Fiscal Year 2003
Monitoring & Evaluation Report

Mark Twain National Forest

Land and Resource Management Plan

Waterfall in Hercules Glade Wilderness Photo by Kale Horton 4-24- 2003

The United States Department of Agriculture (USDA) prohibits discrimination in its programs on the basis of race, color, national origin, sex, religion, age, disability, political beliefs or familial status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication or program information (Braille, large print, audiotape, etc.) should contact the USDA Office of Communication at (202) 720-2791.

To file a complaint, write the Secretary of Agriculture, U.S. Department of Agriculture, Washington, D.C., 20250, or call 1-800-245-6340 (voice) or (202) 720-1127 (TDD). USDA is an equal employment opportunity employer.

Table of Contents

Summary iii

Certification iv

Introduction 1

Background *1*

Objective *1*

Indicators and Thresholds *3*

Supporting Monitoring Information *3*

Monitoring Items Required by the Forest Plan *4*

Data Storage *4*

Council Bluff Prescribed Burn **Photo by John Roth April 10, 2003Methods** **4**

Methods 5

Design *5*

Analysis Methods *5*

Results 6

General *6*

Soil and Water *8*

Air Quality *10*

Visual Management *10*

Lands *10*

Timber Management *11*

Vegetative Manipulation *13*

Wildlife *14*

Grazing *24*

Roads *25*

Minerals *25*

Recreation *26*

Wilderness *27*

Heritage Resources *27*

Fire *28*

Economic Efficiency *29*

Conclusions **34**

General *34*

Soil and Water *34*

Visual Management *34*

Lands *34*

Timber Management *34*

Vegetative Manipulation *35*

Fish and Wildlife *35*

Grazing *35*

Roads *35*

Minerals *35*

Recreation *35*

Wilderness *36*

Heritage Resources *36*

Fire *36*

Economic Efficiency *36*

Evaluation and Recommendations **37**

Evaluation of Monitoring Results and Conclusions *37*

Plan Amendment *37*

Plan Revision *37*

Research Needs *38*

Public Disclosure *38*

List of Preparers **39**

Summary

Monitoring and evaluation is a continuous process on the Mark Twain National Forest. The purpose of this task is to determine whether resource management activities performed by Forest Service personnel are meeting the management direction described in the 1986 Land and Resource Management Plan (Forest Plan). Through this process, the quality of project implementation is assessed. Monitoring and evaluation addresses physical, biological, social, and cultural elements and emerging issues.

The process provides timely information about the outcomes of our decisions, and the need to reassess or change the Forest Plan or the way we are implementing the plan. The results provide answers that reduce uncertainties about our decision-making. It is designed to ensure: (1) Forest Plan goals and objectives are being achieved through the outputs; (2) Standards and Guidelines are being implemented as required; and (3) environmental effects are occurring as desired and predicted.

Interdisciplinary teams conducted the monitoring activities; almost 50 professionals in all resource areas participated in collecting pertinent information. The teams used existing data and scheduled field inspections to each district on a sample basis. They found that Management Prescriptions and Standards and Guidelines in the Forest Plan have been adequately applied in most cases. In those rare cases where implementation of a standard and guideline fell short of the Forest Plan standard and guideline, actions were initiated to ensure appropriate implementation.

The evaluation of monitoring results allows the Forest Supervisor to initiate action to improve overall compliance with Standards and Guidelines where needed, and determine if any amendments to the Forest Plan are needed to improve resource management. The Planning staff in the Supervisor's Office and on the Districts jointly conducted this process.

Summary Results: Monitoring trips revealed that water bars had been placed appropriately on skid trails, effectively trapping sediment and diverting water onto undisturbed areas for filtration. Riparian plantings next to Bull Creek (Ava District) were extremely successful (70% survival rate) when seedlings were planted in furrow created by tilted dozer blade. Riparian plantings near West Fork of the Black River (Salem) were not successful (no survival) when seedlings were planted in opening with fescue and repeated ATV abuse. Road closures were most effective when the closure was placed at the only available access point. All types of road closures (gates, rocks, or dropped vegetation) were breached by going around the closure or by creating another trail, confirming that the type of closure is not as important as the strategic placement of the closure. Some situations, such as large flat areas, do not lend themselves to physical closure methods. As part of the Council Bluff Prescribed burn mitigations, portions of the Council Bluff Campground were pre-burned. There have been no complaints from the public and the recreation staff on duty Memorial Day weekend remarked the public had favorable comments on the reduction of undergrowth in the campground area. Monitoring in the Chadwick Motorcycle and ATV area and its impacts to the Eat Fork of Bull Creek needs to continue. Recent efforts in improving signage, law enforcement, and temporary barricades have helped reduce some of the unauthorized use. Prescribed fire activities are being implemented successfully with little to no negative impacts to soils or the watershed.

Certification

I have reviewed the FY 2002 Forest Plan Monitoring and Evaluation report for the Mark Twain National Forest that was prepared by an interdisciplinary team. The report meets the intent of both the Forest Plan and regulations contained in 36 CFR 219. This report is approved.

/s/ Ronnie Raum
RONNIE RAUM
Forest Supervisor

Date: September 3, 2004

Introduction

Background

The USDA Forest Service is dedicated to multiple-use management of public lands for sustained yield of renewable resources such as outdoor recreation, range, timber, watershed, wildlife, and fish. Under this management concept, the best combination of uses benefits the American people and assures the productivity of the land and quality of the environment for present and future generations. Forest Service activities cover three major areas:

1. Management, protection, and use of the National Forest System, encompassing 191 million acres of land, for continuous flows of services and products now and in the future.
2. Cooperation with State foresters, private forest and woodland owners, wood processors, and public and private agencies.
3. Research in forestry and forest products utilization to support National Forest management and cooperative forestry programs.

The Forest Service relies on long-range program planning to assure that the resource demands placed on the Nation's forests and rangelands are met and the productivity and environmental quality of these lands are maintained.

The Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA), bolstered by the National Forest Management Act of 1976 (NFMA), provides the background for this planning.

National Forest System Land and Resource Management Planning sets forth a process for developing, adopting, and revising land and resource management plans for the National Forest System as required by the RPA, as amended (36 CFR Part 219, Subpart A). The resulting plans provide for multiple use and sustained yield of goods and services from the National Forest System in a way that maximizes long-term net public benefits in an environmentally sound manner.

The Mark Twain Forest Plan was approved in Fiscal Year 1986 and provides direction for management of the Forest. The Forest Plan is supported by the Forest Plan Final Environmental Impact Statement (EIS) and Record of Decision (ROD). The Forest Plan Final EIS was prepared following Council on Environmental Quality regulations for carrying out the National Environmental Policy Act (NEPA). It describes the range of alternatives considered and their environmental effects.

In Region 9, the Integrated Resource Management (IRM) process provides an approach for implementing Forest Plans. The IRM process fosters teamwork designed to unify people and manage the resources in an integrated manner. It begins with the Forest Plan and contains six steps to implementation. These steps are: (1) Opportunities; (2) Analysis; (3) Schedule; (4) Design; (5) Execute; and (6) Protect and Manage.

The principles of IRM are the key to accomplishing the Forest Service mission at each of the steps of managing the land and resources.

Objective

Monitoring activities and evaluating the results are an essential step in effective Forest Plan implementation. Monitoring and evaluation (M&E) helps us determine if management activities are

meeting the direction of the Forest Plan. Monitoring and evaluation help improve management and planning decisions. For example, they help identify the need to change desired conditions, goals, objectives, standards and guidelines over time. Chapter V of the Forest Plan describes the monitoring and evaluation program.

What questions are we asking?

Monitoring is done to observe or record the results of implementation actions. This information is used to determine:

1. If Forest Plan goals and objectives are being achieved;
2. If management prescriptions are being applied as directed;
3. If the results of applying prescriptions address the management problems and issues, concerns and opportunities, and if new management problems are arising;
4. If effects are occurring as predicted; and
5. If costs of implementing the Forest Plan are as predicted.

Why do we need the answers?

Monitoring and evaluation are tools that help determine how the Forest Plan is being implemented, whether implementation is achieving desired outcomes, and whether assumptions used in the planning are valid. Without an effective monitoring and evaluation program, the Forest, the agency, and the public will have no reliable information to address these questions.

The purpose of monitoring and evaluation is to determine progress in meeting Forest Plan direction. It is through this process that the quality of implementation is assessed and any needed changes in Forest Plan direction are determined. Monitoring must address physical, biological, social, and cultural elements and emerging issues.

How are the answers going to affect management?

Monitoring and evaluation may evaluate, document, and report how well we are implementing the Forest Plan, how well the plan is working, and if its purpose and direction remain appropriate. Results from various monitoring techniques provide input for the evaluation task.

The Forest conducts an evaluation of the monitoring results annually. Based on this evaluation, recommendations are made for proposed amendments, revisions, or changes in management direction to the Forest Plan.

Can analysis of existing data answer the questions?

Monitoring uses existing data to the extent possible. Field inspections are done on a sample basis. The frequency, precision, and reliability of sampling are based on the relative importance and identified needs. A full spectrum of data collection techniques will be used, including:

1. Site-specific observations by specialists;
2. Field assistance trips;
3. General field observations;
4. Management Attainment Reports (MAR);
5. Formal management reviews on a scheduled basis; and
6. Discussions with other agencies and general public users.

Is there public involvement?

The monitoring and evaluation process and subsequent report is not a decision document. It is a disclosure of information obtained by interdisciplinary teams (IDT), consisting of District personnel and Supervisor's Office (SO) specialists. Although public comment was not gathered on this specific report, it is important to note that the public is always involved in the management of the Forest. They have many opportunities to express their views in various projects and programs. The public is an indispensable part of the planning process on the Forest.

Indicators and Thresholds

Indicators have been established for each monitored resource: timber, wildlife, soil, visual quality, land use, roads, minerals, recreation, heritage resources, fire, and wilderness. These indicators are described in Chapter V of the Forest Plan.

Resource specialists use scientific methods to measure the success or failure of the programs. For example, timber specialists use stocking surveys to determine adequate establishment of new forest vegetation within 5 years after regeneration harvest. Similarly, recreation specialists use "Recreation Visitor Days" (RVDs) to measure the success of the Forest's recreation areas and programs. Economists, on the other hand, measure the impacts of various projects by looking at median family income, unemployment rates, and economic impact to local communities.

For some of the indicators used by specialists a threshold is established. In other cases, no threshold has been used in the past. For example, thresholds in the recreation field may be the capacity of a campground, the number of seats at a picnic table, etc. Chapter IV of the Forest Plan includes those thresholds that have been established for specific resource areas.

Supporting Monitoring Information

Monitoring information is collected on a continuous basis. Some monitoring data is obtained from existing information, such as statistics and reports from internal sources and other agencies. Monitoring trips by the Forest Supervisor, Deputy Forest Supervisor, Rangers, Staff, and SO and District specialists are the main source of information.

Other information sources are:

1. Routine observations by District or SO employees;
2. Contact with the public, other agencies, and media;
3. Other Forest Plan monitoring, such as change detection analysis, and wildlife habitat and age class distribution queries;
4. Contact with the public, other agencies, and media;
5. Forest Plan pre-revision analysis and sub-regional assessment analysis.

Monitoring Items Required by the Forest Plan

The Forest Plan spells out two considerations that determine monitoring requirements: (1) Monitoring needs required by the National Forest Management Act; and (2) Additional considerations found to be significant and linked to the resolution of specific public issues, management concerns, resource development opportunities, and the corresponding environmental effects.

The 1987 Mark Twain National Forest Monitoring Plan, issued on August 7, 1987, lists 30 monitoring items. These items are reported each year in the monitoring reports. In 1991, an independent land management consulting firm made a more detailed Forest Plan implementation review. In this report, the 30 monitoring items are grouped into resource areas as shown in Chapter 3. (The original numbers are show in brackets.) Several resource areas, such as recreation, wilderness, heritage resources, and fire have been included in this report even though there are no specific monitoring items for them included in the Monitoring Plan. They have been included to give a more complete picture of the current condition of those resource areas.

Data Storage

Data for the management of the National Forest are kept in field notes, reports, maps, and computers. Data are stored on file in the District offices and the Supervisor's Office. The responsible District personnel compile the field data for the District Ranger's approval. The reports containing pertinent monitoring information are then sent to the Supervisor's Office for analysis.

Council Bluff Prescribed Burn **Photo by John Roth April 10, 2003**

Methods

Design

This Monitoring and Evaluation report is prepared in accordance with the requirements specified in NFMA Regulations 36 CFR 219, the Mark Twain Forest Plan requirements, regional direction, Forest Service Handbook (FSH 1909.12), Forest Service Manual (FSM 1922.7), planning regulation guidance on what to monitor, and associated national policy direction.

The audience is the Mark Twain National Forest Leadership Team with benefits to the Regional Office, Washington Office, and the public. The report, which is based on monitoring data and information gathered during the previous fiscal year, focuses on evaluation of Forest Plan implementation and contains information to assist the Regional Office personnel in preparing "State of the Region Report." Accomplishment is reported in the fiscal year when the Forest Plan monitoring and evaluation report is completed.

Analysis Methods

Effective analysis is accomplished when the monitoring team (or individual with the responsibility) makes an objective assessment of how well a project (or mitigation) attains the goals it was designed to achieve. The analysis provides documentation to continue implementing the Forest Plan, or modify it to describe more accurately what we are doing or should be doing.

The Forest takes an interdisciplinary team approach in monitoring activities. The Forest Supervisor directs the review of projects, scheduling of field trips, and monitoring team composition. The Forest Supervisor or his designee leads the team to selected locations to inspect the situation on the ground. At the site, the District Ranger or specialist in charge of the project explains the purposes of the project and the methods used in achieving them. After observation by the team, a discussion usually follows. In an open dialogue, opinions and ideas are freely exchanged. Results of these monitoring activities, along with data provided by resource specialists in the Supervisor’s Office, are compiled for use in this Annual Monitoring Report.

Results

General

Evaluate How Management Prescriptions, Practices and Standards and Guidelines Have Been Applied. (1)

Twelve formal, scheduled monitoring trips were conducted throughout the year. Participants included District and Supervisor's Office personnel. The monitoring teams reviewed both the documentation and on-the-ground implementation of environmental analyses designed to implement the Forest Plan. Overall, implementation of management prescriptions, practices, and standards and guidelines was found to be good to excellent. The teams found that standards for snag, cavity, and reserved trees had been met. Standards and guidelines designed to protect soil and water, such as revegetating skid trails and log landings, had been implemented and were found by the monitoring teams to be effective. Cultural resource sites, sinkholes, and caves were also protected as required by Forest Plan standards and guidelines.

Comparison of Outputs and Services with Forest Plan Projections (2)

The following table shows the Forest's accomplishments in the past fifteen years. Accomplishments for the first decade of Forest Plan implementation are shown as one total, as are the objectives for the first decade. Forest Plan objectives for both the first decade and subsequent years are based on information in Table 4-1 "Average Annual Forest-wide Outputs" of the Forest Plan (page IV-5.)

ACCOMPLISHMENTS - FISCAL YEARS 1986-2003

Activity	Unit of Measure	1st Decade Accomp. FY 86-95	FY 96	FY 97	FY 98	FY 99	FY 00	FY 01	FY 02	FY03	Total FY 96-02	LRMP Objective FY 96-02
Recreation Use	M RVD	14203	2019	2024	2523	2400	2400	2400	2400	2400	18566	12864
Wilderness Use	M RVD	459.0	54.8	55.0	56.0	56.0	56.0	56.0	56.0	57.5	447.3	217.6
Fish and Wildlife Use	M WFUD	4036.0	442.9	450.0	397.0	410.0	415.0	415.0	413.0	566	3508.9	4672
Wildlife Habitat Improvement	M Acres	112.0	8.4	5.1	6.3	8.5	4.6	2.9	5.3	6.1	47.2	79.2
Range Use	M AUM	313.0	80.0	20.2	25.0	23.2	19.7	19.3	18.4	19.5	225.3	336
Range Improvement	M Acres	23.0	1.0	1.2	1.7	2.6	2.1	1.9	5.8	5.1	21.4	44
Road Development	Miles	584.2	54.4	48.2	56.8	18.6	30.6	11.1	4.8	16.8	241.3	296
Land Purchase	M Acres	12.8	0.8	0.7	0.6	1.9	0.6	0.4	0.7	0.6	6.3	2.4
Land Exchange	M Acres	23.8	1.2	0.8	3.0	1.3	0.4	0.4	2.5	0	9.6	25.6
Property Boundary Survey	Miles	965	57	40	33	33	30	27	30	40	290	688
Timber Sold	MMBF	623.1	58.2	49.6	45.0	30.3	19.5	16.1	39.8	47.2	305.7	1188
Acres Harvested	M Acres	169.9	16.8	15.8	13.7	11.9	12.6	5.3	9.4	15.0	100.5	328
Reforestation	M Acres	99.7	8.1	7.7	8.8	6.9	6.4	5.6	3.7	1.5	48.7	89.6
Timber Stand Improvement	M Acres	33.5	7.0	5.6	3.2	2.0	1.8	2.7	0	4.5	26.8	124

MRVD **1,000 Recreation Visitor Days. A Recreation Visitor Day equals 12 hours of recreation use.**
MWFUD **1,000Wildlife and Fish User Days.**
MAUM **1,000 Animal Unit Months of use. Includes hay production.**
MMBF **1,000,000 Board Feet.**

Soil and Water

Determine the Effects on Soil Productivity of the Land. (3)

Implementation monitoring of Forest-wide Standards and Guidelines (S&Gs) for water and soil resource management was conducted on all Ranger Districts during the year. Timber, range, and wildlife management activities were monitored. The general Forest-wide findings of implementation monitoring are summarized below:

- Standards and Guidelines for maintenance of soil productivity have been effectively implemented on all projects. Standards and Guidelines to maintain soil erosion and other soil disturbance within allowable thresholds are consistently planned and applied on all projects. Steep, highly erodible slopes are avoided in project planning, layout and implementation.
- Standards and Guidelines for maintenance of water quality on timber management projects are being consistently planned and implemented. Implementation of stream course protection measures (filter strips) have met or exceeded the intent and function of the standards and guidelines. Identification of stream course protection is becoming more consistent from district to district.
- Implementation of Standards and Guidelines for protection of specialized habitats, including caves, springs, seeps, fens, riparian areas, and temporary pools has been consistent on all projects. All Ranger Districts emphasized identification of specialized habitats in project level inventories and implementation of buffer zones where required.

The effects of applying Forest-wide Standards and Guidelines for water and soil resource management were evaluated on the Potosi/Fredericktown and Poplar Bluff Ranger Districts during the year. Timber management activities were evaluated. The general Forest-wide findings of effectiveness monitoring are summarized below:

- Implementation of forest and range management practices to maintain erosion rates within Standards and Guideline thresholds have been effective. Soil disturbance, compaction, displacement, and rutting have been kept within the threshold levels specified in the Forest Plan for timber management projects. As discussed above, there was a need identified for improvement of the effectiveness of erosion control measures on some projects. As a result, the Forest has taken steps to meet this need by developing timber sale administrator and equipment operator training to improve implementation of soil and water conservation practices.
- Productivity of land on the Forest is monitored by on-site inspections and evaluations. Monitoring and modeling were conducted by using a modification of the Water Erosion Prediction Project (WEPP) to predict soil erosion potential for forested land. Relative to soil erosion, the soil productivity of the Forest has not been diminished by vegetation management activities.

Validation monitoring of Forest-wide Standards and Guidelines for water and soil resource management was conducted through several studies this year.

- An on-going study is being conducted in the Ellington area by the North Central Forest Experiment Station to determine the long-term effects of forest management practices upon soil-site productivity. Preliminary findings from this study indicate a direct relationship between soil compaction, organic matter removal, and site productivity. This information is being incorporated into project analyses.

- The Cave Research Foundation and Forest staffs provide biological and physical assessments of significant cave resources on-forest. These assessments provide a validation of specialized habitat cave protection standards and guidelines.

- The Forest continues to maintain a water quality monitoring station at Greer Spring, providing a long-term base-line water quality data set within the Eleven Point River basin. Additional long-term water quality data is also available for the Current River at Doniphan and the Eleven Point River at Riverton. This data is being analyzed to determine current conditions and trends in water quality for these water bodies.

Identify Emerging Issues, Concerns, and Opportunities. (11)

The use of prescribed fire for landscape restoration and it's short- and long-term effects upon soil and water resources, the ability of the Ozark Plateau to support native ecosystems, and potential redefining of the desired future condition for National Forest System lands is, and will continue to develop as, an issue.

Groundwater quality and the potential effects of land use, point and non-point pollution sources upon groundwater will emerge as issues as urban and industrial development continue to increase in the Ozark Plateau.

Identify Research Needs to Support or Improve National Forest System Lands. (12)

Although there has been a variety of high quality and pertinent research studies conducted regarding soil and water resources and interrelationships among National Forest management activities and these resources, there is always a continual need to study and learn. As such, the following have been identified as some possible beneficial research studies.

- The extensive use of prescribed fire to restore fire-dependent Ozark Plateau ecosystems has potential to affect soil and water quality, water flows and overall hydrologic regime. Little is known about the short- and long-term effects of repeated prescribed fire use puon the soil and water resources of the Forest. The Forest needs basic research to be able to predict the cumulative effects of prescribed fire use upon these ecosystems.

- Protocols for water resource and aquatic habitat inventory and monitoring of Ozark Plateau stream systems need to be developed and tested. A well-documented, comprehensive stream/aquatic habitat inventory is needed as a foundation for monitoring of emerging water quality, karst landscape and aquatic TES issues and concerns on the National Forest.

- Public land management agencies are only beginning to study the potential effects of rural and urban land uses upon the karst resources of the Ozark Plateau. The National Forest needs information on how point and non-point sources of water pollution affect groundwater systems and significant cave resources.

- Ongoing research and studies of the potential effects of National Forest management upon water quality dependent populations and habitat of aquatic species will be a continual need. The Ozark Plateau contains one of the most diverse assemblages of fish, shellfish and crayfish species in North America. A number of these species are endemic to the Ozark Plateau, or have limited ranges that include the Ozark Plateau. Research of how they could potentially be affected by the management of National Forest System lands is needed.

- Validation of National Forest draft regional soil quality standards on Ozark Plateau soils needs to be addressed. Standards for soil disturbances including displacement, compaction and puddling need to be verified with respect to long-term ecosystem productivity. Effectiveness monitoring

protocols for soil quality parameters need to be developed for these soil types.

- The primary forest productivity of MTNF lands needs to be evaluated and refined. The ability of National Forest System lands to produce crops of industrial wood products is dependent largely upon their productivity. The ability of these lands to produce crops of industrial wood products is in turn, a factor in identifying suitable lands which constitute the land base for determining the allowable sale quantity (ASQ) and vegetation practices associated with timber production.

Relationships between site characteristics (e.g., soils, geology, slope, aspect) and potential native plant community composition and structure need to be studied further. Significant work in the Ozark Plateau on this subject has been done by the Missouri Department of Conservation during the past decade. The National Forest and Forest Research need to continue building upon this body of work.

Air Quality

Current situation and accomplishments

A project to determine ambient air quality in the Hercules Glade Wilderness area is being initiated. The air quality IMPROVE sampling protocol has been installed.

Identify Emerging Issues, Concerns, and Opportunities. (11)

Air quality and the potential effects of land use upon regional air quality will emerge as issues as urban and industrial development continue to increase on the Ozark Plateau. As the National Forest continues to increase its use of prescribed fire as a vegetation management tool, the effects of management generated air pollution will emerge as an issue.

Identify Research Needs to Support or Improve National Forest System Lands. (12)

The potential effect of wildland prescribed fire upon air quality needs to continue to be evaluated and described. As the National Forest continues to increase its use of prescribed fire as a vegetation management tool, the effects of management generated air pollution needs to continue to be studied and documented.

Visual Management

Determine the Effects of Applying Visual Quality Standards and Guidelines. (5)

FY2002 monitoring trips did not identify any projects or activities that did not meet visual quality objectives.

Lands

Accomplishment of Land Acquisition, Land Exchange, and Land Line Survey. (16)

The land adjustment program added a total of 612 acres to the National Forest by purchase from willing sellers. Although limited work was done on several land exchanges, none were completed. The Forest accomplished 40 new miles of boundary located to standard and maintained 10 miles of boundary, bringing the total miles surveyed to 2,031.

Timber Management

Assure Lands Are Adequately Restocked Within Five Years. (7)

The Forest's FY 2003 Plantation Survival Report showed first and third year survival of 90 percent and 86 percent, respectively. The following table shows the results of stocking surveys over the life of the Forest Plan.

	Planned	**Fiscal Year Accomplishment**		**Cumulative Accomplishment**	
Year	Reforestation	Regen. Harvests	Regen. Cert.	Regen. Harvests	Regen. Cert.
1986	11,200	12,051	10,323	12,051	10,323
1987	11,200	14,949	9,262	27,000	19,585
1988	11,200	12,262	9,797	39,262	29,382
1989	11,200	10,341	9,366	49,603	37,748
1990	11,200	8,434	13,589	58,037	52,337
1991	11,200	8,304	9,376	66,341	61,713
1992	11,200	6,606	10,636	72,947	72,349
1993	11,200	7,097	11,434	80,044	83,783
1994	11,200	9,194	7,728	89,238	91,511
1995	11,200	6,137	5,812	95,375	97,323
1996	11,200	6,090	12,231	101,465	109,554
1997	11,200	6,640	10,608	108,105	120,162
1998	11,200	5,746	6,859	113,851	127,021
1999	11,200	4,107	2,963	117,958	129,984
2000	11,200	6,398	5,659	124,356	135,643
2001	11,200	5,613	11,760	129,969	147,403
2002	11,200	2,359	3,387	132,328	150,790
2003	11,200	4,209	1,514	136,537	152,304

Regeneration harvest acreage has dropped over the years due to a reduction in timber outputs, as well as a reduction in regeneration type harvests. Because it takes one or more years after a harvest for the regeneration work to be accomplished and certified, the cumulative accomplishment totals for harvests and certification are not equal.

Re-examine Lands Not Suitable for Timber Production. (8)

On November 28, 1995, an analysis of lands identified in the Forest Plan as not suited for timber production was completed. The analysis concluded that land acreages originally identified as not suited remain not suited.

Determine Extent and Severity of Insect and Disease Occurrence. (9)

The drought that continued in 2001 for at least a third year in most of the Ozarks caused many hardwood crowns to brown. This drought stress will result in increased mortality for the next several years, as some stressed trees succumb to the combined effects of twolined chestnut borer and Armillaria root rot attacks. In 2001, increased mortality in the red oak group became more apparent, and oak borers were detected on

permanent monitoring plots established on the Salem and Potosi districts. The Salem and Potosi districts completed work on an Environmental Impact Statement and are currently addressing areas of high mortality in need of salvage harvest or other treatments.

In winter 2001/2002 permanent oak mortality monitoring plots were established in 57 stands throughout portions of the MTNF. Red oak borers infested the red oak group to some degree in all stands, from 69% in riparian stands to 90% in high risk stands. All stand categories had comparable ratings for > 33% crown dieback (~ 40%), and ~ 8% mortality of red oak BA in 2001. Further decline and mortality of red oaks in declining stands is anticipated.

Mark Twain personnel have not assisted in gypsy moth trapping since FY 1998. The gypsy moth trapping is being accomplished through a statewide effort referred to as the County Trappers concept. State and Private Forestry in St. Paul has provided some financial support of the County Trapper program.

Identify Emerging Issues, Concerns, and Opportunities. (11)

There is a continuing concern among Missouri forest managers that red oak borer infestations, coupled with oak decline, may result in a level of devastation similar to what is occurring in Arkansas. Scarlet and black oak components in heavily stocked mature stands should be harvested and regenerated with mixtures including more drought-tolerant, longer-lived species white oaks and shortleaf pine.

Compare Accomplishments with Objectives (18)

The quantity of timber offered over the Forest Plan implementation period is well below the Allowable Sale Quantity specified in the LRMP. The amount of timber sold increased from 39.8 million board feet (MMBF) in FY 2002 to 47.6 MMBF in FY 2003. Salvage on areas affected by tornado damage and oak decline accounted for over one third of the sale acres in 2003. The use of uneven-aged management harvest (UAM) methods in FY 2003 represented 40.5 percent or 6,090 sell acres. Even-aged management (EAM) harvest methods (clearcut, shelterwood and seed tree) represented 32.4 percent or 4,873 acres. Major changes in harvest methods since 1988 based on timber sell acres are:

1. Clearcuts averaged 6.6 percent of sale acres during the last five years, compared to 65 percent of sell acres in 1988.
2. UAM increased from 0.9 percent to an average of 30 percent for the last five years.
3. Shelterwood and seed tree methods of EAM have increased from combined total of 5 percent in 1988 to 29 percent in 2003.
4. Commercial thinning, salvage, and miscellaneous categories amounted to 30 percent in 1988. Although this group shows considerable fluctuation from year to year, there has been a long-term upward trend. In 2003, this group accounted for 27.1 percent of acres sold and has accounted for an average over the last five years of 42 percent.

Silvicultural prescriptions reviewed met the intent of Forest Plan and NEPA documents.

Compliance with Forest Plan Standards and Guidelines (19)

Monitoring teams found that opening sizes and spacing for vegetation management projects complied with Forest Plan standards and guidelines. Silvicultural prescriptions were implemented correctly on the ground, and met management prescription direction. Landings and skid trails were scarified and seeded as required, and buffer zones along streams and wetlands were correctly implemented. Snags and wildlife trees were retained as required by the Forest Plan and the Biological Opinion.

Vegetative Manipulation

Evaluate Uneven-aged Management on selected sites. (20)

Several steps have been taken to meet the Forest Plan objectives to "apply and evaluate the uneven-aged management system on selected areas to determine the long term feasibility of using this system on the Forest" (Forest Plan IV-3). For example, long-term monitoring plots have been established by the North Central Forest Experiment Station (NCFES) on the Salem Ranger District (West Fork Timber Sale and Sinkin Creek Experiment Forest).

Before the onset of serious multi-year drought conditions, results of uneven-aged management (UAM) had been acceptable on Ecological Land Type (ELT) 17 (south to southwest facing side slopes with a grade of 8% or greater), but ELT 18 (north to northeast facing side slopes with a grade of 8% or greater) results have often been less than desirable. ELT's predisposed to the accumulation of oak regeneration and the presence of oak advance regeneration were the factors believed most influential for the success of UAM treatments. Observations made during the 1994 Vegetation Management Review indicated that uneven-aged management might be more difficult in some of the moister ELT 18 areas that lack acceptable advance regeneration than in some ELT 17 areas, which generally are drier and have less severe competition from shade tolerant species. Results from the University of Missouri and NCFES monitoring of Pioneer Forest's UAM indicate that UAM can succeed in oak-hickory stands in the Missouri Ozarks with careful manipulation of stand density, given suitable site and stand conditions. Because of severe decline and mortality of 70-year old and older red oaks on droughty upland sites after 2-3 years of continuous drought, stands on droughty sites are not being recommended for UAM unless they contain 50% of more drought-hardy species, such as white oak and shortleaf pine.

Changes in Patterns and Composition (22)

More acres are now receiving some form of harvest treatment to meet resource needs, with the increased use of alternatives to clearcutting, than when clearcuts were the norm. Partial cuts with considerable variation in residual stand stocking and habitat characteristics are now common. One result is fewer acres of the early successional habitats which follow clearcuts and seed tree harvests.

Special Area Classification (23)

In FY 2000, an EA was prepared to define and nominate as a State Natural Area approximately 400 acres known as Solomon Hollow. The Solomon Hollow area contains sandstone glade communities ranked as "significant" or "exceptional" by the Natural Features Inventory Report for Phelps, Pulaski, and Laclede Counties (1992). The Decision Notice changed the management prescription within the area from 3.4 (managed forest with emphases on wildlife habitat diversity) to 8.1 (designated "special areas" other than wilderness). In FY 2001, the State officially designated the area as the Solomon Hollow State Natural Area. In FY 2002, Forest Plan Amendment #29 incorporated Solomon Hollow State Natural Area into the Forest Plan 8.1 management area guidelines (Forest Plan, page IV-194).

Identify Emerging Issues, Concerns, and Opportunities. (11)

It is becoming obvious that under drought stress, older red oaks in dense stands on droughty sites are predisposed on large acreages to severe oak decline and mortality. It is also apparent that more shade tolerant white oaks are among the most abundant seedlings of advance regeneration. Where openings let sufficient light down to the forest floor, shortleaf pine regeneration is showing some success where there are pine seed sources. Stands are moving toward a future mix of species heavier to white oak and shortleaf pine, which are more drought-resistant and longer-lived than black and scarlet oak in the red oak group. As such, salvaging the declining red oak to meet resource needs as well as economic/social needs continues to be an emerging issue.

Wildlife

Maintenance of Viable Populations of Management Indicator Species (15)

Large landscape-scale habitat objectives are used to indicate viable populations of management indicator species on the Forest. The Forest Plan (pages IV-59 thru IV-65) shows the percentage of National Forest System lands, by Landtype Associations, of each habitat type needed to maintain minimum viable populations of management indicator species. Site-specific projects are designed to maintain, enhance, and/or move areas towards the desired condition within Landtype Associations (LTAs) and habitat type. The following table shows those percentages, as well as the existing percentage of acres for each habitat type.

Landtype Association	Habitat Type															
	1		2		3		4		*5		6		7		8	
	Exist	Reqd	Exist	Reqd	Exist	Reqd	Exist	Reqd	Acres Exist	Acres Reqd	Exist	Reqd	Exist	Reqd	# per sq mi exist	# per sq mi reqd
Cedar-Glade Breaks & Hills	2%	1%	7%	10%	30%	20%	12%	10%	14,736	6,126	14%	0%	34%	7%	1.4	1
Oak-Bluestem Plains	0%	1%	<1%	5%	18%	25%	22%	0%	354	0	7%	0%	65%	20%	4.6	1
Oak-Hickory Breaks	2.5%	3%	9.5%	10%	57%	35%	33%	20%	17,033	11,217	23%	5%	28%	1%	1.3	1
Oak-Hickory Hills & Plains	2%	4%	4.5%	5%	44%	35%	43%	20%	45,001	51,659	13%	5%	15%	1%	1.5	1
Oak-Pine Breaks	3%	4%	4.5%	5%	56%	30%	52%	30%	117,968	115,159	14%	10%	7.5%	1%	1.1	1
Oak-Pine Hills & Plains	4%	4%	3%	5%	50%	25%	54%	20%	51,026	67,891	9%	10%	7%	1%	1.5	1
Oak-Pine Mountains	<1%	4%	8%	10%	42%	40%	32%	25%	5,947	6,281	14%	5%	24%	3%	0.7	1

Habitat Type definitions:

1 -- Woodland habitat, early succession (i.e. 0-9 year age class).
2 -- Woodland habitat, old growth condition.
3 -- Woodland habitat, oak and oak-pine over 50 years of age.
4 -- Woodland habitat, pole/sawtimber size classes with over 80 percent crown closure.
5 -- Woodland habitat, oak, oak-pine, pine sawtimber with forbs, grass and shrubs (*Objective is defined as a percentage of total acres in pole and sawtimber component, not as percentage of NFSL)
6 -- Woodland habitat, oak over 50 years of age with dense understory.
7 -- Open (i.e. shrub-grass) and semi-open (i.e. savanna) habitat.
8 -- Permanent water sources per square mile.

Population Trends of Management Indicator Species (13)

The Mark Twain's 13 Management Indicator Species are: wild turkey, ruffed grouse, northern bobwhite, pileated woodpecker, eastern bluebird, wood thrush, ovenbird, indigo bunting, orchard oriole, raccoon, bobcat, cottontail rabbit, and white-tailed deer. The following tables show the most up-to-date information regarding population trends since the 1980 (Forest Plan implementation began in 1986):

BIRDS	**TRENDS 1980-2000 (% change)**	
	MO	**Ozark-Ouachita Plateau**
Wild Turkey	-2.6%	-2.6%
Ruffed grouse	slight decline over past 5 years	
Northern bobwhite	-3.3%	-4.9%
Pileated woodpecker	-0.3%	+0.5%
Eastern bluebird	+1.6%	+1.3%
Wood thrush	+3.7%	+2.7%
Ovenbird	+2.2%	+0.6%
Indigo bunting	-0.1%	+0.5%
Orchard oriole	-0.9%	-2.1%

Source: Sauer, J. R., J. E. Hines, I. Thomas, J. Fallon. 2001. *The North American Breeding Bird Survey, Results and Analysis 1966 - 2000. Version 2001.2, USGS Patuxent Wildlife Research Center, Laurel, MD*

Source for Ruffed grouse: Eric Kurzejeski, MDC Wildlife Research Section, October 2001.

ANIMALS	**TRENDS**
Raccoon	Stable at high population level
Bobcat	Stable in the Ozarks
White-tailed deer	Stable
Cottontail rabbit	Stable

Source: David A. Hamilton, Personnel Communication, MDC, Wildlife Research Section, September 2001; Thomas Dailey, Personnel Communication, MDC, Wildlife Research Section, October 2001; Lonnie P. Hansen, Personnel Communication, MDC, Wildlife Research Section, September 2001.

What are the population trends of Federal listed species (Endangered, Threatened, Candidate, Proposed) considered by the FWS to be found on or near the Mark Twain National Forest in the State of Missouri?

CATEGORY/SPECIES	TREND
MAMMALS	
Gray bat	Stable
Indiana bat	Decreasing
BIRDS	
Bald eagle	Increasing
FISHES	
Topeka shiner	Decreasing
MUSSELS	
Curtis' pearly mussel	Decreasing, possibly extirpated
Pink mucket pearly mussel	Stable
Scaleshell mussel	Decreasing
Tumbling creek cavesnail	Decreasing
AMPHIBIANS	
Ozark hellbender	Decreasing
INSECTS	
Hine's emerald dragonfly	Unknown
PLANTS	
Running buffalo clover	Stable
Mead's milkweed	Decreasing

Source: Interpretation from MDC's Biodiversity Activities Report dated 2000, 1999; July 1997-October 1998; July 1996 – June 1997; MTNF Programmatic Biological Assessment dated September 1998; USFWS Biological Opinion dated June 23, 1999; Janet Sternburg, MDC, Natural History Biologist, Box 180, Jefferson City 65102, September 2001; Larry Furniss, Fisheries Biologist, USFS, 401 Fairgrounds Road, Rolla, MO 65401, September 2001. Jody Eberly, Wildlife Biologist, USFS, 401 Fairgrounds Road, Rolla, MO 65401, September 2001.

Results of monitoring required by June 23, 1999 Biological Opinion.

US Fish and Wildlife Service (USFWS) issued a Biological Opinion on the impacts of forest management activities to the gray bat, bald eagle, Indiana bat and Mead's milkweed to the Forest on June 23, 1999. The reasonable and prudent measures and terms and conditions of the biological opinion included items to be monitored or surveyed and reported annually to USFWS. A summary of those reports is included here. All required surveying was completed. No adverse effects were reported in CY 2003.

GRAY BAT

- During CY 2003, there was no documented human disturbance at any closed MTNF gray bat cave.
- In CY 2003, no additional protective measures were identified as needed.
- In CY 2003, there were no additional protective measures completed.
- From January 1, 2003, to December 31, 2003, there was no reported incidental take of gray bats as a result of human disturbance in MTNF caves.
- During CY2003, no MTNF prescribed fires behaved contrary to its' predicted pattern resulting in an adverse impact to any gray bat.
- Gray bats were captured during mist netted during survey efforts in 2003.

BALD EAGLE

- Results of winter aerial and ground surveys conducted between November 15, 2003, and February 28, 2003, by the Forest Service found no additional communal night roost or concentration on MTNF lands.
- During CY 2003, no nesting territories were found or reported as discovered on MTNF lands, although 2 new territories were discovered *near* National Forest System land, one on Big Piney River and the other on the Eleven Point River.
- During CY 2003, there were no reported cases of incidental take of bald eagles on the MTNF.
- During CY2003, no Forest Service prescribed fires were found to have behaved contrary to their predicted pattern resulting in an adverse impact to a bald eagle.

INDIANA BAT

- During FY 2003 (October 1, 2003 – September 30, 2003), the forested acres affected by management activities were within that allowed by the incidental take statement.
- White's Creek and Cave Hollow Cave gates are substantially intact, although minor vandalism occurs at each.
- Project leader Sybill Amelon, North Central Research Station, conducted both mist-netting and concurrent Anabat surveys on the Potosi/Fredericktown District, Poplar Bluff District, Ava/Cassville/Willow Springs District and Houston/Rolla District. One Indiana bat was captured or discovered during this work.
- No maternity roosts were discovered on Mark Twain National Forest in CY 2003.

MEAD'S MILKWEED

There is one known population of this species on MTNF, located in Bell Mountain Wilderness. No activity occurred relative to this species in FY 2003

HINE'S EMERALD DRAGONFLY

Although the Hine's Emerald Dragonfly was not included in the 1998 Programmatic Biological Assessment, or the 1999 Biological Opinion, the Mark Twain National Forest participated in survey work for this species in Calendar Year 2003. Surveys of fens and seeps on the Mark Twain National Forest were conducted in CY 2003 by private contractors and the Missouri Department of Conservation.

4. *What are the population trends of Regional Forester's Sensitive Species (RFSS) found on Mark Twain National Forest in the State of Missouri?*

MAMMAL

Scientific Name	Common Name	Trend
Myotis leibii	Eastern Small-footed Myotis	Unknown

Source: Missouri species of Conservation Concern Checklist, June 2001.

BIRDS

Scientific Name	Common Name	Trend
Aimophila aestivalis	Bachman's Sparrow	Declining
Ammodramus henslowii	Henslow's Sparrow	Stable
Dendroica cerulea	Cerulean Warbler	Stable
Falco peregrinus anatum	American Peregrine Falcon	Increasing
Lanius ludovicianus migrans	Migrant Loggerhead Shrike	Believed decreasing
Limnothlypis swainsonii	Swainson's Warbler	Believed decreasing

Source: Brad Jacobs, Natural History Biologist, MDC Central Office, Jefferson City, MO 65102, September 2001, information reflects statewide trends for each species.

AMPHIBIANS

Scientific Name	Common Name	Trend
Cryptobranchus alleganiensis	Hellbender	Decreasing
Cryptobranchus alleganiensis bishopi	Ozark Hellbender	Decreasing

Source: Jeff Briggler, Herpetologist, Natural History Biologist, MDC Central Office, Jefferson City, MO 65102, September 2001, information reflects statewide trends for species.

REPTILES

Scientific Name	Common Name	Trend
Macroclemys temminckii	Alligator Snapping Turtle	Believed Stable

Source: Jeff Briggler, Herpetologist, Natural History Biologist, MDC Central Office, Jefferson City, MO 65102, September 2001, information reflects statewide trends for species.

FISH

Scientific Name	Common Name	Trend
Cottus hypselurus	Ozark Sculpin	Stable
Crystallaria (=ammocrypta) asprella	Crystal Darter	Decreasing
Etheostoma (=ammocrypta) clarium	Western Sand Darter	Believed Decreasing
Etheostoma burri	Brook Darter	Believed stable
Etheostoma uniporum	Current Darter	Believed stable
Notropis heterolepis	Blacknose Shiner	Decreasing
Notropis ozarcanus	Ozark Shiner	Decreasing
Notropis sabinae	Sabine Shiner	Believed stable
Percina cymatotaenia	Bluestripe Darter	Stable
Percina nasuta	Longnose Darter	Believed decreasing
Percina uranidea	Stargazing Darter	Stable
Pimephales tenellus parviceps	Eastern Slim Minnow	Decreasing
Typhlichthys subterraneus	Southern Cavefish	Believed stable

Source: Matthew Winston, Personnel Communications, Fisheries Research, Columbia Fish and Wildlife Research Center, September 2001, information reflects statewide trends for each species.

MOLLUSKS

Scientific Name	Common Name	Trend
Antrobia culveri	Tumbling Creek Cavesnail	Declining
Cumberlandia monodonta	Spectaclecase	Believed stable
Cyprogenia aberti	Western Fanshell	Declining
Epioblasma triquetra	Snuffbox	Declining
Obovaria jacksoniana	Southern Hickorynut	Declining
Plethobasus cyphyus	Sheepnose	Declining
Ptychobranchus occidentalis	Ouachita Kidneyshell	Unknown
Quadrula cylindrical cylindrical	Rabbitsfoot	Declining
Toxolasma lividus	Purple Liliput	Believe declining
Vertigo meramecensis	Bluff Vertigo	Unknown
Ochrotrichia contorta	Micro Caddisfly	Unknown
Pseudosinella espana	A springtail	Unknown

Source: Source: Janet Sternburg , Personnel Communications, Natural History Biologist, MDC Central Office, Jefferson City, MO 65102, September 2001, information reflects statewide trends for each species. Linden Trial, Personnel Communications, Fisheries Research, Columbia Fish and Wildlife Research Center, September 2001, information reflects statewide trends for each species.

INVERTEBRATES

Scientific Name	Common Name	Trend
Allocrangonyx hubrichti	Central Missouri Amphipod	Unknown
Caecidotea dimorpha	An Isopod	Unknown
Cambarus hubrichti	Salem cave Crayfish	Unknown
Cambarus setosus	Bristly Cave Crayfish	Unknown
Orconectes eupunctus	Coldwater Crayfish	Declining
Orconectes harrisonii	Belted Crayfish	Unknown
Orconectes meeki	A Crayfish	Unknown
Orconectes peruncus	Big Creek Crayfish	Declining
Orconectes quadruncus	St. Francis River Crayfish	Declining
Orconectes williamsi	White river Midget Crayfish	Believed declining
Stygobromus onondagaensis	Onondaga Cave Amphipod	Unknown

Source: Bob DiStefano, Personnel Communications, Fisheries Research, Columbia Fish and Wildlife Research Center, September 2001, information reflects statewide trends for each species. Linden Trail, Personnel Communications, Fisheries Research, Columbia Fish and Wildlife Research Center, September 2001, information reflects statewide trends for each species.

VASCULAR PLANTS

Scientific Name	Common Name	Trend
Agalinis auriculata	Earleaf (Auriculate false) foxglove	Stable
Agalinis skinneriana	Pale gerardia	Stable
Anemone quinquefolia	Wood anemone	Unknown
Aster dumosus var. strictior	Tradescant aster	Stable
Aster furcatus	Forked aster	Stable
Aster macrophyllus	Large-leaf (Big leaved) aster	Unknown
Berberis canadensis	American barberry	Stable
Calamagrostis porteri ssp. insperata	Ofer Hollow reedgrass(Reed bent grass)	Stable
Callirhoe bushii	Bush's poppy mallow	Stable
Campanula aparinoides	Marsh bellflower	Stable
Carex buxbaumii	Buxbaum's (Brown bog) sedge	Stable
Carex cherokeensis	Cherokee sedge	Stable
Carex communis	Fibrous-root sedge	Stable
Carex decomposita	Epiphytic sedge	Stable
Carex fissa var. fissa	A sedge	Unknown
Carex gigantea	Large sedge	Stable
Carex oklahomensis	Oklahoma sedge	Stable
Carex oxylepis var pubescens	Sharp-scale sedge	Stable
Carex sterilis	Dioecious sedge	Unknown
Carex straminea	Straw sedge	Unknown
Carex stricta	Tussock sedge	Stable
Carex tetanica	Rigid sedge	Unknown
Carex triangularis	Fox (triangular) sedge	Stable
Castanea pumila var. ozarkensis	Ozark chinquapin	Declining

Scientific Name	Common Name	Trend
Cayaponia grandifolia	Southern cayaponia	Stable
Cissus incisa	Ivy Treevine (Marine vine)	Stable
Delphinium treleasei	Trelease's larkspur	Stable
Dichanthelium (=Panicum)	A panicgrass	Unknown
Draba aprica	Open-ground whitlow-grass	Stable
Dryopteris celsa	Log Fern	Stable
Dryopteris goldiana	Goldie's Woodfern	Stable
Echinacea paradoxa var. paradoxa	Yellow coneflower	Stable
Echinacea simulata	Wavy leaf purple coneflower	Stable
Eupatorium semiserratum	Small-flower Thorough-wort	Stable
Geum virginianum	Pale avens	Unknown
Hottonia inflata	Featherfoil	Stable
Hydrocotyle verticillata var.	Whorled (Water) pennywort	Stable
Isotria verticillata	Large whorled pogonia	Stable
Juglans cinerea	Butternut	Declining
Juncus debilis	Weak rush	Unknown
Ludwigia microcarpa	Small-fruit seedbox	Stable
Matelea baldwyniana	Baldwin's milkvine	Stable
Menyanthes trifoliata	Bog Buckbean (Bogbean)	Stable
Parnassia grandifolia	Large-leaf grass-of-parnassus	Stable
Phlox carolina spp. carolina	Carolina phlox	Unknown
Phlox maculata spp.pyramidalis	Spotted (Wild sweet william) Phlox	Stable
Phyllanthus polygonoides	Knotweed leaf-flower	Declining
Platanthera ciliaris	Yellow-fringed orchid	Stable
Platanthera clavellata	Small Green Woodland Orchid	Stable
Platantheria flava var. flava	Southern Rein (Pale green) orchid	Stable
Platantheria flava var. herbiola	Northern Rein (Pale green) orchid	Stable
Polygonum arifolium	Halberd-leaf tear thumb	Stable
Potamogeton pulcher	Spotted pondweed	Stable
Quercus texana	Nuttall's oak	Stable
Rhynchospora harveyi	Harvey's beak-rush	Stable
Rudbeckia fulgida var. speciosa	Orange coneflower	Stable
Sabatia brachiata	Narrow-leaf (Marsh) pink	Stable
Sacciolepis striata	Gibbous (Gibbon's) panic grass	Unknown
Schoenoplectus (Scirpus)	Canby's bulrush	Unknown
Schoenoplectus (Scirpus) purshianus	Weakstalk (Weakstock) bulrush	Increasing
Schoenoplectus hallii	Hall’s bullrush	Stable
Scutellaria bushii	Bush's skullcap	Stable
Silene regia	Royal catchfly	Stable
Solidago gattingerii	Gattinger's goldenrod	Stable
Spiranthes ovalis var. erostellata	Oval ladies tresses	Increasing
Sullivania sullivantii	Kidney-leaved Sullivantia	Stable
Torreyochloa pallida	Pale manna grass	Increasing
Tradescantia ozarkana	Ozark spiderwort	Stable

Scientific Name	Common Name	Trend
Trillium pusillum var. ozarkanum	Ozark trillum (Ozark wake robin)	Stable
Triosteum angustifolium var. eamesii	Yellowleaf Tinker's-weed (Yellow-	Unknown
Valerianella ozarkana	Ozark corn salad	Increasing
Viburnum recognitum	Northern arrow-wood	Stable
Vitis rupestris	Sandgrape	Stable
Waldsteinia fragarioides	Barren strawberry	Stable
Woodwardia areolata	Netted Chain fern	Stable

NONVASCULAR PLANTS

Scientific Name	Common Name	Trend
Campylium stellatum	Yellow starry fen moss	Unknown
Dichelyma capillaceam	A moss	Unknown
Metzgeria furcata	A Liverwort	Unknown
Seligeria donniana	A moss	Unknown
Sphagnum angustifolium	Narrowleaf peatmoss	Unknown
Sphagnum centrale	Sphagnum	Unknown

Source: Tim Smith, Personnel Communications, MDC Natural History Division, September 2001, information reflects statewide trends for each species.

5. *Is there Critical habitat on the Forest? If yes, is it identified and protected?*

There is no critical habitat designated for any species on the Mark Twain National Forest.

Grazing

Current situation and accomplishments

Ninety-one allotments were stocked in 2003. These grazing and haying areas were administered to minimum standard, which includes at least 3 field visits to ensure proper stocking and utilization.

Identify Emerging Issues, Concerns and Opportunities (11)

Some allotments need more than three visits per field season to ensure permittee compliance, especially with increasing concern over water quality and specie composition within pastures. There is a need to perform NEPA on over half the allotments.

Roads

Review Road Closure Progress. (24)

The Forest closed 10.7 miles of non-system roads in FY 2002. Non-system roads are generally closed when project related temporary roads are closed. The Forest continues to experience difficulty maintaining effective road closures due to continued vandalism. The degree of vandalism varies across the Forest.

Determine if Roads Meet Project Intent and Plans. (25)

The Forest reconstructed 4.8 miles of system road in FY 2002. Staff engineers, District Rangers, and interdisciplinary teams reviewed a sample of the road projects in the field. They found that the reconstructed roads met project intent, and that they conformed to the construction plans and the Forest Plan Standards & Guidelines.

Determine Changes in Major Utility or Transportation Corridors. (26)

Improvements to Highway 60 are continuing through several districts. Corridors for electric transmission had no major changes. Several telephone corridors have had existing line replaced and in some cases relocated. There is a trend to bury telephone cables using fiber-optic cable. This trend has seen several overhead lines replaced with buried cable.

Minerals

Compare Compliance of Mineral Operations with Standards and Guidelines, Operation Plans, and Environmental Assessments. (27)

The Viburnum Lead Mineralization Trend, located mostly within the Salem-Potosi and Fredericktown Districts, produces approximately 90 percent of the national annual elemental lead ore in the United States. In 2003, Mineral Management Services reported mineral royalties of $1,822,585 million with approximately $331,638 distributed to 29 counties within the state.

Currently, there are thirty-six preferential leases and seven prospecting permits located in the above districts. The leases and permits are managed in conjunction with the Bureau of Land Management, which is responsible for mineral management while the Forest Service is responsible for surface management. Operating plans for developmental or explorative core drilling were reviewed for compliance with permit stipulations and guidelines. Site-specific mitigations (stipulations) were developed for drill sites based upon Forest Plan Standards and Guidelines, regulations and policy. In 2003, a total of 23 developmental holes were drilled and reclaimed within the Salem-Potosi District. Inspections were conducted to ensure that surface protection measures were implemented and rehabilitation completed.

No other mineral operations were conducted.

2. Compare Changes in Acres of Withdrawn Lands. (28)

The Forest Plan indicates that 1,090,570 acres are available for mineral development. No withdrawals have been made to modify these acres.

Recreation

Current situation and accomplishments

The Chadwick User Fee Demonstration Project included the Chadwick Motorcycle and ATV Use Area, Sutton Bluff Motorcycle and ATV Trails, and the Cobb Ridge Campground. Approximately $190,000 was collected through the sale of day use and season-long tags for motorcycles, ATVs and mountain bikes, and camping fees at Cobb Ridge Campground. Almost 60,000 visitors utilized the areas in FY 2003. The majority of the funds were spent on trail maintenance, relocating 1 mile of trail and installing a bridge at Chadwick, installing concrete block to stabilize the trail on erosive turns and steep pitches at Chadwick and Sutton Bluff, leveraging grant funds to purchase a mini backhoe for future trail construction and maintenance, and doing extra tread work needed after heavy rains. The rest of the funds were used for operational expenses including an increased Forest Service presence at these areas. Funds collected at Cobb Ridge supported a campground host, provided labor to install tables, fire rings and a fence, and supported garbage collection and additional cleaning and maintenance at the campground. Public acceptance and support of this project was excellent, and compliance with the fee requirement is estimated at over 95%.

Six recreation areas were operated and maintained by various local concessionaires under the authority of concession special use permits, allowing us to provide a higher level of service and security to the public than otherwise possible with our budget. Eight other small campgrounds were operated under the national Concession Safety Net Fee Demonstration Project, with revenues collected being used to provide campground hosts, increased visitor contacts and increased maintenance at those sites (especially on holiday weekends), and to purchase a new vault toilet for one of the campgrounds. These campgrounds had over 20,000 visitors and collected almost $23,000 in revenues in 2003. The majority of the tasks involved in operating and maintaining the developed recreation areas was accomplished through the use of our concessionaires, volunteer hosts, and the Senior Community Service Employment Program (SCSEP).

The Forest started the public involvement process in 2003 for an OHV trail study. The project would monitor the effects of OHV's on 3 trail areas totalling 140 miles, utilizing existing trails for most of the routes. Environmental analysis for this proejct is scheduled for 2004.

While there were inadequate resources to maintain all trails to standard, the Forest was able to reconstruct thirteen miles of existing trails. Some trails were maintained through a partnership with AmeriCorps, and through assistance from other volunteers. Over half of the 750 miles of trails on the Forest were maintained in FY 2003 through efforts of Forest employees, SCSEPs, and volunteers.

Partnerships provided the means for dissemination of Forest information at Bass Pro in Springfield and at the Rolla Visitor Center. The Forest's web page is an increasingly popular source of information about recreation and other Forest issues and opportunities.

Determine if Eleven Point National Scenic River Visitors Expectations are Being Met. (17)

Visitor use information was collected from outfitters, campground receipts, and at some of the key access points. Campground Hosts were used to inform river users and to supervise the campground. The recent bottle ban on the river has helped to reduce the broken glass and litter along the river. Though there are some complaints, a majority of the visitor expectations are being met along the Eleven Point River.

Reconstruction of access points serving the Eleven Point National Wild and Scenic River was started in

2003. Old tie walls were replaced with concrete retaining walls.

Wilderness

Current situation and accomplishments

In general, Wilderness use on the Mark Twain was again concentrated on weekends in the spring and fall. Overall, use has remained constant for the past 3-5 years. Illegal ATV/4-wheeler traffic is an increasing problem in the Irish, Rock Pile, and Bell Mountain Wildernesses. Increased development adjacent to the Hercules Glades, Bell Mountain, and Piney Creek Wilderness boundaries poses potential problems, especially where the development is adjacent to unsurveyed boundary lines. While most use is within standards, Paddy Creek is experiencing overuse on peak weekends. The forest participated in the National Visitor Use Monitoring (NVUM) project in FY2002, (see "Recreation" chapter for more details). Based on this study, the six Wildernesses on the forest had a combined use of 22,809 visits that lasted an average of 33.4 hours each, or a total of about 63,500 RVDs, (+/- 32.9%). This is about 180 percent of the use projected in the Forest Plan to occur on the Mark Twain.

Some Wilderness visitors are not specifically seeking a "Wilderness Experience" characterized by a primitive setting where the earth and its community of life are untrammeled by man, the imprint of man is substantially unnoticeable, and with outstanding opportunities for solitude. In contrast, many are seeking a trail system where they can hike for a few hours and enjoy the scenery, maybe see some wildlife, or to visit a cave, stream or other attractions or features. The NVUM survey did not include a large enough sample to determine level of satisfaction of Wilderness visitors. Trailhead registration forms and employee observations indicate that almost all hiking groups stay within the 10-person group size limit, but that some of the horse groups exceed this standard.

Hercules Glade Wilderness *Photo by Kale Horton 4-23-03*

A Wildland Fire Implementation Plan for Hercules Glades Wilderness is approved, so that once again naturally ignited wildfires can be allowed to burn within the Wilderness to meet wilderness objectives, under specific conditions.

There are two Wilderness Rangers on the forest in FY03. On and off-site visitor contacts were made, trails and trailhead counters were maintained, and employees patrolled the Wilderness for clean-up, education, and enforcement. Limits of Acceptable Change monitoring was done in the Hercules Glade Wilderness in 2003 as a Masters Degree project by Wilderness Ranger Kale Horton.

Heritage Resources

Current situation and accomplishments

The FY 2003 Heritage program provided support services to other Forest functions such as timber, recreation, wildlife, and lands to meet legally mandated historic preservation compliance objectives. Heritage program-driven stewardship functions were at a minimal level due to funding. Activities in the program included work on the Heritage INFRA database and forest wide GIS coverage.

Sixty-six field studies were completed to survey for, identify, and evaluate heritage resources through Forest or contract efforts. 119 heritage resources, both prehistoric and historic, were discovered and recorded during surveys of 30,042 acres of Forest Service lands. Forest heritage resources now total approximately 4,332 sites and acreage surveyed totals 502,543 acres.

Six archaeological sites were evaluated against eligibility criteria for the National Register of Historic Places and were determined to be eligible. Fifty-one sites were monitored for protection.

Fire

Current situation and accomplishments

Deliberate arson fires account for 75% of the primary cause of fires on the Mark Twain with landowner burning escapes coming in second at 19% . Other fires are started by equipment, smoking, or miscellaneous causes. Missouri does not have a permit system in place for burning and as a result, landowner burning is a common practice. This application of fire by inexperienced landowner burning is a reason for escapes caused by negligence or carelessness.

In FY 2003, a total of 151 wildland fires burned 2,136 acres of National Forest Lands. Over 50% of wildfires in Missouri were controlled at less than ten acres and another 30% burnt between 10 and 100 acres. The remaining 20% are either very small or grow to over 100 acres as was the case with four wildfires during 2003.

Prescribed burning days were scattered in February through April. Forest personnel had the opportunity to complete 40 prescribed fires for 10,647 acres. The fall season was wetter than normal, affecting the number of individual burns as well as the total acreage.

The Forest was assigned a 8010-acre natural fuels target through the National Fire Plan, 10,647 acres were accomplished. There was 7,614 acres that were designated to protect Wildland Urban Interface (WUI). The other remaining acres of land were treated for fuel reduction, wildlife habitat, and maintenance. Glades are being invaded and converted to stands with cedar as the prime component. Future efforts associated with natural fuels reduction will be focused on these areas.

Economic Efficiency

Comparison of Unit Costs as Contained in the Management Attainment Report (MAR). (6)

In the following table, the unit costs for various resource programs contained in the MAR report from FY 1997 to FY 1999 are listed for comparison: Unit cost is determined based on targets accomplished with appropriated and KV funds.

Activity	Unit of Measure	FY 98 $ Cost/Unit	FY 99 $ Cost/Unit	FY 00 $ Cost/Unit	FY 01 $ Cost/Unit	FY 02 $ Cost/Unit	FY03$ Cost/Unit
Noxious Weed Control	Acre	30	38	38	48	29	34
Water and Soil Resource Improvements	Acre	1,018	1,790	1,325	1,075	1,225	1,225
Mineral Leases and Permits	Case	3,403	4,773	5,378		2,083	2083
Fuel Treatment - Appropriated	Acre	51	70	82	158	84	84
Timber Offered, New	MBF	15[1]	13[1]	22[1]	32[1]	27[1]	28
Timber Offered, SSF	MBF	15[1]	17[1]	21[1]	28[1]	27[1]	28
Reforestation - Appropriated	Acre	56	65	127	257	193	136
Reforestation - KV	Acre	38	56	84	45	187	120
Timber Stand Improvement - Appropriated	Acre	67	180	137	16	0	185
Timber Stand Improvement - KV	Acre	101	179	175	41	0	110
Trail Construction	Mile	3,205	4,665	3,706	7,729[2]	4,770[3]	4,770[3]
Recreation Facility and Site Management	MPAOT Days	55,944	53,798	N/A	N/A	N/A	N/A
Range Non-Structural Improvements	Acre	22	30	31	31	31	34
Range Non-Structural Improvements - KV	Acre	0	61	0	0	34	34
Range Structural Improvements	Structure	194	2,500	2,100	2,100	3,500	3,500
Land Exchange	Acre	61	112	974	125	30	56
Property Boundary Location	Mile	9,008	11,210	11,200	14,120	12,040	15,003
Road Construction and Reconstruction	Mile	49,287	55,905	30,467	68,889	12,700	28,490
WL Habitat Improvements - Appropriated	Acre	57	45	55	40	60	50
WL Habitat Improvements - KV	Acre	85	45	55	50	40	77
WL Habitat Improvements - KV	Structure	0	750	750	0	0	0
Fish Habitat Improvements - Appropriated	Acre	76	80	75	79	75	74
Fish Habitat Improvements - Appropriated	Mile	N/A	N/A	N/A	3,000	1,700	6,000
T&E Habitat Appropriated	Acre	16	N/A	0	0	0	0
T&E Habitat Appropriated	Structure	0	1,500	0	309	0	0
T&E Habitat - KV	Acre	0	0	55	0	0	0

[1]Based on sale preparation costs, which includes marking, cruising, appraisal, advertisement and contract award.
[2]Includes some funds for improvements at Cobb Ridge Campground. Budget coding process prevents separating these out.
[3] Exact figure not available due to change in budget process.
N/A - Not available due to a change in budget coding process

Returns to U.S. Treasury; Returns to Counties. (29)

The following table shows the expenditures and incomes of the Forest for FY 2002. Minerals account for 55 percent of the Forest income; timber 44 percent; and all other sources represent 1 percent.

EXPENDITURES

PROGRAM	DOLLARS
Minerals	198,000
Range	140,000
Land Management	1,049,000
Wildlife/Fish	784,000
Timber	3,036,000
Fire	3,921,000
Recreation Management	1,001,000
Road Improvements and Maintenance	1,641,000
Trail Improvements and Maintenance	330,000
Law Enforcement	153,000
Land and Water Conservation Fund	595,000
Vegetation and Watershed Management	606,000
Forest Planning/Inventory & Monitoring	1,227,000
Additional Miscellaneous Programs	4,250,000
TOTAL	**$18,931,000**

INCOME

PROGRAM	DOLLARS
Minerals	2,400,000
Range	10,500
Land/Uses	37,500
Timber	1,947,000
Recreation	10,000
TOTAL	**$4,405,000**

In the past, each year the National Forests returned 25% of all revenues to the states where National Forest System lands are located. This money was distributed to the counties, prorated on the number of National Forest acres in the county. These funds are to be used to benefit public schools and county roads. In FY 2001, the "Secure Rural School and Community Self-Determination Act of 2000" took effect. Counties could choose to take the average of the three high years since 1986 or continue to receive the standard 25% of revenues.

The high three years for Mark Twain were 1988, 1989 and 1990. During these three years, royalties from mining minerals were included in the Forest's revenue and these revenues were very high. When the law was passed, it did not address the mineral royalties received by "Weeks Law" land in the eastern United States. Therefore, this year counties that chose to adopt the secure payment received the average of the high three, which included mineral royalties and the 25% royalty payment for FY 2001. This may change in the future.

Counties with federal lands also receive Payments in Lieu of Taxes (PILT). PILT funds are not limited to schools and roads.

The amounts received by each county are shown in the following table.

COUNTY	NET NF ACRES	FY 2003 PILT PAYMENTS*
Barry*	55,063	79,690
Bollinger*	1,646	1,967
Boone*	4,140	4,949
Butler	44,379	36,816
Callaway	11,885	14,386
Carter	90,645	91,137
Christian	51,557	52,774
Crawford	50,053	50,636
Dent	72,281	67,393
Douglas	40,910	41,260
Howell	49,351	49,893
Iron	95,214	82,908
Laclede*	29,909	35,219
Madison	51,306	51,682
Oregon	105,612	95,070
Ozark	38,672	70,081
Phelps	63,165	55,179
Pulaski	37,709	34,640
Reynolds	89,915	103,841
Ripley	97,179	82,256
Shannon	83,122	120,400
St. Francois*	673	804
Ste. Genevieve	10,254	10,342
Stone	9,593	58,476
Taney	61,125	87,940
Texas	47,056	48,464
Washington	82,398	72,705
Wayne	87,205	133,087
Wright	7,159	7,243
Total	**1,469,176**	**$1,641,238**

* PILT payments include payments on all federal lands including Forest Service, National Park Service, and Corps of Engineers

Reevaluate local economic parameters (population, income, employment, industrial needs). (30)

The Forest Plan Monitoring Plan requires that local economic parameters and effects be evaluated every 5 years. In 1996, the contributions that National Forest programs make to the local economy were evaluated in *Ozark-Ouachita Highlands Assessment: Social and Economic Conditions* (U.S. Department of Agriculture, Forest Service. 1999) using the IMPLAN model. That report used data from various sources, including the 1990 census, IMPLAN 1993 input-output data, and 1996 Forest economic data.

Basic demographic and economic parameters for the counties containing National Forest System lands in Missouri have been updated based on the 2000 census. The twenty-seven counties that contain National Forest lands in Missouri have been divided into six regions; Southwest, Springfield, South Central, Rolla, Bootheel, and Cape. Of the individual counties containing Mark Twain National Forest land all experienced an increase in population except Iron and Pulaski County. Four out of the eight counties with the highest unemployment rates in the state lay within the MTNF area. The total population of the twenty-seven counties is 638,998. Basic demographic characteristics are illustrated below.

Profile of General Demographic Characteristics: MTNF 2000
Geographic Area: Mark Twain National Forest Counties in Missouri

Source: U.S. Census Bureau, Census 2000

Subject	**Number**	**Percent**
Total Population	638,998	100
Gender		
Male	316,195	49.6
Female	322,803	50.4
Age		
18 Years and Older	477,873	74.7
65 Years and Older	192,778	30
Race		
White	599,089	93.7
African American	10,594	1.6
Asian	3,303	0.5
Native American	4,824	0.7
Pacific Islander	293	0.04
Hispanic (of any race)	20,292	3
Income		
Average Income	$22,492	--
Below Poverty Level	99,958	15.6
Education		
Persons Over 25 with:		
High School Diploma	104,934	16
College Degree	18,549	2.8

The Southwest Region includes Barry County, the western-most county in Missouri in which the Forest Service owns land. This area has surpassed the state in economic growth over the past ten years, with Barry County beating other counties. The population growth rate is 11.5% since 1990 compared with the state's rate of 9.3%. Nevertheless, the poverty rate for this area is a high 14.3%. The unemployment rate during 1999 was 3.3%, slightly above the state's rate of 3.4%. The per capita income in the region was $19,746 during 1998, compared to $25,150 for the state (Department of Economic Development). The major industry in this region is manufacturing, which employs 27.6% of the population. A close second major industry is trade, with 27,449 jobs. Government, service industry, and construction also employ many citizens in this area. Agriculture employs 1.6% of the population.

The Springfield region has one of the state's strongest economies and contains Christian, Stone, and Taney Counties. The population has grown 19.6% since 1990 and the poverty rate is 11.8%, which is lower than the state's overall rate. The low unemployment rate of 3.3% brings the per capita income to $22,451 in 1998. This is good in comparison to $25,150 for the state (DED). The trade industry dominates this region, followed by service, government and manufacturing. Agriculture accounts for only 0.5% of the employment.

Economically, the South Central Region is up to par with the rest of the state, but although the population has grown 11.1% since 1990, the other economic indicators are not as strong. Douglas, Howell, Oregon, Ozark, Shannon, Texas, and Wright Counties make up this region. Howell County has seen the most progress during the last ten years. The poverty rate for this region is 22.5%, almost double than the state as a whole. The unemployment rate, at 5.3%, was also almost twice as high as the state average. Per capita income in this region was $15,189 in 1998, the least for any region (DED). This region has a strong trade industry, followed closely by manufacturing and government employment. Agriculture accounts for 0.7% of the industry employment in this area.

The counties of Crawford, Dent, Laclede, Phelps, and Pulaski make up the Rolla Region. This region has a booming tourist industry, and employs many individuals on a seasonal basis. The population has grown 9.9% over the past ten years. The poverty rate is 14.1% and the unemployment rate in 1999 was 4.5%, which may be due to the high seasonal employment. Per capita income in 1998 was $19,269 (DED). The Rolla region employs most of its workers in the trade and government industries. Service and manufacturing industries are also strong in this region. Agriculture employs 0.8% of the people in this region.

The Bootheel Region is not growing economically as fast as the state as a whole. The population growth since 1990 was only 1.8%. The poverty rate in this region is 24.9%, the highest in the state. The unemployment rate during 1999 was 4.9% and the per capita income during 1998 was $17,844 (DED). 24% of the people in this region are employed in the trade industry. Manufacturing, services, and government are also top employers in the Bootheel Region. Agriculture employs 1.7% of the workers in this area.

The Cape Region, consisting of Bollinger, Iron, Madison, Reynolds, Ste. Genevieve, St. Francois, and Washington Counties, generally outpaces the economy of Missouri as a whole. The population has grown 9.4% in the past ten years and the per capita income was $18,970 in 1998. The poverty rate is 14.2% and the unemployment rate during 1999 was 4.2% (DED). The top industries in and around the Mark Twain National Forest are present in the Cape region. Trade, manufacturing, services, and government again employ the majority of the people in this region. Agriculture employs 0.6% of the residents in the Cape Region.

Conclusions

General

During monitoring field trips in FY 2002 and the subsequent evaluation activities, District Interdisciplinary teams and Supervisor's Office specialists found that the Forest Plan Standards and Guidelines were met in most areas on the Mark Twain.

This report is a reflection of the Forest's commitment in managing the multiple natural resources in a professional manner. This report demonstrates the hard work and dedication of many employees in the past year.

The monitoring and evaluation results indicate that the Mark Twain National Forest continues to fulfill the mandate from the Congress and the trust from the American people in taking care of the National Forest in Missouri.

Soil and Water

In addition to the ongoing monitoring by Sale Administrators on timber sales, implementation of soil and water mitigation measures was formally monitored on a sample of timber sales roads. The overall implementation was found to be effective. Soil productivity of the Forest has not been diminished by vegetation management activities. Several studies and projects to validate soil and water practices are ongoing.

Clearer Forest Plan direction for identifying stream characteristics would aid in implementing standards and guidelines for stream course protections. Further analysis and possible changes will be evaluated during the Forest Plan revision process.

Visual Management

Visual quality standards and guidelines were met during the FY 2003 monitoring trips.

Lands

The lands program added a total of 612 acres to the National Forest, and accomplished 40 miles of boundary marked to standard.

Timber Management

The ID teams visited many timber sale areas and found excellent compliance with Forest Plan Standards and Guidelines. Regeneration was accomplished successfully. Silvicultural prescriptions met the intent of the Forest Plan.

The quantity of timber offered over the Forest Plan implementation period is well below the Allowable Sale Quantity specified in the Forest Plan. The amount of timber being sold increased, with 47.6 million board feet (MMBF) of timber sold in FY 2003.

The use of uneven-aged management harvest (UAM) methods in FY 2003 represented 40.5 percent of total acres sold; even-aged management (EAM) harvest methods (clearcut, shelterwood and seed tree) represented 32.4 percent; and commercial thinning, salvage and miscellaneous categories amounted to 27.1 percent.

Oak decline continues to plague the scarlet and black oak groups. Increased mortality is evident in stressed stands. The extended drought is the probable triggering factor, but the probable cause is the large number of overstocked, over-mature red oak stands. There is a need to address salvage needs for areas heavily affected by oak decline.

Vegetative Manipulation

Because of severe decline and mortality, stands of 70-year old and older red oaks on droughty sites are not being recommended for UAM unless they contain 50% of more drought-hardy species, such as white oak and shortleaf pine.

Approximately 400 acres on the Houston/Rolla/Cedar Creek District were nominated by the Forest and designated by the State as the Solomon Hollow State Natural Area. The Solomon Hollow area contains sandstone glade communities ranked as “significant” or “exceptional” by the Natural Features Inventory Report for Phelps, Pulaski, and Laclede Counties (1992).

Fish and Wildlife

Population trends of most of the Mark Twain's thirteen Management Indicator Species are stable or slightly increasing. The Forest amended the Forest Plan to incorporate the terms and conditions of the Biological Opinion received in FY99 on four species that are Federally listed. Monitoring in FY 2003 found no cases of incidental take of these four species. There is no critical habitat designated for any species on the Forest.

Grazing

All active allotments and haying areas were administered to minimum standard. More monitoring time is needed to meet other more specific concerns.

Roads

The Forest reconstructed 4.8 miles of classified roads, and closed 10.7 miles of unclassified roads. Classified (system) road closures continue to be strongly opposed by local residents.

Minerals

There are currently thirty-six hardrock preferential right leases and seven prospecting permits, located on the Salem-Potosi and Fredericktown districts. All operations are being administered to standard. There have been no requests to withdraw lands for mineral exploration.

Recreation

Significant changes in river access on the Eleven Point River were started in 2003. The Forest continues to look for ways to imporove accessibility and meet customer needs. The user fee demonstration project in the Chadwick Motorycycle and ATV Use Area, Cobb Ridge Campground, and Sutton Bluff Motorcycle and ATV Use Area continues to be successful. Public acceptance and support of this project is excellent.

Wilderness

In general, Wilderness use on the Mark Twain is concentrated on weekends in the spring and fall. Use was about 55,000 – 63,000 RVDs, or almost 200% of Forest Plan projections. Some Wilderness visitors are not specifically seeking a "Wilderness Experience," but are seeking a trail system to hike for a few hours, enjoy the scenery, and see some wildlife. Illegal use with motorized vehicles and encroachment from private lands continue to be among the greatest threats to the Wilderness resource on Mark Twain National Forest.

Heritage Resources

The FY 2003 heritage program provided support services to other Forest functions such as timber, recreation, wildlife, and lands to meet legally mandated historic preservation compliance objectives. Sixty-six studies covering 30,042 acres were completed, with over 119 heritage resources discovered and recorded.

Heritage driven projects to provide public education, resource protection and stewardship and partnership development was performed at a minimal level.

Fire

Arson, followed by landowner burning escapes, continues to be the primary cause of wildfires on the Mark Twain. A total of 151 wildland fires burned 2,136 acres of National Forest lands. The Forest successfully accomplished a natural fuels target of 10,647 acres.

Economic Efficiency

In the past, each year the National Forests returned 25% of all revenues to the states where National Forest lands are located. These funds were to be used to benefit public schools and county roads. In FY 2001, the "Secure Rural School and Community Self-Determination Act of 2000" took effect. Counties could choose to take the average of the three high years since 1986 or continue to receive the standard 25% of revenues. Counties with federal lands also receive Payments in Lieu of Taxes (PILT). PILT funds are not limited to schools and roads. In FY 2002, minerals accounted for 55 percent of the Forest income; timber 44 percent; and all other sources represented 1 percent.

Evaluation and Recommendations

Evaluation of Monitoring Results and Conclusions

The monitoring results were first evaluated on each District in a shared effort by an ID team. The monitoring included site-specific observation by Specialists; general field observations; discussions with Forest users, interested individuals and organizations; and attainment reporting.

In the Supervisor's Office, the Forest NEPA Coordinator led an ID team to evaluate the monitoring results and drew pertinent conclusions from the findings. Afterwards, recommendations were made for modification of practices on the ground, or Forest Plan amendment or revision.

Plan Amendment

The National Forest Management Act Planning Regulations permit amendments to the Forest Plan that may result in either significant or non-significant changes to the Plan (36 CFR 219.10 (e) (f)). The Forest Supervisor develops amendments to the Forest Plan, determines and documents whether they will result in a significant or non-significant change to the Forest Plan, and completes all appropriate public notification.

If the change resulting from the proposed amendment is determined to be significant, the Forest Supervisor will follow the same procedure as that required for development and approval of a Forest Plan.

If the proposed change is determined to be non-significant, the Forest Supervisor may implement the amendment following appropriate public notification and completion of NEPA procedure.

The need to amend the Forest Plan may come from several sources, such as recommendations of the interdisciplinary team based on monitoring and evaluation, changes in implementation schedules based on actual funding received, or changes in conditions.

There are no recommended amendments to the Forest Plan identified in this report.

Plan Revision

The National Forest Management Act requires revision of the Forest Plan at least every 15 years. However, the Plan may be revised sooner if physical conditions or demands on the land and resources have changed sufficiently to affect overall goals or uses for the entire Forest. The Mark Twain began revision in FY 2002.

This report identified several items that might need to be considered during Forest Plan revision:

- Clarify Forest Plan direction on the identification of stream characteristics to aid in implementing standards and guidelines for stream course protections.
- Develop additional standards and guidelines applicable to uneven aged management. Examine feasibility of wildlife habitat objectives, such as acres of 0-9 age class, when using uneven aged management.
- Add standards and guidelines for landscape prescribed burns, especially fire line construction and timing for vegetative response.

- Address more fully invasive, non-native and noxious weeds control.

Research Needs

- Development and testing of protocols for water resource and aquatic habitat inventory of Ozark Plateau stream systems in order to develop a comprehensive stream/aquatic habitat inventory A well documented, comprehensive stream/aquatic habitat inventory is needed as a foundation for monitoring of emerging water quality, karst landscape and aquatic TES issues and concerns on the National Forest.
- Identification of potential effects of rural and urban land uses upon the karst resources of the Ozark Plateau in order to define how point and non-point sources of water pollution affect groundwater systems and significant cave resources.
- Research and studies of the potential effects of National Forest management upon water quality dependent populations and habitat of aquatic threatened and endangered species.
- Continuing evaluation and documentation of the effects of wild-land prescribed fire upon air, water, and timber quality.
- Validation of National Forest regional soil quality standards on Ozark Plateau soils. Verification of standards for soil disturbances including displacement, compaction and puddling with respect to long-term ecosystem productivity. Development of effectiveness monitoring protocols for soil quality parameters for these soil types.
- Further study of relationships between site characteristics; soils, geology, slope, aspect; and potential native plant community composition and structure, building on work by the Missouri Department of Conservation and the Forest during the past decade.
- Evaluation of the primary forest productivity and ability of National Forest System lands to produce crops of industrial wood products. Refinement of the process for identifying suitable lands which constitute the land base for determining the allowable sale quantity (ASQ) and vegetation practices associated with timber production.
- Evaluation of the effects of grazing on Regional Forester's sensitive species.

Public Disclosure

This Monitoring and Evaluation Report will be published and made available to the public. It will also be posted on the Mark Twain National Forest website at http://www.fs.fed.us/r9/marktwain/. To obtain additional copies of this report, please write or call:

Forest Supervisor
Mark Twain National Forest
401 Fairgrounds Road
Rolla, MO 65401
Telephone: (573) 364-4621

List of Preparers

The Mark Twain Forest Monitoring Team, led by Becky Bryan, prepared this Monitoring and Evaluation Report. Interdisciplinary teams on each District conducted the monitoring field trips.

More than 40 individuals were involved in the Fiscal Year 2003 activities, including Forest Supervisors, District Rangers, Supervisor Office Specialists, Forestry Technicians, Wildlife Biologists, Foresters, Outdoor Recreation Planners, Archaeologists, GIS Specialists, and NEPA Coordinators. Their names and respective specialties are listed below:

Line Officers

Ronnie Raum, Forest Supervisor
Michael Sanders, Deputy Forest Supervisor
Jerry Bird, District Ranger
Katie Stuart, District Ranger
John Bisbee, District Ranger
Jenny Farenbaugh, District Ranger
Thomas Haines, District Ranger
Henry Hickerson, District Ranger

Supervisor's Office Staff and Specialists

Kris Swanson, Resources Staff Officer
Richard Hall, Planning/Operations Staff Officer
Becky Bryan, Forest NEPA Coordinator
Paul Nelson, Forest Fire Ecologist
Dave Moore, Forest Ecologist
Ross Melick, Forest Silviculturist
Charly Studyvin, Forest Silviculturist
Nancy Feakes, Forest Recreation Specialist
Dave Easter, Forest Engineer
Lori Wilson, Forest Hydrologist
Larry Furniss, Forest Fishery Biologist
Jody Eberly, Forest Wildlife Biologist
Mary Lane, Wildlife Biologist
Jim Turner, Lands Program Manager
Karen Mobley, Social Planner
Gretchen Moore, Forest Geologist/Minerals
Kolleen Bean, Forest Archaeologist
Diane Crouch, Forest Road Engineer
Marvin Dablemont, Assistant Fire Management Officer
Bennie Terrell, Fuels Specialist
Getrisc Smith, Social Science Planner

Regional Office and Other Forest Staff

Ross McElvain, Regional Range Conservation Program Manager

District NEPA Coordinators

Tom McGuire
Brian Davidson
Mark Hamel
Jay Turner
Bill Paxton

District Wildlife Biologists

Megan York
Angelina Trombley
Sarah A. Bradley
Klaus Leidenfrost
Lynda Mills
Dwayne Rambo

District Silviculturists

Darrell Dostal
Doyle Henken
Brian Merkel

District Sale Administrators/Forest Service Representatives (FSR)

John Fraenzl
Bill Miles
W. David Sullivan
Chris Hopfinger

District Timber Management Assistants

Joe Walker
Darla Rein
John Bryan
Bob Harrell

Other District Specialists

Stephen Herndon, Range Specialist
Carol Trokey, Forester
Steve Nurse, Fire Management Officer
Jerry Soard, Fire Management Officer
Chris Woods, Asst Fire Management Officer

District Forestry Technicians
Gail Blair, Wildlife, Fire, SUP
Gary Blair, Timber
Robert Horner, Timber
Ted Leimer, Timber etc.
Justin Adams, Recreation
Dan Maijala, Recreation/Timber
James Murrell, Timber, Range, Wildlife, Fire, Recreation,