

Fiscal Year 2000 Monitoring & Evaluation Report

Mark Twain National Forest Land and Resource Management Plan

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Table of Contents

Summary.....	iii
Certification	v
Introduction.....	1
I. Background.....	1
II. Objective.....	1
III. Indicators and Thresholds.....	3
IV. Supporting Monitoring Information	3
V. Monitoring Items Required by the Forest Plan.....	4
VI. Data Storage.....	4
Methods.....	5
I. Design	5
II. Analysis Methods.....	5
Results.....	6
I. General.....	6
II. Soil and Water.....	8
III. Air Quality	10
IV. Visual Management	11
V. Lands.....	11
VI. Timber Management.....	11
VII. Vegetative Manipulation.....	14
VIII. Wildlife	15
IX. Grazing.....	25
X. Roads.....	25
XI. Minerals	26
XII. Recreation	26
XIII. Wilderness.....	27
XIV. Heritage Resources	28
XV. Fire	28
XVI. Economic Efficiency.....	29

Conclusions.....	34
I. General.....	34
II. Soil and Water.....	34
III. Visual Management	34
IV. Lands.....	34
V. Timber Management.....	34
VI. Vegetative Manipulation.....	35
VII. Fish and Wildlife.....	35
VIII. Grazing.....	35
IX. Roads.....	35
X. Minerals	35
XI. Recreation	35
XII. Wilderness.....	36
XIII. Heritage Resources	36
XIV. Fire	36
XV. Economic Efficiency.....	36
Evaluation and Recommendations.....	37
I. Evaluation of Monitoring Results and Conclusions	37
II. Plan Amendment.....	37
III. Plan Revision	37
IV. Other Recommendations.....	37
V. Research Needs.....	38
VI. Public Disclosure	38
Appendix I	39
List of Preparers	39
Appendix II.....	41

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 insure: (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; some 70 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.

The Forest's appropriation in FY 2000 was far short of the Forest Plan projection. The budget strain is reflected in program accomplishments. Despite a great deal of effort by the employees, shortages in funding and personnel have resulted in decreased accomplishments in some resource areas. Proper implementation remains a high priority and is not affected by reduced budget.

Certification

I have reviewed the FY 2000 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/ Randy Moore

RANDY MOORE
Forest Supervisor

Date: October 4, 2001

Introduction

I. 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 significant 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.

II. 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.

III. 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, wildlife biologists use population trends for the Forest's Management Indicator Species (wild turkey, ruffed grouse, northern bobwhite, pileated woodpecker, eastern bluebird, wood thrush, ovenbird, indigo bunting, orchard oriole, raccoon, bobcat, and white-tailed deer.)

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.

IV. 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 Even-aged Management/Uneven-aged Management (EAM/UAM) committee, 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.

V. 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 shown 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 in order to give a more complete picture of the current condition of those resource areas.

VI. 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 District Ranger's approval. The reports containing pertinent monitoring information are then sent to the Supervisor's Office for analysis.

Methods

I. 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 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 fiscal year when the Forest Plan monitoring and evaluation report is completed.

II. 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

I. General

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

Fifteen formal and scheduled monitoring trips were conducted throughout the year, with at least one trip on each District. Participants included District, SO, and Regional Office personnel. The monitoring teams reviewed both the documentation and on-the-ground implementation of environmental analyses designed to implement the Forest Plan.

In general, the work showed good knowledge of and progress towards the desired future condition of the Management Prescription areas as described in the Forest Plan. The implementation of these projects indicated good awareness and application of the Forest Plan Standards and Guidelines. 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.

2. *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 is based on information in Table 4-1 "Average Annual Forest-wide Outputs" of the Forest Plan (page IV-5.)

ACCOMPLISHMENTS - FISCAL YEARS 1986-2000

Activity	Unit of Measure	1st Decade Accomp. FY 86-95	1st Decade LRMP Objective	FY 96	FY 97	FY 98	FY 99	FY 00	Total FY 96-00	LRMP Objective FY 96-00
Recreation Use	M RVD	14,203.0	14,699.0	2,019.0	2,024.0	2,523.0	2,400.0	2,400.0	11,366.0	8,040.0
Wilderness Use	M RVD	459.0	153.0	54.8	55.0	56.0	56.0	56.0	277.8	137.5
Fish and Wildlife Use	M WFUL	4,036.0	5,277.0	442.9	450.0	397.0	410.0	415.0	2,114.9	2,920.0
Wildlife Habitat Improvement	M Acres	112.0	90.0	8.4	5.1	6.3	8.5	4.6	32.9	49.5
Range Use	M AUM	313.0	374.0	80.0	20.2	25.0	23.2		148.4	210.0
Range Improvement	M Acres	23.0	49.0	1.0	1.2	1.7	2.6		6.5	27.5
Road Development	Miles	584.2	500.0	54.4	48.2	56.8	18.6	30.6	208.6	185.0
Land Purchase	M Acres	12.8	3.0	0.8	0.7	0.6	1.9	0.6	4.6	1.5
Land Exchange	M Acres	23.8	32.0	1.2	0.8	3.0	1.3	0.4	6.7	16.0
Property Boundary Survey	Miles	965.0	860.0	57.0	40.0	33.0	33.0	30.0	193.0	430.0
Timber Sold	MMBF	623.1	1,050.0	58.2	49.6	45.0	30.3	19.5	202.6	742.5
Acres Harvested	M Acres	169.9	304.0	16.8	15.8	13.7	11.9		58.2	205.0
Reforestation	M Acres	99.7	112.0	8.1	7.7	8.8	6.9	6.4	37.9	56.0
Timber Stand Improvement	M Acres	33.5	36.0	7.0	5.6	3.2	2.0	1.8	19.6	77.5

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

II. Soil and Water

1. *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, recreation, 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. Although this resource is being protected, a continuing issue in implementation of these S&Gs appears to be the lack of clear Forest Plan direction on the identification of stream characteristics. Implementation of erosion control measures, particularly erosion control seeding and water control structures (water bars and outlet ditches) were found to be in need of more effective implementation. As a result, timber sale administrator and equipment operator training to improve implementation of soil and water conservation practices is being developed. The Forest also works continually to enhance our management practices by developing and applying more effective erosion control and water management measures, thus minimizing potential effects of land management activities upon surface and groundwater resources.
- 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 all Ranger Districts during the year. Timber, range, and recreation 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 and range management projects. Soil erosion rates on off-road vehicle (ORV) trails on the Ava and Potosi Ranger Districts have been a management concern, and thus have been addressed on a site-specific basis to help ensure resource protection and make sure rates have remained within threshold levels identified in the Forest Plan. 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 Universal Soil Loss Equation to predict soil erosion potential for forested land. All proposed vegetation management activities that show possible soil losses greater than allowed by Standards and Guidelines were dropped from consideration or modified to be within the Standards and Guidelines. Relative to soil erosion, the soil productivity of the Forest has not been diminished by vegetation management activities.
- Fencing on range allotments has been used as an effective means of protecting special habitat areas, particularly riparian areas. Water sources are developed and located to protect riparian areas, seeps and fens.

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

- A project to determine the effects of forest management practices upon the hydrology and aquatic habitat in small headwater stream systems is nearing conclusion. The administrative study, conducted in cooperation with the U.S. Geological survey and the University of Missouri – Columbia, evaluates the relationship between land management practices and in-stream physical and biological conditions in eleven different stream systems on the Houston/Rolla/Cedar Creek, Salem, and Potosi/Fredericktown Ranger Districts.
- 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.

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

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.

Landscape restoration, 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.

3. *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 between 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.

- Protocols for water resource and aquatic habitat inventory 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 system 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 and 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.
- Relationships between site characteristics; 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 and build upon this body of work.

III. Air Quality

1. *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 will be installed. We're also conducting a baseline inventory and assessment of lichens in the Hercules Glade Wilderness for a more accurate assessment of Air Quality Related Value (AQRV) impacts.

2. *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 in the Ozark Plateau. As the National Forest continues to increase its use of prescribed fire as a vegetation management tool, the affects of management generated air pollution will emerge as an issue.

3. *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 will need to be continued to be studied and documented.

IV. Visual Management

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

Formal monitoring trips conducted throughout the year included the monitoring team looking at road reconstruction projects, timber sales, harvest along the Ozark trail, and temporary road closures. Overall, the team found good implementation of visual standards and guidelines and mitigation measures such as limits on slash disposal heights and leave trees along roads. Furthermore, the visual impact of a clearcut reviewed by the team had been reduced by feathering the edges of the stand. On one Forest Service System road reconstruction project visited, the slash disposal zone had achieved the desired visual results.

There were some isolated cases, however, where implementation of a project did not maintain and/or meet the desired visual quality standards and guidelines. For example, one project had stumps left along a road where as another had excessive slash left. In these cases, the monitoring team discussed the findings and identified a need to work with specialists to ensure the desired visual quality standards and guidelines are clearly communicated and being carried through on all projects during implementation. These results were shared and communicated with members of the Forest Leadership Team to initiate action to meet this identified need.

V. Lands

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

The land adjustment program added a total of 989 acres to the National Forest by purchasing 607 acres of land, and completing three land exchanges for 382 acres. The Forest accomplished 30 miles of boundary located to standard, bringing the total miles surveyed to 1,934.

VI. Timber Management

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

The Forest's FY 2000 Plantation Survival Report showed first and third year survival of 46 percent and 91 percent, respectively. The low first year survival from the 1999 planting was due to severe drought. The following table shows the results of stoking surveys over the life of the Forest Plan.

Year	Planned	Fiscal Year Accomplishment		Cumulative Accomplishment	
	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

	Planned	Fiscal Year Accomplishment		Cumulative Accomplishment	
Year	Reforestation	Regen. Harvests	Regen. Cert.	Regen. Harvests	Regen. Cert.
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

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.

2. *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.

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

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. Monitoring of eight County Trapper activities in FY 1999 showed acceptability ratings of 93 to 100 percent, the highest ever.

In FY 2000, Missouri's Cooperative Gypsy Moth Survey placed and monitored approximately 11,000 pheromone traps. Twelve Gypsy moths were captured statewide; nine in the St. Louis area, one in the St. Charles County, and two in Stone county southeast of Kimberling City.

The drought that continued in 2000 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 2000, increased mortality in the red oak group became more apparent. Interdisciplinary monitoring teams on both the Salem and Potosi Districts noted areas of oak decline and identified the need to remove more of the red oak group in some treatments. The need to address salvage needs for areas heavily affected was also discussed. Aerial observations also found oak decline to be serious on the Potosi and Salem Districts. Field observations found the mortality to be accompanied by high numbers of red oak borers.

4. *Determine Whether Maximum Size Limits for Harvest Areas are Achieving Desired Results. (10)*

Extensive research has been initiated that will help address this monitoring item. The most in-depth research is being conducted on the Missouri Forest Ecosystem Project site managed by the Missouri Department of Conservation, NCFES, and the University of Missouri-Columbia. Results are expected to become available in the near future from the research effort. On the Forest, indications are that

harvest area sizes are not negatively affecting neotropical migrant birds. (J. D. Wilson; Missouri Fish and Wildlife Conference, February 1996, S. K. Robinson; Consequences, Vol. 3, No. 1, 1997)

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

There are growing concerns among Forest personnel and forest industry that salvage opportunities after catastrophic fire, wind, and ice damage are being increasingly jeopardized and lost. Salvage usually offers the best opportunity to lower fire danger and the risk of epidemic insect buildups. Because a portion of the receipts from harvests are retained for reforestation, timber stand improvement, and brush disposal (fire danger reduction, aesthetics), salvage harvests provide an opportunity to insure that money is available for this vital work after a catastrophic event, all of which contributes to and helps protect forest health.

A major issue identified in previous years was chip mills, which became so controversial that the Governor established a Chip Mill Advisory Committee. The committee's final report supported voluntary use of Best Management Practices, voluntary logger and landowner education, and tax incentives for good forestry.

6. *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 being sold is continuing to decline with 19.5 million board feet (MMBF) of timber sold in FY 2000. This is a decline from 30.3 MMBF in FY 1999 and the ten-year high of 63.3 in FY 1993.

The use of uneven-aged management harvest (UAM) methods in FY 2000 represented 24 percent or 1,257 sell acres. Even-aged management (EAM) harvest methods (clearcut, shelterwood and seed tree) represented 27 percent or 1,391 acres. Major changes in harvest methods since 1988 based on timber sell acres are:

1. Clearcuts averaged 5 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 32 percent since 1991.
3. Shelterwood and seed tree methods of EAM have increased (combined total of 5 percent in 1988 to 21 percent in 1999.)
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 2000, this group accounted for 49 percent of acres sold and has accounted for an average over the last five years of 47 percent.

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

7. *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. There was a need identified for a better system for tracking (through the paperwork process) stands and acreages as identified in our site-specific decisions and the timber sale contracts. To address this need, the Districts have developed checklists to ensure that acreages, prescriptions, and mitigation measures are accurately transferred from the NEPA decision document to the timber sale contract.

VII. Vegetative Manipulation

1. 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.

In addition to the above-mentioned research and ongoing evaluation of data, District and Forest interdisciplinary teams evaluated several UAM treatments during monitoring field trips in FY 2000. These site-specific field trips resulted in a variety of findings. On the Houston/Rolla/Cedar Creek District, stands treated with group selections with thinnings resulted in a lighter harvest than initially envisioned. The team validated that the lighter harvest was needed in order to move the area towards the three-age classes required as an objective for UAM.

On the Salem District, the team found that areas treated with UAM had been most affected by fire mortality from a wildfire. It was thought that the increased mortality was due to heavy fuel loading from the harvests and follow-up work.

On the Potosi District, the team found that forbs, grasses and shrubs did not respond positively to an UAM improvement cut, and therefore did not improve wildlife habitat diversity. It was suggested that a heavier harvest would have better met wildlife needs.

2. 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.

3. *Special Area Classification (23)*

An EA was prepared to define and nominate approximately 400 acres as the Solomon Hollow State Natural Area. The Decision Notice changed the management prescription within the area from 3.4 (managed forest with emphasizes wildlife habitat diversity) to 8.1 (designated “special areas” other than wilderness). 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).

4. *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.

VIII. Wildlife

1. *Maintenance of Viable Populations of Management Indicator Species (15)*

Large landscape-scale habitat objectives are used as indicators of viable populations of management indicator species on the Forest. Site-specific projects are designed to maintain, enhance, and/or move areas towards the desired condition within Landtype Associations (LTAs) and habitat type. The percentage of National Forest System lands of each habitat type, by Landtype Associations, determined to be needed to maintain minimum viable populations of management indicator species is shown in the Forest Plan on pages IV-59 thru IV-65. The following table shows those percentages, as well as the existing percentage 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%	6%	10%	30%	20%	12%	10%	14,759	6,126	15%	0%	34%	7%	1.4	1
Oak-Bluestem Plains	0%	1%	1%	5%	19%	25%	24%	0%	441	0	8%	0%	62%	20%	4.6	1
Oak-Hickory Breaks	4%	3%	9%	10%	57%	35%	24%	20%	21,704	11,217	29%	5%	30%	1%	1.3	1
Oak-Hickory Hills & Plains	3%	4%	4%	5%	46%	35%	41%	20%	57,130	51,659	16%	5%	16%	1%	1.5	1
Oak-Pine Breaks	4%	4%	3%	5%	56%	30%	51%	30%	124,537	115,159	15%	10%	7%	1%	1.1	1
Oak-Pine Hills & Plains	5%	4%	2%	5%	50%	25%	54%	20%	55,832	67,891	10%	10%	9%	1%	1.5	1
Oak-Pine Mountains	1%	4%	7%	10%	42%	40%	32%	25%	5,946	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.

2. *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 1980-1999 (% change)	
	MO	Ozark-Ouachita Plateau
Wild Turkey	-2.7%	-1.5%
Ruffed grouse	slight decline over past 5 years	
Northern bobwhite	-4.5%	-3.0%
Pileated woodpecker	+0.1%	+0.4%
Eastern bluebird	+1.3%	+1.4%
Wood thrush	+4.2%	+2.8%
Ovenbird	+3.3%	-0.2%
Indigo bunting	-0.3%	+0.1%
Orchard oriole	-1.4%	-3.0%

Source: Sauer, J. R., J. E. Hines, I. Thomas, J. Fallon, and G. Gough. 1999. *The North American Breeding Bird Survey, Results and Analysis 1966 - 1999. Version 98.1, [USGS Patuxent Wildlife Research Center](#), Laurel, MD*

Source for Ruffed grouse: Eric Kurzejeski, MDC Wildlife Research Section, May 2000.

ANIMALS	TRENDS
Raccoon	Increasing
Bobcat	Stable
White-tailed deer	Stable
Cottontail rabbit	Decreasing

Source: David A. Hamilton, Personnel Communication, MDC, Wildlife Research Section, May 2000; Thomas Dailey, Personnel Communication, MDC, Wildlife Research Section, June 2000; Lonnie P. Hansen, Personnel Communication, MDC, Wildlife Research Section, May 2000.

3. *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
Pink mucket pearly mussel	Stable
Tumbling creek cavesnail	Decreasing
INSECTS	Unknown; two known locations.
Hine's emerald dragonfly	Stable
PLANTS	
Running buffalo clover	Decreasing
Mead's milkweed	Stable
Hall's bulrush	

Source: Interpretation from MDC's Biodiversity Activities Report dated 1999; MDC's Wildlife Diversity Report dated July 1997-October 1998; MDC's Wildlife Diversity Report dated July 1996 – June 1997; MTNF Programmatic Biological Assessment dated September 1998; USFWS Biological Opinion dated June 23, 1999; Garry Houf, Wildlife Biologist, USFS, 401 Fairgrounds Road, Rolla, MO; Larry Furniss, Fisheries Biologist, USFS, 401 Fairgrounds Road, Rolla, MO.

4. *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.

GRAY BAT

- Monitoring conducted in Cook Cave found the gray bat population has increased to 11,500 individuals.
- There was no documented human disturbance at any closed MTNF gray bat cave.
- From January 1, 1999, to December 31, 2000, there was no reported incidental take of gray bats because of human disturbance in MTNF caves.
- There were no adverse impacts to any gray bat because of prescribed fires conducted by MTNF.

BALD EAGLE

- Results of winter aerial and ground surveys conducted between November 15, 1999, and March 15, 2000, by the Forest Service found no additional communal night roost or concentration on MTNF lands.
- During 2000, no nesting territories were found or reported as discovered on MTNF lands.
- During 2000, there were no reported cases of incidental take of bald eagles on the MTNF.
- During 2000, there were no adverse impact to a bald eagle as a result of Forest Service prescribed fires.

INDIANA BAT

- During FY 2000 (October 1, 1999 – September 30, 2000), the forested acres affected by management activities was well below that allowed by the incidental take statement, as shown in the following table:

Activity	Forested Acres Affected in FY2000	Maximum Affected Forested Acres Allowed
Timber harvest	2,648	20,000
Prescribed fire	5,878	12,000
Wildlife habitat improvement	1,716	2,000
Timber stand improvement	2,570	4,000
Soil & water improvement	2	150
Range management	10	50
Mineral exploration & development	4	50
Wildfire fire lines	10	50
Special use	2	50
Road construction	7	25
TOTALS	12,847	38,375

- The gate at Cave Hollow Cave continues to be vandalized.
- A pilot survey conducted by North Central Experiment Station (Sybill Amelon) between May-August 1999 on the Houston-Rolla and Potosi-Fredericktown Districts using mist nets and Anabat II detectors captured one male Indiana bat on the Forest.
- The male was found in a wooded area with an 80% canopy closure using a dead red maple with 80% bark coverage. While being monitored, it was found only on the one tree.
- In 2000, no maternity roost was found on the MTNF, (at least one site on the Potosi District was investigated as a potential roost).
- In 2000, potential foraging areas for all Indiana bat caves on or near MTNF were identified using an Arc View computer program.
- In 2000, within the Cave Hollow Cave’s area of influence, 176-selected stand of trees were inventoried. The average number of “roost trees” for the 176 stands was 86.7 trees/acre. The compartments surveyed were C72, C74, C93, C94, C95, C96, C97 (Salem) and C232 (Potosi).
- In 2000, the potential foraging area where two reproductively active female was previously reported captured was mapped using Arc View. (An effort to recapture female Indiana bats in that area yielded a negative result).

5. *Population trends of Regional Forester’s Sensitive Species (RFSS) found on Mark Twain National Forest.*

MAMMALS

Scientific Name	Common Name	Trend
<i>Myotis leibii</i>	Eastern Small-footed Myotis	Unknown

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

BIRDS

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

Source: Brad Jacobs, Natural History Biologist, MDC Central Office, Jefferson City, MO 65102, May 2000, information reflects statewide trends for each species.

AMPHIBIANS

Scientific Name	Common Name	Trend
<i>Cryptobranchus alleganiensis</i>	Hellbender	Decreasing
<i>Cryptobranchus alleganiensis bishopi</i>	Ozark Hellbender	Decreasing

Source: Janet Sternburg , Personnel Communications, Natural History Biologist, MDC Central Office, Jefferson City, MO 65102, September 2001, information reflects statewide trends for each species.

REPTILES

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

Source: Matthew Winston, Personnel Communications, Fisheries Research, Columbia Fish and Wildlife Research Center, May 2000, information reflects statewide trends for each species.

MOLLUSKS

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

Source: Janet Sternburg, Natural History Biologist, MDC Central Office, Jefferson City, MO 65102. Linden Trail, Personnel Communications, Fisheries Research, Columbia Fish and Wildlife Research Center, May 2000, information reflects statewide trends for each species.

INVERTEBRATES

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

Source: Janet Sternburg, Natural History Biologist, MDC Central Office, Jefferson City, MO 65102. Linden Trail, Personnel Communications, Fisheries Research, Columbia Fish and Wildlife Research Center, May 2000, information reflects statewide trends for each species.

VASCULAR PLANTS

Scientific Name	Common Name	Trend
<i>Agalinis auriculata</i>	Earleaf (Auriculate false) foxglove	Stable
<i>Agalinis skinneriana</i>	Purple false-foxglove (Pale gerardia)	Stable
<i>Anemone quinquefolia</i>	Wood anemone	Unknown
<i>Aster dumosus var. strictior</i>	Tradescant aster	Stable
<i>Aster furcatus</i>	Forked aster	Stable
<i>Aster macrophyllus</i>	Large-leaf (Big leaved) aster	Unknown
<i>Berberis canadensis</i>	American barberry	Stable
<i>Calamagrostis porteri ssp. insperata</i>	Ofer Hollow reedgrass(Reed bent grass)	Stable
<i>Callirhoe bushii</i>	Bush's poppy mallow	Stable
<i>Campanula aparinoides</i>	Marsh bellflower	Stable
<i>Carex buxbaumii</i>	Buxbaum's (Brown bog) sedge	Stable
<i>Carex cherokeensis</i>	Cherokee sedge	Stable
<i>Carex communis</i>	Fibrous-root sedge	Stable
<i>Carex decomposita</i>	Epiphytic sedge	Stable
<i>Carex fissa var. fissa</i>	A sedge	Unknown
<i>Carex gigantea</i>	Large sedge	Stable
<i>Carex oklahomensis</i>	Oklahoma sedge	Stable
<i>Carex oxylepis var pubescens</i>	Sharp-scale sedge	Stable
<i>Carex sterilis</i>	Dioecious sedge	Unknown
<i>Carex straminea</i>	Straw sedge	Unknown
<i>Carex stricta</i>	Tussock sedge	Stable
<i>Carex tetanica</i>	Rigid sedge	Unknown
<i>Carex triangularis</i>	Fox (triangular) sedge	Stable
<i>Castanea pumila var. ozarkensis</i>	Ozark chinquapin	Declining
<i>Cayaponia grandifolia</i>	Southern cayaponia	Stable
<i>Cissus incisa</i>	Ivy Treevine (Marine vine)	Stable
<i>Delphinium treleasei</i>	Trelease's larkspur	Stable
<i>Dichanthelium (=Panicum) yadkinense</i>	A panicgrass	Unknown
<i>Draba aprica</i>	Open-ground whitlow-grass	Stable
<i>Dryopteris celsa</i>	Log Fern	Stable
<i>Dryopteris goldiana</i>	Goldie's Woodfern	Stable
<i>Echinacea paradoxa var. paradoxa</i>	Yellow coneflower	Stable
<i>Echinacea simulata</i>	Wavy leaf purple coneflower	Stable
<i>Eupatorium semiserratum</i>	Small-flower Thorough-wort	Stable
<i>Geum virginianum</i>	Pale avens	Unknown
<i>Hottonia inflata</i>	Featherfoil	Stable
<i>Hydrocotyle verticillata var. verticillata</i>	Whorled (Water) pennywort	Stable
<i>Isotria verticillata</i>	Large whorled pogonia	Stable
<i>Julans cinerae</i>	Butternut	Declining
<i>Juncus debilis</i>	Weak rush	Unknown
<i>Ludwigia microcarpa</i>	Small-fruit seedbox	Stable
<i>Matelea baldwyniana</i>	Baldwin's milkvine	Stable

Scientific Name	Common Name	Trend
<i>Menyanthes trifoliata</i>	Bog Buckbean (Bogbean)	Stable
<i>Parnassia grandifolia</i>	Large-leaf grass-of-parnassus	Stable
<i>Phlox carolina</i> spp. <i>carolina</i>	Carolina phlox	Unknown
<i>Phlox maculata</i> spp. <i>pyramidalis</i>	Spotted (Wild sweet william) Phlox	Stable
<i>Phyllanthus polygonoides</i>	Knotweed leaf-flower	Declining
<i>Platanthera ciliaris</i>	Yellow-fringed orchid	Stable
<i>Platanthera clavellata</i>	Small Green Woodland Orchid	Stable
<i>Platantheria flava</i> var. <i>flava</i>	Southern Rein (Pale green) orchid	Stable
<i>Platantheria flava</i> var. <i>herbiola</i>	Northern Rein (Pale green) orchid	Stable
<i>Polygonum arifolium</i>	Halberd-leaf tear thumb	Stable
<i>Potamogeton pulcher</i>	Spotted pondweed	Stable
<i>Quercus texana</i>	Nuttall's oak	Stable
<i>Rhynchospora harveyi</i>	Harvey's beak-rush	Stable
<i>Rudbeckia fulgida</i> var. <i>speciosa</i>	Orange coneflower	Stable
<i>Sabatia brachiata</i>	Narrow-leaf (Marsh) pink	Stable
<i>Sacciolepis striata</i>	Gibbous (Gibbon's) panic grass	Unknown
<i>Schoenoplectus (Scirpus) etuberculatus</i>	Canby's bulrush	Unknown
<i>Schoenoplectus (Scirpus) purshianus</i>	Weakstalk (Weakstock) bulrush	Increasing
<i>Scirpus hallii</i>	Hall's bullrush	Stable
<i>Scutellaria bushii</i>	Bush's skullcap	Stable
<i>Silene regia</i>	Royal catchfly	Stable
<i>Solidago gattingerii</i>	Gattinger's goldenrod	Stable
<i>Spiranthes ovalis</i> var. <i>erostellata</i>	Oval ladies tresses	Increasing
<i>Sullivania sullivantii</i>	Kidney-leaved Sullivantia	Stable
<i>Torreyochloa pallida</i>	Pale manna grass	Increasing
<i>Tradescantia ozarkana</i>	Ozark spiderwort	Stable
<i>Trillium pusillum</i> var. <i>ozarkanum</i>	Ozark trillium (Ozark wake robin)	Stable
<i>Triosteum angustifolium</i> var. <i>eamesii</i>	Yellowleaf Tinker's-weed (Yellow-flowered horse gentian)	Unknown
<i>Valerianella ozarkana</i>	Ozark corn salad	Increasing
<i>Viburnum recognitum</i>	Northern arrow-wood	Stable
<i>Vitis rupestris</i>	Sandgrape	Stable
<i>Waldsteinia fragarioides</i> (spp. <i>fragarioides</i>)	Barren strawberry	Stable
<i>Woodwardia areolata</i>	Netted Chain fern	Stable

NONVASCULAR PLANTS

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

Source: Tim Smith, Personnel Communications, MDC Natural History Division, June 2000, 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 Forest.

IX. Grazing

1. *Current situation and accomplishments*

All 91 allotments and haying areas were administered to minimum standard overall and met Forest Plan standards and guidelines. At least 3 field visits were made to insure both proper stocking and utilization, and for the identification and correction, if needed, of resource problems. Administration of permits ensures that productivity is not jeopardized and resource objectives are met.

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

There is a continuing need for ongoing analysis of the effects of grazing on Regional Forester’s sensitive species.

X. Roads

1. *Review Road Closure Progress. (24)*

The Forest closed 20.4 miles of non-system roads in FY 2000. 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.

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

The Forest reconstructed 30 miles of system road in FY 2000. Shared service 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.

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

The Special Use Permits and Easements associated with major utility and transportation corridors have received some modification since last reviewed. A major planning effort is presently underway that proposes changes to the Highway 60 corridor 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.

XI. Minerals

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

The Forest contains the largest lead deposit in the World. The Viburnum Trend, located mostly within the Forest, produces about 90 percent of the national annual elemental lead ore in the United States. Mineral royalties exceeded \$3.6 million in FY 2000, which is about 55 percent of the Forest's total revenues for the year.

There are thirty-six active leases and seven prospecting permit applications in the Viburnum Trend area. Site visits were made to Doe Run operations throughout the year. Operating plans were reviewed for compliance with permit stipulations and guidelines. Site-specific mitigations (stipulations) were developed for drill sites within active leases based upon Forest Plan Standards and Guidelines, NEPA documents, regulations and policy. The minerals program is managed in conjunction with the Bureau of Land Management, which is responsible for subsurface management while the Forest Service is responsible for surface management.

In FY 2000, the Forest initiated an environmental assessment to determine if the stipulations for 10 leases that are up for renewal on Salem and Potosi/Fredericktown Districts needed to be updated. Stipulations were developed based upon Forest Plan Standards and Guidelines, NEPA documents, regulations and policy.

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.

XII. Recreation

1. 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 \$86,100 was collected through the sale of day use and season-long tags for motorcycles, ATVs and mountain bikes. Over 20,900 visitors utilized the areas in FY 2000. The majority of the funds were spent on trail maintenance to reconstruct 5 miles of trail at Chadwick and 2 miles of trail at Sutton Bluff, with the rest being used for operational expenses for the areas. Public acceptance and support of this project was excellent, and compliance with the fee requirement is estimated at over 90%.

Six recreation areas were operated and maintained by various local concessionaires under the authority of concession special use permits. Utilizing the concessionaires to operate these more highly used recreation areas has allowed us to provide a higher level of service and security to the public, in spite of our decreasing budget. In order to provide a viable operation that could offer these increased services, the concessionaires continued to charge day use fees in some of these areas. Eight other small campgrounds were offered for concession operation, but did not have interested concessionaires. These were operated under the national Concession Safety Net Fee Demonstration Project, starting in June, with revenues collected being used to provide campground hosts, increased visitor contacts and increased maintenance at those sites.

A well was dug in the Cobb Ridge Campground, and a contract for expansion and rehabilitation of the campground was awarded. This will include installation of electrical at some of the campsites.

While there were inadequate resources to maintain all trails to standard, the Forest was able to reconstruct nineteen miles of existing trails, and construct a new nine-mile segment of the Ozark Trail. Some trails were maintained through a partnership with AmeriCorps, and through assistance from other volunteers. Almost 500 miles of trails were maintained on the Forest in FY 2000. St. Louis Partners, AmeriCorps, also helped to collect trail inventory information.

Partnerships provided the means for dissemination of forest information at Bass Pro in Springfield and at the Rolla Visitor Center. The forest web page became a new and increasingly popular source of information about recreation and other forest issues and opportunities.

Recreation use on the Mark Twain National Forest in FY 2000, (including use within the Wildernesses), was estimated to be slightly less than 2,500M RVDs (Recreation Visitor Days, or the equivalent of 12 hours of recreational use), or just under the previous year's use. This is about 147 percent of the use projected by the Forest Plan. Though this seems high, occupancy at developed recreation sites is less than 30 percent. Use at many of the developed sites was slightly lower than in the past two years, but dispersed use was steady or higher.

Canoeing and kayaking was lower in FY 2000 compared with recent years, because of drought conditions and low water tables.

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

Boating use of the Eleven Point National Scenic River was lower than in the past few years, due to drought and low water conditions. However, camping and day use at developed sites along the river did not drop noticeably. Visitor use information was collected from outfitters, and at some of the key access points. In general, along the Eleven Point River, a majority of the visitor expectations are being met. Glass food and beverage containers were banned from the Eleven Point River starting in January 2000, to reduce the hazards associated with broken glass. Campground Hosts were used to inform river users and to supervise the campgrounds.

Maintenance of facilities serving the Eleven Point National Wild and Scenic River continued to be hampered by reductions in budget and staffing. Turner Mill South access was improved through the Missouri Department of Natural Resources Community Assistance Program and a grant from the National Forest Foundation. Indications are that, in general, visitor expectations are being met. There were a few complaints about difficulties in launching boats, and about a tree that fell into the Boze Mill Pond area of the river.

XIII. Wilderness

1. 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 years. Illegal ATV/4-wheeler traffic continues to be a 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. While most use is within standards, Paddy Creek is experiencing overuse on peak weekends. Wilderness recreation use on the Mark Twain National Forest in FY2000 was estimated to be approximately 55M RVDs (Recreation Visitor Days, or the equivalent of 12 hours of recreational use). This is about 180 percent of the use projected in the Forest Plan to occur on the Mark Twain.

Visitor exit surveys conducted at trailheads confirmed that many Wilderness visitors are not specifically seeking a “Wilderness Experience” characterized by a primitive setting where the earth and its community of life are untrammled 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.

Monitoring of campsites in the Hercules Glades showed changes in the campsites over the past 6 years, but no clear trends. While many of them have more vegetation cover and less bare soil, fewer facilities (such as fire rings and primitive seats), and a smaller camp area, some now have a larger campsite, less vegetation cover, and/or more bare soil than they did in 1994. Campsite monitoring was also initiated in Paddy Creek Wilderness.

An Air Quality Specialist is being shared with forests in Arkansas, to coordinate management of the Hercules Glades Class I airshed.

XIV. Heritage Resources

1. Current situation and accomplishments

The FY 2000 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 included public service activities, the study and evaluation of heritage sites, Archaeological Resources Protection Act actions to guard against heritage resource destruction, public volunteer opportunities in archaeology, and continuation of partnerships.

Forty-nine field studies were completed to survey for, identify, and evaluate heritage resources through forest or cooperative efforts. One hundred one heritage resources, both prehistoric and historic, were discovered and recorded during surveys of 9,295 acres of Forest Service lands. Forest heritage resources now total 3,766 sites and acreage surveyed totals 386,245 acres.

A Passport in Time project was undertaken on the Doniphan/Eleven Point Ranger District at the Huff Site, an archaeological resource located along the Eleven Point River. The site consists of Late Archaic and Early Mississippian prehistoric remains, an early historic period frontier occupation, and a late 19th-early 20th century farmstead. Volunteers helped excavate the Huff Site, donating 601 hours of fieldwork to the Mark Twain National Forest.

XV. Fire

1. Current situation and accomplishments

Arson continues to be the primary cause of fires on the Mark Twain with landowner burning escapes coming in second. Missouri does not have a permit system in place for burning. As a result, landowner burning is a common practice, and along with landowner burning come escapes caused by negligence or carelessness.

In FY 2000, 179 wildland fires burned 8,713 acres of National Forest Lands. Seventeen fires larger than 100 acres occurred this year.

Prescribed burning days were scattered in February through April. Forest personnel had the opportunity to complete 39 prescribed fires for 7604 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 4000-acre natural fuels target, and all of the acres were accomplished. Several thousand acres of land remain to be treated. 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.

XVI. Economic Efficiency

1. 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
Noxious Weed Control	Acre	30	38	38
Water and Soil Resource Improvements	Acre	1,018	1,790	1,325
Water and Soil Resource Improvements - KV	Acre	0	0	0
Mineral Leases and Permits	Case	3,403	4,773	5,378
Fuel Treatment - Appropriated	Acre	51	70	82
Timber Offered, New	MBF	15*	13*	22*
Timber Offered, SSF	MBF	15*	17*	21*
Reforestation - Appropriated	Acre	56	65	127
Reforestation - KV	Acre	38	56	84
Timber Stand Improvement - Appropriated	Acre	67	180	137
Timber Stand Improvement - KV	Acre	101	179	175
Trail Construction	Mile	3,205	4,665	3,706
Recreation Facility and Site Management	MPAOT Days	55,944	53,798	N/A
Range Non-Structural Improvements	Acre	22	30	31
Range Non-Structural Improvements - KV	Acre	0	61	0
Range Structural Improvements	Structure	194	2,500	2,100
Land Exchange	Acre	61	112	974
Property Boundary Location	Mile	9,008	11,210	11,200
Road Construction and Reconstruction	Mile	49,287	55,905	30,467
WL Habitat Improvements - Appropriated	Acre	57	45	55
WL Habitat Improvements - KV	Acre	85	45	55
WL Habitat Improvements - KV	Structure	0	750	750
Fish Habitat Improvements - Appropriated	Acre	76	80	75
Fish Habitat Improvements - Appropriated	Structure	0	1,000	2,000
T&E Habitat Appropriated	Acre	16	N/A	0
T&E Habitat Appropriated	Structure	0	1,500	0
T&E Habitat - KV	Acre	0	0	55

* Based on sale preparation costs, which includes marking, cruising, appraisal, advertisement and contract award.

N/A Not available due to a change in budget coding process

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

The following table shows the expenditures and incomes of the Forest for FY 2000. Minerals account for 55 percent of the Forest income; timber 44 percent; and all other sources represent 1 percent.

EXPENDITURES

PROGRAM	DOLLARS
Minerals	245,000
Range	300,000
Land/Use	119,000
Wildlife/Fish	642,000
Timber	1,576,000
Soil/Water	176,000
Property Survey	460,000
Fire	1,637,000
Recreation Operation and Maintenance	624,000
Road Construction and Reconstruction	840,000
Road/Trail Maintenance	517,000
Law Enforcement	120,000
Land and Water Conservation Fund	1,256,000
Ecosystem Management	1,011,000
Administration	1,279,000
Additional Miscellaneous Programs	3,228,000
TOTAL	\$14,030,000

INCOME

PROGRAM	DOLLARS
Minerals	3,631,000
Range	12,000
Land/Uses	48,000
Timber	2,870,000
Recreation	21,000
TOTAL	\$6,582,000

Each year National Forests return 25 percent of all revenues to the counties where National Forests are located. This money is to be used for the benefit of public schools and county roads. Counties with National Forest land also receive Payment in Lieu of Taxes (PILT). The use of PILT funds is not limited to schools and roads. The FY 2000 information is listed below:

COUNTY	NET NF ACRES	FY 2000 25% PAYMENTS	FY 2000 PILT PAYMENTS*	FY 2000 MINERALS PAYMENTS	TOTAL PAYMENTS TO COUNTIES
Barry	54,852	42,905	42,956	31,845	117,706
Bollinger	1,646	1,288	1,053	956	3,297
Boone	4,142	3,240	2,395	2,183	7,817
Butler	48,375	37,839	28,548	27,990	94,377
Callaway	12,168	9,518	7,855	7,061	24,433
Carter	90,646	70,903	65,299	52,792	188,994
Christian	52,077	40,735	33,208	30,227	104,169
Crawford	50,134	39,215	31,933	29,074	100,222
Dent	72,492	56,703	47,493	42,024	146,220
Douglas	40,910	32,000	26,029	23,787	81,816
Howell	49,274	38,542	31,297	28,595	98,434
Iron	95,314	74,554	60,544	54,806	189,904
Laclede	29,392	22,990	18,302	17,056	58,348
Madison	51,208	40,055	32,648	29,632	102,335
Oregon	105,612	82,610	67,218	61,286	211,113
Ozark	38,512	30,124	39,739	22,347	92,210
Phelps	65,352	51,118	39,932	37,749	128,799
Pulaski	48,189	37,693	29,659	27,971	95,324
Reynolds	89,888	70,310	71,340	52,128	193,779
Ripley	97,124	75,970	61,788	56,197	193,955
St. François	673	526	407	472	1,405
Ste. Genevieve	10,254	8,021	6,527	5,950	20,498
Shannon	83,126	65,021	80,174	48,117	193,312
Stone	10,167	7,953	36,018	8,490	52,461
Taney	65,300	51,078	59,312	37,436	147,825
Texas	48,890	38,242	30,249	28,323	96,814
Washington	82,327	64,369	52,382	47,762	164,513
Wayne	88,332	69,093	90,156	51,114	210,363
Wright	7,159	5,600	4,557	4,154	14,311
Total	1,493,535	\$1,168,214	\$1,099,018	\$867,521	\$3,134,753

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

3. *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 has 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

I. General

During many monitoring field trips in FY 2000 and the subsequent evaluation activities, various district Interdisciplinary teams, supported by 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.

II. 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, trails, and 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.

III. Visual Management

Visual quality objectives were met on most projects visited by the monitoring teams. In some areas, mitigation measures had not been fully implemented. Districts have been made aware of areas where more care needs to be taken to ensure the desired visual quality standards and guidelines are clearly communicated and being carried through on all projects during implementation. These results were shared and communicated with members of the Forest Leadership Team to initiate action to meet this identified need.

IV. Lands

The lands program added a total of 989 acres to the National Forest. The Forest exceeded its boundary marked to standard target by 50%.

V. 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 LRMP. The amount of timber being sold is continuing to decline with 19.5 million board feet (MMBF) of timber sold in FY 2000.

The use of uneven-aged management harvest (UAM) methods in FY 2000 represented 24 percent of total acres sold; even-aged management (EAM) harvest methods (clearcut, shelterwood and seed tree) represented 27 percent; and commercial thinning, salvage and miscellaneous categories amounted to 49 percent.

Oak decline continues to plague the scarlet and black oak groups. Increased mortality has begun to appear in stressed stands. The extended drought is the probable cause. There is a need to address salvage needs for areas heavily affected by oak decline.

VI. 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.

The Forest nominated approximately 400 acres on the Houston/Rolla/Cedar Creek District 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).

VII. 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 2000 found no cases of incidental take of these four species. There is no critical habitat designated for any species on the Forest.

VIII. Grazing

All 91 allotments and haying areas were administered to minimum standard. Effects of grazing on Regional Forester sensitive species continue to be analyzed.

IX. Roads

The Forest reconstructed 30 miles of classified roads, and closed 20 miles of unclassified roads. Road closure continues to be strongly opposed by local residents.

X. Minerals

The Forest contains the largest lead deposit in the world. The Viburnum Trend, located mostly within the Forest, produces about 90 percent of the annual elemental lead ore in the United States. There are thirty-six active leases and seven prospecting permits in the Viburnum Trend area. An environmental assessment has been initiated to determine if stipulations need to be updated for 10 leases due for renewal.

XI. Recreation

Six recreation areas were operated under a concession special use permit, allowing a higher level of service and security in spite of decreasing budgets. The Concession Safety Net fee demonstration

program allowed the Forest to invest campground revenues in some of those same types of services at sites that were offered for concessions, but had no bidders.

Recreation use was estimated to be roughly 2,500,000 RVDs (Recreation Visitor Days), which is 147 percent of the Forest Plan projection. Occupancy at developed recreation sites is less than 30 percent.

The user fee demonstration project in the Chadwick Motorcycle 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.

Boating use of the Eleven Point National Scenic River was lower than in previous years due to drought and low water conditions. While reductions in budget and staffing continues to hamper maintenance of facilities along the river, visitor information collected by outfitters indicates that the majority of visitor expectations are being met.

XII. Wilderness

In general, Wilderness use on the Mark Twain is concentrated on weekends in the spring and fall. Use was about 55,000 RVDs, or 180% of Forest Plan projections. Visitor exit surveys confirmed that many Wilderness visitors are not specifically seeking a “Wilderness Experience,” but were seeking a trail system to hike for a few hours, enjoy the scenery, and see some wildlife.

XIII. Heritage Resources

The FY 2000 heritage program provided support services to other Forest functions such as timber, recreation, wildlife, and lands to meet legally mandated historic preservation compliance objectives. Forty-nine field studies covering 9,295 acres were completed, with over 100 heritage resources discovered and recorded.

XIV. Fire

Arson, followed by landowner burning escapes, continue to be the primary cause of wildfires on the Mark Twain. A total of 170 wildland fires burned 8,713 acres of National Forest lands. The Forest successfully accomplished a natural fuels target of 4,000 acres.

XV. Economic Efficiency

Each year National Forests return 25 percent of all revenues to the counties where National Forests are located. This money is to be used for the benefit of public schools and county roads. Counties with National Forest land also receive Payment in Lieu of Taxes (PILT). The use of PILT funds is not limited to schools and roads. In FY 2000, minerals accounted for 55 percent of the Forest income; timber 44 percent; and all other sources represented 1 percent.

Evaluation and Recommendations

I. 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 Planner 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.

II. 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.

III. 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 is scheduled to begin revision in FY 2002.

This report identified one item that might need to be considered during Forest Plan revision:

- Clarify Forest Plan direction on the identification of stream characteristics (ephemeral v. intermittent drainages)

IV. Other Recommendations

Other recommendations identified in this report can be implemented without changes to the Forest Plan. Those items are:

- Pursue nomination of Solomon Hollow as a State Natural Area.
- Begin the process for assessing salvage needs in areas heavily impacted by oak decline.

- Manage stands on droughty sites with UAM only if they contain 50% of more drought-hardy species, such as white oak and shortleaf pine.
- Set up vegetative monitoring in various pastures, particularly the warm season grass conversions.

V. Research Needs

- Identification of the full extent of oak decline on the Forest.
- 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
- 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.
- Continuing evaluation and documentation of the 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 quality
- Validation of National Forest regional soil quality standards on Ozark Plateau soils. Verified 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.

VI. 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.usda.gov/mtnf/>. If you do not have access to the Internet and wish to obtain a copy of this report, please write or call:

Forest Supervisor
 Mark Twain National Forest
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Appendix I List of Preparers

The Mark Twain Forest Planning Team, led by Laura Watts, 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 1999 activities, including Forest Supervisor, Deputy Forest Supervisor, District Rangers, Supervisor Office and Shared Service 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

Randy Moore, Forest Supervisor
Kevin Elliott, Deputy Forest Supervisor
Jerry Bird, District Ranger
Katie Stuart, District Ranger
John Bisbee, District Ranger
Maureen Hyzer, District Ranger
Warren J. DuBois, District Ranger
Henry Hickerson, District Ranger

Supervisor's Office Staff and Specialists

Kris Swanson, Resources Staff Officer
Richard Hall, Planning/Operations Staff Officer
Charlotte Wiggins, Public Affairs Staff Officer
Cheryl Moreland, Staff Assistant
Laura Watts, Forest Planner
Darsan Wang, Natural Resource Economist
Neil Babik, Forest Soil Scientist
Ross Melick, Forest Silviculturist
David Shore, Timber Program Manager
Nancy Feakes, Forest Recreation Specialist
Dave Easter, Forest Engineer
Susan Owen, Forest Hydrologist
Larry Furniss, Forest Fishery Biologist
Garry Houf, Forest Wildlife Biologist
Sean Terry, Soil Scientist (Student Career Experience Program)

Regional Office and Other Forest Staff

Rodney Windell, Regional Timber Sales Contract Officer
Larry Laing, Regional Soil Scientist
Sharon Metzler, Regional Appeals and Litigation Coordinator
Ross McElvain, Regional Range Conservation Program Manager
Jim DiMaio, Forest Planner, Huron-Manistee National Forest
Ted King, Analyst, Wayne
Ted Schiltz, Hiawatha National Forest

District Nepa Coordinators

Janan Hay
Mark Hamel
Karen Mobley
Becky Bryan

District Wildlife Biologists

Jody Eberly
Dennis Heape
Barbara Walker
Sarah A. Bradley
Klaus Leidenfrost
Phil Weston

District Silviculturists

Darrell Dostal
Beth Hardman
Don Fish
Doyle Henken

District Sale Administrators

Maxcie Williams
Robert Glock
John Strange
Ronnie Aspin,
Tom Hudson
Bill Miles
John Fraenzl
Gary Blair

District Timber Management Assistants

John Bryan
Joe Walker
Darla Rein
Tom Oldham
Bob Harrell

Shared Service Specialists

Janet Fraley, Shared Service Engineer
James Wettstead, Shared Service Archaeologist

Other District Specialists

Steve Herndon, Range Management Specialist
Carol Trokey, Forester, Recreation Specialist
Jim Voyles, Forester, Recreation Specialist
Amy Sullivan, Engineer, GIS Coordinator

District Forestry Technicians

James Murrell, Range, Timber, Fire
Ron Moon, Reforestation, TSI
Steve Forsberg, Archeology, Timber, Recreation, Lands
David Sullivan, Archeology, Timber
Gail Blair, Wildlife, Fire
Chris Woods, Fire
Paul Konstan, Timber, Recreation

Appendix II

Acronyms Used

EA	Environmental Analysis
EAM	Even-aged management
EIS	Environmental Impact Statement
Forest Plan	Land and Resources Management Plan
FR	Forest Road
FSH	Forest Service Handbook
FSM	Forest Service Manual
FY	Fiscal Year
IDT	Interdisciplinary team
IRM	Integrated Resources Management
MAR	Management Attainment Report
M&E	Monitoring and evaluation
NCFES	North Central Forest Experiment Station
NEPA	National Environmental Policy Act of 1969
NFMA	National Forest Management Act of 1976
PILT	Payment in Lieu of Taxes
RPA	Forest and Rangeland Renewable Resources Planning Act of 1974
RVD	Recreation visitor day
SO	Supervisor's Office
The Forest	Mark Twain National Forest
UAM	Uneven-aged management