slopes shall not exceed 3:1. Outside pit walls shall be vegetated if drilling time exceeds 12 month

COA-50: Protect pits from surface waters by levees or walls and by drainage ditches, where needed, and no siphons or openings will be placed in or over levees or walls that would permit escaping of contents so as to cause pollution or contamination.

COA-51: After drilling operations cease:

- The disposal of fluids and cuttings will be accomplished within 30 days of completion of the drilling operations
- Materials may be pumped back down hole only after proper approval from the Illinois State or Bureau of Land Management (**BLM**), as applicable,

COA-52: Pit sludge and cuttings may be buried on site in the existing pit only if an independent laboratory has tested the material and provided the Forest Service with proof that

all Federal and State waste disposal requirements are met. If burial is allowed, only existing pits may be utilized. If burial is not allowed, all drilling sludge and cuttings will be removed and appropriately disposed of. If man-made pit liners are used they will be removed from the pit and disposed of off of national forest.

COA-53: Pits will be backfilled when dry; and site smoothed and recontoured as near as practicable to the original topography, with stockpiled topsoil respread evenly.

COA-54: Reserve pit closure — Pits will be closed in accordance with Illinois state standards.

COA-55: Within 90 days of termination of oil or gas production, or plugging of the well, remove the wellhead control device and appurtenances, unless Permittee/operator has approval from the BLM not to remove them. Remove gravel or other surfacing, recontour the site and revegetate according to Forest Service specifications.

COA-56: Conditions specific to petroleum/gas production equipment:

- Petroleum product and water storage tanks will be placed on level ground and surrounded by a dike capable of holding 1-1/ 2 times the volume of the largest tank. A sump shall be installed inside the dike and routinely pumped to prevent overflow.
- Tanks will be placed on a stable, solid foundation six inches or more in height to insure that they remain clear of standing water. The foundation will be designed so that it will not subside and cause the tanks to sink or lean. Trenching within diked areas will not be allowed.
- Dikes will not be dug from a level surface. Instead, a level surface will be used as a base with the dike built upon that. The dike core will be of clay or other similarly impermeable material. The top of the dike will be level and maintained so that it does not become beaten down at any point. The top of the dike should be a minimum of 18 inches in width and side slopes of no greater than 3:1. It is recommended that the sides and top of all dikes be covered with a thick plastic sheet and washed gravel on top of the plastic. This will help prevent erosion and sloughing of dike material. Also, this will help solve the problem of vegetation growth and fire hazards; spraying or mowing should not be necessary. Dikes must be constructed before any liquid is stored in the tanks.
- Any liquids collected within dikes, including liquids that may be rainwater, will not be drained off the site (outside dike area). Drains will not be installed. Liquids will be removed by vacuum truck to an approved disposal or injection facility.
- All lines used to drain oil or salt water will have well-maintained and sealed valves to prevent leaks and vandalism. Load-out valves shall be located within dike area.
- Only that amount of the site that is needed to contain production facilities, a reasonable adjacent work area, and the access road will be occupied. The remaining authorized area will be restored as per Forest Service standards. Guy wires left on site form work-over rigging will be well-marked.
- A fence is required to exclude casual foot traffic and cattle. It will enclose all surface production equipment. Its location will be approved by the Forest officer. Construction standards will be to specifications supplied by the Forest officer. These specifications, as a minimum, include safety signs and fencing. Forest Service requirements for signing gates will be met.
- On-site equipment will be kept well maintained, neatly arranged, and painted where appropriate. It is the intent that a neat, orderly appearance is presented. Facilities will

be painted to blend into the surrounding environment; specific painting requirements will be determined by the authorized Forest officer.

COA-57: Upon a spill occurrence, the permittee shall take immediate containment and cleanup action and notify the Forest officer at the earliest opportunity — not more than 48 hours. The plan shall include all pipelines.

COA-58: Upon plugging and abandonment of the well bore, the casing will be cut off below ground level as per state and BLM specifications.

COA-59: All nonessential equipment for the production facility will be removed from national forest land within 30 days of being excess.

COA-60: It is the permittee's responsibility to notify the district ranger when flaring of the formation gas is to begin. Prior to flaring, the permittee must have approval from State or BLM as appropriate.

COA-61: Maintain a fuel break by mowing around all production equipment to reduce fire danger during the months from May through September.

COA-62: If H2S is encountered during the drilling process, the Forest Service must be notified within 12 hours. If the operator is drilling into a zone known to contain H2S, a safety plan must be prepared and attached to the permit. This plan should identify safety equipment to be maintained on site, how the area will be posted, emergency procedures, and a secondary exit in case of an emergency. All H2S wells will be fenced and posted accordingly. These wells will be monitored according to the level of H2S being emitted.

COA-63: Related mechanical facilities such as pumps, pump stations, and tanks shall be designed, constructed, operated and maintained in accordance with safe and proven engineering practice, and meet or exceed recognized engineering standards for the type of facility.

COA-64: Pipeline rights-of-way outside the scope of the lease will be authorized by a special-use permit. Conditions of use, including restoration and abandonment, will be included in the permit.

Appendix D

Harvest Methods

Cover photo: Pines overlook at Red Bluff Campground, Mark Twain National Forest, USDA Forest Service

Photographer: Joe Walker

Appendix D

Harvest Methods

Silvicultural Systems and Regeneration Harvest Methods

The principal objective in harvesting timber is to regenerate a stand and maintain it in a healthy, vigorous condition to meet a number of resource management objectives. These include enhancing forest health and species diversity, restoring historic natural vegetation and community type, visual management, wildlife habitat, timber quality, and integrated pest management. Moving toward the desired condition is foremost in selecting the harvest method.

Even-aged System

Even-aged methods regenerate and maintain a stand with a single age class. The three types are clearcut, seed tree, and shelterwood. Forest-wide Standards and Guides require a minimum of 7 to 10 percent of all even-aged harvest units be retained as reserve trees. According to the Dictionary of Forestry published by the Society of American Foresters, even-aged management as practiced on the Mark Twain is actually two-aged management because of the amount of reserves. To avoid confusion, the Mark twain will continue to refer to clearcutting, seed tree, and shelterwood “with reserves” as even-aged management. However, the resulting stand may be two-aged or trend towards an uneven-aged condition as a consequence of both an extended period of regeneration establishment and the retention of reserve trees that may represent one or more age classes.

Uneven-aged System

Uneven-aged methods regenerate and maintain a multi-aged structure by removing some trees in all size classes either singly or in small groups. The two major types are group selection and single tree selection. A stand may be considered uneven-aged if three or more 20-year age classes are developed within the stand (Roach, 1974). Harvesting, with repeated entries, is an ongoing process with uneven-aged management. . For example under an uneven-aged system with a 20-year cutting cycle there would be regeneration harvesting activity, perhaps accompanied by pre-commercial thinning or other cultural work, approximately every 20 years .

Clearcutting with Reserves

Clearcutting with reserves is the cutting of essentially all trees except for reserve trees, producing a fully exposed microclimate for the development of a new age class. Regeneration can be from natural seeding, direct seeding, planted seedlings, or advance reproduction. Varying numbers of reserve trees are not harvested to attain goals other than regeneration.

Seed tree with Reserves

Seed tree with reserves is the cutting of all trees except for a small number of widely dispersed trees retained for seed production, and to produce a new age class in a fully exposed microenvironment. Some of the seed trees or other reserve trees are retained after regeneration has become established to attain goals other than regeneration.

Shelterwood with Reserves

Shelterwood with reserves is the cutting of most trees, leaving those needed to produce sufficient shade to produce a new age class in a moderated microenvironment. The sequence of cutting can include three types of cuttings: (a) an optional preparatory cut to enhance conditions for seed production, (b) an establishment cut to prepare the seed bed and create a new age class, and (c) a removal cut to release established regeneration from competition with the overwood. Some of the shelterwood trees or other reserve trees are retained after regeneration has become established to attain goals other than regeneration.

Group Selection

Group selection is a method of regenerating uneven-aged stands in which trees are removed, and new age classes are established, in small groups. The objective of this method is to establish regeneration at each harvest cycle, thereby producing an uneven-aged stand. Because the removal of groups will permit more light to reach the forest floor than with single tree selection, group selection can be used to encourage a higher proportion of shade-intolerant species. The width of smaller groups is commonly twice the height of the mature trees, and the width of larger openings is up to two acres.

Single Tree Selection

Single tree selection is the periodic removal of individual trees. The goal is to maintain a given number of trees in each diameter class. This practice should not be confused with "high-grading" where only the best large trees are cut. In order for the practice to work, some trees must be cut within most or all diameter classes. To maintain the desired distribution of trees by diameter classes or diameter group (i.e., basal area in pole-size timber) it may be necessary to remove trees of less than saw timber size at different periods of the cutting cycle. Harvesting, with repeated entries, is an ongoing process in single tree selection. It involves the cutting of selected individual trees throughout most or all size classes, creating stands of mixed ages and sizes. It simulates natural disturbances such as might result from the periodic death of scattered trees in a climax forest. Since regeneration is established under the partial shade of the overstory, and new seedlings must survive for long periods under this shade, single tree selection is useful as a regeneration cutting method primarily for species that are shade tolerant. However, it has been shown that this method can be used to successfully regenerate oak/pine forests in the Missouri Ozarks with careful attention to residual overstocking, and when restricted to favorable sites and aspects.

Intermediate Treatments

Release

Release is a treatment to free young trees from undesirable competition (usually overtopping), and can be used to improve the composition, structure, condition, health, and growth of a stand. Release treatments are made no later than 10 years of age in shortleaf pine stands and no later than 15 years of age in hardwood and hardwood-pine stands.

Pre-commercial Thinning (PCT)

Pre-commercial thinning is used to maintain or improve species composition by favoring desired species, and to obtain desired stocking levels for forest health and increased growth.

PCT treatments are made between 10 to 30 years of age in shortleaf pine, and between 15 to 35 years of age in hardwood and hardwood-pine stands.

Commercial Thinning

Commercial thinning is an intermediate treatment that reduces basal area by cutting and removing trees by means of a commercial timber sale. The treatments may be made to improve growth, enhance forest health, obtain advanced regeneration, or move the stand toward its natural community type. Methods of thinning include:

Thinning from Above

The removal of trees from the dominant and co-dominant crown classes in order to favor the best trees of those same crown classes.

Thinning from Below

The removal of trees from the lower crown classes to favor those in the upper crown classes.

Mechanical Thinning

The thinning of trees in either even-aged or uneven-aged stands involving removal of trees in rows, strips, or by using fixed spacing intervals.

Restoration Thinning

Thinning to a specified basal area to restore the natural community type.

Selection Thinning

Selection thinning is the removal of trees in the dominant crown class in order to favor the lower crown classes.

Improvement Cuts

Improvement cuts are used under the uneven-aged management system to achieve internal stand structure objectives when regeneration is not an objective. They may be applied each entry if necessary.

Choice of Regeneration Harvest Method

The Forest manages four principal timber types. These are Oak-Hickory, Oak-Pine, Shortleaf Pine, and Bottomland Hardwoods. The primary regeneration harvest methods for managing these timber types on the forest are clearcutting with reserves, seed tree with reserves, shelterwood with reserves, and group selection. Documentation of silvicultural systems for these timber types is found in two publications (Silvicultural Systems for the Major Forest Types of the United States-Agricultural Handbook 445, and Silvics of North America Volumes 1 and 2-Agricultural Handbook 654). The decision on which regeneration harvest method to use is based on desired condition, management objectives, stand conditions, and the silvical characteristics of the species present or desired.

*Clearcutting can be used only where it has been found to be the optimum method of regeneration to meet multiple-use objectives. Other even-aged harvest methods can be used only when determined to be appropriate. (16 USC 1604, Section 6(g)(3)(F)(i)) These determinations are made and documented as part of each individual project decision.

Table D-1 summarizes the cutting methods recommended for regeneration of the four major forest types found on the Mark Twain National Forest. For more detailed information, see Silvicultural Systems for the Major Forest Types of the United States-Agricultural Handbook 445, pp. 116 – 120 (Oak-Hickory); pp. 172 – 174 (Oak-Pine); pp. 157 – 161(Shortleaf Pine); pp. 175 – 179 (Bottomland Forests).

Table D-1. Recommended Harvest Cutting Methods for Regeneration of Desired Forest Types

Forest Type	Clearcutting w/ reserves	Shelterwood w/ reserves	Seedtree w/reserves	Group Selection	Single Tree Selection
Shortleaf Pine	R	R	R	A	NGR
Oak-Pine	R	R	NR	A	NGR
Oak-Hickory	R	R	NR	A	NGR
Bottomland Hardwoods	R	R	NR	A	A

R = Recommended method; A = Acceptable method; NR =Not recommended; NGR = Not generally recommended

The decision of which regeneration method to use is made at the site-specific project level. The following discussion provides general information regarding each of the harvest cutting methods and under what circumstances they might be used.

Even-aged System

Even-aged systems are most suited to regenerating shade-intolerant species. With even-aged systems, regeneration harvests generally occur in a stand only once during the rotation age cycle, which on the Mark Twain National Forest ranges from 70 to 120 years.

Clearcutting with Reserves

Clearcutting is the optimum method for regenerating shade-intolerant species such as oak and shortleaf pine when advance reproduction is adequate or artificial regeneration is planned. Clearcutting may also be optimal for stands where the residual trees would not be worth retaining for a future crop, when stands have had the best trees removed in past harvests, in heavily damaged or declining stands. Clearcutting may be optimal for treating oak mortality related to oak decline, especially where red oak species predominate. Clearcutting may also be optimal for shifting species composition where the restoration of natural communities requires a stronger representation of shade-intolerant species.

Clearcutting is also used to provide shrub-brush habitat for wildlife species that use openings, edges, and low browse, such as white-tailed deer, rabbit, bobcat, most game birds, Bachman's sparrow, northern bobwhite, prairie warbler, woodcock, indigo bunting, eastern towhee, yellow-breasted chat and ruffed grouse.

Seed tree with Reserves

Seed tree cuts can be used for regenerating shortleaf pine where the seedbed is satisfactory for natural pine seeding, there are adequate seed trees, and a good seed crop is anticipated. It

is not recommended for use with the hardwood species present on the Mark Twain because these species do not produce a consistent and reliable seed crop, and are not readily regenerated via seed sources.

Shelterwood with Reserves

The shelterwood method is most appropriate for species or sites where the shelter of a partial overstory is needed for reproduction, or to give desirable regeneration an advantage over less desirable species. Shelterwood cutting can be used to shift species composition where the restoration of natural communities (especially in savannas and woodlands) requires a stronger representation of shade-intolerant species. Shelterwood cuts are also useful for regenerating stands in areas with high visual quality objectives.

Uneven-aged System

Uneven-aged systems are most suited to regenerating shade tolerant species. With uneven-aged systems, regeneration harvests occur in a stand several times (approximately every 20 years) during the rotation age cycle, which on the Mark Twain National Forest ranges from 70 to 120 years.

Uneven-aged harvest methods are generally considered to be less visually impacting than even-aged methods due to the maintenance of continuously forested conditions, and so are useful in areas of high visual concern. However, the frequent and repeated harvest operations required by this system, and the associated increase in road maintenance, are objectionable to some.

Group Selection

Group selection harvest systems develop a vegetative condition with an interconnected canopy and many small openings (0.25 acre to 2 acres), providing habitat for those wildlife species that use a forested environment with many small openings in a variety of age classes.

Single Tree Selection

The single tree selection method can meet the needs of most cavity dwelling and closed canopy wildlife species, assuming it is carried out for many decades.*

Appendix E

Goods, Services, and Probable Management Practices

Cover photo: Summer Tanager, Missouri Department of Conservation

Photographer: Jim Rathert

Appendix E

Goods, Services, and Probable Management Practices

Introduction

This Appendix displays an estimate of the goods and services provided, the proposed (Decade 1) and probable (Decade 2) management practices expected, and information including land classification.

The outputs and proposed and probable practices listed are projections based on available inventory data and on computer modeling.

NOTE: The outputs and amounts listed below are estimates and are subject to annual budgets for funding the resource programs on the forest. Actual amounts may vary from these and will be monitored on an annual basis.

Land Classification

Land identified as suitable for timber management include producing timber as part of multiple use direction. These are lands that contribute to the timber sale program on a regularly scheduled basis. Table E-1 shows how acres of these lands compare to the total acreage of National Forest System land.

Table E-1. Classification of national forest land for timber production.

Classification	Acres
Total National Forest System land	1,495,747
Non-forest and water	107,261
Legally withdrawn (Wilderness, *National* Scenic River)	69,981
Land not physically suited for timber production (e.g., low site index, regeneration not assured)	1,964
Land not appropriate for timber production due to other resource Management (e.g., riparian areas, campgrounds, unique areas)	319,829
Land suitable for timber management	996,712

Allowable Sale Quantity (ASQ)

The allowable sale quantity of timber (ASQ) is the maximum amount of volume that may be offered and sold during a given decade of Forest Plan implementation from land identified as suitable for timber management. ASQ is normally expressed as an annual average.

During Decade 1 (the first ten years of plan implementation) the ASQ is 1,030 million board feet (171 million cubic feet). The amount of timber that may be sold annually may exceed

103 million board feet as long as the decadal ASQ is not exceeded. Decade 2 is estimated to be the same as Decade 1.

The estimated volumes that can be harvested in each decade on a long term, sustained yield capacity is equal to the annual ASQ of 17,156 mcf per year (103 mmbf). Volumes in decades 1-15 are all equal to these numbers.

Proposed (Decade 1) and Probable (Decade 2) Management Practices

Tables E-2 and E-3 list the proposed and probable management activities that would be used to work toward the vegetative and other multiple-use desired conditions and objectives of the Forest Plan. The table displays the amount of each harvest treatment for the first two decades of plan implementation based upon modeling estimates. Actual treatments during plan implementation may vary from these modeled outputs. Regeneration treatments set the forest vegetation back to age zero, meeting the 0-9 year old age class objective and include, but not limited to, clearcutting, seed tree, shelterwood, and uneven-aged harvests intended to regenerate forest vegetation. Thinning treatments include, but not limited to, commercial thinning and uneven-aged harvests intended to reduce the basal area of tree stocking of forest vegetation.

Table E-2. Estimate of acres of timber harvest by treatment method (Forestwide)

	Decade 1 (Proposed)		Decade 2 (Probable)	
Treatment Method	**Acres**	**Percent**	**Acres**	**Percent**
Commercial Thinning	99,800	47%	99,800	47%
*Clearcutting	66,100	31%	66,100	31%
Shelterwood cutting	16,000	8%	16,000	8%
Seed Tree cutting	7,000	3%	7,000	3%
Single Tree Selection	3,200	2%	3,200	2%
Group Selection	20,400	10%	20,400	10%*
Totals	212,500	100%	212,500	100%

Table E-3. Proposed management activities for Decade 1.

Management Activity	Unit	MP 1.1 and 1.2 Ecosystem Restoration	MP 2.1 General Forest	MP 5.1 Wilderness	MP 6.1 Semi Primitive Non Motorized	MP 6.2 Semi Primitive Motorized	Decade Total
Commercial Thinning	acres	33,600	50,000	0	1,200	15,000	99,800
Pre-commercial thinning and release	acres	7,500	30,000	0	300	2,400	40,200
Regeneration cut	acres	34,500	65,000	0	1,200	12,000	112,700
Temporary roads	miles	480	800	0	20	200	1,500
Skid Trails (1mile = .96 acres)	acres	1,300	2,150	0	50	500	4,000
Non-commercial thinning	acres	8,400	0	0	0	0	8,400
Red Cedar Reduction	acres	10,600	2,000	0	0	0	12,600
Prescribed Burning	acres	236,600	270,300	42,900	32,100	87,300	688,000*
Hazard Fuels Treatment - Mechanical	acres	36,500	77,600	21,500	6,800	6,800	149,200

** Includes a total of 18,800 acres in Management Prescriptions 6.3 and 8.1*

Probable activities for Decade 2 are the same as for Decade 1.

Table E-4 lists the estimated acres proposed for ecosystem restoration work. This work moves the Forest toward the desired conditions and objectives during the first 10 years of Plan implementation.

Table E-4. Estimated Acres in MP 1.1 and 1.2 to be treated for restoration in Decade 1 based on Forest Plan objectives.

Natural Community Type	Minimum	Maximum
Prairie	100	500
Savanna	5,300	13,400
Open Woodland	36,300	45,300
Closed Woodland	41,800	50,400
Forest	0	19,300
Glade	13,900	19,400
Fens	11	889
Total	97,411	149,189

Appendix F

Recreation Opportunity Spectrum

Mark Twain
National Forest
Forest Plan

Cover photo: Wavy-leaved coneflower on dolomite glad, Missouri Department of Conservation

Photographer: Jim Rathert

Appendix F

Recreation Opportunity Spectrum

Overview

When the goal of the recreationist is to obtain satisfying experiences, the goal of the recreation resource manager becomes one of providing the opportunities for these experiences. By managing the natural resource settings, and the activities which occur within it, the manager is providing the opportunities for the recreation experience to take place. Therefore, for both the manger and the recreationist, recreation opportunities can be expressed in terms of three principal components: the activities, the setting, and the experience.

Probable experience opportunities have been arranged along a continuum called the Recreation Opportunity Spectrum (ROS) and is divided into six classes.

Forest Plan Application

The Forest Plan is built around the concept of management prescriptions. Each management prescription defines and describes a future condition for managing National Forest System lands. The Recreation Opportunity Spectrum is a tool used to define the recreation program objectives for each management prescription.

The following table shows how ROS classes and management prescriptions relate.

Table F-1. MTNF Management Prescription by ROS class.

Primitive	Semi-Primitive Non-motorized	Semi-Primitive Motorized	Roaded Natural	Rural	Urban
5.1	6.1	1.2, 6.2	1.1	7.1	–

Other Management Prescriptions are not shown above for the following reasons:

- Under Management Prescription 6.3 the candidate rivers ROS objectives are tied to the classification of each river segment. Scenic river areas are under the semi-primitive motorized class and recreation river areas under roaded natural.
- For Management Prescription 8.1 areas are usually smaller than one hundred acres and are normally under the roaded natural class. In areas with specific standards and guidelines a different ROS class may be the objective and it will be stated with the management direction. For example, National Recreation Trails are under the semi-primitive non-motorized part of the Spectrum.

The following chart shows in detail what is expected in each of the settings throughout the Recreation Opportunity Spectrum.

	Setting	**Setting**
Primitive	**Physical**	**Theme:** Remote (3 miles from motorized use), predominately unmodified, naturally evolving **Size*:** 5,000 + acres **Infrastructure**:** *Access* - Non-motorized trails are present. Remnants of past roads may be visible. *Fishing sites* –rivers and lakes; *Camp/Picnic sites* – not developed or defined, leave no trace; *Sanitation* – no facilities, leave no trace; *Water supply* – undeveloped natural; *Signing* – minimal, constructed of rustic, natural materials; *Interpretation* - through self discovery and at trailheads; *Water crossing* – minimal, some bridges made of natural materials (wood) may exist but are rare. **Vegetation:** Natural, no treatments except for fire use.
	Managerial	Few signs, few encounters with rangers, Travel on foot and horse, no motorized or mechanized travel allowed.
	Social***	Very high probability of solitude; closeness to nature; self-reliance, high challenge and risk; little evidence of people.
Semi-Primitive Non-Motorized	**Physical**	**Theme:** Predominately natural/natural appearing; less remote (between ½ and 3 miles from open motorized routes); rustic improvements to protect resources. **Size*:** 2,500 + acres (No size criteria apply within designated Wilderness boundaries). **Infrastructure**:** *Access* - Non-motorized trails are present. Closed and temporary roads may be present but not dominant on the landscape. Road are surfaced to protect soil and water resources. Use of local roads is usually pickup or logging trucks. *Fishing sites* – rivers, lakes and reservoirs; *Camp/Picnic sites* – not developed, leave no trace *Sanitation* – no facilities, leave no trace *Water supply* – undeveloped natural *Signing* – rustic constructed of natural materials. *Interpretation* - through self discovery, at trailheads *Water crossing* – rustic structures or bridges made of natural materials. **Vegetation:** Predominately natural, treatment areas exist to enhance forest health but are few and widely dispersed;
	Managerial	Minimum or subtle signing and regulations, some encounters with rangers. Motorized travel prohibited.
	Social***	High probability of solitude, closeness to nature, self-reliance high to moderate challenge and risk; some evidence of others.

	Setting	**Setting**
Semi-Primitive Motorized	**Physical**	**Theme:** Predominately Natural, Natural Appearing; may be within ½ mile from open motorized routes, either primitive or improved. **Size:** 2,500 + acres (no minimum size within designated Wilderness) **Infrastructure**:** *Access* - Motorized trails exist Local roads are common; surface is aggregate or native soil. Roads are open for public use *Fishing sites* – rivers, lakes, and reservoirs w/ some trails & primitive roads (motorized trails); *Camp/Picnic sites* – not developed, leave no trace, some identified dispersed areas *Sanitation* – limited facilities, rustic, may have rustic outhouses available. *Water supply* - undeveloped natural, rustic developments; *Signing* – rustic, made of natural materials; *Interpretation* – self discovery, some located on site or at trailheads; *Water crossing* - rustic structures or bridges made of natural material, some designed for motorized use. **Vegetation:** treatment areas are very small in number, widely disbursed, and consistent with natural vegetation patterns.
	Managerial	Minimum or subtle on-site controls with some restrictions; Motorized off-highway vehicles allowed.
	Social***	Moderate probability of solitude, closeness to nature, high degree of challenge and risk using motorized equipment; motorized use visible and audible.

	Setting	**Setting**
Roaded Natural	**Physical**	**Theme:** Natural Appearing with nodes and corridors of Development such as campgrounds, trailheads, boat launches, and rustic, small-scale resorts; within ½ mile of improved roads. Size: **n/a** **Infrastructure**:** *Access* – All road surfaces are present, though system roads are usually aggregate; Classified Road System for all types of vehicle use *Fishing sites* – rivers, lakes, reservoirs with some facilities; *Camp/picnic sites* – identified dispersed and developed sites; *Sanitation* – developed outhouses that blend with setting *Water supply* – often developed *Signing* – rustic with natural materials to more refined using a variety of materials such as fiberglass, metal, etc.; *Interpretation* – simple roadside signs, some interpretive displays *Water crossing* – bridges constructed of natural materials. **Vegetation:** Changes (treatments) to the natural vegetation patterns are evident but in harmony with natural setting.
	Managerial	Opportunity to be with other users in developed sites; some obvious signs (information and regulation) and low to moderate likelihood of meeting Forest Service rangers.
	Social***	Moderate evidence of human sights and sounds; moderate concentration of users at campsites; little challenge or risk.
Rural	**Physical**	**Theme:** Altered Landscapes with natural appearing backdrop. Ranches, administrative sites, and moderately developed resorts are sometimes in this ROS class. **Size: n/a** **Infrastructure**:** *Access* - Travel routes highly developed, classified roads Majority of routes are concrete, paved or graveled. Trails are constructed for ease of movement. *Camp/Picnic sites* – developed and designed for user comfort, variety of construction materials used that blend with setting. May have hookup amenities such as hot water, electricity, and sewage disposal. *Sanitation* – developed and designed for user comfort *Water supply* – developed and designed for user comfort *Signing* – natural and synthetic materials appropriate *Interpretation* –roadside exhibits, interp. Programs, etc; *Water* crossing bridges constructed of a variety of materials, In harmony with landscape **Vegetation:** dominate treatments that blend with landscape.
	Managerial	Obvious signing (regulation and information), education and law enforcement staff available. Motorized and mechanized travel common and often separated.
	Social***	High interaction among users is common. Little challenge or risk associated with being outdoors.

	Setting	**Setting**
Urban	**Physical**	**Theme:** Heavy site modifications and facilities. Backdrop is often natural appearing. Highly developed Ski areas and resorts are examples of urban nodes within NF System lands. **Size: n/a** but typically small nodes **Infrastructure**:** *Access* - Travel routes highly developed (typically maintenance levels 4 and 5) for motorized use often with mass transit supplements available. Trails are constructed for ease of movement. Majority of routes are concrete, paved or graveled. *Camp/Picnic sites* – developed and designed for user comfort, variety of construction materials used, campsites in close proximity to each other, nearby café's and restaurants. *Sanitation* – developed and designed for user comfort, most have running water. *Water supply* – developed and designed for user comfort, many have hot water available. *Signing* – natural and synthetic materials appropriate *Interpretation* –exhibits in staffed visitor centers, roadside exhibits, etc; *Water* crossing bridges constructed of a variety of materials, design for user convenience and safety. **Vegetation:** often planted, manicured and maintained
	Managerial	Intensive on-site management obvious signs and staffing, education and law enforcement available. Motorized and mechanized travel restricted to designated routes. No motorized or mechanized travel allowed off designated travel routes.
	Social***	Opportunity to be with others high degree of interaction with people. Challenge and risk are unimportant except for competitive sports.

**** Size of Primitive areas may be smaller if contiguous to a SPNM area(s)***
Size of SPNM areas may be smaller if contiguous to Primitive area(s)

***** Levels of development for infrastructure should be consistent with definitions for development scales (Appendix A, Meaningful Measures User Guide 2000). New and/or reconstructed facilities should follow BEIG (Built Environment Image Guide) principles and concepts.***

****** Use figures, where available, should be included as part of defining existing conditions of the Social setting. Sources of information include: INFRA, NVUM, MM/CUAs, traffic counts, local surveys and use monitoring, etc.***

Appendix G

Visual Management System

Mark Twain
National Forest
Forest Plan

Cover photo: Turner Mill Wheel, Mark Twain National Forest, USDA Forest Service
Photographer: Randy Long

Appendix G

Visual Management System

Overview

In response to increasing environmental concerns, the Forest Service developed The Visual Management System to inventory, classify, analyze, and manage its visual resources. Maintenance and enhancement of the natural appearance of the characteristic landscape while actively managing for various resource benefits such as timber, grazing, wildlife, and recreation are the system's main objective.

The Visual Management System measures and evaluates two main elements; the physical and man-made features of the land and the publics concern for scenic quality.

Variety Classes

The physical and man-made features are evaluated within the context of the local physiographic character type in terms of three degrees of quality. They are expressed and mapped as Variety Classes; A - Distinctive, B - Common and C - Minimal. These variety classes consider the presence and quality of the elements' landform, rock form, vegetation, streams, lakes and cultural features (man-made elements).

Sensitivity Levels

Peoples concern for scenic quality is measured and evaluated in terms of the number and type of users and the distance they are able to view the landscape from travelways and use areas. The number and types of users are classified to levels of Sensitivity; Level 1 (highest), Level 2 (moderate), and Level 3 (seldom seen). The actual area viewed is considered by distance zones of foreground (fg), middleground (mg) and background (bg) with the premise that the closest area (fg) is most critical. Thus, Sensitivity Level 1, foreground (fg 1) is the most sensitive viewing area.

The following situations were considered Sensitivity Level 1 during mapping:

- Use Areas classified as development level 3, 4 or 5, and those with high level of use.
- Roads and trails (hiking/horse riding) with National or Regional importance (i.e. Ozark Trail), including designated Scenic Byways.
- Primarily, all Interstate, U.S. Highways (Federal primary system which includes principal and secondary arterials) and State numbered roads (principal collectors). Roads that are paved, with high design and construction standards and/or primary connector between collector roads.
- Roads and trails providing primary access to Level 1 Use Areas.
- Waterbodies with National and Regional Ozark Highlands importance; i.e., Eleven Point National Scenic River, Council Bluff Lake, Table Rock Lake.
- Waterbodies that are floatable and fishable at least 10 months of the year. Receives high to moderate recreation-oriented use.

The following situations were considered Sensitivity Level 2 during mapping:

- All developed recreation areas not designated Level 1.
- Primarily all State lettered principal and secondary collectors, all-weather County and Forest Service System roads with observed moderate to high recreation-oriented use and moderate non-recreational use.
- Usually all-weather paved (can be gravel surface) and usually carries through traffic (not dead-end).
- Roads providing access to Level 2 Use Areas.
- All developed trails not designated Level 1.
- Relative large perennial springs that are not developed that receive moderate recreation use.
- Water bodies that are floatable approximately two months of the year (water levels fluctuate moderately with seasons.) Fishing and other water enjoyment activities may occur all year. Receives moderate use.

The following situations were considered Sensitivity Level 3 during mapping:

- Primitive County, Forest Service and private roads. Soil and/or gravel surfaced two-wheel tracks.
- Usually no through traffic. Low recreation-oriented use and high non-recreational use.
- Water bodies that are only periodically floatable and no developed public access; i.e., intermittent streams, small farm and wildlife ponds. Receives low recreation-oriented use.

Visual Quality Objectives

The physical components of the landscape as Variety Classes are combined with the user related Sensitivity Levels to produce Visual Quality Objectives (VQO) of management. There are five differing levels of Visual Quality Objectives; Preservation (P), Retention ®, Partial Retention (PR), Modification (M), and Maximum Modification (MM). Following is a brief description of these five VQO's:

Preservation - Allows ecological change only. Management activities are prohibited except for very low visually impacting recreation facilities.

Retention - Management activities may not be visually evident. Contrasts in form, line, color and texture must be reduced during or immediately after the management activity.

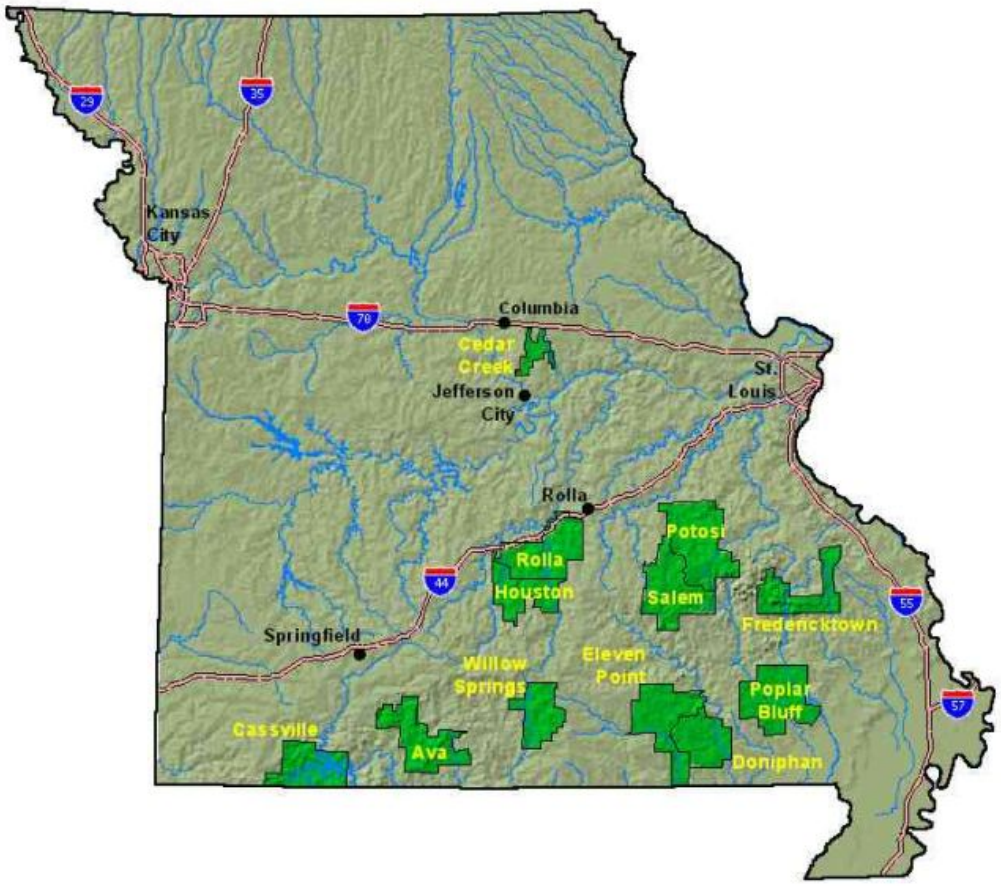
Partial Retention - Management activities must remain visually subordinate to the characteristic landscape. Associated visual impacts in form, line, color and texture must be reduced as soon after project completion as possible but within the first year.

Modification - Management activities may visually dominate the characteristic landscape. However, landform and vegetative alterations must borrow from naturally established form, line, color or texture so as to blend in with the surrounding landscape character. The objective should be met within one year of project completion.

Maximum Modification - Management activities including vegetative and landform alterations may dominate the characteristic landscape. However, when viewed as background they must visually appear as natural occurrences within the surrounding landscapes or character type. Reduction of contrast should be accomplished within five years.

Appendix H

Forest Plan Unit Maps

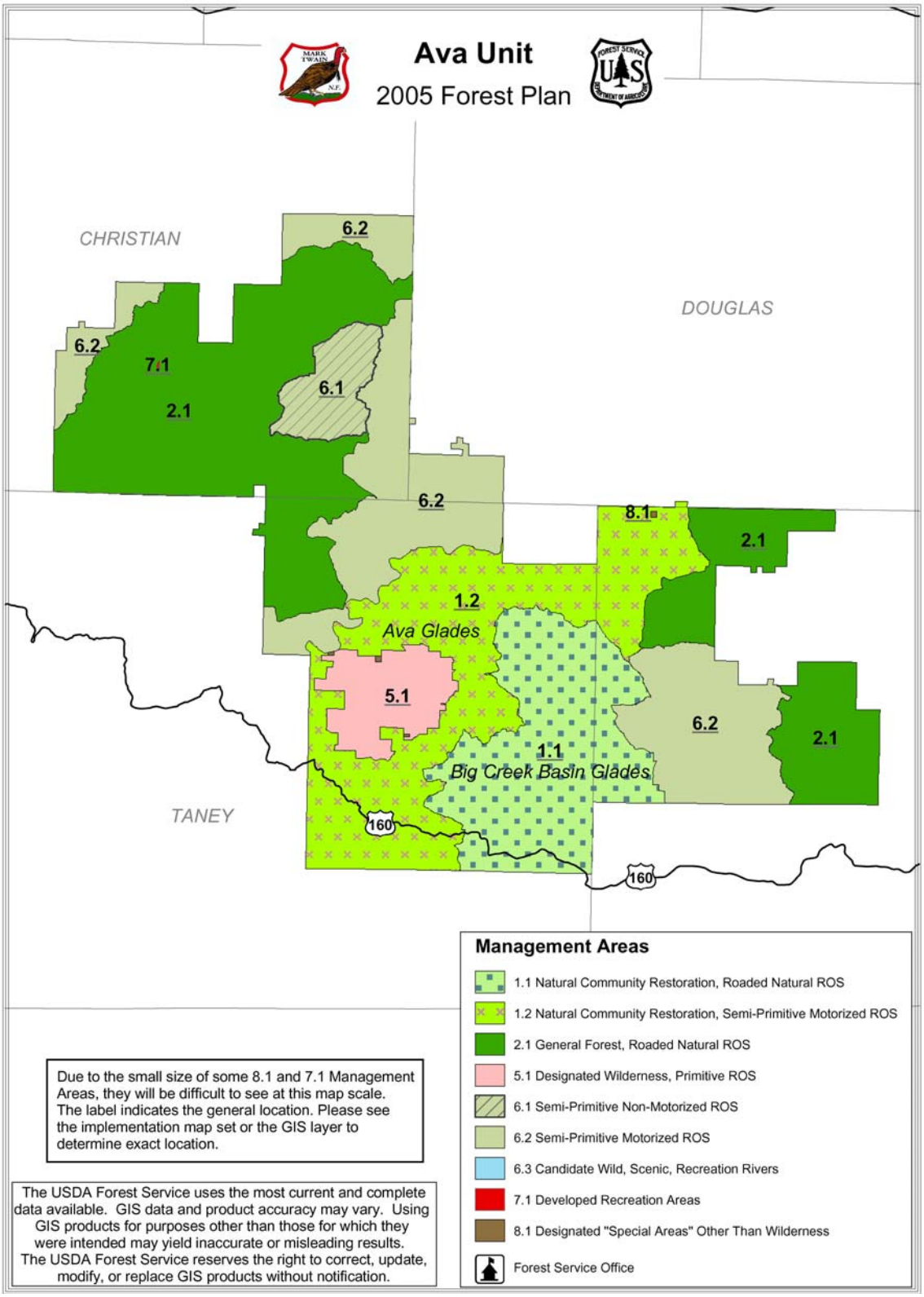


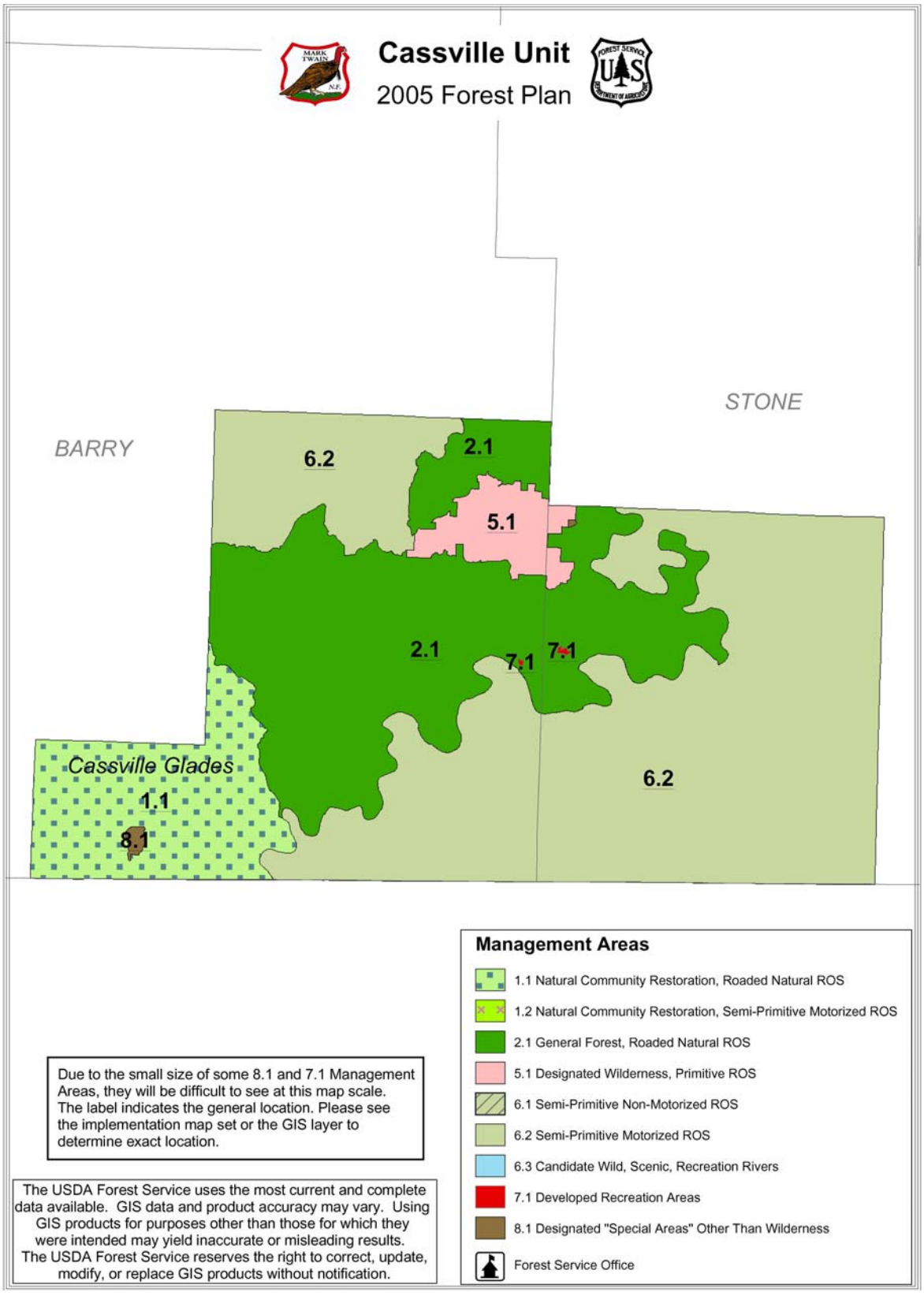
Cover graphic: Location Map for Mark Twain National Forest Units

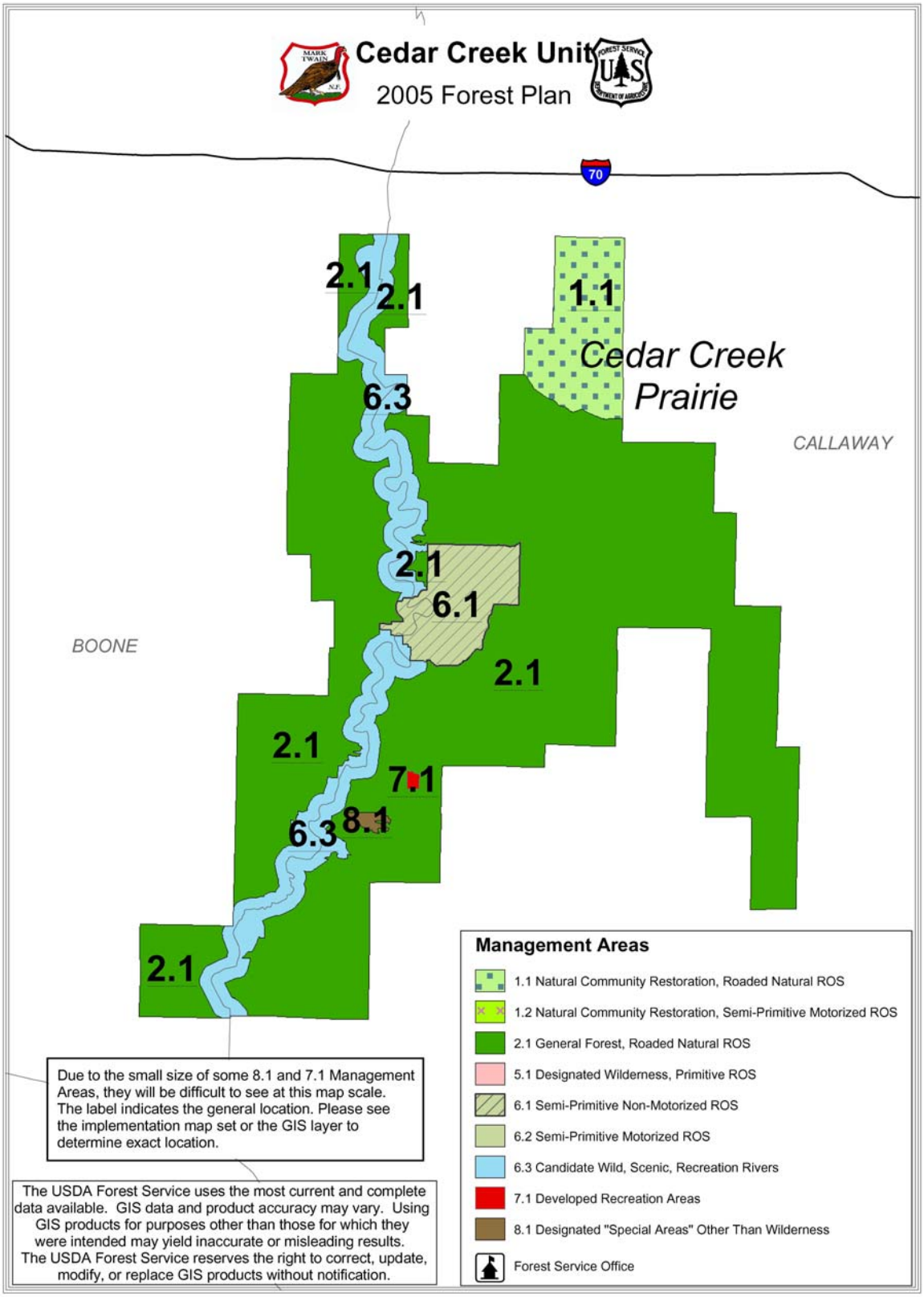
Prepared by: Marg Olson

Appendix H

Forest Plan Unit Maps




Cassville Unit
2005 Forest Plan
BARRY
STONE
6.2
2.1
5.1
2.1
7.1
7.1
Cassville Glades
1.1
8.1
6.2
Management Areas
1.1 Natural Community Restoration, Roaded Natural ROS
1.2 Natural Community Restoration, Semi-Primitive Motorized ROS
2.1 General Forest, Roaded Natural ROS
5.1 Designated Wilderness, Primitive ROS
6.1 Semi-Primitive Non-Motorized ROS
6.2 Semi-Primitive Motorized ROS
6.3 Candidate Wild, Scenic, Recreation Rivers
7.1 Developed Recreation Areas
8.1 Designated "Special Areas" Other Than Wilderness
Forest Service Office
Due to the small size of some 8.1 and 7.1 Management Areas, they will be difficult to see at this map scale. The label indicates the general location. Please see the implementation map set or the GIS layer to determine exact location.
The USDA Forest Service uses the most current and complete data available. GIS data and product accuracy may vary. Using GIS products for purposes other than those for which they were intended may yield inaccurate or misleading results. The USDA Forest Service reserves the right to correct, update, modify, or replace GIS products without notification.


Cedar Creek Unit
2005 Forest Plan
70
2.1
2.1
1.1
Cedar Creek
Prairie
6.3
CALLAWAY
2.1
6.1
BOONE
2.1
2.1
7.1
6.3
8.1
2.1
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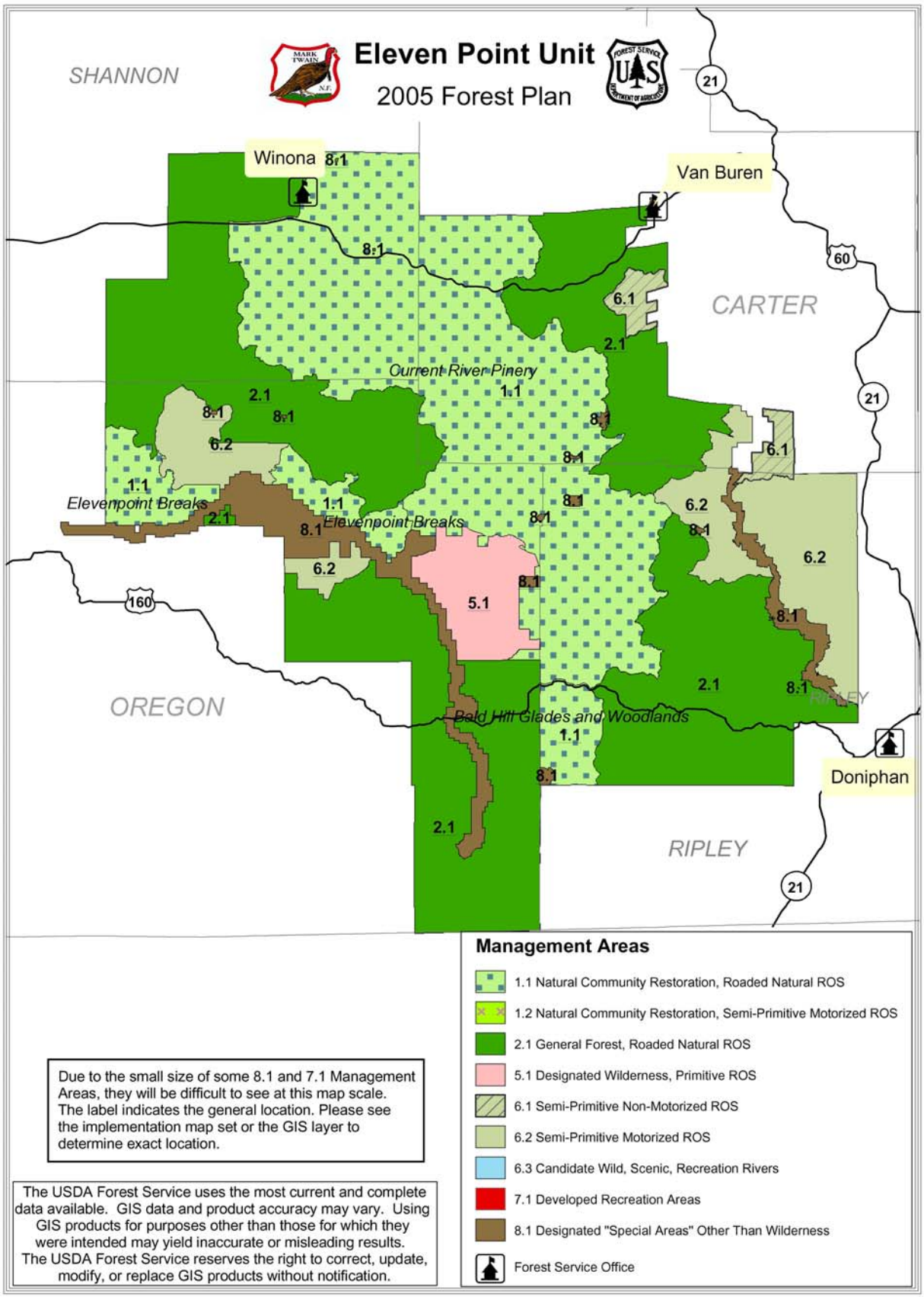
Eleven Point Unit
2005 Forest Plan
SHANNON
CARTER
OREGON
RIPLEY
Winona
Van Buren
Doniphan
Current River Pinery
Elevenpoint Breaks
Elevenpoint Breaks
Bald Hill Glades and Woodlands
21
60
160
Management Areas
1.1 Natural Community Restoration, Roaded Natural ROS
1.2 Natural Community Restoration, Semi-Primitive Motorized ROS
2.1 General Forest, Roaded Natural ROS
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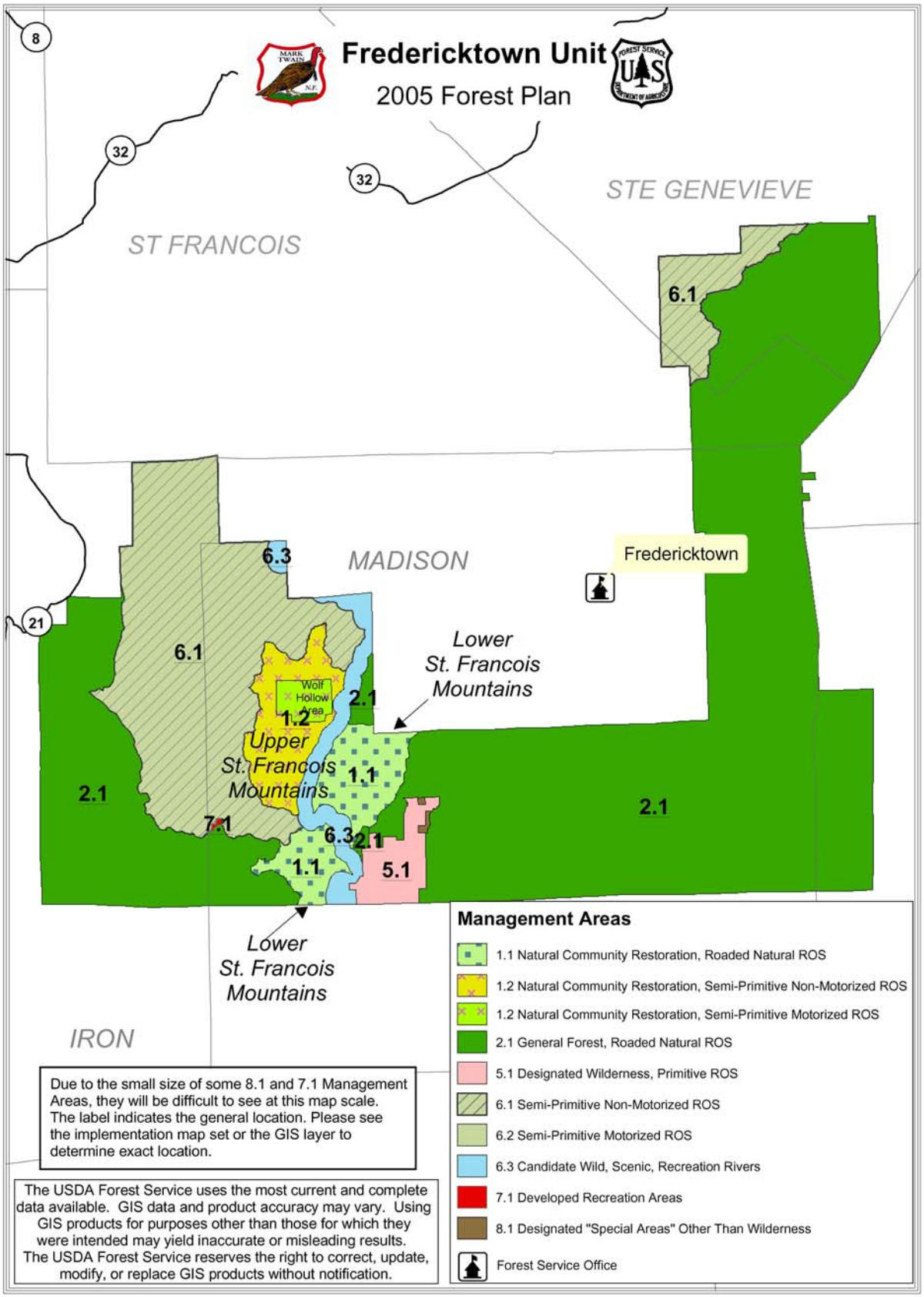
Fredericktown Unit
2005 Forest Plan
8
32
32
21
ST FRANCOIS
STE GENEVIEVE
MADISON
IRON
Fredericktown
Lower St. Francois Mountains
Upper St. Francois Mountains
Lower St. Francois Mountains
Wolf Hollow Area
6.1
6.3
2.1
1.2
1.1
7.1
5.1
Management Areas
1.1 Natural Community Restoration, Roaded Natural ROS
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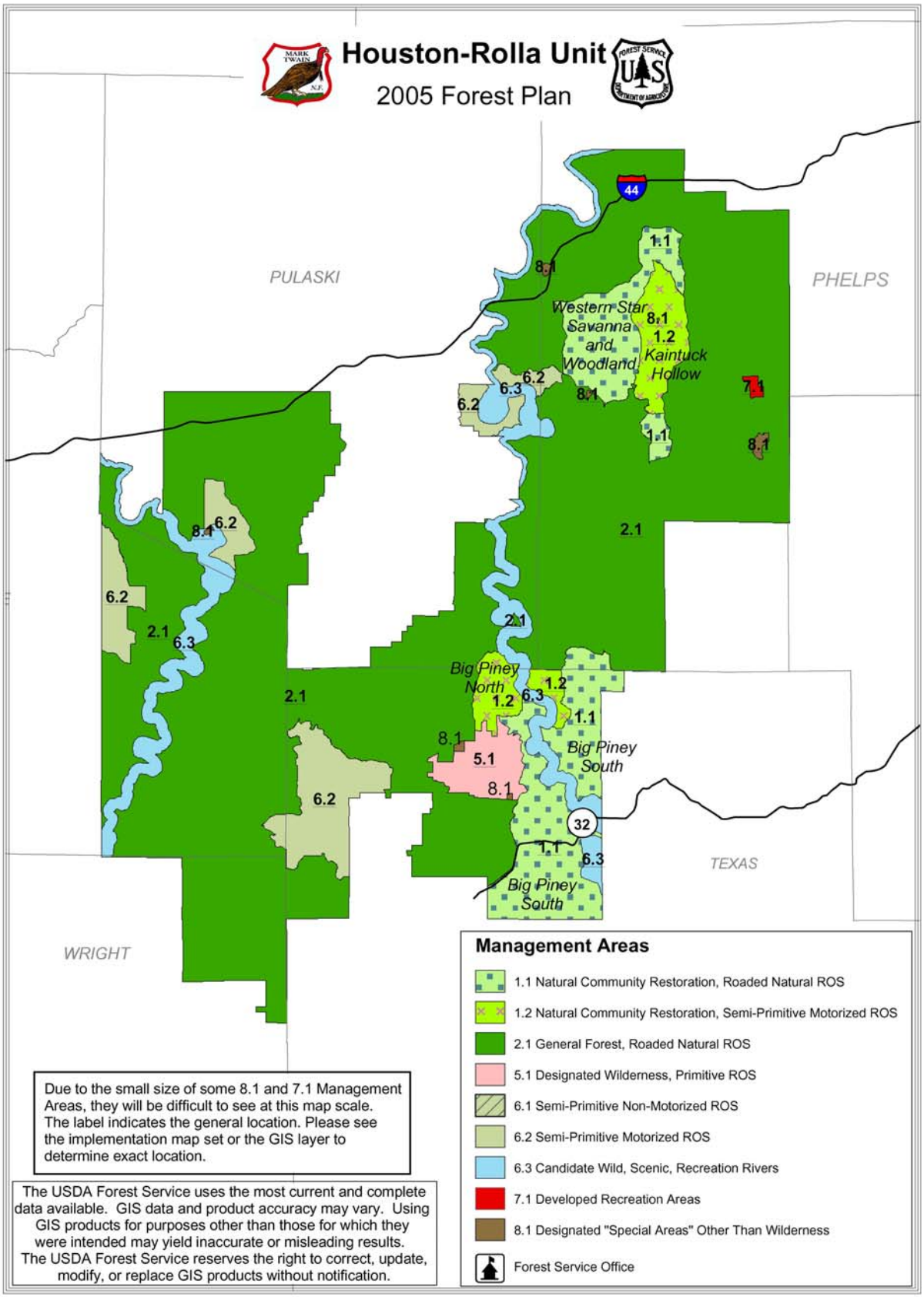
Houston-Rolla Unit
2005 Forest Plan
PULASKI
PHELPS
TEXAS
WRIGHT
44
32
Western Star Savanna and Woodland
Kaintuck Hollow
Big Piney North
Big Piney South
Big Piney South
1.1
8.1
1.2
6.2
6.3
7.1
2.1
5.1
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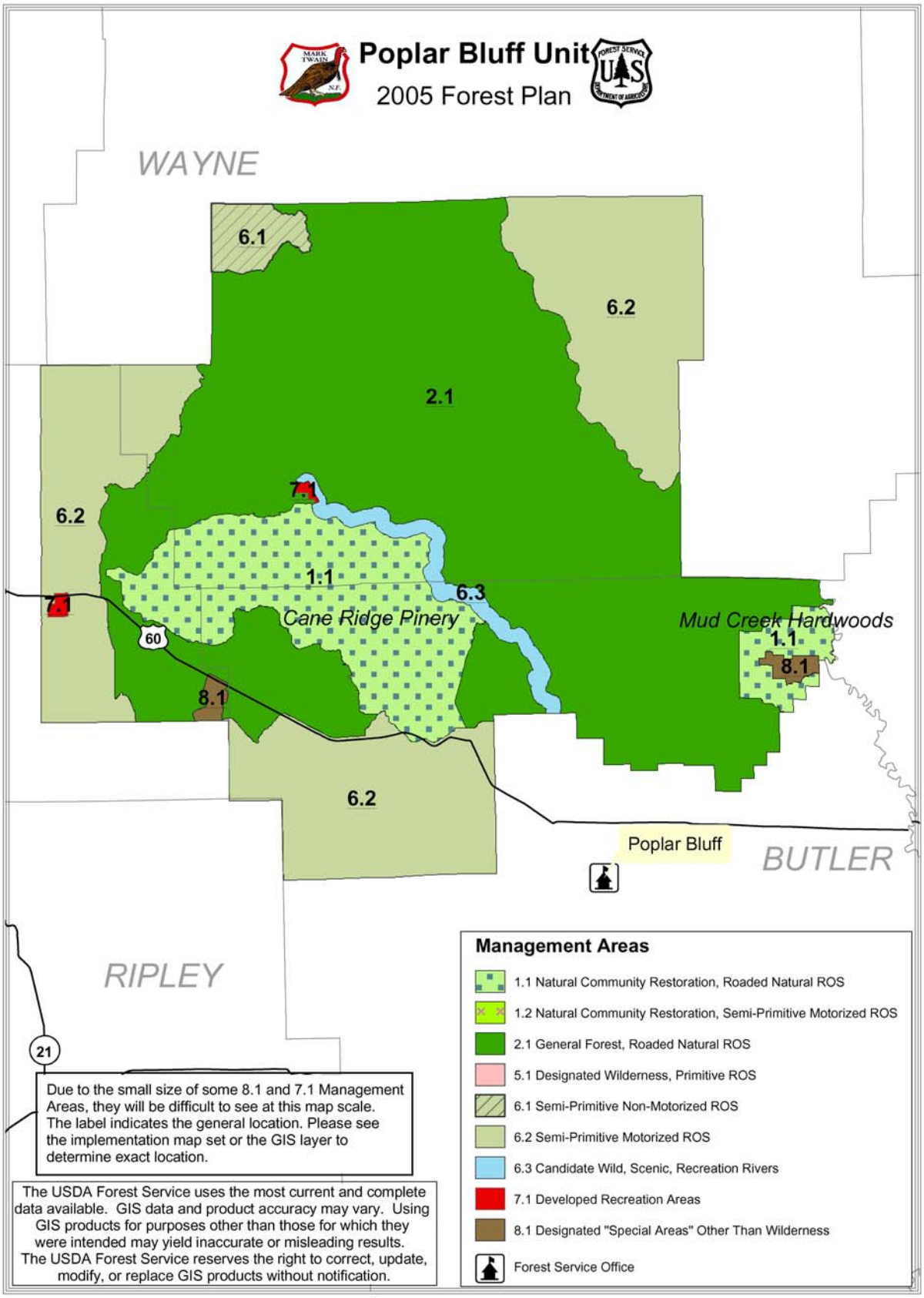
Poplar Bluff Unit
2005 Forest Plan
WAYNE
6.1
6.2
2.1
7.1
6.2
1.1
6.3
7.1
Cane Ridge Pinery
Mud Creek Hardwoods
1.1
8.1
60
8.1
6.2
Poplar Bluff
BUTLER
RIPLEY
21
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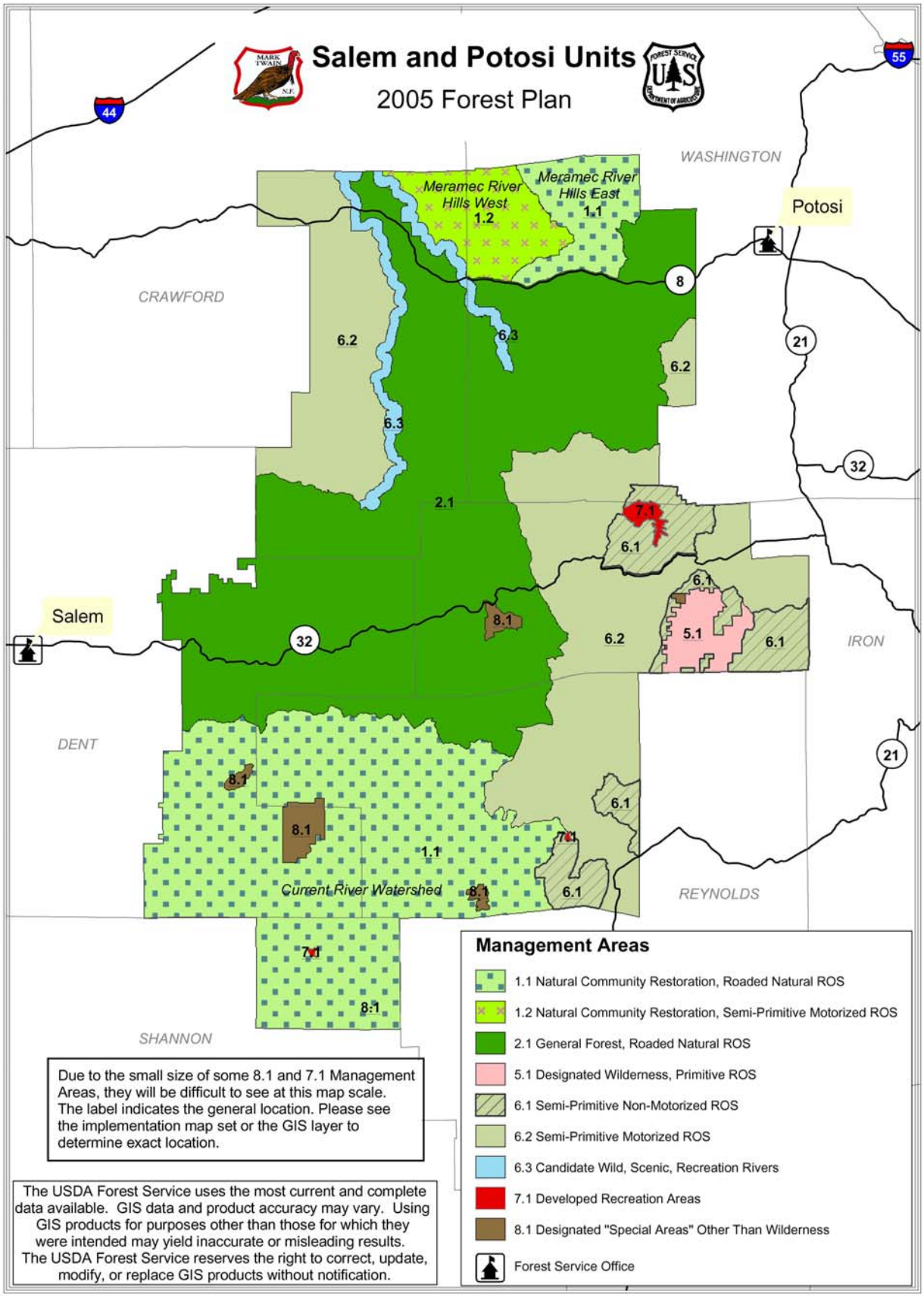
Salem and Potosi Units
2005 Forest Plan
WASHINGTON
CRAWFORD
Meramec River Hills West 1.2
Meramec River Hills East 1.1
Potosi
Salem
IRON
DENT
REYNOLDS
SHANNON
Current River Watershed
Management Areas
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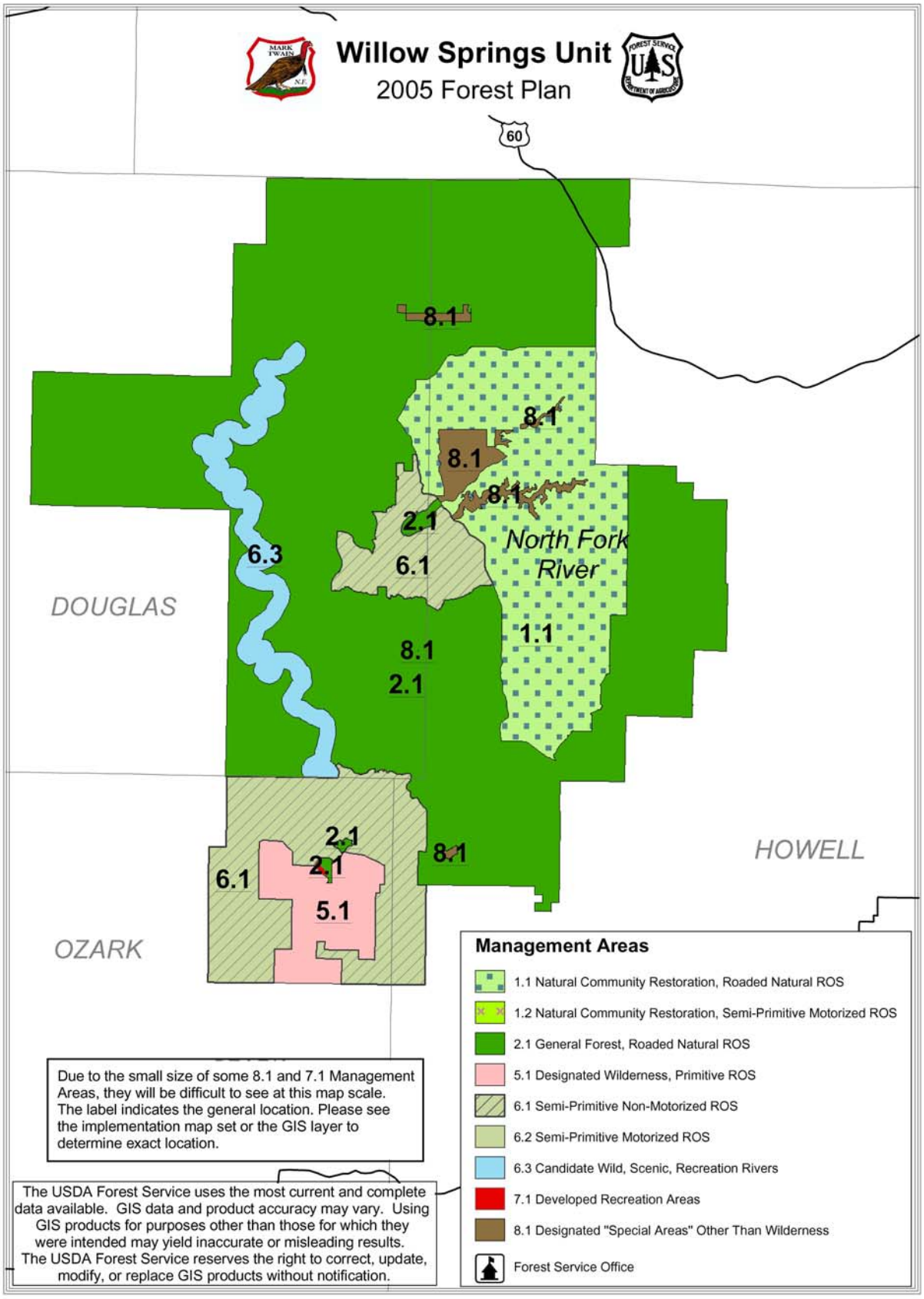
Willow Springs Unit
2005 Forest Plan
60
8.1
8.1
8.1
8.1
2.1
6.1
6.3
North Fork
River
1.1
8.1
2.1
DOUGLAS
HOWELL
OZARK
2.1
2.1
6.1
5.1
8.1
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Cover image: Morgan Spring Branch

Photographer: Randy Long, Mark Twain National Forest

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