PREFACE

Construction of Wappapello Dam was authorized in June 1936, and work began in September 1938. The project was completed in June 1941. The original Master Plan was approved in 1946, then revised in 1958 and updated in 1963, 1975 and 1985. The Master Plan has served as the guide for the orderly development and management of the land and water resources at Wappapello Lake.

This updated Master Plan presents a current inventory and assessment of land and water resources and physical improvements, reformulated resource use objectives, discussions of influences on lake operation and management and an evaluation of existing and future needs and requirements to protect the value of the resource base. Emphasis has been placed on increasing the efficiency of operation and rehabilitation of facilities for public safety.

Although Wappapello Lake is managed primarily by the St. Louis District of the U.S. Army Corps of Engineers, many others play a crucial role in the operation of the project. These important players include the Memphis District of the U.S. Army Corps of Engineers, Missouri Department of Natural Resources, Missouri Department of Conservation, marina concessionaires, upstream and downstream interest groups, farmers, local organizations, youth groups and businesses. The objective of the Wappapello Lake Master Plan is to meet the needs and interests of the various users of the project and outline a 10-year plan of action assuring that all project purposes are addressed.

A public involvement plan describing the interaction with elected officials, agencies and the public is located in Appendix III. The public's desires and interests for the lake project are noted there.

All aspects of lake operation have been reevaluated due to changes that have taken place since the last update in 1985. In some instances, public lands have been reclassified to more fully reflect their present use. All recreation area site plans have been revised to reflect existing development.

The plan will be approved in the St. Louis District; however, this does not assure that all proposed projects will be completed. After approval, funding must be secured to complete the proposed projects.

Previously Issued Pertinent Design Memoranda & Supplements

Basis for Design of Wappapello Dam and Reservoir, St. Francis River Missouri, 15 January 1937 Appendix No. 1.

St. Francis River Project, The Wappapello Dam, Analysis of Design and Appendix 1 hearings, 27 September 1938.

Technical Memorandum No. 134-1. Final Report on Studies Conducted on the Outlet Structures for the Wappapello Dam, 31 August 1938.

St. Francis River Project, The Wappapello Dam, Analysis of Design Appendix II: Report on Soil Investigations, 27 September 1938.

St. Francis River Project, The Wappapello Dam, Report on Field Compaction Tests by the Soils Laboratory, 11 October 1939.

The Master Plan, Recreational Development, Lake Wappapello, St. Francis River, Missouri, Office of the President, Mississippi River Commission, Vicksburg, Mississippi, August 1946.

Supplements to the 1946 Master Plan:

Rules and Regulations Governing Public Use of Reservoir Areas, Corps of Engineers, Department of the Army.

Operations and Maintenance Manual for Wappapello Reservoir, September 1950.

Reservoir Regulation Manual – Wappapello Reservoir, July 1952.

Master Plan for Reservoir Management, Wappapello Reservoir, St. Francis River, Missouri, Office of District Engineer, U.S. Army Engineer District, (Lower Mississippi Valley Division), Memphis, Tennessee, revised 1958.

Memorandum of Agreement, dated 14 October 1957, with U.S. Forest Service for Fire Detection and Suppression.

Lease beginning 1 January 1957 with Missouri State Park Board for Development of Lake Wappapello State Park.

Agricultural and Grazing Leasing Plan, Appendix B, Design Memorandum (DM) *No. 22, Master Plan*, 1963.

Agricultural Land Use Plan, Attachment 1, DM No. 22, Master Plan, 1963.

DM 501, Design Memorandum No. 22 Master Plan for Wappapello Reservoir issued November 1963, approved by OCE March 1964.

DM 502, Design Memorandum No. 25A St. Francis Preliminary Master Plan, Recreational Development, issued November 1964.

DM 503 Feature Design Memorandum No. 503, St. Francis Pumping Plant and Vicinity Recreational Development and Beautification, issued August 1968, approved by OCE November 1968.

Supplement No. 1, Master Plan, Lake Wappapello Reservoir, St. Francis River, Missouri, April 1970 and 1st, 2nd and 3rd endorsements.

DM 504 Updated Master Plan for Development and Management of Wappapello Lake, Missouri, September 1975.

Supplement No. 1 to DM 504 - Updated Master Plan for Development and Management of Wappapello Lake, Construction of Comfort Station and Sewage Treatment Facilities at Chaonia Landing, 4 August 1976.

Supplement No. 2 to DM 504 – Updated Master Plan, 29 July 1985.

Supplement No. 3 to DM 504 – Traditional Access Plan, approved in 1988 and updated in November 1992.

Supplement No. 4 to DM 504 – Construction of Showerhouse at Greenville Campground, approved 13 June 1997.

Wappapello Lake Project, Relocation Design Memorandum, State Highways and Wayne County Roads, *St. Francis River, Missouri, April 1996*, approved 17 July 1997.

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LIST OF ACRONYMS USED IN THIS DOCUMENT

	Federal Agencies
BLM	Bureau of Land Management
DNR	Department of Natural Resources
FAO	Financial Accounting Office
FHA	Federal Highway Administration
FWS	Fish and Wildlife Service
NMFS	National Marine Fisheries Service
NPS	National Park Service
NRCS	Natural Resources Conservation Service
OSHA	Occupational Safety and Health Administration
USACE	United States Army Corps of Engineers
USCG	Unites States Coast Guard
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Service
	Missouri Agencies
MDC	Missouri Department of Conservation
MDNR	Missouri Department of Natural Resources
MDOT	Missouri Department of Transportation
MEC	Missouri Equine Council
MSHP	Missouri State Highway Patrol
MSWP	Missouri State Water Patrol
SHPO	State Historic Preservation Office
	Others
MRTC	Mississippi River Transmission Corporation
OCE	Office of the Chief of Engineers
SEMO	Southeast Missouri
TNC	The Nature Conservancy
	Acts, Regulations and Programs
ADA	Americans with Disabilities Act
ADADG	Americans with Disabilities Act Design Guidelines
CFR	Code of Federal Regulations
CWA	Clean Water Act
DM	Design Memorandum
EA	Environmental Assessment
EAP	Emergency Action Plan
EIS	Environmental Impact Statement
EM	Engineering Manual
EMP	Environmental Management Program
EP	Engineering Pamphlet
ER	Engineering Regulation
FCA	Flood Control Act
FONSI	Finding of No Significant Impact

FWCA	Fish and Wildlife Coordination Act
HREP	Habitat Restoration and Enhancement Program
LTRM	Long Term Resource Monitoring
LWCFA	Land and Water Conservation Fund Act
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MR&T	Mississippi River and Tributaries (Funding)
NAGPRA	Native American Graves Protection and Repatriation Act
NAWMP	North American Waterfowl Management Plan
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
NRRS	National Recreation Reservation Service
O&M	Operations and Maintenance
OMP	Operational Management Plan
RHA	River and Harbor Act
TEA21	Transportation Equity Act for the 21st Century
UFAS	Uniform Federal Accessibility Standards
USC	United States Code
WRDA	Water Resources Development Act
	Classifications
ESA	Environmental Sensitive Area
ES-C	Environmental Sensitive - Cultural
ES-E	Environmental Sensitive - Environmental
LD	Low Density
MR	Multiple Resource Management
MRMA	Multiple Resource Management Area
OP	Operations
R	Recreation
VM	Vegetative Management
WM	Wildlife Management
	Measurements
FTE	Full Time Equivalent
GPD	Gallons per day
kVA	Kilovolt-amperes
NGVD	National Geodetic Vertical Datum
SRUF	Special Recreation User Fee
VERS	Visitor Estimation Reporting System
cfs	Cubic Feet per Second
kW	Kilowatt

SECTION II - PROJECT DESCRIPTION

2.01 -- LOCATION

Wappapello Lake is located on the Upper St. Francis River in the southeastern part of Missouri. The dam site lies 22 miles southeast of Greenville, one mile southwest of Wappapello and 16 miles northeast of Poplar Bluff. Although most of the lake is in Wayne County, a small southern portion extends into Butler County. The dam lies approximately 16 miles east of U.S. Route 67 and 12 miles north of U.S. Route 60. Highways providing direct access to the lake include: U.S. Route 67 running north-south on the west side of the lake, and State Route D and BB running north-south on the east side of the lake. State Routes T, KK, W, PP, RA and 172 provide access to the southern end of the lake; and State Routes 34, 143, FF and F provide access to the northern end of the lake. The location of the lake and adjacent lands is shown on Plate 2, *Land Classification Map*, and the regional highway network is presented on Plate 4, *Road Network*.

2.02 -- LAKE DATA

a. General

Construction of the dam was started in September 1938 and was completed in June 1941. The dam is a rolled earth-fill structure with a controlled outlet and an emergency spillway in the right abutment. A 125 kVA hydroelectric plant provides power for operating the dam gates and lights and other lake purposes. Pertinent data related to lake features and additional information is presented in Table 1.

TABLE 6
PERTINENT DATA SUMMARY
WAPPAPELLO LAKE

LAKE	
Drainage Area	1,310 sq. mi.
Conservation Pool	
Elevation (Top)	354.74 ft. NGVD*
Surface Area (Top)	5,200 acres
Storage Capacity	30,900 acre-ft.
Runoff Capacity	0.44 in.
Recreational Pool	
Elevation (Top)	359.74 ft. NGVD
Surface Area (Top)	8,400 acres
Flood Pool	
Elevation	354.75-394.74 ft. NGVD
Surface Area (Top)	23,200 acres
Storage Capacity	613,200 acre-feet
Runoff Capacity	8.78 in.
Maximum Regulated Outflow	10,000 c.f.s.
Surcharge Pool	
Elevation	394.75-413.74 ft. NGVD
Surface Area (Top)	32,100 acres
Storage Capacity	1,134,600 acre-ft
Runoff Capacity	16.24 in.
Freeboard	
Elevation	413.75-419.74 ft. NGVD
Dam, Earth Fill	
Elevation, Top of Dam	419.74 ft. NGVD
Maximum Height above Streambed	109 ft.
Length of Crest	2,700 ft.
Crown Width	30 ft.
Maximum Base Width	765 ft.
Volume of Earth in Dam	2,300,000 cu. yd.
Spillway	
Length	740 ft.
Elevation of Crest	394.74 ft. NGVD
Outlet Structure	
Length of Structure	724 ft.
Gates	3 gates ea. 10 ft x 20 ft
Elevation of Gate Sill	338.1 ft. NGVD
Number of Conduits	1 ea.
Inside Diameter of Conduits	22 ft.

* NGVD – National Geodetic Vertical Datum

b. Basin Hydrologic and Climate Summary

(1) General. The climate of the area is mild, with the average annual temperature about 57.2° Fahrenheit. The first killing frost normally occurs in mid-October and the last frost occurs in April. The average temperature for January is 31.6°; for July, it is 79.7°F. The annual rainfall is well distributed throughout the year at an average 46.79 inches. Snowfall is moderate, averaging 8 to 12 inches, and is the heaviest in January and February. The average growing season is 185 days. Regional climatic averages are presented in Table 2.

(2) Precipitation. The normal annual rainfall in the St. Francis Basin in the Ozark uplands is about 47 inches per year. Normal monthly rainfall varies from about 3.0 to 5.2 inches in the region, the heaviest occurring in the period March through July. In the southern portion, or that part which lies in the alluvial valley of the Mississippi River, the normal monthly rainfall varies from about 2.8 to 6.0 inches, with the heaviest occurring during the months November through May. The maximum annual total for one station was observed at Kennett, Missouri, in 1957 when 86.75 inches of precipitation was recorded. A minimum station total of 22.37 inches was recorded at Arcadia, Missouri, in 1953. Since 1940, the maximum annual rainfall over the reservoir area has been 67.30 inches in 1945 with a runoff of 52.9 percent. The minimum rainfall occurred in 1953 when 23.72 inches was recorded over the same area with a runoff of 33.8 percent. Average annual snowfall is about 8 to 12 inches in the reservoir area, diminishing to about four inches in the southern portion of the basin. Snow rarely remains on the ground more than a few days at a time.

TABLE 1
REGIONAL CLIMATIC AVERAGES (1961-1990)[1/]

Month	**Average Monthly High °F**	**Average Monthly Low °F**	**Average °F**
January	41.5	21	31.6
March	57.6	36.1	46.9
May	78.1	55.6	66.7
July	91.0	68.2	79.7
September	81.7	59.2	70.3
November	58.1	37	47.7
Annual Temperatures			
Annual Days Over 90°F:			55 to 60
Annual Days Under 32°F:			70 to 110
Average Annual Heating Degree Days °F			4,365
Average Annual Cooling Degree Days °F			1,548
Precipitation			
Annual Average Rainfall:			46.8 in.
Annual Average Snowfall:			8 to 12 in.

[1/] National Climatic Data Center, August 1992 for Wappapello Dam, Butler Co., Mo.

(3) Evaporation. The average annual lake evaporation is about 33.4 inches. The pool elevation versus surface area, for use in calculating evaporation from the pool, is presented as Table 3.

TABLE 2
WAPPAPELLO LAKE
ELEVATION - SURFACE AREA DATA

Elevation (feet NGVD)	Surface Area (acres)
312.74	0
319.74	58
324.74	174
329.74	190
334.74	234
339.74	880
344.74	1,400
349.74	2,600
354.74 (Top Conservation Pool)	5,200
359.74 (Recreation Pool)	8,400
364.74	10,400
369.74	12,400
374.74	15,200
379.74	16,900
384.74	18,600
389.74	20,800
394.74 (Top Flood Pool)	23,200
399.74	25,200
404.74	27,800
409.74	30,000
413.74 (Top Surcharge Pool)	32,100
419.74 (Top of Dam)	35,100

(4) Floods. The St. Francis Basin has been subject to periodic floods throughout its history, with most of the flood damage confined to agricultural areas. The August 1915 flood exceeded all previous records on the upper St. Francis with a peak flow past Wappapello estimated at about 85,000 cubic feet per second (cfs). This flood was one of the most destructive of record in the St. Francis Basin, causing an estimated damage of $5 million. The flood of May 1933 overflowed approximately 207,000 acres of which 91,000 acres were cultivated with estimated damages of about $826,000. The March 1935 flood produced the highest stage of record at St. Francis, Arkansas. This flood overflowed an area of 337,000 acres including 151,000 cultivated acres, with an estimated damage of $2 million. The January 1937 flood produced the greatest flow on the lower St. Francis, being the culmination of a series of rains totaling approximately 17 inches in 25 days. It caused an estimated damage of $600,000 resulting from an overflowed area of 371,000 acres of which 195,000 acres were cultivated. In 1943 and 1945, with the dam in place, flood damages were reduced by $8 million and $14 million, respectively.

c. Lake and Shoreline. The lake is confined by the steeply sloped Ozark Hills. The main portion of the lake is formed by the St. Francis River Valley. The topography varies due to the many small tributaries that enter the river above the dam site. This results in ravines, valleys, and an irregular shoreline. Many of the slopes are timbered. The lake has a water surface area of 8,400 acres at recreation pool with a shoreline 180 miles in length. The pool at this elevation extends approximately 28 miles above the dam and is a maximum of 47 feet deep. Table 3 contains pertinent elevation and surface area data.

d. Project Structures. The complete structure consists of an earth dam, a concrete outlet structure, and a concrete emergency spillway. The dam is a rolled earth fill with riprap stone protection on the slopes. It has a length of 2,700 feet and height of approximately 109 feet above the old channel bed.

The crown is 30 feet wide and carries a roadway 22 feet wide. Supplementing the main dam are three small auxiliary dikes that rim the left abutment with a total length of about 1,700 feet and a maximum height of approximately 30 feet.

The outlet control structures are 400 feet south of the dam in the right abutment. The conservation pool weir, with crest elevation at 354.74 NGVD and a length of 70 feet, is pierced by five sluices, each 6 feet wide and 7.5 feet high, with invert elevation at 338.74 NGVD. The intake section of the control structure lies within the gate house and contains three water passages, each controlled by a motor-operated, tractor-type gate, 10 feet wide and 20 feet high. The outlet works also contain a penstock. This provides for the operation of 125-kVA hydroelectric unit to furnish power and lights for the dam, gate house, and some recreation facilities. A diesel engine directly connected to a 50-kVA generator serves as a stand-by unit. An uncontrolled emergency spillway is provided in a natural saddle about 1,200 feet south of the south end of the dam. This concrete structure, founded on bedrock, has a 740-foot long spillway with a crest elevation of 394.74 feet NGVD.

2.03 -- LAKE REGULATION

a. General Objective. The objective is to provide flood protection to downstream interests during wet periods while maintaining the pool as nearly as possible at rule curve elevation. Rule curve is defined as the elevation at which a reservoir is desired to be maintained to accommodate reservoir functions (other than flood control) plotted against the time of year. Plate 23 provides information on fluctuation of reservoir levels and hydrological data.

b. Regulation Procedure

(1) Non-crop Season. The non-crop season is considered to exist from 1 January through 31 March. During this period the release rate may reach the maximum of 10,000 cfs independent of pool elevation. Rate of release shall

match rate of inflow as nearly as possible up to 10,000 cfs and be maintained at this rate until the storm inflow is depleted or the pool approaches its lower limit. Some discretion is allowed in the discharge rate at elevations below 379.74 feet NGVD, but when this elevation is exceeded, 10,000 cfs must be discharged.

(2) Crop Season. The crop season is considered to exist from 1 April through 31 December, the date when all crops have normally been harvested. During this period the maximum non-damaging flow rate at Fisk, Missouri, and St. Francis, Arkansas, is 3800 cfs. The outflow from the Lake must be controlled in order not to exceed the 3800 cfs at Fisk and St. Francis unless the pool level should exceed one of the elevations shown in the following table, at which time the outflow would be increased to a constant discharge rate as noted. Reservoir capacity and surface area data are provided in Table 3.

Period	If pool exceeds: (Elevation NGVD)	Outflow is increased to: (Constant Discharge)
1 Jan-30 Jun	379.74 ft.	10,000 cfs
1 Jul -31 Oct	391.74 ft.	7,000 cfs
1 Nov-31 Dec	388.74 ft.	7,000 cfs

2.04 -- VISITATION DATA

a. General. Visitation at the lake has been estimated since 1963 by the use of traffic counters and statistical analysis based on visitor use surveys. The visitation unit used to estimate recreation use until 1991 was the Recreation Day. In 1991, the Visitor Estimation Reporting System (VERS) was installed at the lake project to administer visitation reporting. Two of the units of measurement in VERS are *visitor hours* and *visits*.

Visitor hours represent the presence of one of more persons recreating on land or water for periods of time aggregating to sixty minutes. It takes into consideration the number of participants and duration of stay and provides a good estimate of the amount of use.

Visits are simply a ‘head count’ of visitors to a project but do not reflect the amount of use or length of stay. It represents the entry of one person into a recreation area or site to carry on one or more recreation activities.

A *Recreation Day* is similar to a *Visit* but reflects the duration of the visit in days. It is the unit of measure for determining recreation benefits at water resource development projects.

b. Past and Current Visitation. Visitation at Wappapello Lake increased steadily from 1958, when data collection began, to 1971. Although the number of visitors has remained relatively stable for the past 27 years, increases in the amount of time spent in activities on the project generally continues to grow (see Table 4-Wappapello Lake Actual Visitation Data, Visitor Hours 1991-1999). Year to year

variations in actual visitation can be attributed to changes in weather conditions, fluctuations in lake levels, cost and supply of gasoline, general economic conditions, and the level of facility development occurring on the lake.

Wappapello Lake has established a zone of influence as shown on Plate 3. The 1984 Visitor Use Survey provided data that showed that 43 percent of lake visitors travel a distance greater than 75 miles to reach the lake, 20 percent of lake users come from within a 25-mile radius, 26 percent from within a 26 to 50 mile radius, and 11 percent from within a 51 to 75 mile radius. This information highlights the need for the Master Plan to address recreational development best suited to the type of visitor traveling a substantial distance to the lake. Table 4 presents a summary of actual visitation from 1958 through 1998.

c. Projected visitation. A discussion of projected visitation at Wappapello Lake is presented in Paragraph 5.14.

TABLE 3 WAPPAPELLO LAKE
ACTUAL VISITATION DATA 1958 - 1999

Year	Recreation Days (except as noted)	Visitor Hours
1958	423,590	
1959	440,100	
1960	476,800	
1961	533,500	
1962	601,100	
1963*	1,229,885	
1964	1,163,772	
1965	1,110,446	
1966	1,292,381	
1967	1,200,440	
1968	1,319,558	
1969	1,580,627	
1970	1,664,980	
1971	1,870,774	
1972	2,031,451	
1973	1,743,825	
1974	2,120,739	
1975	1,998,595	
1976	1,743,825	
1977	1,868,096	
1978	1,600,600	
1979	2,168,808	
1980	1,936,856	
1981	1,549,150	
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1984	2,101,600	
1985	2,106,246	
1986	2,094,309	
1987	2,084,047	
1988	2,304,706	
1989	2,237,817	
1990	2,223,379	
1991	2,263,199 ◆	6,616,751
1992	2,215,805 ◆	9,044,760
1993	2,371,532 ◆	13,983,305
1994	2,182,090 ◆	13,369,196
1995	2,300,425 ◆	14,018,422
1996	2,362,248 ◆	14,729,941
1997	2,016,356 ◆	17,403,759
1998	1,995,338 ◆	16,596,142
1999	2,072,087 ◆	17,944,166

* Initial year of traffic counter/load factor use

◆ Visits (calculated using VERS data)

SECTION I - INTRODUCTION

1.01 -- AUTHORIZATION

Federal laws provide that land and water areas of U. S. Army Corps of Engineers (Corps) water resource projects, constructed for the primary purposes of flood control, navigation, and/or power, shall be administered to encourage and develop collateral uses, such as recreation, conservation of fish and wildlife resources, and other purposes in the public interest. The St. Francis Basin Project, which includes Wappapello Dam and Lake, was authorized for flood control by the Flood Control Act, approved 15 June 1936 (Overton Act), and amended by subsequent Flood Control Acts. Development and use of flood-control reservoir areas for recreational and related purposes were authorized by Section 4 of the Flood Control Act, approved 22 December 1944, and amended by Section 209 of the Flood Control Act of 1954, approved 3 December 1954. The Fish and Wildlife Coordination Act, enacted 10 March 1934, as amended, provides authority for making project lands of value for wildlife purposes available for management by interested federal and state wildlife agencies. This report has been prepared in accordance with guidance contained in the following:

a. ER 1165-2-400 *Water Resource Policies and Authorities, Recreation Planning, Development and Management Policies* (1985).

b. ER 1110-2-400 *Design of Recreation Sites, Areas, and Facilities* (1988).

c. ER 1130-2-540 *Environmental Stewardship Operations and Maintenance Policies (1996).*

d. EP 1130-2-540 *Environmental Stewardship Operations and Maintenance Guidance and Procedures* (1996).

e. EM 1110-1-400 *Recreation Planning and Design Criteria* (1987).

f. ER 1130-2-550 *Recreation Operations and Maintenance Policies* (1996).

g. EP 1130-2-550 *Recreation Operations and Maintenance Guidance and Procedures* (1996).

h. ER 1130-2-406 *Shoreline Management at Civil Works Projects* (1990).

i. ER 405-1-12 *Real Estate Handbook* (1985)

1.02 -- PROJECT PURPOSES

The authorized purposes of Wappapello Lake are to provide flood control for the St. Francis River and its tributaries, and to provide and manage recreation, and fish and wildlife conservation on project lands and waters.

Wappapello Lake is an integral part of the St. Francis Basin Project. The St. Francis Basin Project controls the St. Francis and Little St. Francis Rivers through a combination of a reservoir, levees, a pumping station, channel improvements, and interior drainage. Although the primary purpose of the project is recognized as flood control, the lake constitutes a major recreation resource and has been developed into a recreational center to meet the varied recreational needs of the surrounding region. Recreational facilities have been developed in accordance with Section 4 of the Flood Control Act of 1944. Lands have been outgranted to the Missouri Department of Natural Resources (MDNR) for operation of Lake Wappapello State Park. Project lands have been made available to the Missouri Department of Conservation (MDC) for fish and wildlife management. The Corps promotes habitat improvement and maintains a refuge on project lands.

1.03 -- PURPOSE OF THE MASTER PLAN

The original Master Plan served as a guide for the orderly and coordinated resource development and management of all land and water at the lake. Presented in the original document was data on the scope of development considered adequate for initial public use and an estimate of future requirements. This updated Master Plan presents an inventory and assessment of the land and water resources and related physical improvements, an analysis of resource use and a reevaluation of existing and future needs required to protect and improve the values of the resource base.

1.04 -- PRIOR MASTER PLANS AND SUPPLEMENTS

The original Master Plan was approved in 1946, revised in 1958, updated in 1963 and1975 and was last updated on 29 July 1985 as *Supplement No. 2, Design Memorandum (DM) No. 504, Updated Master Plan*. Since that approval, there have been two supplements as described below.

a. *Supplement No. 3 - Wappapello Lake Traditional Access Plan*, 1 December 1988, proposed rehabilitation and maintenance of 56 existing public accesses to project lands and waters, closure of 71 existing public accesses, and authorization of several additional designated primitive camping areas with associated minimum health and safety facilities. The final revised plan, *Wappapello Lake Traditional Access Plan,* November 1992, provided an analysis and findings of only those accesses identified by the public for proposed changes during the review period for the Traditional Access Plan.

b. *Supplement No. 4, 13 June 1997, DM 504, the Wappapello Lake Master Plan, St. Francis River, Missouri*, approved construction of a shower building in the Greenville Campground, Wappapello Lake.

1.05 -- APPLICATION OF PUBLIC LAWS

Development and management of federal reservoirs for various purposes is provided under several statutes. These laws cover development of recreation facilities, licensing of project lands for fish and wildlife purposes, protection of natural resources, and leasing of public lands for incidental uses other than recreation.

a. Recreation. Development and management of recreation facilities by the Corps, other governmental agencies, local groups, or individuals is authorized under the following public laws:

(1) Section 4 of the Flood Control Act, approved 22 December 1944 (PL 534, 78th Congress), authorizes providing facilities for public use, including recreation, and conservation of fish and wildlife.

(2) The River and Harbors Act, approved 2 March 1945 (PL 14, 79th Congress), specifies the rights and interests of the states in watershed development and water utilization and control, and the requirements for cooperation with state agencies in planning for flood control and navigation improvements.

(3) Section 209 of the Flood Control Act of 1954 (PL 83-780), approved 3 September 1954, amended the Flood Control Act of 1944. It authorized the Secretary of the Army to grant leases to federal, state or governmental agencies without monetary considerations for use and occupation of land and water areas under the jurisdiction of the Department of the Army for park and recreation purposes when in the public interest.

(4) The Land and Water Conservation Fund Act of 1965, approved 1 September 1964 (PL 578, 88th Congress, 78 Stat. 897), contains provisions by which the Corps may charge for admission and use of its recreation areas under prescribed conditions.

(5) The Federal Water Project Recreation Act, approved 9 July 1965 (PL 72, 89th Congress, 79 Stat. 213) contains cost sharing provisions for acquisition of lands and development of recreation facilities for water resources projects authorized after 1965. It also provides for cost sharing development of new areas that were not part of initial project construction.

(6) The Architectural Barriers Act of 1968 (PL 90-480), together with the acts and amendments listed in 7, 8, and 9 below, provides information and guidance regarding universal accessibility for persons with disabilities to the Corps recreation facilities and programs.

(7) The Rehabilitation Act of 1973 (PL 93-112) and the Rehabilitation Act Amendments of 1974 (PL 93-516) (see Architectural Barriers Act above).

(8) The Rehabilitation, Comprehensive Services, and Developmental Disabilities Amendments of 1978 (PL 95-602) (see Architectural Barriers Act above).

(9) The Americans with Disabilities Act of 1990 (PL 101-336) (See Architectural Barriers Act above).

(10) The Omnibus Budget Act - Day Use Fees, approved 10 August 1993 (PL 103-66), contains provisions by which the Corps may collect fees for the use of developed recreation sites and facilities, including campsites, swimming beaches, and boat launching ramps but excluding a site or facility which includes only a boat launch ramp and a courtesy dock.

b. Fish and Wildlife. Fish and wildlife resources are maintained and protected in compliance with the following public laws:

(1) The Fish and Wildlife Coordination Act, enacted 10 March 1934, as amended, 14 August 1946 (PL 79-732), 1958 (PL 85-624), provides authority for making project lands of value for wildlife purposes available for management by interested federal and state wildlife agencies. It further provides for more effective integration of a fish and wildlife conservation program with federal water resources developments.

(2) The National Environmental Policy Act of 1969, as amended (42 USC 4321 et seq), declares a national environmental policy and requires that all federal agencies shall, to the fullest extent possible, use a systematic, interdisciplinary approach which integrates natural and social sciences and environmental design arts in planning and decision making.

(3) The Endangered Species Act of 1973 as amended (16 USC 1531 and 1536) requires that federal agencies shall, in consultation with the U.S. Fish and Wildlife Service (USFWS) (or the National Marine Fisheries Service), use their authorities in furtherance of conserving endangered and threatened species and take such action as necessary to assure that their actions are not likely to jeopardize such species or destroy or modify their critical habitat.

(4) The Water Resource Development Act of 1986, Section 1135, provides for modifications in the structures or operations of a project, consistent with authorized project purposes to improve the quality of the environment, i.e. restoration of fish and wildlife habitat.

c. Forest Resources - Protection and Improvement of Natural Resources. The Forest Conservation Act (PL 86-717) approved 6 September 1960, provides for the protection of forest cover in reservoir areas, and specifies that reservoir areas of projects for flood control, navigation, hydroelectric power development, and other related purposes, owned in fee and under the jurisdiction of the Secretary of the Army and the Chief of Engineers, shall be developed and maintained so as to encourage, promote and assure fully adequate and dependable future resources of readily available timber through sustained yield programs, reforestation, and accepted conservation practices, and to increase the value of such areas for conservation, recreation and other beneficial uses; provided, that such development and management shall be accomplished to the extent practicable and compatible with other uses of the project. The law further provides that in order to carry out the national policy declared in the first section of this Act, the Chief of Engineers, under the supervision of the Secretary of the Army, shall provide for the protection and development of forest or other vegetative cover and the establishment and maintenance of other conservation measures on reservoir areas under his jurisdiction, so as to yield the maximum benefit and otherwise improve such areas. Programs and policies developed pursuant to the preceding sentence shall be coordinated with the Secretary of Agriculture, and with appropriate state conservation agencies.

d. Other Incidental Uses. Title 10, United States Code, Section 2667, authorizes the lease of land at water resource projects for any commercial or private purpose not inconsistent with other authorized purposes, subject to specific restrictions thereupon, as set out in regulations, policy, and Delegations of Authority. Title 16, United States Code, Section 460d, authorizes use of public lands for any public purpose, including fish and wildlife, if it is in the public interest. Such uses are also subject to regulations, policy and Delegations of Authority. The use of project lands for easements and licenses is authorized in various Congressional Acts and codified in Titles 10, 16, 30, 32 and 43 of the United States Code. Lands and rights-of-way will be acquired pursuant to provisions of the Uniform Real Property Acquisition and Relocation Assistance Act of 1970, P.L. 91-646, as amended.

e. Cultural and Historical Considerations. A number of laws mandating the protection of cultural resources on public lands have been passed during the past 75 years. These laws and Executive Orders are summarized in Appendix A of the *St. Louis District Cultural Resource Management Policy* (April 1982). The following laws subsume, clarify or supersede all previous cultural resource law:

(1) The Archeological Resources Protection Act of 1979 (16 USC 470 et seq.), PL 96-95, 96th Congress Revision and update of 1906 Antiquities Act. Protects archaeological resources and sites that are on public lands and Indian land, and fosters increased cooperation and exchange of information between governmental authorities, the professional community, and private individuals.

(2) The 1980 Historic Preservation Amendment to the National Historic Preservation Act of 1966, PL 96-515, states a policy of preserving, restoring and maintaining cultural resources and requires that federal agencies take into account the effect of any undertaking on any site eligible for the *National Register of Historic Places*.

(3) The Archaeological and Historic Preservation Act (Reservoir Salvage Act, PL 86-523) 27 June 1960, as amended 16 USC 469 et seq., provides for the preservation of historical and archaeological data which might otherwise be lost or destroyed as the result of flooding or any alteration of the terrain caused as a result of any federal construction projects.

f. Other Cultural/Historical Laws. The Native American Graves Protection and Repatriation Act (PL 101-601) 16 November 1990, requires federal agencies and museums to inventory human remains and associated funerary objects and to provide culturally affiliated tribes with the inventory of collection. The Act requires repatriation, on request, to the culturally affiliated tribes and establishes a grant program within the Department of the Interior to assist tribes in repatriation and to assist museums in preparing the inventories and collections summaries.

1.06 -- MISSION STATEMENT

Programs and activities related to outdoor recreation have as their design base the following mission statement:

> "The Army Corps of Engineers is the steward of lands and waters at Corps water resources projects. Its Natural Resources Management Mission is to manage and conserve those natural resources, consistent with ecosystem management principles, while providing quality public outdoor recreation experiences to serve the needs of present and future generations.
>
> In all aspects of natural and cultural resources management, the Corps promotes awareness of environmental values and adheres to sound environmental stewardship, protection, compliance and restoration practices.
>
> The Corps manages for long-term public access to, and use of, the natural resources in cooperation with other federal, state, and local agencies as well as the private sector.
>
> The Corps integrates the management of diverse natural resource components such as fish, wildlife, forest, wetlands, grasslands, soils, air and water with the provision of public recreation opportunities. The Corps conserves natural resources and provides public recreation opportunities that contribute to the quality of American life."

1.07 -- SCOPE OF THE REPORT

This is the fourth update of the Wappapello Lake Master Plan since it was revised in 1958. It reflects current conditions, a reclassification of project lands, as well as formulation of resource use objectives, rehabilitation and relocation of existing facilities and proposed facilities and actions. To amplify Paragraph 1.03 above, this update was accomplished for the purposes of revising outdated material, reflecting the current status of Wappapello Lake, outlining future plans, and revising land use classifications.

SECTION II - PROJECT DESCRIPTION

2.01 -- LOCATION

Wappapello Lake is located on the Upper St. Francis River in the southeastern part of Missouri. The dam site lies 22 miles southeast of Greenville, one mile southwest of Wappapello and 16 miles northeast of Poplar Bluff. Although most of the lake is in Wayne County, a small southern portion extends into Butler County. The dam lies approximately 16 miles east of U.S. Route 67 and 12 miles north of U.S. Route 60. Highways providing direct access to the lake include: U.S. Route 67 running north-south on the west side of the lake, and State Route D and BB running north-south on the east side of the lake. State Routes T, KK, W, PP, RA and 172 provide access to the southern end of the lake; and State Routes 34, 143, FF and F provide access to the northern end of the lake. The location of the lake and adjacent lands is shown on Plate 2, *Land Classification Map*, and the regional highway network is presented on Plate 4, *Road Network*.

2.02 -- LAKE DATA

a. General

Construction of the dam was started in September 1938 and was completed in June 1941. The dam is a rolled earth-fill structure with a controlled outlet and an emergency spillway in the right abutment. A 125 kVA hydroelectric plant provides power for operating the dam gates and lights and other lake purposes. Pertinent data related to lake features and additional information is presented in Table 1.

TABLE 1
PERTINENT DATA SUMMARY
WAPPAPELLO LAKE

LAKE	
Drainage Area	1,310 sq. mi.
Conservation Pool	
Elevation (Top)	354.74 ft. NGVD*
Surface Area (Top)	5,200 acres
Storage Capacity	30,900 acre-ft.
Runoff Capacity	0.44 in.
Recreational Pool	
Elevation (Top)	359.74 ft. NGVD
Surface Area (Top)	8,400 acres
Flood Pool	
Elevation	354.75-394.74 ft. NGVD
Surface Area (Top)	23,200 acres
Storage Capacity	613,200 acre-feet
Runoff Capacity	8.78 in.
Maximum Regulated Outflow	10,000 c.f.s.
Surcharge Pool	
Elevation	394.75-413.74 ft. NGVD
Surface Area (Top)	32,100 acres
Storage Capacity	1,134,600 acre-ft
Runoff Capacity	16.24 in.
Freeboard	
Elevation	413.75-419.74 ft. NGVD
Dam, Earth Fill	
Elevation, Top of Dam	419.74 ft. NGVD
Maximum Height above Streambed	109 ft.
Length of Crest	2,700 ft.
Crown Width	30 ft.
Maximum Base Width	765 ft.
Volume of Earth in Dam	2,300,000 cu. yd.
Spillway	
Length	740 ft.
Elevation of Crest	394.74 ft. NGVD
Outlet Structure	
Length of Structure	724 ft.
Gates	3 gates ea. 10 ft x 20 ft
Elevation of Gate Sill	338.1 ft. NGVD
Number of Conduits	1 ea.
Inside Diameter of Conduits	22 ft.

* NGVD – National Geodetic Vertical Datum

b. Basin Hydrologic and Climate Summary

(1) General. The climate of the area is mild, with the average annual temperature about 57.2° Fahrenheit. The first killing frost normally occurs in mid-October and the last frost occurs in April. The average temperature for January is 31.6°; for July, it is 79.7°F. The annual rainfall is well distributed throughout the year at an average 46.79 inches. Snowfall is moderate, averaging 8 to 12 inches, and is the heaviest in January and February. The average growing season is 185 days. Regional climatic averages are presented in Table 2.

(2) Precipitation. The normal annual rainfall in the St. Francis Basin in the Ozark uplands is about 47 inches per year. Normal monthly rainfall varies from about 3.0 to 5.2 inches in the region, the heaviest occurring in the period March through July. In the southern portion, or that part which lies in the alluvial valley of the Mississippi River, the normal monthly rainfall varies from about 2.8 to 6.0 inches, with the heaviest occurring during the months November through May. The maximum annual total for one station was observed at Kennett, Missouri, in 1957 when 86.75 inches of precipitation was recorded. A minimum station total of 22.37 inches was recorded at Arcadia, Missouri, in 1953. Since 1940, the maximum annual rainfall over the reservoir area has been 67.30 inches in 1945 with a runoff of 52.9 percent. The minimum rainfall occurred in 1953 when 23.72 inches was recorded over the same area with a runoff of 33.8 percent. Average annual snowfall is about 8 to 12 inches in the reservoir area, diminishing to about four inches in the southern portion of the basin. Snow rarely remains on the ground more than a few days at a time.

TABLE 2
REGIONAL CLIMATIC AVERAGES (1961-1990)[1/]

Month	**Average Monthly High °F**	**Average Monthly Low °F**	**Average °F**
January	41.5	21	31.6
March	57.6	36.1	46.9
May	78.1	55.6	66.7
July	91.0	68.2	79.7
September	81.7	59.2	70.3
November	58.1	37	47.7
Annual Temperatures			
Annual Days Over 90°F:			55 to 60
Annual Days Under 32°F:			70 to 110
Average Annual Heating Degree Days °F			4,365
Average Annual Cooling Degree Days °F			1,548
Precipitation			
Annual Average Rainfall:			46.8 in.
Annual Average Snowfall:			8 to 12 in.

[1/] National Climatic Data Center, August 1992 for Wappapello Dam, Butler Co., Mo.

(3) Evaporation. The average annual lake evaporation is about 33.4 inches. The pool elevation versus surface area, for use in calculating evaporation from the pool, is presented as Table 3.

TABLE 3
WAPPAPELLO LAKE
ELEVATION - SURFACE AREA DATA

Elevation (feet NGVD)	Surface Area (acres)
312.74	0
319.74	58
324.74	174
329.74	190
334.74	234
339.74	880
344.74	1,400
349.74	2,600
354.74 (Top Conservation Pool)	5,200
359.74 (Recreation Pool)	8,400
364.74	10,400
369.74	12,400
374.74	15,200
379.74	16,900
384.74	18,600
389.74	20,800
394.74 (Top Flood Pool)	23,200
399.74	25,200
404.74	27,800
409.74	30,000
413.74 (Top Surcharge Pool)	32,100
419.74 (Top of Dam)	35,100

(4) Floods. The St. Francis Basin has been subject to periodic floods throughout its history, with most of the flood damage confined to agricultural areas. The August 1915 flood exceeded all previous records on the upper St. Francis with a peak flow past Wappapello estimated at about 85,000 cubic feet per second (cfs). This flood was one of the most destructive of record in the St. Francis Basin, causing an estimated damage of $5 million. The flood of May 1933 overflowed approximately 207,000 acres of which 91,000 acres were cultivated with estimated damages of about $826,000. The March 1935 flood produced the highest stage of record at St. Francis, Arkansas. This flood overflowed an area of 337,000 acres including 151,000 cultivated acres, with an estimated damage of $2 million. The January 1937 flood produced the greatest flow on the lower St. Francis, being the culmination of a series of rains totaling approximately 17 inches in 25 days. It caused an estimated damage of $600,000 resulting from an overflowed area of 371,000 acres of which 195,000 acres were cultivated. In 1943 and 1945, with the dam in place, flood damages were reduced by $8 million and $14 million, respectively.

c. Lake and Shoreline. The lake is confined by the steeply sloped Ozark Hills. The main portion of the lake is formed by the St. Francis River Valley. The topography varies due to the many small tributaries that enter the river above the dam site. This results in ravines, valleys, and an irregular shoreline. Many of the slopes are timbered. The lake has a water surface area of 8,400 acres at recreation pool with a shoreline 180 miles in length. The pool at this elevation extends approximately 28 miles above the dam and is a maximum of 47 feet deep. Table 3 contains pertinent elevation and surface area data.

d. Project Structures. The complete structure consists of an earth dam, a concrete outlet structure, and a concrete emergency spillway. The dam is a rolled earth fill with riprap stone protection on the slopes. It has a length of 2,700 feet and height of approximately 109 feet above the old channel bed.

The crown is 30 feet wide and carries a roadway 22 feet wide. Supplementing the main dam are three small auxiliary dikes that rim the left abutment with a total length of about 1,700 feet and a maximum height of approximately 30 feet.

The outlet control structures are 400 feet south of the dam in the right abutment. The conservation pool weir, with crest elevation at 354.74 NGVD and a length of 70 feet, is pierced by five sluices, each 6 feet wide and 7.5 feet high, with invert elevation at 338.74 NGVD. The intake section of the control structure lies within the gate house and contains three water passages, each controlled by a motor-operated, tractor-type gate, 10 feet wide and 20 feet high. The outlet works also contain a penstock. This provides for the operation of 125-kVA hydroelectric unit to furnish power and lights for the dam, gate house, and some recreation facilities. A diesel engine directly connected to a 50-kVA generator serves as a stand-by unit. An uncontrolled emergency spillway is provided in a natural saddle about 1,200 feet south of the south end of the dam. This concrete structure, founded on bedrock, has a 740-foot long spillway with a crest elevation of 394.74 feet NGVD.

2.03 -- LAKE REGULATION

a. General Objective. The objective is to provide flood protection to downstream interests during wet periods while maintaining the pool as nearly as possible at rule curve elevation. Rule curve is defined as the elevation at which a reservoir is desired to be maintained to accommodate reservoir functions (other than flood control) plotted against the time of year. Plate 23 provides information on fluctuation of reservoir levels and hydrological data.

b. Regulation Procedure

(1) Non-crop Season. The non-crop season is considered to exist from 1 January through 31 March. During this period the release rate may reach the maximum of 10,000 cfs independent of pool elevation. Rate of release shall

match rate of inflow as nearly as possible up to 10,000 cfs and be maintained at this rate until the storm inflow is depleted or the pool approaches its lower limit. Some discretion is allowed in the discharge rate at elevations below 379.74 feet NGVD, but when this elevation is exceeded, 10,000 cfs must be discharged.

(2) Crop Season. The crop season is considered to exist from 1 April through 31 December, the date when all crops have normally been harvested. During this period the maximum non-damaging flow rate at Fisk, Missouri, and St. Francis, Arkansas, is 3800 cfs. The outflow from the Lake must be controlled in order not to exceed the 3800 cfs at Fisk and St. Francis unless the pool level should exceed one of the elevations shown in the following table, at which time the outflow would be increased to a constant discharge rate as noted. Reservoir capacity and surface area data are provided in Table 3.

Period	If pool exceeds: (Elevation NGVD)	Outflow is increased to: (Constant Discharge)
1 Jan-30 Jun	379.74 ft.	10,000 cfs
1 Jul -31 Oct	391.74 ft.	7,000 cfs
1 Nov-31 Dec	388.74 ft.	7,000 cfs

2.04 -- VISITATION DATA

a. General. Visitation at the lake has been estimated since 1963 by the use of traffic counters and statistical analysis based on visitor use surveys. The visitation unit used to estimate recreation use until 1991 was the Recreation Day. In 1991, the Visitor Estimation Reporting System (VERS) was installed at the lake project to administer visitation reporting. Two of the units of measurement in VERS are *visitor hours* and *visits*.

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A *Recreation Day* is similar to a *Visit* but reflects the duration of the visit in days. It is the unit of measure for determining recreation benefits at water resource development projects.

b. Past and Current Visitation. Visitation at Wappapello Lake increased steadily from 1958, when data collection began, to 1971. Although the number of visitors has remained relatively stable for the past 27 years, increases in the amount of time spent in activities on the project generally continues to grow (see Table 4-Wappapello Lake Actual Visitation Data, Visitor Hours 1991-1999). Year to year

variations in actual visitation can be attributed to changes in weather conditions, fluctuations in lake levels, cost and supply of gasoline, general economic conditions, and the level of facility development occurring on the lake.

Wappapello Lake has established a zone of influence as shown on Plate 3. The 1984 Visitor Use Survey provided data that showed that 43 percent of lake visitors travel a distance greater than 75 miles to reach the lake, 20 percent of lake users come from within a 25-mile radius, 26 percent from within a 26 to 50 mile radius, and 11 percent from within a 51 to 75 mile radius. This information highlights the need for the Master Plan to address recreational development best suited to the type of visitor traveling a substantial distance to the lake. Table 4 presents a summary of actual visitation from 1958 through 1998.

c. Projected visitation. A discussion of projected visitation at Wappapello Lake is presented in Paragraph 5.14.

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1989	2,237,817	
1990	2,223,379	
1991	2,263,199 ◆	6,616,751
1992	2,215,805 ◆	9,044,760
1993	2,371,532 ◆	13,983,305
1994	2,182,090 ◆	13,369,196
1995	2,300,425 ◆	14,018,422
1996	2,362,248 ◆	14,729,941
1997	2,016,356 ◆	17,403,759
1998	1,995,338 ◆	16,596,142
1999	2,072,087 ◆	17,944,166

* Initial year of traffic counter/load factor use

◆ Visits (calculated using VERS data)

SECTION III - OPERATING PROJECTS: STATUS

3.01 -- PROJECT DEVELOPMENT AND OPERATION CHRONOLOGY

Wappapello Lake was authorized for development by the Flood Control Act of 15 June 1936 (Overton Act) for flood control. Development and use of lake areas for recreational and related purposes was authorized by Section 4 of the Flood Control Act of 22 December 1944, and as amended by Section 209 of the Flood Control Act of 3 December 1954. Construction began in September 1938, and Wappapello Lake was placed into operation in June 1941.

3.02 -- CHRONOLOGY OF EXPENDITURES FOR PUBLIC USE AND ENVIRONMENTAL RESOURCE DEVELOPMENT

a. Federal Government

(1) Fourteen public recreation areas have been developed by the Corps of Engineers totaling 1,932 acres. Originally 18 areas, these areas were consolidated or reclassified. The 14 public use areas include Redman Creek, Rockwood Point, Chaonia Landing, Holliday Landing, 34 Bridge, North Greenville, Greenville, Sulphur Springs, Lost Creek, Possum Creek, Peoples Creek, Sundowner, Eagle Point and Spillway Recreation Areas. The extent of development varies at each area. Some provide the basic facilities such as access road, picnic tables, launching ramps, parking areas, and/or comfort stations while others are provided with extensive camping areas with playgrounds, comfort stations, electrical hookups, trails, and beaches.

(2) Operation and Maintenance Cost. Total operations and maintenance baseline cost for the period 1 October 1998 through 30 September 1999 amounted to $6,921,859.00.

b. Non-Federal Public Agencies

Land and water areas at Wappapello Lake have been outgranted for recreation and fish and wildlife management purposes to the State of Missouri, the City of Greenville, and the University of Missouri. These outgrants are described as follows:

(1) Area R-4. Lake Wappapello State Park. A 1,854-acre lease is issued to the MDNR. Appendix I contains an updated status report on the development of this area. Development at the state park includes organized camping units, picnicking facilities, boat ramps and related parking, a swimming beach, trails and cabins. A site plan of this park is included on Plate 8. The MDNR also has a license for a backpacking/equestrian/mountain bike trail on public land within the Asher/Bluewater and Snow Creek Multiple Resources Management Areas. Additional general information is provided in Paragraph 8.03 b.(4).

(2) MR-WM-1. Chollo Holly Wildlife Management Area. This 1880-acre area is licensed to the MDC for fish and wildlife management purposes. The area has six parking areas for public access. Appendix II contains an updated status report of the development at this area. Additional general information is provided in Paragraph 8.04 b.(1), and indexed on Plate 2, *Land Classification Map*.

(3) MR-VM-1. University of Missouri Forest Resource Area. Of this 741-acre area, 489-acres are leased to the University of Missouri School of Forestry, Fisheries and Wildlife. It is utilized as a hydrometeorologic research study site. General information is provided in Paragraph 8.04 c.(1), and indexed on Plate 2, *Land Classification Map*.

(4) R-8. North Greenville Recreation Area. Twelve acres of this 150-acre area are leased to the City of Greenville and have been developed as a baseball park. The area has an established ball diamond, fence, lighting, parking lot, and concession sales/restroom structure. Paragraph 8.03 b.(8) provides detailed information on this area. A site plan of this area is shown on Plate 12.

c. Private Recreational Investment

(1) Concession leases. There are currently six commercial concession operations on the lake. A brief description of each area follows (See Section VIII and Paragraph 11.02 for proposed plans for marinas.)

(a) Barrett's Resort and Marina within Area R-2, Rockwood Point Recreation Area, has been in operation since the 1950s and comprises 29.69 acres of land. Development includes a marina, gas sales, boat and motor rentals, and a snack bar with food sales on leased land; and overnight accommodations (cabins) on adjacent private land. A site plan of the lease area is presented on Plate 6 and additional information is provided in Paragraph 8.03 b.(2).

(b) Sundowner Marina, comprising 8.15 acres, is located approximately one mile north of the dam within Area R-17, Sundowner Recreation Area. The development on public land includes marina facilities, gas sales, and snack sales. Boat and motor rentals are available. Development on the adjacent private land includes a store, gas sales and boat repair and sales facilities. A site plan of the leased area is presented on Plate 19 and additional information is provided in Paragraph 8.03 b.(17).

(c) Chaonia Landing Resort and Marina, located in Area R-5 Chaonia Landing Recreation Area, has also been in operation for many years and includes 24 acres of land. The facilities on this site consist of a marina with gas sales, a store, cabins, a pool, campsites, picnic sites, and boat and motor rentals. A site plan of the leased area is presented on Plate 9 and additional information is provided in Paragraph 8.03 b.(5).

(d) Holliday Landing Resort and Marina in Area R-6, Holliday Recreation Area, comprises 18.781 acres, and is located approximately seven miles south of

Greenville on the west side of the lake. The concession is entirely on public land and includes a marina, a store, gas sales, campsites, cabins, a shower house, a storage area, and rental boat services. A site plan of the lease area is presented on Plate 10 and additional information is provided in Section 8.03 b.(6).

(e) Lost Creek Lodge, Area R-12 Lost Creek Recreation Area, consists of 2.128 acres on public land located on the east side of the lake approximately two miles south of Shook. The concession includes a marina, boat rentals, and camping on public land. Cabins and additional campsites are located on the adjacent private land. A site plan of the lease area is presented on Plate 15 and additional information is provided in Paragraph 8.03 b.(12).

(f) The Spillway concession, located within Area R-19 Spillway Recreation Area, comprises 0.10 acre adjacent to the outlet channel. Services provided include a restaurant and bait and tackle sales. A site plan of the leased area is presented on Plate 5 and additional information is provided in Paragraph 8.03 b.(19).

(2) Recreational Development by Organizations. There are currently four areas that have been developed by three youth organizations:

(a) *Boy Scouts of America*. The Greater St. Louis Area Council No. 312 is authorized use of a total of 142 acres of land for camping and other recreation activities under two separate leases. The Council manages 82 acres at Baker Lodge Recreation Area, Area R-3, on the southern portion of the lake. The area is used for both primitive and indoor camping. Extensive development includes a lodge constructed on the site. The Scouts also have a lease covering 60 acres at Poole Lodge Recreation Area R-11, along the east side of the lake. Similar to the Baker Lodge site, this area is used for camping. The major development is a lodge. Site plans of these areas are included as Plate 7 and additional information is provided in Paragraphs 8.03 b.(3) and 8.03 b.(11).

(b) *The Lutheran Church-Missouri Synod*. The Camp SEMO Recreation Area, Area R-13, is a 174-acre lease area for a youth camp. It is located along the eastern shore of the lake near the mouth of Lost Creek. The site development includes cabins, a dining hall, ball field, and other recreational facilities and is depicted on Plate 16. The camp, previously operated by the Missouri 4-H Club Association, was closed in 1984 for renovations and improvements. With the approval of the Corps, the lease was transferred to the Lutheran Church-Missouri Synod and was reopened. The 4-H Club now works with the Lutheran Church and still uses the facility. Additional information is provided in Paragraph 8.03b (13).

(c) *Girl Scouts of America*. Camp Latonka, Area R-15, is leased to the Cotton Boll Girl Scout Council. The lease area consists of 368.5 acres and is located along the east side of the lake approximately two miles north of the dam. The Girl Scout area is extensively developed with cabins, horseback riding

facilities, a beach, ball fields, and other recreational facilities and is depicted in Plate 18 and additional information is provided in Paragraph 8.03 b.(15)

d. Summary of Recreational Facilities

Table 5 presents a listing of all existing recreational facilities that have been provided at Wappapello Lake by the Corps, the State of Missouri, private concessionaires and other organizations.

Table 5

WAPPAPELLO LAKE SUMMARY EXISTING PUBLIC AND QUASI-PUBLIC RECREATIONAL DEVELOPMENT

Recreation Areas and Quasi public(*) areas	CS Waterborne (W.B.)	C.S. W.B. W/Vault	C.S. Vault	Showerhouse	Picnic Shelter	Sewage Treatment Facility	Cabins (Rental Units)	Visitor Center	Group Camp	Primitive Camp	Camp Sites	Picnic Sites	Dump Station	Boat Launching Ramps (Lanes)	Swimming Beach	Courtesy Dock	Amphitheater	Overlook	Playground Equipment	Fountain and/or hydrant	Playcourts	Control Station	Fish Cleaning Station	Trail	Bulletin Board	Lift Stations	Well	Boat Stalls (wet)	Fishing Piers	Horseshoe Pits
Redman Creek (R-1)	3	2		2	3			1			109	14	1	1(3)	1	1	1	1	3	18	4	1			7	3	3			4
Rockwood Point (R-2)			1									5		2(3)	1	1									1					
Barrett's Concession														1(1)														172		
Baker Lodge (R-3)*							1													1							1			
Mo. State Park (R-4)	2		5	2	2	4	8(8)				80	46	2	3(4)	1	1	1		3	14				4	8		1			
Chaonia Landing (R-5)		1									12			2(5)		2				1					2		1			
Chaonia Concession						1	3(8)				16	3								5								126		
Holliday Landing (R-6)														1(2)																
Holliday Concession			2	1			3(6)				51	2	1	1(1)						49					1		1	80		
34 Bridge (R-7)																						1								
North Greenville (R-8)																														
Greenville City Park	1																			1	1									
Greenville (R-9)		5	1	1	1	1					111	14	1	1(2)		2	1		1	15	1	1		1	2		1			2
Sulphur Springs (R-10)			1							4				1(1)																
Poole Lodge (R-11) *							1(1)													1							1			
Lost Creek (R-12)														1(1)																
Lost Creek Concession											8			1(1)						8							20			
Camp SEMO (R-13) *				2	1	1	6(6)		1		4						1		1	8	1			1			1			
Possum Creek (R-14)			1							2				1(1)																
Camp Latonka (R-15) *			12	2	3	1	15		5						1	1	1				1			2			2			
Peoples Creek (R-16)	4			1	4				1		57			1(2)	1	1				12		1			2	6	2	1		
Sundowner (R-17)			1											1(2)											1					
Sundowner Concession																								3				112		
Eagle Point (R-18)	1		1		1	1						12						1		3	1				2	2	1			
Spillway (R-19)	1				1							14		1(1)			1		1	4	1			1	1	2				2
Outlying Areas										13				13(13)										3	6					
TOTAL	12	8	25	11	16	9	37(29)	1	7	19	448	110	5	32(43)	5	9	6	2	9	140	10	3	0	12	33	13	15	510	1	8

SECTION IV - RECREATIONAL AND ENVIRONMENTAL RESOURCES

4.01 -- PHYSIOGRAPHIC

The lake lies within the southeastern limits of the Salem Plateau section of the Ozark Plateau Physiographic Province. This province is frequently referred to as the Ozark Dome since the area is topographically an east-west elongated dome of outward dipping Paleozoic rocks. The Salem Plateau section contains most of the higher summits of the province.

The St. Francis River, which forms Wappapello Lake, flows south from its headwaters in the St. Francois Mountains and enters the Mississippi Embayment downstream of Wappapello Dam. The St. Francis River north of the lake possesses an incised valley having steep slopes and a narrow floodplain. South of the lake the river exits the Ozark Escarpment and meanders through the low-lying bottom lands of the Mississippi Alluvial Valley to its mouth at the Mississippi River near Helena, Arkansas.

4.02 -- GEOLOGIC

a. General. Rock formations in the area consist of lower Paleozoic sedimentary rocks, primarily Ordovician calcium and magnesium carbonates. Since carbonate rocks are soluble to some extent in groundwater, karst features such as caves, springs and sinkholes are common throughout the area.

Houck's History of Missouri lists 140 caves in Wayne County, many not explored. Rebel Cave, a commercial enterprise now closed, is the only named cave in the lake area.

Dolomites of the Canadian Series Roubidoux and Gasconade formations comprise the bedrock in the immediate vicinity of Wappapello Dam. These formations are typically light gray, fine to medium grained, cherty dolomites. The Roubidoux Formation also contains fine to medium grained quartzose sandstone beds. Fossils are not common in either of these formations but occasionally fossil mollusks are found in the chert layers.

The major mineral resources of the area include sand and gravel, agricultural and building stone, clay deposits and brown iron ore. The gravels are predominately cherts with minor amounts of igneous rocks. The sand fraction is mostly quartz.

The stone quarried in the area is dolomite from the Emminence and Gasconade formations. Principal use of the quarried stone is for agricultural liming although crushed stone production does increase during periods of

highway construction. A building stone quarry in the Roubidoux Formation sandstone operates intermittently in southern Wayne County.

Deposits of brown iron ore are widespread in this region. The most important deposits occur in cherty clay residuum derived from the weathering of Ordovician dolomites. Limonite is the ore mineral and occurs as irregular masses in the residuum. All mining has been done using open pit methods. Because of their small individual size and scattered occurrence they are not well suited to large mechanized operations. During 1998, there was no known mining of these deposits in the region.

b. Earthquake Activity. The major earthquake activity in the area was the 1811-1812 New Madrid series, which had epicentral locations near New Madrid, Missouri. These earthquakes occurred between December 1811 and February 1812 and were some of the largest events known to have occurred in the contiguous states. Many smaller earthquakes have occurred in this region since the 1811-1812 New Madrid series.

c. Earthquake Evaluation. The Wappapello Dam is being evaluated for resistance to strong ground shaking due to earthquakes. This evaluation was required by the Office of the Chief of Engineers for all large Corps structures. The current *Phase I Special Study on Seismic Deficiencies* for Wappapello Lake outlines apparent design deficiencies of Wappapello Dam and appurtenant structures.

The District has proposed a non-emergency, multi-year, phased program be initiated to mitigate the liquefaction concerns in the foundation sands, rectify the nonstructural seismic hazards of the gate house, and develop strategies for Wappapello's Emergency Action Plan (EAP).

The District recommends that MR&T funding be acquired to produce a Phased II Seismic Evaluation Report, which would incorporate current studies and determine the scope, cost and scheduling of the potential Phase III analyses and Phase IV quality assurance. A Phase III Design Memorandum would establish explicitly: potential corrective measures for the foundation sands; the chosen liquefaction resistance method and its design, quality assurance procedures, and specifications; and, nonstructural mitigation procedures for the gate house. The DM would resolve the strategies for the EAP, if these strategies had not been funded previously. Phase IV would construct and conduct quality assurance measures for the resolved mitigation efforts.

4.03 -- ARCHAEOLOGICAL

Wappapello Lake is potentially rich in cultural (archaeological and historical) resources. The National Historic Preservation Act (PL 96-515 as amended) directs each federal agency to establish a program to locate and inventory all cultural (archaeological or historical) properties under the agency's ownership and control; and to nominate to the Secretary of the Interior all properties that appear to qualify for inclusion in the *National Register of Historic Places*. The Act also requires federal agencies to take into account the effect of federally licensed, funded, or executed undertakings upon properties listed in or eligible for inclusion in the *National Register of Historic Places*. The appropriate State Historic Preservation Office and the Advisory Council for Historic Preservation (an executive office advisory to the President) are to be offered reasonable opportunities to comment on possible effects to cultural properties before the expenditure of federal funds on the issuance of any licenses. Where a particular property's eligibility for inclusion in the *National Register of Historic Places* has not yet been determined, federal agencies are prohibited from inadvertently selling, transferring, demolishing, or neglecting the property until such determination has been made.

Because Wappapello Lake was constructed prior to legislation requiring the inventory, evaluation, and management of cultural resources, new archaeological and historical sites are being discovered which have not been previously recorded. A Programmatic Agreement was developed in 1993 and accepted by the Advisory Council for Historic Preservation and the Missouri State Historic Preservation Office for the management of the cultural resources. A Historic Properties Management Plan was developed in 1998, in accordance with the Programmatic Agreement. It is being used to locate, inventory, evaluate, nominate, and manage archaeological and historical properties. This plan will become part of the Operational Management Plan and will identify and prioritize items of work for cultural resource inventory, evaluation, and management.

4.04 -- HISTORIC

a. General. DeSoto ascended the lower St. Francis River in search of gold; however, he veered off to the east before reaching Wayne County. As a colonial territory, present-day Wayne County was originally part of French Louisiana. In 1762 France ceded Louisiana to Spain, and grants of land were given by Spain to various settlers on the St. Francis River. After Spain ceded Louisiana back to France, the United States purchased Louisiana from France including the grants that were recognized by this country. Along Wappapello Lake, these start at Kime and follow the river northerly. Three of the grants later became villages on what is now Wappapello Lake.

Up to 1818 the territory now known as Wayne County, formed St. Francois Township of Cape Girardeau County. When the township became a county, it

was nicknamed the State of Wayne because it was so large. The first settler arrived in 1802 but by 1809 there were still no roads in the county.

b. Old Greenville Historic Site (ES-C-3). Greenville was the chief village in the county and the original roads in the county radiated from it. Because it was within the flood zone of Wappapello Lake, the town had to be moved north to higher ground. The village streets, building foundations, steps to the courthouse and the cemetery are included in the Old Greenville National Register Site adjacent to the Greenville Recreation Area. Further information regarding this site is contained in Paragraph 8.05 b.(3).

c. Chaonia Historic Area (ES-C-1). To secure a railroad, a local resident donated 45 acres for the construction of a village named Wellsdale. The railroad was routed through in 1888 and the town was renamed Chaonia. By 1899, the village consisted of a railroad station and a sawmill. The Chaonia Ferry became very influential in the growth of Chaonia because a large, prosperous agricultural community was across the St. Francis River on Lost Creek. This community depended on the ferry for access to the railroad. The crossing was so greatly needed that a steel bridge was eventually constructed. Chaonia grew to consist of several stores, churches, a bank and numerous residences.

There are still evidences of the old railroad system within the Chaonia Historic Area. Because it also was in the flood zone of Wappapello Lake, the town was removed. Further descriptions of this area are contained in Paragraph 8-05 b.(1).

d. Taskee Historic Area (ES-C-2). Another community center founded during the 1800s was Taskee. This town was the site of the first and largest railroad station in the area and, therefore, served as a center for commerce and travel. Because it also was in the flood zone of Wappapello Lake, the town was removed. Details regarding this area are contained in Paragraph 8.05 b.(2).

e. Kime Historic Area (ES-C-4). This town developed around a spring. Building foundations and a cemetery still remain within the area. Because it also was in the flood zone of Wappapello Lake, the town was removed. Paragraph 8.05 b.(4) contains additional information regarding the Kime Historic Area.

4.05 -- ECOLOGIC

Prior to the construction of Wappapello Lake, the river valleys were used almost exclusively for farming. The majority of the lands, which were not used for farming, were heavily forested with yellow pine, oak, walnut, poplar, hickory, ash, and cherry. Lumber products at that time were in demand in the area so the forests were heavily utilized.

Since acquisition of project lands by the Corps, minimal logging has taken place. By controlling fire and curtailing cutting, forested areas have evolved into

mature stands of equal age timber. The ecology of public lands is best described as mature hardwood forestland bordering on a shallow constructed lake.

Epidemic outbreaks of insects and damaging diseases are not common to the Ozark timberlands. Recommended management practices to keep the forests in a healthy condition for use and enjoyment by the public as well as for wildlife management are contained in Sections X and XII.

4.06 -- ENVIRONMENTAL AND SCENIC QUALITIES

a. Topographic Qualities. Wappapello Lake is located in Wayne and Butler Counties in southeastern Missouri. This area is classified as the Ozark Uplands. The area around the lake lies on the edge of the Uplands and is often referred to as the Poplar Bluff Brown Iron District of the Ozark Foothills. A more extensive description of Wappapello Lake area topography is presented in Paragraph 5-03.

b. Vegetation. The original vegetation of Wappapello Lake consisted of woodlands that were part of the eastern temperate deciduous forest formation composed primarily of oak-hickory. Over 80 percent of the 20,172 acres of woodland found on public lands at Wappapello Lake is of this type. Major species include white oak, black oak, shagbark hickory, and mockernut hickory. The drier ridge tops are dominated by pignut hickory and post oak. Where a sandstone soil base exists, shortleaf pine and pine-oak mixture stands are found. Eastern red cedar may be locally abundant where limestone is close to the surface.

Toward the ravines and lower elevations the oak-hickory association grades into stands possessing more mesic species such as red oak and chinquapin oak, white ash, green ash, basswood, black walnut, and bitternut hickory. Persimmon, blackgum, butternut, and sugar maple occur here also. On the low, poorly drained bottomland, sycamore, sweetgum, cottonwood, and river birch predominate. Understory trees of the uplands include primarily redbud, flowering dogwood, and shadbush. The diversity of some of the mesic stands is quite high. For example, within the Johnson Tract (ES-E-2), in one small area less than 100 meters across, at least 27 species of forest trees were recorded.

The U.S. Forest Service (USFS) inventory, completed in 1972, listed the following forest types and quantities: oak-hickory, 16,837 acres or 83 percent; bottomland hardwoods, 2,351 acres or 12 percent; oak-pine forest, 814 acres or 4 percent; pinewoods, 117 acres, less than 1 percent; and cedar-hardwoods, 52 acres, less than 1 percent. The total woodland is 20,172 acres. The project will be re-inventoried to obtain forest and wildlife data, and update data based on stand conditions, environmental concerns and special status species. The woodlands of the lake vary in quality. Stands located on the better soils consist of large, high quality specimens. These are among the finest upland stands to be found in the state. Tree growth on the drier ridges is slower, and many of these

stands are of lower quality and form and consist primarily of trees of medium size. Most of the bottomland stands are young pole stands.

Open land is also a critical habitat component found on project lands. These lands are maintained in early successional stages by prescribed fire, bush-hogging, and agricultural practices. Warm season grasses such as big and little bluestem are the primary species, along with various forbs, composites and some woody invasion species.

Other minor plant communities may be found on lake lands. Small canebrakes consisting of cane grow along the St. Francis River. Willow thickets are sometimes quite extensive. These have minor impact on the ecology of the area.

c. Wildlife. Fauna typical of deciduous woodlands and its edge habitat exist at Wappapello Lake. Originally white-tailed deer, elk, black bear, mountain lion, bobcat, and gray wolf comprised the big game of the area. Wild turkeys were common. Because of unregulated hunting much of the big game was scarce by the mid-1800s in many parts of the Ozarks. Regulated hunting, conservation and habitat management has brought a revival of many species on Wappapello Lake project lands. Otters and beavers are found along the St. Francis River and lake as well as game species typical of edge habitats, such as eastern cottontails, bobwhite quail, and squirrels. Deer and wild turkeys are abundant in numbers.. Migratory waterfowl use the lake for resting and feeding and are relatively abundant during the fall and winter months.

d. Aquatic Resources. The fishes of Wappapello Lake are typical of midwestern waters. Major sport species are white and black crappie, bluegill, green sunfish, red ear, long ear, largemouth bass, and white bass. Also present are channel, blue, yellow and flathead catfish, gizzard shad, and a variety of other fish species. In 1997, the MDC began a stocking program of walleye in the St. Francis River above Wappapello Lake. Preliminary results are favorable that this stocking will be successful in reestablishing a fishable walleye population. All totaled, there are approximately 50 species of fish within this region.

(1) The waters of the lake and tailwater also have many diverse forms of phytoplankton, zooplankton, aquatic insects, crustaceans, amphibians, reptiles and mollusks. All, in one life stage or another, are an integral part of the food chain, necessary to sustain the life of lake organisms. The food supply of the fishes is supplemented also by numerous terrestrial forms, particularly during periods of rainfall or strong winds. Maintenance of good water quality (relatively free of inorganic or organic pollutants) is also necessary for the well being of the diverse aquatic populations.

(2) The MDC has conducted annual electro-fishing surveys since 1968. During the spring of 1994, electro-fishing was not conducted due to high water within the lake reservoir. These surveys have concluded that fish populations

within the lake remain stable with increasing growth rates. The surveying continues to provide information to help manage the lake to maintain stable fish populations.

e. Scenic Qualities. The north and south ends of the dam afford some of the best views of the wider expanses of the lake. Other scenic vistas occur on the ridge tops, especially those along the water. This type of open land offers a broad view of the lake and provides a relief from the numerous wooded areas giving a more pastoral scenic effect.

The many islands and bays along with the high ridges make an especially interesting lake, both from the land and water, in contrast to some constructed lakes which appear only as wide places of the original river held between parallel bluff lines. In spring, the serviceberry, wild plum, redbuds, and dogwoods bloom in the wooded areas making them come alive with accents of color. Fall is especially beautiful when the groves of sweetgum in the bottomlands burst into flaming colors.

4.07 -- RECREATIONAL DEVELOPMENT

The recreational developments at Wappapello Lake are varied. Major activities of the visiting public consist of sightseeing, fishing, boating, water skiing, camping, picnicking, swimming, hiking, and hunting. Park and recreation areas have been developed which provide both extended-use and day-use opportunities. Included in these recreation areas are campsites, picnic sites, boat launching ramps, beaches, interpretive facilities, and hiking and nature trails. In addition, lands have been allocated for wildlife management. These wildlife areas are available for non-consumptive as well as consumptive recreational use. A description of land use and recreational development is presented in Section VIII.

SECTION V - FACTORS INFLUENCING AND CONSTRAINING RESOURCE DEVELOPMENT AND MANAGEMENT

5.01 -- GENERAL

Development and management at Wappapello Lake is influenced by both physical and social factors. Several factors, such as the geology, archeology, history, ecology, environmental and scenic qualities and recreational development, were previously discussed in Section IV. The influence of these and other factors on resource management and development are examined in this section. It is the objective of the Corps to consider these factors in order to provide for the continued enjoyment and maximum sustained use by the public of the lands, waters, forests and associated resources, consistent with their carrying capacity and their aesthetic and biological values.

5.02 -- DEMOGRAPHIC

a. Population. Population in Wayne County, Missouri, declined 19 percent between 1950 and 1970. Since that period, however, the downward trend has been reversed. Since 1970, population in Wayne County, Missouri, has increased from 8,546 in 1970 to 11,543 in 1990 or 35 percent. Much of this growth can be attributed to increasing employment opportunities, especially in manufacturing and retail trade. Table 6 shows the forty-year pattern.

Butler County, Missouri, experienced a parallel pattern to that of Wayne County. Between 1950 and 1970, population declined by 11.1 percent. This trend has been reversed with 1990 population in Butler County, Missouri, growing about 16 percent from 33,529 in 1970 to 38,765 in 1990. Employment opportunity was the likely stimulus for this reversal. Table 6 shows the population pattern for Wayne and Butler Counties for this time period. Table 7 depicts population within a 75-mile radius of Wappapello Lake.

TABLE 6
POPULATION GROWTH

YEAR	WAYNE COUNTY, MO	BUTLER COUNTY, MO
1950	10,514	37,707
1960	8,638	34,656
1970	8,546	33,529
1980	11,277	37,698
1990	11,543	38,765

SOURCE: Census of Population, General Population Characteristics, 1950-1990.

TABLE 7
POPULATION WITHIN 75-MILE RADIUS OF WAPPAPELLO LAKE

COUNTY	1970[1]	1980[1]	1990[1]
MISSOURI			
Bollinger	8,820	10,301	10,619
Butler	33,529	37,693	38,765
Cape Girardeau	49,350	58,837	61,633
Carter	3,878	5,428	5,515
Dunklin	33,742	36,324	33,112
Iron	9,529	11,084	10,726
Madison	8,641	10,725	11,127
Mississippi	16,647	15,726	14,442
New Madrid	23,420	22,945	20,928
Oregon	9,180	10,238	9,470
Pemiscot	26,373	24,987	21,921
Perry	14,393	16,784	16,648
Reynolds	6,106	7,230	6,661
Ripley	9,030	12,458	12,303
Scott	33,250	39,647	39,376
Shannon	7,196	7,885	7,613
Stoddard	25,771	29,009	28,895
St. Francois	36,818	42,600	48,904
Ste. Genevieve	12,867	15,180	16,037
Washington	15,086	17,983	20,380
Wayne	8,546	11,277	11,543
ARKANSAS			
Clay	18,771	20,616	18,107
Greene	24,765	30,740	31,804
Randolph	12,645	16,834	16,558
ILLINOIS			
Alexander	12,015	12,264	10,626

[1/]SOURCE: Census of Population, General Population Characteristics, 1970-1990.

b. Employment. Employment in Wayne County, Missouri, has steadily increased since 1970. As shown on Table 8, manufacturing, construction, retail trade and professional and related services were key industries in Wayne County showing substantial growth during the 1970-1990 period. Not all industries grew in employment during this time. Agriculture, forestry, fisheries, mining and wholesale trade experienced a decline in employment.

Table 9 depicts employment by industry for Butler County, Missouri, for the period of 1970 through 1990. As with Wayne County, overall employment in Butler County has increased since 1970. Manufacturing, transportation, retail trade and professional and related services experienced some of the greatest

growth during this period. The agriculture/mining industry experienced decline in employment during this time period.

TABLE 8
EMPLOYMENT BY INDUSTRY
WAYNE COUNTY, MISSOURI

INDUSTRY	1970[1]	1980[2]	1990[3]
Agriculture, Forestry, Fisheries, and Mining	259	266	247
Construction	158	208	265
Manufacturing	569	1,028	1,295
Transportation	102	191	207
Communications, and Other Public Utilities	32	62	51
Wholesale Trade	163	128	62
Retail Trade	295	492	640
Finance, Insurance, and Real Estate	39	80	76
Business and Repair Services	59	59	83
Professional and Related Services	405	576	719
Public Admin.	107	132	117

SOURCE: [1/] General Social and Economic Characteristics, 1980, p. 27-472
[2/] General Social and Economic Characteristics, 1980, p. 27-439
[3/] Social and Economic Characteristics, 1990, p. 323

TABLE 9
EMPLOYMENT BY INDUSTRY
BUTLER COUNTY, MISSOURI

INDUSTRY	1970[1]	1980[2]	1990[3]
Agriculture, Forestry, Fisheries, and Mining	827	815	696
Construction	672	986	990
Manufacturing	1,535	1,567	2,295
Transportation	513	575	1,367
Communications, and other Public Utilities	321	430	385
Wholesale Trade	337	465	523
Retail Trade	2,212	2,795	3,212
Finance, Insurance, and Real Estate	328	555	647
Business and Repair Services	212	496	483
Professional and Related Services	2,789	4,000	3,906
Public Admin.	383	667	552

SOURCE: [1/] General Social and Economic Characteristics, 1980, p. 27-472
[2/] General Social and Economic Characteristics, 1980, p. 27-439
[3/] Social and Economic Characteristics, 1990, p. 323

c. Housing. Housing in Wayne and Butler Counties, Missouri has followed population trends. The number of housing units in Wayne County has increased from 2,894 in 1950 to 6,406 in 1990. This represents an increase of 121 percent. Butler County housing units have increased less, from 10,467 in 1950 to 17,046 in 1990, or about 63 percent. The number of people living in each housing unit has decreased from 3.0 to 2.2 in both counties according to U.S. Census documents. Table 10 shows housing units for Wayne and Butler Counties, Missouri from 1950 through 1990.

TABLE 10
NUMBER OF HOUSING UNITS

YEAR	WAYNE COUNTY, MO	BUTLER COUNTY, MO
1950	2,894	10,467
1960	2,790	10,915
1970	3,022	11,292
1980	5,667	15,901
1990	6,406	17,046

SOURCE: Census of Population and Housing, 1950-1990.

d. Economic Summary. Employment, population growth, and housing development show that Wayne and Butler Counties have reversed the declining trends of the 1950-1970 period. The 1970-1990 decade has shown substantial growth. Much of this reversal has been stimulated by employment opportunities, especially in the manufacturing, retail and professional services industries. The developments in and around Wappapello Lake are an important factor in this growth.

Land ownership in Butler and Wayne Counties is typical of rural areas. The single largest land ownership is in privately held land consisting of 86.9 percent in Butler County and 54.9 percent in Wayne County. The USFS accounts for the second largest holding which is 10.6 percent and 16.6 percent for Butler and Wayne Counties, respectively. Two significant differences in ownership between the counties are 9,793 acres of wildlife refuge and 14,201 acres in state parks within Wayne County. Table 11 shows the characteristics of land ownerships for both counties.

TABLE 11
LAND OWNERSHIP DISTRIBUTION
(1971)

	BUTLER COUNTY		WAYNE COUNTY	
	ACRES	PERCENT	ACRES	PERCENT
U.S. Forest Service	48,330	10.6	84,396	16.6
Corps of Engineers	1,660	0.4	45,231	8.6
State Owned Forest Cropland	951	0.2	13,539	2.7
Private Owned Forest Cropland	4,732	.0	49,873	9.8
Forest Cropland (other)	80	0.0	10,758	2.1
State Owned Univ. of Missouri	3,910	0.9	2,640	0.6
Private Owned land	398,417	86.9	278,986	54.9
Wildlife Refuge	0	0.0	9,793	1.9
State Owned Parks	0	0.0	14,201	2.8
TOTAL	458,080	(100.0)	508,757	(100.0)

[1/] Ozark Foothills Regional Planning Commission, *Ozark Foothills Regional Profile, 1983*

e. Age Distribution. Age distribution in Wayne and Butler Counties, Missouri, is almost parallel. There are no abnormal or unusual characteristics among the age groups represented in Table 12. Over 50 percent of the total population for the two county area is in the prime working age group (20-64). The largest age group for the two-county area is in the 15-19 year age bracket. Wayne County has a slightly larger percentage of people in the retirement age bracket (65-85) than Butler County. Sometimes in rural areas, the working age population leaves to find employment, resulting in greater percentages of people in the younger and older age groups. It would appear that local employment opportunities have prevented the out-migration of the workforce between 20 and 64 years of age. As the area gets more retired "baby-boomers", it may increase demand for new upgraded infrastructure.

TABLE 12
AGE DISTRIBUTION BY COUNTY

AGE GROUP	WAYNE COUNTY, MO		BUTLER COUNTY, MO	
	1980[1]	1990[2]	1980[1]	1990[2]
Under 5	690	696	2,640	2,533
5- 9	758	785	2,836	2,790
10-14	880	768	3,013	2,873
15-19	1,030	809	3,397	2,864
20-24	694	612	2,713	2,229
25-29	651	724	2,667	2,696
30-34	580	725	2,535	2,885
35-39	604	675	2,188	2,723
40-44	591	625	1,880	2,528
45-49	586	678	2,011	2,161
50-54	604	680	2,045	1,928
55-59	692	732	2,230	2,078
60-64	716	746	1,894	2,050
65-69	801	704	1,972	2,109
70-74	613	560	1,529	1,550
75-79	401	505	1,110	1,355
80-84	205	313	589	821
85+	181	206	443	592

SOURCE: [1/] Census of Population, General Population Characteristics, Missouri 1980.
[2/] Census of Population, General Population Characteristics, Missouri 1990.

f. Medical Facilities. Most of the medical facilities and services are located in Poplar Bluff, a community within Butler County. The three medical facilities are Doctor's Regional Medical Center, Lucy Lee Hospital, and the Veteran's Administration Hospital. The three hospitals combined have 431 beds, a staff of 118 doctors, 285 registered nurses, and 130 licensed practical nurses. There are 29 operating rooms with laboratories and diagnostic facilities.

Medical facilities located in Wayne County are Lakeside Family Clinic, and Greenville Family Clinic. Lakeside Family Clinic has one nurse practitioner, one laboratory technician, one registered nurse, one laboratory and one diagnostic facility. Greenville Family Clinic has one staff doctor, two registered nurses, one laboratory facility and one fully equipped ambulance.

g. Summary. Stimulated by employment opportunities, especially in the manufacturing, retail and professional services sectors of industry, the Wayne/Butler County, Missouri, area has experienced population, economic and housing growth in the period of 1970 through 1990. The development in and around Wappapello Lake is an important factor in sustaining this trend. In order for this growth to continue, locals must adopt growth policies to stimulate greater diversification.

5.03 -- TOPOGRAPHY, GEOLOGY AND SOILS

a. Topography. The topography of the lake is characterized by steeply sloping hills with excellent forest cover. The valleys, which are tributaries to the St. Francis River, are generally narrow. The lake lies adjacent to the Southeastern Lowlands province, an area of flat, poorly drained land that occupies extreme southeastern Missouri. To the immediate north of the lake lies the edge of the true Ozark Uplands, typified by the St. Francois Mountains which begin in Sam A. Baker State Park. In this area, the land is steep and extremely dissected, with granitic outcrops prevailing.

b. Geology. The lands surrounding the lake are moderately dissected with outcrops of bedrock occurring along the streams. These outcroppings consist of Ordovician cherty dolomite and interbedded finely grained dolomite of the Gasconade Formation and sandstone and cherty and finely grained dolomite of the Roubidoux Formation. Some of the ridges extend a considerable distance into the lake forming long bays and peninsulas of land; others are stubby with short bays. There is a difference of nearly 340 feet between normal pool elevation and the higher ridgetops.

Cleared fields on the level land along parts of the lake offer diversity for the wildlife. The wooded hills along the occasional bluffs near the lake add to the scenic value of the area. The northern end of the lake narrows to the point that it occupies only the old riverbed. Although relatively large areas periodically flood along the river, this high water is only temporary and does not form a part of the lake.

c. Soils. The most abundant soil association at Wappapello Lake is that of the Clarksville-Fullerton-Lebanon series found on the cherty-stony uplands. They are developed from cherty limestones and occasionally interbedded sandstone and some shallow loess. The Clarksville is a cherty silt loam. It possesses a grayish brown cherty silt loam surface over a yellowish brown cherty silt loam mid-layer with a light silty clay loam subsoil. The soil is excessively to moderately well drained. Major problems are droughtiness, steepness, erosiveness, and low fertility. On the flat ridgetops, the Fullerton series possesses a cherty fragipan at 18-30 inches.

On some gently to steeply sloping areas are soils of the Baxter-Dewleyville-Hagerston series. These are red cherty soils developed from cherty limestone. The soils are similar to the above, being suited for forests, grassland, and orchards. Huntington silt loam occupies the first terraces of the bottomland. This is a deep, well-drained, silty alluvial soil. On the extreme bottomlands Enis soils may be found. These are similar to the above.

5.04 -- ACCESSIBILITY

a. Major Highways. Major access to Wappapello Lake is provided by two major U.S. highways, Routes 60 and 67, which intersect at Poplar Bluff, Missouri. Route 60 is an east-west highway, which provides four-lane access from Interstate 57 at Sikeston, Missouri, to the east. It is being upgraded to provide four-lane access from Springfield, Missouri to the west. U.S. Route 67 is a north-south highway that crosses the lake one mile south of Greenville, Missouri. It provides access from St. Louis, Missouri to the north, and Walnut Ridge, Little Rock and Corning, Arkansas to the south. Fifty miles of this highway is being studied for upgraded to a full four-lane freeway. It is presently four lanes for 13 miles north of Poplar Bluff and from Interstate 55 south of St. Louis to Frederickstown. Plate 4, *Road Network* displays these highways within the area.

b. Secondary Roads. Eleven secondary state highways provide direct access to the project. These include Highways 172, 34, 143, T, RA, W, PP, F, FF, D and BB. All of these are paved with bituminous asphalt and are in good condition. These roads are shown on Plate 4, *Road Network*.

c. County roads. All of the county roads located on the project are in Wayne County, with the exception of one in Butler, and are maintained by the local county authorities. The conditions of the roads around the project range from poor to good. Some of these roads are narrow in width, which reduces their carrying capacities during peak visitor weekends and presents hazardous conditions to the visiting public. Plate 4, *Road Network* shows the location of the county roads.

d. Access Roads to Recreation Areas. The following access descriptions are the primary routes of travel used by the public to access Wappapello Lake recreation areas:

(1) State Route T is a major access road to Wappapello Lake. It provides access across the dam and to R-19, Spillway Recreation Area, R-1, Redman Creek Recreation Area and R-18, Eagle Point Recreation Area.

(2) State Route RA from State Route T provides access to R-2, Rockwood Point Recreation Area and R-3, Baker Lodge Recreation Area.

(3) State Route 172 from U.S. Highway 67 or State Route W provides access to R-4, Lake Wappapello State Park.

(4) State Route W, also accessible from U.S. Highway 67 or State Route 172 provides access to R-5, Chaonia Landing Recreation Area.

(5) State Route F accessible from U.S. Highway 67 provides access to R-6, Holliday Landing Recreation Area. Wayne County maintains a small section of this road (approximately 1,000 feet) until it reaches the project boundary. This section is proposed to be upgraded by the State of Missouri and Wayne County

under a federal grant program. After it is upgraded, it will become part of the State Route F Highway.

(6) State Route 34 provides access to R-7, 34 Bridge Recreation Area.

(7) U.S. Highway 67 provides direct access to R-8, North Greenville Recreation Area and R-9, Greenville Recreation Area.

(8) State Route D is also a major access road to Wappapello Lake. It provides access to R-10, Sulphur Springs Recreation Area, R-16, People's Creek Recreation Area, R-17, Sundowner Recreation Area and R-18, Eagle Point Recreation Area.

(9) State Route BB to County Road 531 provides access to R-11, Poole Lodge Recreation Area.

(10) State Route BB to County Road 526 to County Road 527 provides access to R-12, Lost Creek Recreation Area.

(11) State Route D to County Road 523 to County Road 522 provides access to R-13, Camp SEMO Recreation Area.

(12) State Route D to County Road 521 provides access to R-14, Possum Creek Recreation Area and R-15, Camp Latonka Recreation Area.

e. Raising County Roads and Highway. Flooding of certain county roads and highways and the raising of those roads and highway is explained in Section X.

f. Approved Traditional Access Plan. The project had many access points located in remote areas, which were used primarily for hunting and fishing. The majority of these "traditional accesses" were not maintained. In an effort to provide safe and adequate public access around the lake while protecting the natural resources, a Traditional Access Plan was prepared and approved that recommended the accesses to be maintained and remain open to the public and those to be closed. In addition, the plan identified areas on public land where primitive camping is allowed, and the regulations and facilities necessary to support primitive camping areas.

5.05 -- BOUNDARY MONUMENTATION

Currently, 99 percent of the boundary line is certified. Work is progressing to complete field marking, and encroachment resolution. Encroachments have been a significant problem to completion of boundary monumentation. An aggressive boundary maintenance and monitoring program is necessary to enforce established boundary lines and prevent future encroachments.

5.06 -- AREA OF INFLUENCE

Paragraph 5-02 above provides a detailed analysis of this subject. Plate 3 provides a graphic depiction of the zone of influence.

5.07 -- RELATED RECREATIONAL RESOURCES

Within the Wappapello Lake zone of influence, numerous recreational opportunities exist. A number of these have water-oriented features similar to those at Corps lakes. All, however, contribute to a rich choice of selected features and locations within the state and within 100 miles of the lake. Lands administered by federal agencies are detailed in Table 13. Other public recreation areas managed by federal and state agencies are listed in Table14.

a. Clearwater Lake, managed by the Corps from the Little Rock District provides 18,000 acres of land and 1,600 acres of water for recreation uses. Located a short distance from Wappapello Lake, it offers many of the same activities such as swimming, boating, water-skiing, camping, picnicking, sightseeing, hunting and fishing.

b. A unique recreation area available in this part of the state is the Ozark National Scenic Riverway. The National Park Service administers 80,790 acres and 134 miles of natural streams on the Jacks Fork and the Current Rivers. Floating these streams can be a memorable experience.

c. The Mark Twain National Forest administered by the USFS contains 1,494,247 acres within the zone of influence. These lands vary to an extraordinary degree. Likewise the recreation opportunities vary site to site and present a wide choice to the user.

d. The USFWS administers the Mingo National Wildlife Refuge, containing 21,676 acres of land and 4,713 acres of water. The area teems with wildlife, especially waterfowl. Birdwatching opportunities are outstanding compared to any other area of Missouri. Boardwalks and trails provide access to the marshes and islands within the swamp.

e. There are 12 state parks in this segment of Missouri. Variation of size, location, habitats, and recreation opportunities combine to give the users a rich mix from which to choose. At present these units contain 37,693 acres.

f. The University of Missouri, College of Forestry has 160 acres adjoining public land at the lake. These lands are used for teaching and experimental projects. The University maintains a camp to facilitate these aims.

Table 15 lists the lands administered by the MDC. These lands comprise 77,491 acres at present. The Department has a varied list of recreation pursuits that are allowed in these areas. Recreational activities available in the area

include hunting, fishing, canoeing, trapping, hiking, sightseeing, horseback riding, and camping in designated areas.

This department has an active ongoing program to purchase state forests, wildlife areas, access areas and natural areas state wide. Such purchases are made possible by a state sales tax of one eighth of one percent.

TABLE 13
LANDS ADMINISTERED BY FEDERAL AGENCIES

Agency/Project	Water Acres	Land Acres	Total Acres
Corps of Engineers			
Clearwater Lake	1,600	18,000	19,600
Wappapello Lake	8,400	35,949	44,349
National Park Service			
Ozark National Scenic Riverway	134 miles		80,790
United States Forest Service			
Mark Twain National Forest			1,494,247
United States Fish and Wildlife Service			
Mingo National Wildlife Refuge	4,713	21,676	26,389

TABLE 14
RELATED RECREATIONAL RESOURCES IN SOUTHEASTERN MISSOURI

PROJECT NAME	LAND ACRE.	WATER ACRE.	FISHING	HUNTING	SWIMMING	BOATING	CAMPING	PIC-NICKING	CONCESSION	LODGE	TRAILS	PRINCIPAL MANAGING AGENCY
FEDERAL												
CLEARWATER LAKE	18,000	1,600	●	●	●	●	●	●	●		●	CORPS
OZARK NAT'L SCENIC RIVERWAY	80,790		●	●	●	●	●	●	●	●	●	DEPT. OF INTERIOR, NAT'L PARK SERVICE.
MARK TWAIN NAT'L FOREST	1,494,247		●	●	●	●	●	●	●		●	USFS
MINGO REFUGE	21,676	4,713	●	●		●	●	●	●		●	USFWS
FEDERAL TOTAL	1,614,713	6,313										
MISSOURI STATE PARKS												
MASTODON	425		●					●			●	MDNR
WASHINGTON	1,821		●		●	●	●	●	●	●	●	
ST. FRANCIS	2,735		●		●	●	●	●			●	
ST. JOE	8,238		●		●	●		●	●		●	
HAWN	4,804		●				●	●	●		●	
ELEPHANT ROCKS	129		●		●			●			●	
JOHNSON SHUT-INS	8,469		●		●	●	●	●	●		●	
TRAIL OF TEARS	3,415		●		●	●	●	●			●	
SAM A. BAKER	5,164		●		●	●	●	●	●	●	●	
BIG OAK TREE	1,005		●			●		●			●	
MONTAUK	1,356		●			●	●	●	●	●	●	
DILLARDS	132		●		●	●		●			●	
STATE PARKS TOTAL	37,693											
UNIV. OF MISSOURI COLLEGE OF FORESTRY	160											

TABLE 15
LANDS MANAGED BY MISSOURI DEPARTMENT OF CONSERVATION

County	State Forests	Wildlife Areas	Wildlife Preserves	Tower Sites	Natural Areas	Community Lakes
Bollinger	8,469	460		80		
Butler Co.	3,554	2,927				
Cape Girardeau		351	594			
Dent	3,763			40	30	
Dunklin	89	1,944				
Franklin	4,338	501		40		
Howell		177		80		
Iron	6,888					
Jefferson		692			49	
Madison	460					
Mississippi		267				
Pemiscot		296				
Perry					52	310
St. Francis	194	1,188		20		
Ste. Genevieve				80		
Scott	894			64		120
Stoddard	1,020	9,149				
Texas	1,234	120		26	489	57
Washington	10,986			80		
Wayne	14,959			0		
TOTALS	56,848	18,072	594	870	620	487
Grand Total = 77,491						

5.08 -- RESERVOIR PLAN OF OPERATION (LAKE REGULATION)

Operational concepts and plan of operation for Wappapello Lake are explained in Paragraph 2.03 and in the *Operational Management Plan* under separate cover.

5.09 -- FACILITY RELOCATION

Prior to lake operation, railroads, highways, and utility lines were relocated to the extent necessary to permit continued use.

5.10 -- EARTH BORROW AREAS

The lake has several old borrow areas within its boundaries. The borrow from these areas was used primarily for dam construction and the construction of three dikes near the dam and U.S. Highway 67 relocation. The borrow areas have been re-vegetated and do not hamper the scenic qualities of the lake. All excavated areas have been re-vegetated to blend into the natural terrain. Borrow areas have also been identified as part of the relocation of state highways and Wayne County roads.

5.11 -- WATER QUALITY

A water quality monitoring program is conducted every six weeks during the months of March through November. Samples are collected at three lake sites, one upstream site, and one downstream site in the outlet channel.

The State of Missouri has established criteria for contaminant levels in the state's water resources. These parameters include heavy metals, pesticides, herbicides, organics and other contaminants. The water quality sampling done reflects the minimal of parameters needed to indicate if the water is able to sustain adequate plant and animal growth and to ensure safety for human recreation.

The following parameters are analyzed: alkalinity, total organic carbon (TOC), iron, manganese, ammonia-nitrogen, nitrate-nitrogen, ortho-phosphate, total phosphate, silica, total suspended solids (TSS), total volatile suspended solids (TVSS), fecal coliform and fecal strepococcus bacteria, pH, dissolved oxygen, specific conductance, oxidation-reduction potential (ORP), chloride, chlorophyll, pheophytin-a, atrazine and alachlor.

In addition to water samples, sediment samples are taken once a year. This data provides supplemental information as to the relative amounts of contaminants transported by sediments versus contaminants dissolved in the water column. Trend analysis of this data is performed every five years. The parameters analyzed include: fourteen priority pollutant metals, total phosphate (TPO_4), Kjeldahl nitrogen, nitrate –N(NO_3), total solids, total organic carbon (TOC), chlorinated pesticides and PCBs.

Annual water quality reports are written and submitted to each Corps lake. An annual division water quality management report is also submitted.

5.12 -- ADAPTABILITY OF EMERGENCY SPILLWAY FOR PUBLIC USE

The emergency spillway at Wappapello Lake has been developed into a specialized day use area, which is a part of the Redman Creek Recreation Area (R-1) and the Spillway Recreation Area (R-19). Facilities in the Redman Recreation Area include a three-lane boat launching ramp, a car and trailer parking area, a tennis court, volleyball courts, a basketball court, a beach, a shelter, a playground and a water-borne comfort station. The Spillway Recreation Area development includes a one-lane boat ramp on the St. Francis River, a parking area and the Pine Ridge Trail entrance.

5.13 -- RECREATION ATTENDANCE AND FACILITY REQUIREMENTS

a. Existing User Demand. Existing user demand is reflected with 1998 visitation used as a basis for computations. Existing facility requirements are based on visitation, design criteria, and guidelines detailed in the *Institute for Water Resource's Research Report 74-RI (Estimating Recreational Facility Requirements, Volume IV of V)*. Facility requirements are oriented toward key facilities, which include camp sites, picnic units, boat launching lanes and beach area.

(1) Facility Design Day Load. This determination represents the anticipated number of users visiting the project on an average weekend day during the peak month of use. Based on 1998 visitation, the present facility design day load is estimated at 24,209 **(**See Table 16 – Actual and Estimated Annual Attendance).

(2) Summary of Existing User Demand. Utilizing the facility design day load, participation rates for each activity requiring facilities, and the appropriate activity turnover rates, the principal recreation facility requirements were estimated. The existing facility user demand is presented in Table 17.

(3) Summary of Existing Facility Supply. The existing supply of key park and recreation facilities is also presented in Table 17. The principal agencies developing facilities at Wappapello Lake are the Corps and the MDNR.

(4) Evaluation of Existing Supply Demand. Comparison of existing supply and demand, as presented in Table 17, indicates a need for the development of additional campsites and boat launching lanes.

TABLE 16
WAPPAPPELLO ACTUAL AND ESTIMATED ANNUAL ATTENDANCE
(1970-2020)

Year		Recreation Days *(except where noted)*
1970	(actual)	1,664,980
1971	(actual)	1,870,774
1972	(actual)	2,031,451
1973	(actual)	1,743,825
1974	(actual)	2,120,739
1975	(actual)	1,998,595
1976	(actual)	1,743,825
1977	(actual)	1,868,096
1978	(actual)	1,600,600
1979	(actual)	2,168,808
1980	(actual)	1,936,856
1981	(actual)	1,549,150
1982	(actual)	1,974,778
1983	(actual)	2,038,873
1984	(actual)	2,101,600
1985	(actual)	2,106,246
1986	(actual)	2,094,309
1987	(actual)	2,084,047
1988	(actual)	2,304,706
1989	(actual)	2,237,817
1990	(actual)	2,223,379
1991	(actual)	2,263,199 ◆
1992	(actual)	2,215,805 ◆
1993	(actual)	2,371,532 ◆
1994	(actual)	2,182,090 ◆
1995	(actual)	2,300,425 ◆
1996	(actual)	2,362,248 ◆
1997	(actual)	2,016,356 ◆
1998	(actual)	1,995,338 ◆
1999	(actual)	2,072,087 ◆
2000	(estimated)	2,298,695
2005	(estimated)	2,382,912
2010	(estimated)	2,467,129
2015	(estimated)	2,551,346
2020	(estimated)	2,635,563

◆ Visits calculated with VERS Data

TABLE 17
PRINCIPAL RECREATION FACILITIES:
EXISTING SUPPLY AND DEMAND SUMMARY

Existing Supply					1998 Demand	Existing Excess/ Shortage
Facility	Corps	State	Concessionaires	Total		
Camp Units [1/]	289	80	79	448	484	-36
Picnic Units	59	46	5	110	104	+6
Boat Launch Lanes	36	4	3	43	46	-3[2/]
Swimming Beach Area (linear ft.)	1,025	125	0	1,150	1,089	+61

Source: U.S. Army Corps of Engineers, St. Louis District, 1998.
[1/] Total camping units excludes sites designated for primitive use.
[2/]The proposed level of launch lane development is considered sufficient to serve the boating public without creating an overcrowding situation on the water surface.

5.14 -- PROJECTED USER DEMAND

Utilizing projected visitation, (based on a linear regression analysis of available recreation day data,) current planning and design criteria, and the procedures and guidelines outlined in the *Institute for Water Resources Research Report 74-RI (Estimating Recreational Facility Requirements, Volume IV)*, the projected recreation facility requirements through 2020 were computed and are presented in Table 18. Estimates of user demand indicated that a number of basic facilities are insufficient to meet the calculated demand for the year 2020. According to the procedures noted above, facility deficiencies presently exist in terms of camping units and boat launch lanes. Approximately 184 additional camping units, 25 additional picnic units, 17 boat launch lanes and 273 linear feet of additional beach area are required to meet the demand calculated for 2020. Twenty additional camping units are proposed in this plan for the Greenville Recreation Area. Two additional lanes for boat launching are also proposed, one lane at the Sundowner Recreation Area, and one lane at the Allison Point area at Lake Wappapello State Park. The proposed level of launch lane development is considered sufficient to serve the boating public without creating an overcrowding situation on the water surface. No other development is anticipated at this time to fill these areas of facilities needs. Appendix I discusses the recreation facility development and future plans proposed by the MDNR, which contributes to the supply of picnic units, camp sites, and boat launching ramps.

TABLE 18
SUMMARY: PROJECTED RECREATION FACILITY REQUIREMENTS

	2000	**2010**	**2020**
Camp Units	551	592	632
Picnic Units	118	127	135
Boat Launch Lanes	52	56	60
Swimming Beach Area (linear ft.)	1,241	1,332	1,423

Source: U.S. Army Corps of Engineers, St. Louis District, 1998.

5.15 -- ENVIRONMENTAL AND ECOLOGIC CONCERNS

The Wappapello Lake project and vicinity provides potential habitat for a federally threatened wildlife species, the Bald eagle. There are at least two active Bald eagle nests within project boundaries. Bald eagles will be managed in accordance with the objectives of the Bald Eagle Recovery Plan.

In addition to Bald eagles, Table 19 below shows other federally identified threatened or endangered species, or species of concern recognized by the USFWS. Efforts should be taken to minimize potential impacts to these species and their habitats.

Table 20 below contains state identified threatened or endangered wildlife and plant species that exists within or immediately adjacent to Corps lands encompassing Wappapello Lake.

Additional observations and inventories are needed to determine the presence or absence of any or all federal and state endangered or threatened plants and animals on project lands and waters since much of this information is incomplete. Any operation and maintenance plans or actions will consider any possible effects on all species documented in the area. If endangered or threatened species are confirmed on project lands, appropriate federal or state agencies will be notified. If feasible, and in accordance with ER 1130-2-540, *Environmental Stewardship Operations and Maintenance Policies*, recovery plans will be developed and incorporated for protection of those species. Federal and state listed plant and wildlife species located or potentially located on project lands and waters is also included in Table 19 and Table 20 below.

These tables were developed with assistance from lake personnel, Mr. Gary Framer and Ms. Mary G. Henry of the USFWS office in Columbia, Missouri, and Ms. Mary Lynn, MDC, Policy Analyst, Jefferson City, Missouri.

TABLE 19
FEDERAL LIST OF THREATENED AND ENDANGERED SPECIES
SITED OR POTENTIALLY SITED IN THE WAPPAPELLO LAKE AREA

Federal List	**Status**	**Scientific Name**
Bald Eagle	T	*Haliaeetus leucocephalus*
Alligator snapping turtle	S	*Macroclemys temminckii*
Crystal darter	S	*Ammocrypta asprella*
Longnose darter	S	*Percina nasuta*
Western fanshell	S	*Cyprogenia aberti*
Running buffalo clover	E	*Trifolium stoloniferum*
Curtis' pearlymussel	E	*Epioblasma florentina curtisi*
Pink Mucket	E	*Lampsilis orbiculata*
Snuffbox	E	*Epioblasma triquetra*

E - endangered
T - threatened
S - species of concern (USFWS)
R - rare

TABLE 20
STATE LIST OF THREATENED OR ENDANGERED SPECIES
NOTED OR POTENTIALLY NOTED IN THE WAPPAPELLO LAKE AREA

State List	**Status**	**Scientific Name**
Longnose darter	E	*Percina nasuta*
Mountain madtom	E	*Noturus eleutherus*
Alligator snapping turtle	R	*Macroclemys temminckii*
Western fanshell	R	*Cyprogenia aberti*
Rabbitsfoot	E	*Quadrula cylindrica cylindrica*
Swainson's warbler	E	*Limnothlypis swainsonii*
A leatherflower	E	*Clematis viorna*
Little leafed alum root	E	*Heuchera parviflora var parviflora*
Pale avens	E	*Geum virginianum*
Loesel's twayblade orchid	E	*Liparis loeselii*
Four-toed salamander	R	*Hemidactylium scutatum*
Few-lobed grape fern	E	*Botrychium Biternatum*
Leafy bulrush	R	*Scirpus polyphyllus*
Canada rush	E	*Juncus canadensis var canadensis*
Bald eagle	E	*Haliaeetus leucocephalus*
Juniper leaf	R	*Polypremum procumbens*
Running buffalo clover	E	*Trifolium stoloniferum*
Buffalo Clover	S	*Trifolium Reflexum*
Copper’s Hawk	R	*Accipiter Cooperii*
Mole Salamander	R	*Ameiurus Talpoideum*

Table 20 – continued

State List	Status	Scientific Name
Brown Bullhead	R	*Ameiurus Nebulosus*
Lake Cress	S	*Armoracia Lacustrus*
A Sedge	E	*Carex Bromoides*
Spreading Sedge	S	*Carex Laxiculmis*
Tussock Sedge	R	*Carex Stricta*
Rose Turtlehead	E	*Chelone Obliqua Var Speciosa*
Curtis' Pearlymussel	E	*Epioblasma Florentina curtisi*
Snuffbox	R	*Epioblasma Triquetra*
Lake Chubsucker	R	*Erimyzon Sucetta*
Hyssopleaf Throughwort	E	*Eupatorium Hyssopifolium Var Calear*
Mooneye	R	*Itioclon Tergisus*
Featherfoil	R	*Hottonia Inflata*
Southern Brook Lamprey	R	*Ichthyomyzon* Gagei
Mississippi Kite	R	*Ictinia Mississippiensis*
Pink Mucket	E	*Lampsillis Abrupta*
American Frogbit	E	*Limnobium Spongia*
Geometrid Moth	R	*Lytrosis Permagnaria*
A Liverwort	R	*Metzgeria Fuccata*
Arrow Arum	R	*Peltandra Virginica*
Yellow-Fringed Orchid	E	*Platanthera Ciliaris*
Green wood Orchid	E	*Plutanthera Clavellata*
Pale Manna Grass	E	*Torreyochloa Pallida*
March Blue Violet	R	*Viola Cucullata*

E - endangered
T - threatened
R - rare
S - species of concern (USFWS)

SECTION VI – COORDINATION AND PARTNERSHIPS

6.01 -- GENERAL

A high degree of coordination has been maintained with federal and state agencies and other organizations since Wappapello Lake was in the early planning stages. These agencies continue to be actively involved with the Corps in the planning and coordination process. Agencies providing input to this updated document include MDC and MDNR. A brief summary of the coordination and partnering process, both present and historical, is contained in the following paragraphs.

6.02 -- FEDERAL AGENCIES

a. U.S. Forest Service. This agency is responsible for the administration of the Mark Twain National Forest that adjoins Corps managed land at Wappapello Lake.

(1) Forest fire suppression on Corps' land is an item of mutual interest between our agencies. The USFS continues to cooperate with the Corps in the suppression of wildfires on public land. The USFS also coordinates land management practices on property adjacent to Corps property.

(2) Close cooperation has also been maintained on the development and operation of the Ozark Trail system that is located on both agencies' land.

b. U.S. Fish and Wildlife Service. Close cooperation has been maintained with this agency, specifically with the nearby Mingo National Wildlife Refuge. Information is exchanged in relation to habitat manipulation techniques and with implementation of the Fish and Wildlife Coordination Act. In addition, coordination is maintained on moist soil and wetland management and the use of natural foods in lieu of supplemental planting for wildlife. The Corps will continue to cooperate with this agency to assure optimal habitat maintenance at the lake and on projects impacting wildlife issues. They also assist in evaluating endangered/threatened species status on project.

c. U.S. Natural Resources Conservation Service. The Corps maintains continuing coordination with this agency concerning agricultural management programs on public land. The NRCS also provides information regarding cooperative plans, tillage techniques, Johnson grass control, agricultural leases and pond construction, design, and location. A Memorandum of Understanding between the agency and the Corps for a soil survey of Wayne County is presently in effect.

d. National Park Service. The National Park Service keeps and maintains the *National Register of Historic Places*, and determines eligibility for inclusion in the National Register. The National Park Service also has a staff of consulting archaeologists who are available for guidance concerning cultural resource management planning and procedures for impact mitigation.

e. Advisory Council on Historic Preservation. This agency is a division of the Executive Office and serves in an advisory capacity to the President. The Advisory Council reviews and comments upon federal agencies' findings of "adverse effect" and "no adverse effect" to cultural properties, which may result from construction, operation, and maintenance projects. The Council also comments and provides guidance on federal agencies' proposals to avoid or mitigate adverse effects.

6.03 -- STATE OF MISSOURI

a. Missouri Department of Conservation. This agency has a long history of involvement in the management of lands surrounding Wappapello Lake. They perform fish and wildlife management activities on an 1880-acre area licensed to the MDC, the Chollo Holly Wildlife Management Area. This agency also bears the responsibility of enforcing the Missouri Wildlife Code such as, fish and game regulations, firearm codes, and for suppression of all wildfires in the state, including those on Corps administered public lands. Close coordination with the MDC will continue to be of primary importance. A more detailed description of the Chollo Holly Wildlife Management area is contained in Paragraph 8-04 b.(1) and Appendix II.

b. Missouri Department of Natural Resources. This agency is responsible for parks and recreation on an 1,854-acre leased area at Lake Wappapello State Park. Facilities are maintained as a complementary addition to Corps' managed recreation areas. The MDNR is authorized under a license to operate and maintain a backpacking/equestrian trail on lands adjacent to and within the State Park lease. A more detailed description of this area is contained in Paragraph 8-03 b.(4) and Appendix I.

(1) Coordination is also maintained through this agency with the State Historic Preservation Office (SHPO). This office provides information and guidance regarding the protection and preservation of cultural resources and assists in making determinations of eligibility for inclusion in the *National Register of Historic Places*.

(2) The Corps coordinates with the MDNR regarding the construction and operation of wastewater treatment facilities, the maintenance of effluents (NPDES and Operating permits), drinking water and clean water quality standards.

c. Missouri State Highway Patrol (MSHP). A Memorandum of Agreement is in place with MSHP, the Missouri State Water Patrol, the Missouri Division of Highway Safety, the Missouri Department of Public Safety, and St. Louis, Little Rock, Memphis, Rock Island, and Kansas City Districts of the Corps of Engineers. This partnership provides a mutually beneficial opportunity for each agency to revolutionize the effectiveness of their safety education/awareness programs through such initiatives as the safety billboards across Missouri.

d. Missouri State Water Patrol (MSWP). A partner as stated in Paragraph c, above, the agency also enforces boating laws and all other violation of state law on Corps of Engineers' property.

e. Missouri Division of Highway Safety. A partner as stated in Paragraph c. above.

f. Missouri Department of Public Safety. A partner as stated in Paragraph c. above.

g. University of Missouri. A hydrometeorologic research study is being conducted by the University on a 489-acre area leased from the Corps. A more detailed description of this area is contained in Paragraph 8.04 c.(1).

6.04 -- OTHER AGENCIES AND ORGANIZATIONS

a. Wayne and Butler Counties. Coordination with these local governmental bodies continues to be conducted as action/plans of mutual interest and/or impacts are identified at Wappapello Lake. A Memorandum of Understanding was developed in 1986 with the identification of Wayne County roads within the project. Cooperative agreements are also maintained with the Wayne County Sheriff's Department and the Butler County Sheriff's Department for the provision of additional law enforcement services on Corps administered public lands. These agreements have proven to be highly successful and will be continued as funding permits.

b. Wappapello Volunteer Fire Department. A Memorandum of Agreement is in place with this agency to suppress fires in Corps owned structures and visitor property and to assist in the suppression of forest and brush fires that immediately threaten Corps owned structures within their jurisdiction. Continued coordination will be maintained as required.

c. Chaonia Volunteer Fire Department. A Memorandum of Agreement is in place with this agency to suppress fires in Corps owned structures and visitor property and to assist in the suppression of forest and/or brush fires that immediately threaten Corps owned structures within their jurisdiction. Continued coordination will be maintained as required.

d. The Nature Conservancy. A Memorandum of Understanding has been in effect since 1995 between the Corps and this non-profit organization to provide information and technical assistance on project lands that have significant ecological value. The Nature Conservancy has helped developed a management plan for the Johnson Tract Glade and Deep Muck Fen areas on the project.

e. Missouri Equine Council (MEC). A Memorandum of Agreement is in place with MEC for the purpose of promoting responsible stewardship of natural resources. The goal of this agreement is to allow each project within the St. Louis District in Missouri to develop a Challenge Cost Share Agreement for the purpose of developing and maintaining multi-use areas.

f. Wappapello Lions Club. A cooperative agreement is in place with the Wappapello Lions Club to operate a portable sales area in the Bill Emerson Memorial Visitor Center. This non-profit organization is to produce and make available to visitors by sale or free distribution, suitable interpretive and educational literature and aids to increase the visitors understanding and appreciation of natural history; cultural, historical and constructed features of the Wappapello Lake Project; and the Corps. In addition, a volunteer agreement is in place for the Lions Club to collect, maintain, and recycle aluminum cans at various recreation areas.

g. Natural Resource Career Camp (NRCC). A Memorandum of Understanding has been developed with all partners involved with NRCC. This MOU is supported by the USFS, Lincoln University, University of Missouri, MDC, MDNR, USFWS, NRCS, U.S. Animal and Plant Health Inspection Service, Conservation Federation of Missouri and the Corps. Funded by a grant from the USFS, the NRCC targeted African-American youth in a pilot project concentrating on the eight county bootheel area of Missouri. The purpose of this program was to expose these youth to the field of Natural Resources. Because of its success, this program is now available to any minority youth throughout the State of Missouri.

h. Wappapello Lake Water Safety Program. Partnering is a key element in the success of the water safety program at Wappapello Lake. This program has received national recognition at the International Boating and Water Safety Summit. In addition, Wappapello Lake was the first recipient of the Corps of Engineers Water Safety Award (lifeline). This traveling award was initiated because of the outstanding efforts that were incorporated in the Wappapello Lake water safety program. The number of partnerships has increased tremendously each year. Such partners include hospitals, utility companies, grocery stores, banks, marinas, shopping centers, fast food restaurants, other federal agencies, and local agencies, etc. Each contributes toward promoting water safety in its own way thereby enhancing our capabilities to do more with less. In addition, a water safety council has been established at Wappapello Lake. Its purpose is to help develop and implement an effective plan to reduce

the number of water related accidents and facilities in the Southeast Missouri Region.

i. Other partners include the Poplar Bluff Chamber of Commerce, Boy Scouts, Girl Scouts, 4-H clubs, Camp SEMO, City of Greenville, Wayne County Historical Society, Spillway Café, Shook Store, Ozark Foothills Regional Planning Commission, Ozark Border Electric Cooperative, Sears Youth Center, Mingo Job Corps, St. Louis Drag Boat Association, local businesses for the purpose of selling Annual Day use passes, and Chambers of Commerce from adjoining towns.

j. In addition, five marinas are operated on the lake. These marinas provide services to the public that may not otherwise be provided by the federal, state or local governments. Reference Paragraph 11.02, Marinas; and Paragraph 11.07, Partnering.

SECTION VII – RESOURCE USE OBJECTIVES

7.01 -- GENERAL

The purpose of this section is to define and prescribe a series of resource use objectives for Wappapello Lake.

Resource use objectives provide general guidance and direction for the use, development, and management of project resources. The objectives listed below have been developed for Wappapello Lake by study and analysis of regional needs, public input, and resource capabilities and potentials. Protecting and enhancing environmental quality was also an important consideration.

As stated in Section I, the authorized purposes for Wappapello Lake are flood control, recreation, and fish and wildlife conservation. Certain project purposes can, by their nature, be conflicting. For example, under certain conditions the flood control purpose of the lake can conflict with the other project purposes of recreation and fish and wildlife conservation. The development of sound resource use objectives increases user satisfaction and minimizes conflicts between project purposes through compromises that do not seriously detract from the achievement of any or all project purposes.

7.02 -- RESOURCE USE OBJECTIVES

Sixteen resource use objectives applicable to the project are presented below. They are formulated to provide general guidance and direction to the overall management and development of Wappapello Lake resources. The objectives are grouped into three categories: General, Recreation, and Environmental Stewardship.

a. General

(1) Administration and Management

Ensure that quality administration and management of all project lands, waters, and other associated constructed and natural resources are consistent and thorough. Seek to continually increase efficiency, cost effectiveness, and innovation in projects while keeping public use and enjoyment a goal of achievement.

Discussion: Project administrative and management decisions/actions will adhere to all applicable laws, regulations, policies, and agreements. Consistent coordination, both internally and with other applicable federal, state, and local government agencies, private organizations, and individuals will be maintained. Actions and/or plans will be implemented in a manner compatible with authorized project purposes and all applicable social and environmental factors to insure

maximum benefits. Compromise will be utilized to minimize conflicts in project uses and development.

The major concerns of management are maintaining the integrity of the operational structures (i.e. Main dam, dikes, gatehouse, and emergency spillway), identification of facilities for rehabilitation or replacement, provision of efficient support facilities, public health and safety, provision of accessible facilities, maintenance of a strong public involvement program, and responsible stewardship of the environment.

b. Recreation

(1) Quality Recreational Experiences

Seek to increase the quality of visitors' experiences by maintaining and developing purposeful, functional recreation areas and facilities that meet the needs of the visitor while maintaining the aesthetic integrity of the environment.

Discussion: An aggressive maintenance/service program will continue to be utilized in order to maintain the quality of all recreational areas and facilities.

(2) Facility Management

Provide quality recreation facilities that meet the needs of the visitors to the region.

Discussion: Maintain, develop, and alter facilities in order to meet the changing and diverse use patterns of the visitors to the park. Campgrounds (both Corps and concession operated), a primitive camping zone, boat-in island campsites, and concession-operated cabins have accommodations for overnight visitors seeking a diverse range of needs. Numerous day use facilities managed by the Corps and the MDNR provide visitors with opportunities in boating, picnicking, swimming, hiking, fishing, and other outdoor recreation opportunities. Five marina concessions provide visitors with additional opportunities along with youth camps such as the two Boy Scout camps, a Girl Scout camp, and Camp SEMO. The need for additional recreation facilities will be identified and efforts will be made to meet this demand.

(3) Barrier-Free Access

Increase outdoor recreational opportunities for the elderly, disabled, and other disadvantaged groups by providing barrier-free access. Continue to identify, build, modify, and redesign areas/facilities as mandated by Uniform Federal Accessibility Standards (UFAS) and Americans with Disabilities Act Design Guidelines (ADADG).

Discussion: All persons must be given access to a wide range of outdoor recreation activities through careful and appropriate planning, design and

program implementation. Accordingly, consideration is given to access facilities and services for disabled persons in the planning, design, and operations of existing recreation areas, and the development of future public use areas at the project.

(4) Visitor Awareness

Continue to expand upon the effective and efficient distribution of information detailing availability of facilities, rule and regulation considerations, seriousness of land and water safety, and awareness of the diversity of recreational opportunities available. Expand upon the range of contact to include locations in Missouri, Illinois, Kentucky, Arkansas, and Tennessee that have not previously been touched.

Discussion: Education is the key factor to increased public knowledge and awareness of natural and cultural features. Education is also the key factor in the reduction of accidents on public lands and waters. Public knowledge is enhanced through programs both on and off site, news releases, a 24-hour lake information hotline, internet website, information handouts, posters, billboards and various other public service announcements done on radio and television. Also, by cooperating with other agencies, public awareness of Corps programs is increased.

(5) Regional Economic Growth

To contribute to and develop partnerships with agencies, groups, and individuals with the common goal of increasing lake and regional tourism in addition to economic development.

Discussion: A portion of Old Greenville Recreation Area and three surrounding cemeteries were placed on the *National Register of Historic Places* in March 1990. An effort to promote and develop both the historical significance of the area and the recreational opportunities available can be most efficiently accomplished through the Corps partnering with other agencies, groups, organizations, and individuals. The use of partners to assist with the operation and management of the project will be fully employed. When feasible, donations and challenge cost-share programs will be utilized to accomplish work. Section 225 of PL 102-580 grants authorization to the Corps to enter into cooperative agreements with non-federal, public and private entities to provide for operation and management of recreational facilities and natural resources at civil works projects. The Corps may accept contributions of funds, materials and services from non-federal, public and private entities. The services of volunteers are accepted under PL 98-63 to carry out any activity of the Corps except policy-making and law or regulatory enforcement.

Relationships with our partner agencies and local constituent groups will be maintained and strengthened; volunteers will be utilized maximally and our

use of cooperating associations will be continued. The expansion of these partnerships will continue to increase area tourism and economic growth. The use of cooperating associations allows the Corps to provide goods and services that at the present time it is unable to provide. (See Paragraph 11.10 for information on Cooperating Associations)

(6) Environmental Protection

To provide a rewarding experience for visitors by monitoring, maintaining, and improving the aesthetic and environmental quality of the area. Sites will be monitored and steps taken to prevent damage or rehabilitate areas before site impacts have any negative effects on visitor's experiences or the environment. Use of all areas for public enjoyment will be encouraged while minimizing any environmental degradation.

Discussion: The development of recreational facilities and opportunities will not only satisfy the technical requirements of the effort but also incorporate environmental protection and enhancement techniques. Site designs, site hardening, impact deterrence, and natural landscaping will be used to accomplish this goal. Water quality in the lake is monitored at least four times per year. Boat and land patrols and reports from concerned citizens enable us to locate point and non-point source contamination areas.

(7) Interpretive Services Outreach Program

Implement an effective interpretive services and outreach program to create greater public awareness, understanding, and appreciation of the project and its resources, not only by using Corps resources, but also through the development of strong partnerships with state and federal agencies, local constituent groups, and with the support of cooperating associations and volunteers.

Discussion: An Interpretive Services Program has been in effect at Wappapello Lake since the mid-1970s. The Interpretive Services and Outreach Program enhances the Corps' image, stirs the public interest in the scenic, recreational, biological and cultural values of the lake and surrounding area, and also promotes public safety education on both land and water areas of the project. We will continue to develop and promote the Ranger Willie B. Safe Public Safety Education Awareness Campaign through partnerships and presentations. It appears that Ranger Willie B. Safe could become the Corps icon for safety. Ranger Willie B. Safe will provide a humanistic approach to all aspects of safety, with an emphasis on water related activities, through programs, presentations and appearances. We will also promote Ranger Willie through the use of activity books and songs designed around this character. The activity books and songs are available through the *National Water Safety Catalog*. This program is in the developmental stages of partnering with other federal and state agencies and organizations to assist with promoting Public Safety Education

Awareness. A St. Louis District Marketing Committee has been established to market the Willie B. Safe Campaign as a District initiative in water safety. This committee is represented by the District Interpretive Coordinator, Public Affairs Office, Safety Office, and field personnel. The goal is to develop and implement a strategy to enable this concept to become a National Initiative within the next three to five years. A visitor center; informational brochures; bulletin boards; interpretive nature trails; historic sites; special events; campground, beach, visitor center presentations; and tours of the gatehouse are incorporated within the scope of this effort. A Watchable Wildlife program has been established to inform the public where opportunities to view wildlife are most promising.

By acquainting visitors with the diverse resources of the project and stimulating them to ask questions and explore, interpretation enhances their recreation experience, assists in reducing management concerns, and helps to protect the lake environment. The interpretive program is administered not only by Corps rangers, but also with the support of Corps of Engineers Resource Volunteers and through partnerships with state agencies, local constituent groups, and a cooperating association.

(8) Special Events

Continue to support special events to serve the mission of the Corps and to promote economic benefits received by the region. This will be accomplished by continuing to provide special events annually as funding permits.

Discussion: To promote public safety we will provide events such as *Ranger Willie's Wet and Wild Waterfest*. We will also continue to develop the Ranger Willie B. Safe program. This program assists us with teaching public safety education awareness. Continue to speak on safety issues on and off-site. Other events promote economical benefits to the local businesses. The *Silver Bullet National Drag Boat Race* attracts approximately 30,000 visitors to the area each year. The *Rod and Kustom Car Show* also helps to bring visitors to the area. Other events like the *Festival of Lights Christmas Auto Tour* help local business during the off-season. This event has an annual visitation of over 14,000 people. Natural resource stewardship events like Earth Day assists with interpreting Wappapello Lake's historical, cultural and natural resources. The Roadside Cleanup teaches participants good natural resource stewardship. We will continue telling the Corps story during a five-minute overview focusing on the Corps Mission at the beginning of all interpretive programs on or off-site. This overview will also include key components of the Chief's strategic vision. We will also provide programs concerning natural resource management to local schools, groups and organizations. Special events such as the *Black Powder Rendezvous*, *Old Greenville Days* and the *Living Indian Village* assists the staff in interpreting the history of the area through living history events. To better serve our customer the *Annual Disabled Person's Fishing Day* event assists the Corps by serving the needs of mentally and physically challenged people that otherwise may not have the opportunity to experience this outdoor recreation activity.

c. Environmental Stewardship

(1) Protection of the Resource

Remain committed to providing responsible stewardship by the conservation, maintenance and restoration of diverse habitat for the benefit of various ecosystems.

Discussion: Continue to monitor and inventory our resources to ensure protection against overuse, erosion, insect and disease infestation, fire, etc., and take corrective actions when warranted. Encourage the use of all areas for public enjoyment while minimizing environmental degradation.

(2) Wildlife

Public land will be managed to encourage optimal utilization by the greatest number of wildlife species through inventorying, manipulating, and protecting their habitats.

Discussion: Management activities to provide food, nesting and cover will include succession control; vegetative plantings; soil manipulation; prescribed burning; and tree planting. Wetland and silvicultural management practices will maintain and sustain wildlife populations. All activities will be conducted in accordance with accepted scientific methods. Management activities will be performed in accordance with the Corps mission statement regarding ecosystem management (ER 1130-2-540 Chapter 2).

(3) Fishery

Maintain a viable fishery through monitoring and protecting water quality, enhancing fish cover habitat, and when possible, controlling lake levels during critical spawning periods.

Discussion: Management of the fishery will be coordinated with MDC as they currently monitor and sample the health and population of the Wappapello Lake fishery. The Corps is participating in the Recreational Fishery Resources Conservation Plan, established by Executive Order (See Paragraph 11.08). Key objectives of the plan are to improve spawning areas, restore habitat, reduce siltation, increase shore fishing access and increase the number of Americans with Disabilities Act (ADA) accesses to ramps and shoreline. The Wappapello Lake Project Office will attempt to incorporate these objectives as funding and human resources allow.

(4) Forest

Forested land will be managed for multiple use.

Discussion: Inventories will be used to monitor and maintain forest cover for its scenic, recreational, water quality, fishery, and wildlife values. Silviculture practices may be performed for disease and pest control, fire hazard reduction, habitat management, and timber stand improvement. There is an increasing demand for wood products in this region of Missouri, especially for wood chips. Silvicultural treatments on Wappapello Lake Project will be performed only to improve habitat conditions and for removal of diseased and poor quality stems. Water quality, recreation and wildlife values will not be compromised for monetary gain.

(5) Soils

Base land management activities on soil types, characteristics, and land use capabilities.

Discussion: Utilize soil conservation practices to minimize the effects of wind, water, and mechanical erosion, based on recommendations from the NRCS. Conservation measures designed to prevent soil loss such as maintaining riparian corridors and grass waterways, stream bank stabilization, minimal and no-till planting, water bars, fertilization, and turf renovation will continue to be implemented.

(6) Wetlands

Re-establish, maintain and protect high quality wetlands to improve water quality and provide habitat for wetland dependent species.

Discussion: Development and maintenance of wetlands using moist soils and water level management regimes will continue to be implemented in support of the North American Waterfowl Management Plan. Negative impacts will be avoided, minimized, or mitigated for a “no net loss” approach to management in accordance with Section 404 of the Clean Water Act and other federal and state regulations. Challenge Cost Share Agreements and joint ventures will be pursued with other agencies and private conservation groups to restore or enhance bottomland hardwood wetland areas.

(7) Cultural Resources

Continue to identify, inventory, and monitor cultural resources.

Discussion: A Historic Properties Management Plan, in accordance with the existing Programmatic Agreement, is being developed and will outline the methods, procedures, and priorities for identifying, evaluating, and preserving significant cultural resources. Continue to protect and manage the Old Greenville *National Register of Historic Places* site and consult with the Missouri State Historic Preservation Office as necessary.

SECTION VIII – RESOURCE PLAN

8.01 -- ZONING OF LAKE LANDS AND WATER – LAND AND WATER USE

a. General

Project zoning provides guidance for the orderly development, use and management of the lake's resources. Resource planning recognizes the authorized project purposes and the opportunities and constraints that influence development and management. All development will be screened to determine compatibility with the lake's natural and cultural resources. Primary planning and zoning considerations include seasonal flooding, soils, ecological conditions, existing and projected recreation demands, state and local participation and interests, and applicable laws, regulations and policies. It also considers effects on adjacent commercial, private and public properties.

Recreational development has generally proceeded as described in supplements No. 1, 2, 3 and 4 of the Master Plan for Wappapello Lake. The land area allocations are depicted on Plate 1, *Land Allocation Map*, and the land area classifications are represented on Plate 2, *Land Classification Map*. An analysis of the resources and use classifications of all lake lands and waters has been made. The objective of classifying lands is to integrate appropriate land and water uses into a balanced plan in the public interest. A description of the applicable land and water use categories follow.

b. Land Allocation

The project required public lands and water total approximately 44,349 acres. These lands were allocated according to the authorized purpose for which they were acquired. One allocation category exists for Wappapello Lake:

(1) Operations. This allocation includes lands acquired according to the authorizing documents for operation of the project, which is flood control.

c. Land Classification

Land use classifications have been determined through the guidance contained in ER 1130-2-550 and EP 1130-2-550; both dated 15 November 1996, and are shown on Plate 2. Land use classifications and descriptions are as follows:

(1) Project Operations. The objective of this resource classification is to provide adequate land for safe and efficient operation and management of the lake's land and water resources for all authorized purposes. Lands classified in this category include the main dam, dike structures, gatehouse, emergency spillway, the outlet structure, land treatment systems and land required for

administrative and maintenance needs. Section 8.02 further details this land resource classification and use.

(2) Recreation Lands. These park and recreation lands are developed to provide for the recreational activities of the visiting public. No agricultural uses are permitted on these lands except on an interim basis where the terrain is adaptable for maintenance of open space and/or scenic values. Factors such as road access, natural resources, recreational facility design and management practices make these lands conducive to accommodating major use by the visiting public. Lands in this classification include areas for concessions and quasi-public and group use development. Paragraph 8.03 describes the development and use of lands in this category in greater detail.

(3) Environmentally Sensitive Areas. In this classification, areas are identified for the preservation of scientific, ecological, historical, archeological and/or aesthetic value. A general description of the Ecological Areas and Cultural Areas classification are as follows.

(a) Ecological Areas. Included in this category are areas providing habitats for rare or endangered species. Limited agricultural practices are permitted in certain portions of these areas. Normally, development for public use is prohibited or limited on land in this classification. Paragraph 8.05 a. further details this land resource classification and use.

(b) Cultural Areas. Included in this category are areas that have historical and archeological significance. Management practices are followed to insure protection of these resources. Paragraph 8.05 b. further details this land resource classification and use.

(4) Multiple Resource Management. This classification includes three categories that further define lands based on their location and natural resources: (a) Recreation–Low Density, (b) Wildlife Management, and (c) Vegetative Management. These include lands that may be managed for one or more activities to the extent that they are compatible with the primary allocation(s).

(a) Recreation – Low Density. Lands zoned in this category offer recreation to the public in an unstructured natural setting as an alternative to the experience generally associated with intensively developed recreation areas. These areas also serve as a buffer between other land uses. Uses for these areas include hiking, walk-in hunting and fishing, and nature study. Agricultural use is not permitted except on an interim basis to maintain open space, provide a supplemental food source and scenic values. Paragraph 8.04 a. provides details on the development of lands in this category.

(b) Wildlife Management. Paragraph 8.04 b. includes description of lands being managed for fish and wildlife habitats. These lands are continuously available for low-density recreational activities. Agricultural leases and timber

harvesting are allowed to the extent practicable and compatible with other uses of the project. These activities generate revenue and maintain habitat conditions beneficial to wildlife. Paragraphs 7.02 c. and 12.06 of this plan describe the objectives and goals of Corps operated and administered fish and wildlife management areas. The Operational Management Plan (OMP) describes the general practices and techniques employed to implement a viable program for fish and wildlife management at Wappapello Lake. Lands on the northern end of the lake, managed by the MDC, have been assigned to this land-use classification.

(c) Vegetative Management. Management activities for these lands include protection and development of forest and vegetative cover and wetland restoration. Use for these lands also includes hiking, walk-in hunting, fishing and nature study. All lands in government fee ownership are being managed to maintain forest resources for recreation, wildlife and scenic values, Paragraph 8.04 c. and the OMP describe the general practices and techniques employed to conduct a program for developing the forest resources of Wappapello Lake, such as tree planting and vegetation manipulation, to support management objectives. Timber will be harvested when required to achieve other management objectives such as wildlife habitat improvement. Forest management is a secondary purpose for area zoned for recreation or low-density recreation. Specific resource use objectives and management practices are described in the OMP on an area-by-area basis.

8.02 -- PROJECT OPERATIONS LANDS

a. General

This section and Paragraph 8.03 include proposals for operational and recreational areas respectively. Proposed facilities that are in addition to existing facilities are listed under the *Proposed New Actions* heading. A field estimate of costs for these facilities is provided in Section XIII. Detailed information concerning implementation of proposals is contained in Paragraph 8.06.

Facilities that are proposed for renovation, relocation or are a replacement for existing facilities are listed under the *Proposed Replacement Actions* heading.

The following paragraphs provide a brief description on all lands classified as Project Operations. Areas are depicted on Plate 2, *Land Classification Map*.

(1) OP-1. Wappapello Lake Main Dam, Office Complex, Spillway, Emergency Spillway and Gatehouse/Visitor Center Area

This 46-acre area contains the main dam, spillway, emergency spillway, gatehouse and a waste water land treatment facility. This area is necessary for the operation of Wappapello Lake as a flood control project.

(a) Wappapello Lake Main Dam - The main dam consists of a rolled earth-fill structure extended across 2.5 acres of the St. Francis River valley floor. The total length of the dam at its crest is 2,700 feet. The crest of the dam is at elevation 419.74 feet NGVD with a maximum height above the streambed of 109 feet. Other pertinent data can be found in Section II, Table 1.

(b) Spillway - The Spillway includes the stilling basin and outlet channel with retaining walls. It is 21.5-feet wide as it exits the conduit and expands to 60 feet at the downstream end. It has two rows of baffle blocks that are 4 feet wide and rise 5 feet above the basin floor. The outlet channel expands from a width of 60 feet at the stilling basin to a 120-foot width in a distance of 300 feet. The channel bottom and side slopes are protected with a riprap blanket.

(c) Emergency Spillway - The emergency spillway is located to the south of the dam. This 740-foot long concrete spillway has a crest of 394.74 feet NGVD. When the lake exceeds this elevation an uncontrolled release is made over this spillway.

(d) Gatehouse - The gatehouse structure contains three gates 10 feet wide by 20 feet high for controlling the rate of discharge through the outlet structure. The gatehouse also contains a hydraulic turbine, generator and exciter that have the capability of producing 125 kVA of hydro-electricity. This electric is presently being used to operate recreational facilities such as the lights on the dam, the Visitor Center area and the Redman Creek and Spillway Recreation Areas.

(e) Administration Office/Maintenance Compound - The Wappapello Lake Project Office and Maintenance Compound are located just south of the dam. The facilities include staff offices, a visitor reception area, a lunch room, an electrical shop, a plumbing shop, a carpenter shop, open and closed storage bays, a storage building, a fenced vehicle and equipment compound, above ground fuel tanks, a storage yard, an employee and visitor parking area, a radio tower and a water well.

Proposed New Actions: None anticipated at this time.

Proposed Replacement Actions: Relocate existing storage yard, which is used to store topsoil, crushed limestone and fill dirt, behind existing chain link fence in the back of the maintenance yard. This will move this aesthetically unappealing facility out of public view and will provide better security for this area. The old metal storage shed within the maintenance compound will be replaced with a more efficient structure. The new facility will match existing structures.

(f) Waste Water Land Treatment Facility - The wastewater treatment plant is located below the dam and serves the Redman Creek, Peoples Creek, Eagle Point and Spillway Recreation Areas, as well as the administration/maintenance compound. A stabilization pond and spray field treats the incoming waste from these areas. Other facilities include an operators building, a storage building, a lift station, a hydrant/fountain and an access road.

Proposed New and Replacement Actions: None anticipated at this time.

(2) OP-2 Dikes 1, 2 & 3

Dikes 1, 2 and 3 are contained within this 11-acre area. These structures are an integral part of the flood control capacity of the main dam.

8.03 -- RECREATION LANDS

a. General

A description of recreation development at Wappapello Lake is presented in this section. A total of 19 areas are classified as recreational. A summarization of development, including existing, proposed and replacement actions are listed for each recreation area. Paragraph 8.06 provides detailed information about funding options.

b. Recreational Areas

The following sub-paragraphs describe recreation areas in a clockwise order around the lake as shown on Plate 2, *Land Classification Map*, and the individual plates as noted.

(1) R-1 Redman Creek Recreation Area (*Plate 5)*

This 240-acre area located south of the dam has been intensively developed for day-use and camping opportunities. This recreation area receives the most use and visitors at the project. The day use portion of the development includes a Visitor Center, three picnic shelters, play courts including a basketball court, two volleyball courts, a tennis court, two horseshoe pits, a playground, an overlook, 14 picnic sites, three water borne comfort stations, a three-lane boat ramp with courtesy loading dock, a swimming beach, vehicle and vehicle/trailer paved parking spaces, and a water well.

The campground portion of this area includes 109 campsites, including two for park attendants. The campground is divided by State Highway T and includes the following facilities: two shower houses, two water borne vault comfort stations, two playgrounds, two horseshoe pits, an amphitheater, fee collection booth, a trailer dump station and one water well. One hundred four sites have electric hook-ups and five sites are walk-in non-electric sites.

Eighteen fountain/hydrants, seven bulletin boards and three lift stations are located within the recreation area.

Proposed New Actions:

Day Use Area: Provide an outdoor shower and water fountain at the swimming beach. Install lights for the basketball and volleyball court utilizing hydroelectric power. Place a disabled accessible fishing pier and disabled accessible transfer area at the boat ramp. Two horseshoe pits will be installed in the island at the Redman picnic area/shelter.

Campground: Thirty sites on the east side of the campground will be upgraded to full service hook-ups that will include 50 amp electric service, and sewer and water hook-ups. Additional annual revenues generated would be $6,975 and the benefit/cost ratio is 1.3. Fifteen additional disabled accessible water fountains will be installed. The two vault restrooms and park attendant pad in the east campground and the park attendant pad in the west campground will be connected to the existing sewer system. A waste water dump station will be located on both sides of the campground. Presently, campers must leave the campground with their camping units to access the dump station to dump waste water. Waste water dump stations within the campground will allow campers to empty their portable waste water containers without moving their camping unit. Five additional campsites will be modified for disabled accessibility. Two parking spaces will be installed to the south of the west shower building. The deteriorating amphitheater will be removed. The five walk-in tent sites will be removed and replaced with back-in trailer electric campsites. Annual revenues generated will be $3,100 with a benefit/cost ratio of 2.36.

Proposed Replacement Actions:

Day Use Area – The comfort station at the Redman Creek Picnic Area will be relocated and replaced with a disabled accessible facility near the picnic shelter. The water fountain and bulletin board in the island in front of the shelter will be removed and placed on the comfort station. Water fountains will be upgraded to be disabled-accessible. The Visitor Center shelter comfort station will be modified to meet disabled accessible standards. Six picnic sites will be relocated from the Spillway Recreation Area. Four picnic sites with tables and grills will be installed near the swimming beach. The other two picnic sites will be installed near the boat ramp and tennis court areas. The Spillway amphitheater will be relocated near the Visitors Center.

Campground: The parking lot for the walk-in sites will be converted into a double site and three other sites will be installed at the amphitheater area. The electric facilities to the campsites on the west side will be replaced and ten sites will be upgraded to 50-amp service. This replacement is necessary because the existing electrical wiring has exceeded its service life and is not compatible with many of the current camping units. All water fountains will be replaced with

disabled accessible facilities. Existing playgrounds on both sides of the campground will be replaced with disabled accessible facilities.

(2) R-2 Rockwood Point Recreation Area (*Plate 6)*

This area, approximately 220 acres, offers boat launching, swimming and marina concession facilities. These facilities are located at three separate locations, Rockwood Point, Rockwood Landing, and Barrett's Resort. Existing facilities at Rockwood Point include a two-lane boat launch ramp, a courtesy loading dock, a bulletin board, a swimming beach with disabled accessible walkway, a vault comfort station, five picnic sites (approved in current Master Plan but not funded) and vehicle and vehicle/trailer paved parking spaces. This area is located at the end of State Highway RA. Rockwood Landing, located at the end of County Road 510, includes a hunting/fishing access with a one-lane boat launch ramp and vehicle/trailer parking spaces. The lower parking lot is paved and the upper parking lot is gravel. A 5.2-acre inholding is located at the north end of the Rockwood Point peninsula.

Barrett's Resort and Marina concession is a 29.69-acre commercial lease with a full service marina, one lane boat ramp for concessionaires use only, and an associated parking area. The marina includes gas sales, boat rentals, 172 boat rental slips, bait/tackle sales and small grocery sales. The concessionaire also provides cabin facilities and a swimming pool on adjacent private property. The developments on the public and private land compliment each other to create a resort type area.

Proposed New Actions: Upon the availability of water from the public water supply district, a disabled accessible water fountain and an outside shower will be provided at the swimming beach. Security lighting in the beach area will be installed. The vault comfort station will be removed and replaced with a comfort station closer to the beach that is a water borne vault disabled accessible facility.

Barrett's Resort Concessionaire is proposing a new raised parking lot to the east of the entrance road at elevation 370 feet NGVD or above. It will provide parking and access to docks at higher lake levels. The access road from the Corps boundary to the raised parking areas will be widened to 18 feet to accommodate two-way traffic. Alternately, the lessees may construct a new one-way road going east down the point to the parking area. If the new road is constructed, the existing access may remain as a one-way exit. If future demand warrants, lessee has approval to enlarge marina by 22 boat slips.

Proposed Replacement Actions: None proposed at this time.

(3) R-3 Baker Lodge Recreation Area (*Plate 7)*

This 82-acre area is located at the southern end of the lake on Moore's Point. The area is leased to Greater St. Louis Area Council, No. 312, of the Boy Scouts of America for development of a Boy Scout Camp. Developments at the site includes a log cabin lodge known as Baker Lodge, a fountain/hydrant, a water well, and a gravel road and parking lot. This area is closed to hunting/trapping for the safety of the camp users.

Proposed New and Replacement Actions: None proposed at this time.

(4) R-4 Lake Wappapello State Park (*Plate 8*)

A lease is issued to the MDNR Division of State Parks comprising 1,854 acres. This area features diversified developments including two separate campgrounds with 37 basic sites and 43 electric sites, two shower house/laundries, two trailer dump stations, two vault comfort stations, a playground and a one-lane boat launching ramp for campers. Day-use facilities include 46 picnic sites, two picnic shelters, two water-borne comfort stations, three vault comfort stations, a two-lane boat launching ramp with courtesy dock, a one-lane boat launching ramp, two playgrounds, an amphitheater, and a swimming beach. Eight housekeeping cabins are available for rent. In addition, the state manages 21 miles of hiking trail, 15 of which are open to backpacking, equestrian, and mountain bike usage. Fourteen fountain/hydrants and eight bulletin boards are located in the recreation area. Support facilities include two service buildings, a storage shed, two superintendent residences, two trailer pad for the concessionaire, a water well and tower, and four sewage treatment facilities. One inholding, Lake Beach (4.05 acres) is located within this area. This multipurpose park is further described in Appendix I, Missouri Department of Natural Resources Leased Land.

Proposed New and Replacement Actions: As furnished by the State Park Superintendent, the following actions are proposed:

Shelter and Amenities: A public shelter near the marina area is to be replaced. Also to be addressed in the project will be upgrading picnic sites, playground, comfort station facilities and parking. Marina Access: The steep entrance and exit roads will be removed and new entrance/exit installed. A disabled accessible fishing area/pier is proposed for this area. Allison Point: Existing one-lane boat ramp will be replaced with a two-lane boat ramp including courtesy dock and parking. Campground Renovation: This project will upgrade existing campgrounds, to include replacement of the shower house in Asher Creek, construction of a connecting road between campgrounds, asphalting parking pads, adding additional electric campsites and addressing campsite slope concerns in the Ridge Campground. Contact Station: Convert existing residence at park entrance into visitor contact station. Construct new concession building at main campground entrance. Cabins: Construct four new rental cabins

to include road parking, utilities and furnishings. Convert Cabin #8 into equestrian cabin and corral with trail to link to existing trail system. Storage Building: Construction of a new storage building for park equipment. Equestrian Camp: Construct new equestrian campground with a new vault comfort station. Construct a new vault comfort station at the equestrian parking lot. The purchase of inholdings from willing sellers only, as discussed in Paragraph 10.04, will require the preparation of a Real Estate Design Memorandum and approval by MVD.

(5) R-5 Chaonia Landing Recreation Area (*Plate 9)*

This very popular 95-acre recreation area is located at the center of the Wappapello Lake project and provides excellent access to both ends of the lake. This access is used extensively for hunting and fishing in the fall, winter, and spring months due to the close proximity of the river channel. The area includes both a Corps development and a commercial concession lease. Current Corps facilities include a three-lane boat launch ramp with courtesy dock, a two-lane boat launching ramp with courtesy dock, a water borne vault comfort station, two bulletin boards, a water well, and vehicle and vehicle/trailer paved parking spaces. A 12-site campground is located on the Snow Creek Cove southeast of the boat ramps. Each of these 12 sites has only a grill, table and lantern post, but no electric hook-ups. One water hydrant services this area. A spur of the Lake Wappapello State Park Backpack Trail ends at the campground.

Twenty-four acres of the area are leased as a commercial concession development for a marina and resort. The concession area facilities include a full service marina with 126 boat slips, boat rentals, and marine gas sales. Land based facilities include a store with bait/tackle, food and grocery sales, two duplex cabins, a four unit cabin, swimming pool, gas sales, a 16-site campground with electric hookup, a sewage treatment facility, three picnic sites, five fountain/hydrants, a storage area and a storage building.

Proposed New Actions: Install septic system in Corps area for the water borne vault comfort station. A fishing area/pier will be installed with an asphalt road and parking lot to provide fishing opportunities for those with disabilities.

Proposed Replacement Actions: The previous Master Plan recommended that the twelve campsites be relocated or removed as part of a campground consolidation. However, these twelve campsites provide a different type of camping experience not available at other campgrounds and will remain. The campground will be modified and impact sites upgraded: the area will be used as both a day use and camping area. The terrain of the area is easily modifiable to a disabled fishing access. The existing fountain will be replaced with an accessible fountain.

(6) R-6 Holliday Landing Recreation Area (*Plate 10)*

This 72-acre site is located at the northern end of Wappapello Lake and is accessed by State Highway F and paved Corps Road #30. This is a popular area for hunting and fishing. The abundance of public land in the area provides a diverse habitat for wildlife. The area includes both Corps facilities and a commercial concession lease. The current Corps facilities consist of a two-lane boat launch ramp with asphalt parking lot.

The commercial concession lease is 18.781 acres for a marina and resort. Development at the concession site includes a full service marina with 80 boat slips, boat rentals, and water based gas sales. Land based facilities include a store with bait/tackle, grocery sales, three duplex cabins, a 51-site campground with electric and water hookup at each site, a dump station, a shower house, two vault comfort stations, two picnic sites, a well, a storage building, a one-lane boat ramp (for concessionaire use only), and a marina gravel parking lot and gravel storage lot.

A Corps maintained breakwater, 150 foot long, with a top elevation of 375.0 feet NGVD protects the marina facilities from current and debris during flood conditions.

Proposed New Actions: Install a bulletin board at boat ramp area. The access road to concessionaire's lease is flooded by the operation of the Wappapello Lake Project. It is proposed that this road be relocated and/or raised.

Proposed Replacement Actions: None proposed at this time.

(7) R-7 34 Bridge Recreation Area (*Plate 11*)

This 216-acre area includes the former 138 acre Black Bridge Recreation Area, leased to MDC, and is located at the northern end of the project on the St. Francis River and has direct access from State Highway 34. This is a popular day use area that provides recreational opportunities that are not normally associated with the lake. The St. Francis River is a typical clear, gravel bottom Ozark Stream. The area, primarily used in the summer months, provides public access for canoe and boat launching, primitive camping, swimming and other related activities. A gravel bar that runs from the bridge south along the river is available for camping. Improvements to the area include an entrance road from Highway 34, a gravel parking lot and a bulletin board.

A portion of this area is held in reserve for future development as a major resort concession as described in Paragraph 10.10 and is shown on Plate 11.

Proposed New Actions: A disabled accessible water fountain will be installed when the Public Water Supply District #2 installs water lines in the area.

Proposed Replacement Actions: In accordance with the approved Traditional Access plan, a vault comfort station and water supply are to be located here. The vault toilet will be relocated from the Greenville Recreation Area.

(8) R-8 North Greenville Recreation Area (*Plate 12)*

Located near the city of Greenville and along the St. Francis River this 150-acre site includes four hunting/fishing accesses, and a 12-acre site leased to the City of Greenville for Park and Recreational purposes. These accesses provide opportunities for canoe and small boat launching, bank fishing, hiking and sightseeing. They also provide access to the adjacent St. Francis East Vegetative Management Area MR-VM-6, which it divides into two sections.

The City of Greenville's Park and Recreational lease includes a lighted baseball/softball field, bleachers, a fountain/hydrant, a parking area and concession stand with restrooms and a sign that says, "Welcome to the City of Greenville and Wappapello Lake."

The City of Greenville has approval for the following developments on the lease area:

Construct a T-ball field; remove trees and brush in outfield to the light poles. Erect an outfield fence, install a scoreboard, and add more parking spaces.

Proposed New Actions: The Traditional Access plan proposed a vault comfort station at this area. This action will not be performed due to lower public use in the area than was anticipated.

Proposed Replacement Actions: None are proposed at this time.

(9) R-9 Greenville Recreation Area (*Plate 13)*

Located one mile south of the City of Greenville, off U.S. Highway 67, this 162-acre site includes both camping and day use activities. Portions of the facilities are located within the boundaries of the 137-acre Old Greenville Historic Site. Situated at the northern end of the lake, this area receives intensive use throughout the year. The day use portion of the area includes a picnic shelter, 14 picnic sites, a vault comfort station, a water-borne vault comfort station, a two-lane boat ramp with courtesy dock, 4 fountain hydrants, a volleyball court, a bulletin board, a playground and 2 horseshoe pits. A one-mile historical hiking trail, called Memory Lane, follows the sidewalks of the historic town of Greenville. Wayside exhibits and a gazebo tell the story of Old Greenville. The area was listed on the *National Register of Historic Places* in March of 1990 because of its archaeological and historic significance. The Union Cemetery located within the campground is private property and also is listed on the *National Register of Historic Places*.

This 111-site campground has 106 sites with electric and five walk-in sites without electric along the shoreline. Facilities within the campground include four water-borne vault comfort stations, a sewage treatment facility, eleven fountain/ hydrants, a bulletin board, a shower house, an amphitheater, a trailer dump station, a portable fee collection booth, a park attendant site, a floating courtesy dock and water well.

Proposed New Actions: Provide walk-in access to island below the boat ramp and a disabled accessible area to increase bank fishing opportunities, and install a fish cleaning station in the day use area. Place the dump station and fish cleaning station on a septic system. Install ten additional water fountains and a disabled accessible playground in the campground. Relocate the five walk-in sites and add 20 campsites to the campground. These 25 campsites will have 50-amp electrical service, water hook-ups and one five-car parking lot. They will generate an estimated yearly revenue of $38,747 with a benefit/cost ratio of 2.6. The roadway will be widened for two-way traffic between the entrance to the middle loop and the showerhouse to improve traffic flow in the area.

Proposed Replacement Actions: It is proposed that electrical facilities for the park attendant and campsites 1-25 be replaced and upgraded to meet current industry requirements of 50-amp service. Fifteen water fountains and seven campsites will be modified to disabled accessible standards. The trail to the walk-in tent sites will be maintained for access to bank fishing and boat mooring. The entrance road to the recreation area floods at elevation 377.0 feet NGVD. Raise this asphalt road approximately three feet to the same elevation as the campground (379.5 feet NGVD). The vault comfort station at the boat ramp will be removed and relocated to the 34 Bridge Recreation Area.

(10) R-10 Sulphur Springs Recreation Area *(Plate 14)*

Facilities on this 296-acre area include one vault comfort station, a one-lane boat ramp, four primitive campsites (grills only) and associated parking. This area is used for sightseeing, fishing, camping and hunting and will continue to provide lake access and related services to the public. Two cemeteries are located in this area, Twidwell and Oak Grove (inholding – 1.2 acres).

Proposed New and Replacement Actions: None are proposed at this time.

(11) R-11 Poole Lodge Recreation Area (*Plate 7*)

This 60-acre area is leased to the Greater St. Louis Area Council, No. 312, of the Boy Scouts of America. Access is by Wayne County Road 531 and Corps Road #15. Development includes a lodge, a water well, a fountain/hydrant and a gravel road. The Boy Scouts use the site for group camping and related activities. This area is closed to hunting/trapping for the safety of the camp users.

Proposed New and Replacement Actions: None proposed at this time.

(12) R-12 Lost Creek Recreation Area (*Plate 15)*

This 56-acre area provides access to the Lost Creek arm of Wappapello Lake. A resort concession is located within this area. The concessionaire's development is located on 2.13 acres lease area and adjacent private property. The leased area includes eight campsites, eight fountain/hydrants, a one-lane boat ramp (for concessionaire's use only) and a 20-stall marina. Development on the adjacent private land includes campsites and cabins.

The major use of this area is for hunting and fishing. A one-lane boat ramp and associated parking are provided outside of the lease area.

Proposed New and Replacement Actions: None are proposed at this time.

(13) R-13 Camp SEMO Recreation Area (*Plate 16)*

This 174-acre site is managed under a lease to the Lutheran Church, Missouri Synod. The site functions as a youth camp providing recreational opportunities for organized youth groups. The site has been developed with a caretaker residence/administration building, a dining hall, two shower houses, a picnic shelter, six cabins, four campsites, an amphitheater, a playground, play courts, a hiking trail, a group walk-in camping area, a water well, eight fountain/hydrants, and sewage treatment facilities. A beach area is approved and developed but has not been used the last few years.

Proposed New and Replacement Actions: As furnished by the camp, the following actions are proposed:

Widen camp roadway for two-way traffic. Extend existing road to develop circle drive past Cabin 6 to near entrance. Other proposed development to include: vault comfort station, replace cabins, replace galley, accessible swimming pool, replace shower house/comfort stations, extend hiking trails, make trails accessible and identify trees, and plants along the trail for interpretation purposes.

(14) R-14 Possum Creek Recreational Area (*Plate 17)*

This 129-acre site offers both camping and day use activities. Developments include two primitive campsites, a vault comfort station, and a one-lane boat launching ramp and associated parking. The area provides access to a popular fishing area. The area also receives a large amount of bank fishing.

Proposed New Actions: Because of heavy utilization of this area, more parking is necessary. Enlarge the parking area by approximately 15 vehicle/trailer spaces.

Proposed Replacement Actions: The two primitive campsites (grills only) will be relocated as boat-in campsites in the Possum Creek Cove.

(15) R-15 Camp Latonka Recreation Area (*Plate 18)*

This 369-acre site is the location of a group camp operated under a lease issued to the Cotton Boll Council of the Girl Scouts of America. This area is developed with 15 cabins, administration and caretaker buildings, a dining hall, 12 vault comfort stations, two shower houses, three picnic shelters, five group camping areas, a swimming beach, a courtesy dock, an amphitheater, play courts, stables, a horse back riding trail, a hiking trail, two water-wells, and a sewage treatment facility. The area provides excellent outdoor recreational opportunities for youth groups and serves to orient them to the environment.

Proposed New Actions and *Replacement Actions*: As furnished by the Girl Scouts, the following actions are proposed:

Improve and extend the present horse-riding trail. Replace and relocate the present barn moving it to higher grounds for better drainage. Replace and enlarge the pasture fence. Replace deteriorating corral fence. Improve the existing hiking trails and possibly extend them adding trail markers and information stations. Install electricity to the 15 cabins. Install two commodes and a shower in the Troop House. Repair drainage problem around the old house site. Improve storm water run-off down trail going to Gypsy Dell. Construct a primitive campsite along horse trail on the point.

(16) R-16 Peoples Creek Recreation Area (*Plate 19)*

A popular multipurpose area with camping and day use facilities is located on this 347-acre area. The 57-site campground is split into an upper and lower area. The lower area offers 37 electric campsites, a water-borne comfort station, a shower house, a fee collection booth, a park attendant site, and a water well and water tower. The lake frontage below the campground has a sand area for mooring, which allows campers to keep their boats in the water. The upper campground has 20 electric sites, a waterborne comfort station, a picnic shelter and water well. Nine fountain/hydrants, four lift stations, and two bulletin boards are located at the campgrounds.

The day use area facilities include a two-lane boat ramp with courtesy loading dock, a disabled accessible fishing pier, a swimming beach, one large picnic shelter and two small picnic shelters, and two water-borne comfort stations. Three fountain/hydrants and two lift stations are located in the day use area.

The area has one inholding, Ferry Point (11.92 acres) that is near the Camp Latonka Recreation Area, R-15.

Proposed New Actions: New items proposed for this plan includes lengthening and leveling the 20 campsites in the People's Creek Upper Campground, which will include installation of water and sewer hook-ups and 50-amp electrical service. Additional annual revenues generated would be $4,650

and the benefit/cost ratio is 1.3. Additionally, a playground will be provided in the lower campground near the existing shower house. A five-car parking lot will be installed. A waste water dump area will be located in the lower campground. Presently, there is no location to dump waste water without leaving the campground. A waste water dump station within the lower campground will allow campers to empty their portable waste water containers. Additional land for buffer in campground is needed. Campsites are within 15 feet of the boundary line in a portion of the campground. The purchase of inholdings from willing sellers only, as discussed in Paragraph 10.04, will require the preparation of a Real Estate Design Memorandum and approval by MVD.

Proposed Replacement Actions:

Day Use Area: The boat ramp comfort station will be removed and replaced at the Spillway Recreation Area, leaving the comfort station at the beach area to service this area. The gate near the boat ramp will be relocated to the campground entrance to allow use of this comfort station. The entrance road to the area is steep and has visibility concerns when leaving the area. The entrance will be relocated to the north to improve the visibility and slope. The two small picnic shelters will be removed and replaced with one large picnic shelter in the Eagle Point Recreation Area. These two shelters receive minimal reservation use; however, they are popular picnic sites. The sites will be reclassified as picnic sites.

Campground: The shower house and comfort station are 29 and 20 years old, respectively, and are not in compliance with present accessibility standards. Based on the cost associated with rehabilitating and maintaining two buildings versus the cost to build and maintain one consolidated facility, it is proposed to replace the two existing facilities with one accessible shower house facility near campsite #23. Campsite #23 will be relocated to provide needed parking for the facility. The comfort station in People's Creek Upper Campground will also be replaced with a new facility. The shelter in the Upper Campground will be removed and replaced at the Spillway Recreation Area as an efficiency measure because of limited use at the present location.

All campsite electrical facilities will be replaced and upgraded to meet current industry standards. This replacement is necessary because the existing electrical wiring has exceeded its service life and is not compatible with many of the current camping units. Water lines and water fountains will be replaced with accessible facilities and three campsites will be modified for disabled accessibility.

The roadway near campsite #1 will be widened to provide safe two-way traffic during times when the lower exit road is flooded.

(17) R-17 Sundowner Recreation Area (*Plate 19)*

This 23-acre area is a major boat launching area with a marina concession facility. Located near the dam, this access includes a two-lane boat ramp with paved parking lot for vehicles and vehicle/trailers, a vault comfort station, a bulletin board and a breakwater. The area is often used for fishing tournaments.

The Sundowner Marina concession is an 8.15-acre commercial lease with a full service marina. The marina includes gas sales, boat rentals, 112 boat rental slips, and bait/tackle sales. Developments on adjacent private land include small grocery sales, gas sales, above ground gas storage tanks, and a watercraft sales-service facility.

A Corps maintained breakwater, with a top elevation of 367.0 feet NGVD, helps protect the marina facilities from wind and wave action.

Proposed New Actions: Action proposed includes conversion of the vault comfort station to a water borne comfort station upon availability of water from the proposed public water supply district. Sewer service is available at the Dike 1 area with the installation of a lift station. Because of heavy utilization and congestion at this boat ramp, the boat ramp will be widened 19.5 feet to provide an additional boat launching lane and area for a courtesy loading dock. This extra lane and courtesy dock will allow better flow at the boat ramp during peak usage times. An accessible water fountain will be provided.

Proposed Replacement Actions: None are proposed.

(18) R-18 Eagle Point Recreation Area (*Plate 20)*

This 140-acre area is located at the north abutment of the dam and on the lands north of the spillway below the dam. Development at the north abutment includes a picnic shelter, 12 picnic sites, a water-borne comfort station, an overlook, a volleyball court, a water well and a paved parking lot. The area below the dam includes a gravel road and two parking lots, a ball diamond and a vault comfort station. Dam instrumentation, piezometers and a seepage weir are also located in this area. A small shallow wetland created by a beaver dam has become a popular fishing area. The previous Master Plan identified a future vault comfort station near the outlet channel. This facility is no longer needed.

Proposed New Actions: At the abutment area, during heavy visitation times, conflicts between pedestrians and vehicular traffic have arisen. With two entrances/exits to the area, many vehicles use this only as a through road. To reduce user conflicts, create a safer recreation area and allow for better control of vehicular access, the north entrance to the area will be removed. The north vehicle parking lot will be removed and a cul-de-sac will be installed. Also, a playground will be provided near the volleyball court. Two horseshoe pits will be installed near the picnic shelter.

The area below the dam is underutilized, but has potential for both recreation and environmental education opportunities. Access to this area will be improved. The gravel entrance road from Highway T will be upgraded to improve the slope and width and then will be paved. The gate will be opened to provide access to the north bank of the St. Francis River at the spillway. A day use/special events area will be developed that will include parking lots, an overflow parking area, a large picnic shelter (removed and relocated from People's Creek Day Use Area), a playground, two horseshoe pits, two volley ball courts and three accessible water fountains. The vault comfort station will be relocated near the spillway and upgraded to water-borne. A ten-vehicle gravel parking lot will be installed at the ball diamond.

An environmental education area will also be developed in the area below the dam. A trail/boardwalk will explore this unique ecosystem. Highlights of this trail will include a beaver-created wetland complex and mature cypress/tupelo forested slough area of the old St. Francis River. Within this area, a five-acre open field will be used to demonstrate wildlife food plot and other vegetative and ecosystem management techniques.

Proposed Replacement Actions: The water fountain will be replaced with an accessible fountain in the north abutment area. In the area below the dam, the vault comfort station at the ball diamond will be removed and replaced at the day use/special event area as an accessible waterborne facility. Water and sewer services are available in the area.

(19) R-19 Spillway Recreation Area (*Plate 5)*

This 30-acre day use area consists of lands south of the spillway. Present facilities at the site include a picnic shelter, 14 picnic sites, a trail, playground equipment, a volleyball court, two horseshoe pits, a water-borne comfort station, an amphitheater, four fountain/hydrants, a bulletin board, two lift stations, a one-lane boat ramp that provides access to the St. Francis River and a small pond. The Pine Ridge Trail, a double loop trail of one-half and three-quarters mile segments has been designated a National Recreation Trail. This trail provides a view of the dam and the St. Francis River Valley.

A 0.10-acre site within this area is leased as a commercial concession for the sale of food, refreshments, bait and tackle, and other related supplies as a service to lake visitors.

Proposed New Actions: A disabled accessible walkway is proposed for the spillway to allow access to the St. Francis River. Also proposed is a four-stall covered fish cleaning station with access road and eight-stall parking lot between the Pine Ridge Trail and the Project Office. Water and sewer service is already available in the area for the fish cleaning station. A grill, water fountain and two horseshoe pits will be added, along with the relocated People's Creek upper campground picnic shelter.

Proposed Replacement Actions: Remove the Peoples Creek Upper Campground picnic shelter and relocate/replace to the Spillway Recreation Area. The parking lot at the Spillway Recreation Area will be expanded by approximately 30 spaces to service this shelter. Four picnic sites on the ledge below the proposed shelter location and two behind the Spillway concession area will be relocated to the Redman Creek Recreation Area. A unisex comfort station with a water fountain will be installed behind the Spillway concession area to provide restroom service to this high use area. Water and sewer services are already available in the area. This comfort station will be replaced/relocated from Peoples Creek boat ramp area. The Spillway comfort station will be replaced and relocated to the same level as the picnic shelters to allow disabled access. The amphitheater will be relocated to the Redman Creek Recreation Area near the Visitor Center. This change in location will allow better utilization of this facility for interpretive programs at the Visitor Center and special events.

8.04 -- MULTIPLE RESOURCE MANAGEMENT LANDS

The following areas have been classified as Multiple Resource Management Lands with three sub categories listed below:

- MR-LD -- Multiple Resource Management Area Recreation – Low Density
- MR-WM -- Multiple Resource Management Area Wildlife Management
- MR-VM -- Multiple Resource Management Area Vegetative Management

These areas are depicted on Plate 2, *Land Classification Map* of this plan.

a. Recreation – Low Density

(1) MR-LD-1 Two Islands MRMA (*Plate 2*)

This 81-acre area is comprised of two islands located in the southern portion of the main lake. The access to the area can be gained by boat only. Six primitive campsites, with grill and table, are located on the islands. These sites are very popular and also receive use for picnicking, sunbathing and sightseeing. The islands are primarily forested with oak/hickory on the ridges and bottomland species near the water. The northern most island contains a 20-acre inholding, which has created management problems for both the landowner and the Corps.

Proposed New Actions: Purchase inholding from willing sellers only as discussed in Paragraph 10.04.

Proposed Replacement Actions: It is proposed to relocate campsite #1. At its present location it receives minimal use because of the steep topography. The site will be relocated between site #3 and site #6 on the north island. Existing sites will have impact sites installed to provide a level camping area.

(2) MR-LD-2 Snow Creek MRMA (*Plate 2*)

This 778-acre area serves as a buffer zone between two developed recreation areas, Chaonia Landing and Lake Wappapello State Park. This area is primarily forested with stands of bottomland timber and oak-hickory on the ridgetops. One hunting/fishing access is located in the area. Two inholdings, Lilly Hollow (2.0 acres) and Snow Creek (1.5 acres), are within this area. MDNR maintains a backpack/hiking, mountain bike, and equestrian trail under a license agreement through this area.

Proposed New Actions: Purchase inholdings from willing sellers only. This subject is discussed in Paragraph 10.04.

Proposed Replacement Actions: None are proposed.

(3) MR-LD-3 Otter Creek MRMA (*Plate 2)*

This 3,919-acre area provides fishing, hunting, and a variety of other day use activities. It contains five accesses for hunting and fishing. Located on the Otter Creek arm of Wappapello Lake, this area provides a mixture of fields, bottomland timber, and oak-hickory forest, making it ideal for all types of hunting. One-lane boat ramps are located at the Strickland Point access and the Otter Creek access. Residential subdivisions are located directly to the south of both of these accesses on private property. In addition, the Ozark Trail, a national trail system, is routed through this area. Primitive camping is permitted within 300 feet of the trail in this area. Three inholdings are found in this area, which include USFS land (38.5 acres), Smoot Hollow near Taskee (40.36 acres), and Rucker Schoolhouse (1.75 acres). The Mississippi River Transmission Corporation (MRTC) pipeline dissects the eastern portion of this area in two locations.

Proposed New Actions: Coordinate with MRTC and USFS to control vehicle access to the pipeline easement. The service road to the pipeline presently has no vehicle controls, which has resulted in numerous unauthorized off-road vehicle trails being established from the pipeline corridor. Erosion, off-road vehicle use and poaching continue to cause management and environmental concerns, and could also cause damage to the pipeline. Access will be controlled by fencing and gating at access points adjacent to public roadways. Purchase inholdings from willing sellers only as discussed in Paragraph 10.04.

Proposed Replacement Actions: During high water events, 364.0 feet NGVD or greater, the boat ramp and lower parking lot at the Otter Creek access become inundated and are unusable. Relocating this boat ramp to the higher parking lot will make the ramp usable to elevation 372.0 feet NGVD. The lower parking lot and boat ramp will be removed.

(4) MR-LD-4 Cozort Point MRMA (*Plate 2*)

Located within this 232 acre area is a large 126.82-acre private inholding that was developed into a recreational community subdivision. Lake access is provided by a one-lane Corps maintained public boat ramp that provides direct access to the river channel.

Proposed New Actions: The name of the area was originally misspelled. The correct spelling of Cozort will now be used instead of Cozart.

Proposed Replacement Actions: None proposed at this time.

(5) MR-LD-5 Caldwell Creek MRMA (*Plate 2*)

Hunting and fishing are traditional uses of this 1,457-acre area. Access is provided by two hunting/fishing lots. The habitat includes various stages of bottomland succession with stands of upland forest scattered throughout the area. The hunting/fishing lot on Caldwell Creek provides bank fishing opportunities and access for small boats and canoes. The Ozark Trail traverses through the area. The MRTC pipeline bisects this area. Three inholdings, which include the Mine inholding (4.1 acres), Estes Cemetery (0.9 acres) and New Liberty Church (1.05 acres), are within the area.

Proposed New Actions: Coordinate with MRTC and USFS to control vehicular access to the pipeline easement. The service road to the pipeline presently has no vehicle controls, which has resulted in numerous unauthorized off-road vehicle trails being established from this pipeline corridor. Erosion, off-road vehicle use and poaching continue to cause management and environmental concerns, and could cause damage to the pipeline. Access will be controlled by fencing and gating at access points adjacent to public roadways. Purchase inholding from willing sellers only as discussed in Paragraph 10.04. Restore approximately 65 acres of wetland habitat that has been previously utilized for agricultural purposes. Three or four units, containing 15-20 acres each, will be restored. One unit will be managed as a green tree reservoir impoundment.

Proposed Replacement Actions: None proposed at this time.

(6) MR-LD-6 Walnut Cove MRMA (*Plate 2*)

Located halfway up the lake on the east side, this 1027-acre area provides seven hunting/fishing parking lots, with four of them having lake access. One-lane boat launching ramps are located at Paradise Point, Lost Creek Point, North Perkins Branch and Walnut Cove. This area provides excellent hunting and fishing opportunities. Upland forests provide quality habitat for deer, turkey and squirrels while bottomland areas offer suitable habitat for waterfowl. Three inholdings: Walnut Cove (11.352 acres), Paradise Point (18.77 acres) and Craft Subdivision (18.062 acres) are within the area.

Proposed New Actions: Purchase inholdings from willing sellers only as discussed in Paragraph 10.04. Restore approximately 10 acres of wetland habitat currently being used for other habitat management activities in the Perkins Branch area. Raise existing road through the bottomland area to facilitate as a berm for the wetland. Water control structures will be installed for water level manipulations.

Proposed Replacement Actions: None proposed at this time.

(7) MR-LD-7 Lost Creek Landing MRMA (*Plate 2*)

This 912-acre area provides fishing, hunting and a variety of other day use activities. A portion of this area also serves as a waterfowl refuge. Portions are closed to vehicle and boat traffic during the duck hunting season to provide necessary waterfowl resting areas. The site also receives heavy public use. Located within this area are two one-lane boat launching ramps, one at Lost Creek Landing and one at Lost Creek Low Water Bridge, and a primitive camping area at Lost Creek Landing. The Lost Creek Nature Trail, a one-mile loop, is part of the National Trail System and is part of the Watchable Wildlife program as a wildlife viewing area. A two-acre pond within the trail system has been stocked with largemouth bass, bluegill and catfish. A moist soil unit is located near the Warner Davis access.

Proposed New Actions: The name of the Warner Robins access within this area is incorrect. The name was taken from the last landowner before government acquisition, which was Warner Davis. The area will be renamed Warner Davis. The boundary line for the waterfowl refuge will be relocated. Portions of this refuge line are also located in Lost Creek MR-VM-10. The refuge line will be moved to the south side of Hatties Ford road and will continue east to Highway D, then south to the Corps boundary line. This will make it easier for the public to identify the refuge. The Hatties Ford road will be open to vehicular traffic during the duck season unless the area is flooded. This road is on the periphery of the refuge and will provide a potential viewing area for wildlife. A gate will be installed on the Warner Davis road and a three-car turnaround provided. The Warner Davis road will remain closed to vehicular traffic during the duck season. This change will increase the refuge by approximately 70 acres.

Proposed Replacement Actions: Increase the dimensions of the existing levee at the Warner Davis moist soil unit to augment water holding capabilities. Rehabilitation of the existing levee will allow for better control of water level manipulations and moist soil plant diversity.

(8) MR-LD-8 Pisos Point MRMA (*Plate 2*)

This 965-acre area is located on the east side of the lake and serves as a buffer zone between Camp SEMO Recreation Area, Possum Creek Recreation Area and Camp Latonka Recreation Area. In addition, there is a residential

subdivision located directly to the east of this area on private property. The site offers a one-lane boat launching ramp and parking lot. Three developed inholdings: Wilkison (0.185 acres), Lone Star Ridge (39.47 acres) and Pisos Point (4.7 acres) are located within this area. The shoreline is indented by several coves with the ridges primarily forested with oak-hickory. The area is divided into two sections by the Possum Creek Recreation Area.

Proposed New Actions: Purchase inholdings from willing sellers only as discussed in Section 10.04.

Proposed Replacement Actions: None are proposed at this time.

b. Wildlife Management

(1) MR-WM-1 Chollo Holly Wildlife Management Area (*Plate 2*)

This 1880-acre area is licensed to the MDC as the Chollo Holly Conservation Area, for fish and wildlife management purposes. Six parking areas provide public access. The Corps administers a preferential grazing lease within the area that allows original owners grazing rights during their lifetime. A mixed bottomland hardwood forest comprises the largest habitat type in this area. Upland forest and old field habitats account for approximately two-thirds of the habitat with cropland, pasture, savanna/glades and water composing another one-third. The major emphasis of management on Chollo Holly is to improve wildlife habitat. This is being accomplished through providing a stable food source utilizing leave crops, establishing field borders, planting cover strips to break up large fields, silvicultural treatments, and establishing permanent vegetation where needed. Habitats are manipulated mechanically, with prescribed fire and the use of approved herbicides to improve existing wildlife habitat and remove undesirable vegetation. Other management objectives are to increase diversity of forestland, implement soil conservation practices to control soil erosion and maintain water quality, and to protect and enhance the habitat of any rare, threatened or endangered species. A nature trail and 3.73 miles of the Ozark Trail traverse the area. This area is described further in Paragraph 3.02 b (2) and in Appendix II.

Proposed New and Replacement Actions: None are proposed at this time.

c. Vegetative Management

(1) MR-VM-1 University of Missouri Forest Resource Area (*Plate 2*)

This 741-acre area contains a 489-acre forest resource area that has been leased by University of Missouri, School of Forestry, Fisheries and Wildlife since 29 January 1957 for a hydrometeorologic research study site. The area has been used to collect data on acid rain, the effects of logging and land use practices on water quality, soil erosion, run-off and watershed stability. Developments within the area include a gravel road network, gauging instrumentation,

study structures and overhead electric line. The remaining 252 acres are predominantly forested and serve as a buffer between the lease area and Lake Wappapello State Park. Hall Hollow is used as a floating duck blind storage cove. Two 40-acre USFS inholdings are also within this area.

Proposed New and Replacement Actions: None are proposed at this time.

(2) MR-VM-2 Asher/Bluewater Creek (*Plate 2*)

This 998-acre vegetative management area contains a cross section of habitat communities. The uplands are oak-hickory forests that gently slope into the bottoms of Asher and Bluewater Creeks. These bottoms are composed of fields in various stages of succession. Old field and warm season grass fields are prevalent and interspersed with wildlife buffer zones and supplemental food plots. Prescribed burning and silvicultural treatments are used to improve habitat conditions. This offers a mosaic of vegetation types to support a myriad of flora and fauna. A Corps maintained parking area and roadway provide public access to the area. A 21-acre private inholding is within the area. Horseback riding and hunting are popular uses. The Lake Wappapello State Park and the University State Forest border the area with a section of the Lake Wappapello State Park license backpack trail crossing through the area.

Proposed New Actions: Purchase inholdings from willing sellers only as discussed in Section 10.04.

Proposed Replacement Actions: None are proposed at this time.

(3) MR-VM-3 Ojibway (*Plate 2*)

This 1,393-acre area varies from heavily forested bottomlands scattered with brushy draws to high-forested bluffs. Otter Creek is the main water source and meanders along the southern edge of this vegetative management area. Public access to the area is by service roads maintained by the USFS on the Mark Twain National Forest. Interior access is by walk-in only. The MRTC pipeline crosses a portion of this area. One inholding, Bethel Cemetery (3.78 acres), is located within this area. This area serves as a buffer to the Hawes Bluff Environmental Sensitive Area.

Proposed New Actions: Coordinate with MRTC and USFS to control vehicular access to the pipeline easement. The service road to the pipeline presently has no vehicle controls, which has resulted in numerous unauthorized off-road vehicle trails being established from this pipeline corridor. Erosion, off-road vehicle use and poaching continue to cause management and environmental concerns, which could cause possible damage to the pipeline. Access will be controlled by fencing and gating at access points adjacent to public roadways.

Proposed Replacement Actions: None are proposed at this time.

(4) MR-VM-4 Pleasant Valley (*Plate 2*)

The Ozark Trail, a trail that extends through the state and that was developed in cooperation with the MDC and the USFS, traverses this 1,832-acre area. Three Corps parking areas provide public access. Three cemetery inholdings including Wight (2.0 acres), Pleasant Valley (0.8 acres) and A.E. Jones (0.115 acres) are found within this area. The Civil War Veteran's Grave Memorial is also located in the area. The memorial consists of a lone pine tree, a sidewalk, bulletin boards, a flagpole, a light and a memorial plaque for an unknown soldier who died during the Civil War. These improvements were made and maintained by the local community, the Wappapello Eagles, Piedmont Eagles, Wayne County Eagles, VFW Post #3416, and the American Legion Post #281 under a special use permit. Upland forest is the predominant habitat and managed by silvicultural treatments. Bottomland sites are managed with prescribed burning, agricultural leasing and supplemental food plots.

Proposed New and Replacement Actions: None are proposed at this time.

(5) MR-VM-5 St. Francis West (*Plate 2*)

Nine Corps parking areas and a boat ramp provide public access throughout this 3120-acre area. The landscape typifies various stages of early bottomland succession associated with creek and riverine habitats. Stands of upland forest are scattered throughout the area. Agricultural leasing is a major management tool, which provides a supplemental food source for various wildlife species that inhabit the area and maintains open space and scenic value. Silvicultural treatments are also used to improve habitat conditions. Prescribed burning plays a major role in succession control and warm season grass management. A ruffed grouse release occurred here in 1981. An annual drumming survey is conducted to monitor the population. The Ozark Trail, which extends through the state and which was developed in cooperation with the MDC and the USFS, traverses the area. A state-endangered plant, *Clematis viorna*, a leather flower, has been identified and is listed on the Missouri Natural Heritage database. Five inholdings, which include the Moon inholding (3.244 acres), and four cemeteries: Meadors (0.299 acres), Hixson (0.3 acres), Old Rhubottom (0.32 acres) and New Rhubottom (0.51 acres), are also found within the area.

Proposed New Actions: Purchase inholdings from willing sellers only as discussed in Paragraph 10.04. Two existing parking areas, PA50 – Clark's Creek on US Highway 34 and PA58 – Costner Place on State Route FF will be enlarged to accommodate horse trailers. Both parking areas will provide access to the Ozark Trail. A one-half mile spur trail will be added to provide access from the Clark's Creek parking area to the Ozark trail.

Proposed Replacement Actions: None are proposed at this time.

(6) MR-VM-6 St. Francis East (*Plate 2*)

This 2,552-acre area is very similar in habitat and topography to the St. Francis West Vegetative Management Area. Eight Corps parking areas provide public access. The landscape typifies various stages of early bottomland succession associated with creek and riverine habitats. Old field growth and warm season grass plantings are maintained with prescribed burning. Forest lands are managed with different silvicultural treatments to provide diversity. Agricultural leasing is a major management tool and provides a supplemental food source. Succession control via haying provides habitat for various animal species that inhabit the area. The Military Road Moist Soil Unit utilizes a St. Francis River overflow channel to trap and hold water. This 11-acre unit is managed to promote desirable vegetation, invertebrate populations and amphibian habitat. The area is used extensively by waterfowl, shorebirds, mammals, and a wide array of frogs and songbirds. Five inholdings, which include the Bennett (.037 acres) and Hannapel (0.18 acres) cemeteries, the New Prospect Church (5.84 acres), and the Cowshed (2.084 acres) and CoStephens inholdings (1.15 acres), are within the area.

Proposed New Actions: Purchase inholdings from willing sellers only as discussed in Paragraph 10.04. Restore approximately 30-40 acres of wetland habitat within the Military Road area currently managed for other uses. Two or three units will be created, each consisting of 10-15 acres.

Proposed Replacement Actions: None are proposed at this time.

(7) MR-VM-7 Laconia (*Plate 2*)

This 922-acre area adjoins the Johnson Tract Environmental Sensitive Area. Public access is via one Corps parking area and three Wayne County roads. The area is predominantly fields with early succession bottomland forest. The extreme northeast section of Laconia contains an oak-hickory upland forest. Holliday Creek is the major interior water source. These habitats are managed by plantings, prescribed burns and silvicultural techniques. Adjacent to the St. Francis River, is a 7-acre moist soil unit. Water levels are controlled with a stop-log structure and managed to promote desirable vegetation, invertebrate populations and amphibian habitat. Lands adjacent to the moist soil unit contain ephemeral ponds, and supplemental food plots. The area is used extensively by waterfowl, shorebirds, mammals and a wide array of frogs and songbirds. An interpretive display, located on a spur trail off the Johnson Tract trail, explains the importance of managing and preserving wetlands.

Proposed New Actions: Restore approximately 40 acres of wetland habitat currently managed for other uses. The levee system will be constructed adjacent to the existing levee to provide quality habitat for wetland dependant species.

Proposed Replacement Actions: None are proposed at this time.

(8) MR-VM-8 Happy Hollow (*Plate 2*)

This 1,499-acre area adjoins the Sulphur Springs recreation area and the Kime Historic Area. Six Corps parking areas provide public access. This area is comprised of several habitat types that promote a diversity of wildlife. Habitats include upland oak-hickory forests, bottomlands in various successional stages, native warm season grasses and supplemental food plot areas for wildlife. Habitat is manipulated through various activities such as prescribed burning, wildlife plantings, succession control and forestry management techniques. This area is used for hunting and fishing and provides extensive recreational opportunities. The MRTC pipeline crosses a portion of this area. Two borrow areas, where fill was excavated for the raising of Hwy D and BB, provide a wetland area and a small pond for fishing opportunities.

Proposed New Actions: Coordinate with MRTC and USFS to control vehicular access to the pipeline easement. The service road to the pipeline presently has no vehicle controls, which has resulted in numerous unauthorized off-road vehicle trails being established from this pipeline corridor. Erosion, off-road vehicle use and poaching continue to cause management and environmental concerns, which could cause possible damage to the pipeline. Access will be controlled by fencing and gating at access points adjacent to public roadways. Bank fishing access to this area will be provided from the Berry Springs Road, RD16, because of the pipeline closure, This gravel roadway will be extended approximately 2,000 feet towards the lake with a five-vehicle parking lot (PA27a) installed at the end of the road.

Proposed Replacement Actions: None proposed at this time.

(9) MR-VM-9 Blue Springs (*Plate 2*)

This 2,014-acre area is heavily used for hunting and fishing. Five Corps parking areas and two one-lane boat ramps provide public access to the area. Habitat is almost equally divided between upland forest and bottomland early succession and is manipulated through prescribed burning, planting supplemental food sources, silvicultural treatments and bushhogging. On the north end of the area is Davidson’s Blue Spring, which pumps out approximately 31.7 million gallons of water per day. The site is popular for fishing. The MRTC pipeline crosses a portion of this area.

Proposed New Actions: Coordinate with MRTC and USFS to control vehicular access to the pipeline easement. The service road to the pipeline presently has no vehicle controls, which has resulted in numerous unauthorized off-road vehicle trails being established from this pipeline corridor. Erosion, off-road vehicle use and poaching continue to cause management and environmental concerns, and could possibly cause damage to the pipeline. Access will be controlled by fencing and gating at access points adjacent to

public roadways. Restore approximately 35 acres of wetland habitat in the Center Ridge area currently utilized for other management practices.

Proposed Replacement Actions: None are proposed at this time.

(10) MR-VM-10 Lost Creek (*Plate 2*)

Portions of this 2,680-acre area serve as the Lost Creek Waterfowl Refuge. Portions of the area are closed to vehicles, boat traffic and firearms hunting during the duck season. Walk-in access and bow hunting are allowed. Seven Corps parking areas and several Wayne County roads provide public access to this heavily used area. Three inholdings, which include the Lost Creek (179.32 acres) and Taner inholdings (40 acres), and Shiloh Cemetery (1.84 acres), are within the boundaries of this area. Jones Cemetery is also in this area and is maintained under a volunteer agreement with the Jones Cemetery Group. The East and West Forks of Lost Creek, Hickory Flats Creek and Little Creek are the interior water sources. Habitat is manipulated through prescribed burning, silvicultural treatments, planting supplemental food sources and bushhogging. The area serves as a buffer for the Deep Muck Fens Environmental Sensitive Area.

Proposed New Actions: Purchase inholdings from willing sellers only as discussed in Section 10.04. The boundary line for the waterfowl refuge will be relocated. Portions of this refuge line are located in Lost Creek Landing MRMA (MR-LD-7). The line will be moved to the south side of Hatties Ford road and will continue east to Highway D, then south to the Corps boundary line. This will make it easier for the public to identify the refuge. The Hatties Ford road will be open to vehicular traffic during the duck season unless the area is flooded. This road is on the periphery of the refuge and will provide a potential viewing area for wildlife. This change will increase the refuge by approximately 70 acres.

Proposed Replacement Actions: None are proposed at this time.

8.05 -- ENVIRONMENTAL SENSITIVE LANDS

The following areas have been classified as Environmental Sensitive Lands with two sub categories listed below:

ES-E -- Environmental Sensitive Area – Ecological

ES-C -- Environmental Sensitive Area – Cultural

a. Ecological

(1) ES-E-1 Hawes Bluff (*Plate 2*)

This 63-acre area has been identified because of its unique high limestone bluffs that are relatively unusual for this physiographic region. No roads or other developments exist on the area. Access is best achieved by boat, which contributes to the areas limited human impacts. The state-endangered Little Leafed Alum Root, *Heuchera parviflora var. parviflora* was last observed in 1981 and is listed in the Missouri Natural Heritage Database. An updated floral and faunal inventory will be conducted to determine its continued existence and the presence of any other rare, threatened or endangered species.

Proposed New Actions: Correct all previous references to Hall's Bluff to the proper spelling of Hawes Bluff.

Proposed Replacement Actions: None are proposed at this time.

(2) ES-E-2 Johnson Tract (*Plate 2*)

This 1,485-acre area features rugged hills cut by deep valleys. The majority of the area is covered with mature mixed hardwood and pine forests. A remnant dolomite glade exists on the topographical feature known as Cedar Bluff, and is being restored to pre-settlement conditions through prescribed burning. This interesting and biologically diverse area supports 602 taxa of vascular plants. A five-mile loop backpack trail with two primitive camp sites provides interior access. Two Corps maintained parking areas provide public access. The area contains a private inholding (Jones 9.5 acres).

Proposed New Actions: The Cedar Bluff glade will be burned every three years and large cedars removed. Purchase inholding from willing sellers only as discussed in Paragraph 10.04.

Proposed Replacement Actions: None are proposed at this time.

(3) ES-E-3 Deep Muck Fens (*Plate 2*)

This 132-acre area contains the Hatties Ford Fens. These fens are one of only eight deep muck fen complexes in Missouri. Fens are wetlands supplied with a constant source of minerotrophic phreatic water. These deep muck fens are characterized by organic soils with a component of mucky sedge peat, with soil depths typically exceeding 40 inches. Vegetative sampling and inventory work conducted by The Nature Conservancy documented that the Hatties Ford Fen system is markedly different in vegetational composition from other deep muck fens and represents a unique expression of this natural community.

The Hatties Ford fens harbor several state rare or endangered species including the four-toed salamander, *(Hemidactylium scutatum)*, Canada Rush, (*Juncus canadensis var canadensis,* and Loesel's Twayblade Orchid, *(Liparis loeseli)i*. A 1994 invertebrate census turned up the rare toothpick grasshopper. This species is restricted to undisturbed high-quality natural areas and their presence is an indicator of the fens' overall health.

In 1995, the St. Louis District entered into a MOU with The Nature Conservancy for the purposes of carrying out assessment and management activities on Corps land in Missouri. As a result, a management plan was written in 1996 to safeguard this unique wetland system. The goals of the plan are to maintain and enhance the biodiversity of the fen system, maintain the integrity of the hydrological cycle, decrease cattail (*Typha lattifolia)* populations and maintain the size and vigor of the Canada Rush and Loesel's Twayblade Orchid. These goals are and will be accomplished through water quality monitoring, photomonitoring, prescribed burning and future inventories of flora and fauna to determine their response to the management. Public awareness for this community will be accomplished through brochures, interpretive signs and incorporation into the Watchable Wildlife Program.

The Hatties Ford Fens are designated as a Nature Conservancy Natural Area Registry site. They will also be nominated for inclusion as a Missouri Natural Area.

A Corps maintained road and parking area provides public access.

Proposed New Actions: Construct a self-guided trail and brochure to interpret this unique area.

Proposed Replacement Actions: None proposed at this time.

b. Cultural

(1) ES-C-1 Chaonia Historic Area (*Plate 2*)

This 110-acre area is set aside to recognize the community that thrived here prior to the development of Wappapello Lake. The area was the site of a logging community during the 1800s. Foundations, sidewalks, a ferry landing point and remains of iron ore smelters can still be found in the area. The site will be evaluated as part of a comprehensive cultural resource survey to determine its eligibility for nomination to the *National Register of Historic Places* and protection as required by law. Public awareness and interpretation of the site through brochures may be accomplished in the future.

Proposed New and Replacement Actions: None proposed at this time.

(2) ES-C-2 Taskee Historic Area (*Plate 2*)

This 120-acre area is set aside because of its significance as a railroad center during the 1800s. It is the site of the first known railroad station within the Project area and served as a center for commerce. Several foundations can still be located within the area. The site will be evaluated as part of a comprehensive cultural resource survey to determine its eligibility for nomination to the *National Register of Historic Places* and protected as required by law. Public awareness and interpretation of the site through brochures may be available in the future.

Proposed New and Replacement Actions: None proposed at this time.

(3) ES-C-3 Old Greenville Historic Area (*Plate 2 and Plate 13*)

The Old Greenville National Historic Site includes 137 acres located at the original town site. Of this area, 47 acres are located within the Greenville Recreation Area and are classified as recreation lands; and the remaining 90 acres are located north of the recreation area and are classified as environmentally sensitive.

Old Greenville and three private cemeteries were placed on the *National Register of Historic Places* in March of 1990 and are protected as required by the National Historic Preservation Act of 1966. Two of the cemeteries are inholdings (Union and Wight) with the third being adjacent to public land (Hickman). In cooperation with the Wayne County Historical Society, the Corps developed and maintains a walking trail, known as Memory Lane, through the remaining sidewalks and foundations of the old town. Interpretive markers depicting each site allow visitors to go back in time to see the town as it was during its height of prosperity. A gazebo is also in place and traces the history of the town's development and the important role it played as the county seat of Wayne County.

Proposed New and Replacement Actions: None proposed at this time.

(4) ES-C-4 Kime Historic Area (*Plate 2*)

This 175-acre site is set aside to recognize its significance as a community center dating back to the turn of the century. Several foundations from homes and businesses can still be seen in the area. Kirkpatrick Cemetery (1.04 acres) inholding is nearby and contains graves dating back to the 1800s. The site will be evaluated as part of a comprehensive cultural resource survey to determine its eligibility for nomination to the *National Register of Historic Places* and protected as required by law. Public awareness and interpretation of the site through brochures may be accomplished in the future.

Proposed New and Replacement Actions: None proposed at this time.

8.06 -- IMPLEMENTATION

a. Introduction

The means of accomplishing a development program is equally as important as the plan itself. Current national priorities limit development and renovation options more than in the past. Recreation visitation to Wappapello Lake is no longer increasing at the annual rate of the 1960s, 1970s and 1980s. Nevertheless, a need exists for the proposals contained in this Master Plan; and this need is expected to become greater in the future. It should also be recognized that changing priorities could drastically affect the manner and schedule for Master Plan implementation. This plan will have continuing utility despite any changing priorities that may affect its implementation.

b. Implementation Methods

There are six basic implementation methods and an ad-hoc method currently available for recreational and resource development at Wappapello Lake:

(1) Cost Sharing

Requirements for cost sharing recreational development with non-federal public interests will be considered when the need for such facilities can be sufficiently demonstrated. Although this Master Plan does not contain any cost-sharing proposals, it may in the future serve as a basis for initiating such actions.

The current Corps regulation, ER 1165-2-400, requires that all recreational developments be cost shared 50 percent by non-federal public agencies. The non-federal sponsor is required to enter into a cost-sharing contract with the Corps prior to construction and agree to assume operation and maintenance responsibilities for the completed recreation facility. There are two exceptions to

this policy. These exceptions permit the construction, operation and maintenance of new facilities without cost sharing:

(a) One exception is the authority for upgrading sanitary facilities in existing Corps managed recreation areas to meet urgent sanitation needs in accordance with provisions of applicable state and federal laws.

(b) The second exception involves the use of the Special Recreation User Fee (SRUF) funds, which is discussed in Paragraph (3) below.

(2) Development Solely by Local Interests Under an Outgrant

As in the past, local governmental entities with all or part of a project in their jurisdiction, may obtain use, under a lease or license. All costs are the sole responsibility of the local sponsor.

(3) Use of Special Recreation User Fee (SRUF) Revenues

Special recreation user fee revenues, which are rebated to the District, will be available to accomplish a wide range of actions. Essentially, these funds may be used to decrease project operation and maintenance costs and/or to increase user fee revenues, but only in existing recreation areas. Means of achieving these goals may generally include renovation, consolidation, separation of day-use and overnight areas, addition of facilities or features thereof, and payment of operation and maintenance costs including those for fee collection and other improvements on a case-by-case basis. According to October 1984 guidance on the use of SRUF funds, they may also be applied to the provision of barrier-free access for people with physical disabilities. Under this implementation method, operation, maintenance, and major replacement responsibilities would remain with the Corps or, with changed local conditions, could conceivably be assumed by an outgrantee.

(4) Regular MR&T General Funds

The use of MR&T O&M funds is restricted to normal O&M activities and to where facilities are in need of total renovation, reconstruction, or replacement. Changes or upgrades to facilities is restricted to current MR&T O&M funding levels for replacement or rebuilding of existing facilities.

(5) Development by Concessionaire

The fifth development method that could be used at Wappapello Lake involves the implementation of some of the plans proposed in this Master Plan by a concessionaire. Only activities for which there is a viable commercial market are eligible. For developments undertaken in this manner, operation, maintenance, and major replacements are also provided by the concessionaire.

(6) Challenge Cost-Share

The challenge cost-sharing program provides opportunities for public and non-federal groups and individuals to contribute to and participate in the operation and/or management of recreation facilities and natural resources at Corps water resource development projects. Partnering with others provides a way to stretch the Corps budget by sharing the cost of operating and managing recreation facilities and natural resources.

(7) Congressional Mandate

A member of Congress or the Senate could sponsor a bill authorizing funds for specific facilities that cannot be obtained by conventional means.

SECTION IX – FACILITY LOAD AND OTHER DESIGN CRITERIA

9.01 -- SITING

All proposed structures will be located at the highest possible elevation that meets users' needs with site selection, based on soil types and erosion potential.

a. Buildings. Buildings are generally located in areas of tree cover providing the recreational user with isolation and screening from other uses or activities and providing an aesthetically pleasing area.

b. Topography. The topography of the area will be utilized to the best possible advantage by placement of the buildings to provide the user with a scenic view.

c. Trails. The siting of trails was determined by the locations that would provide the best water and nature orientation. Trails are generally located below 395.0 feet NGVD flood pool elevation. In some areas trails will be used by operational vehicles for service and maintenance. A typical section is shown on Plate 22.

d. Roads. Road siting where possible was limited to level areas located away from extensive tree cover, and above flood pool.

9.02 -- ROADS

See Plate 22.

9.03 -- BOAT LAUNCHING RAMPS

See Plate 22.

9.04 -- PICNIC SHELTERS

See Plate 22.

9.05 -- SWIMMING BEACH

See Plate 22.

9.06 -- COMFORT STATIONS

See Plate 22.

9.07 -- SIGNS

All new signs will be installed, as required, by project personnel and will conform to *OCE Sign Manual, EP 310-1-6 a and b*, and the *Graphic Standards Manual, EP 310-1-6*.

9.08 -- INTERPRETIVE DEVICES

Nature trails, markers, visual aids, and displays are provided by lake personnel, as required.

9.09 -- WASTE AND DISPOSAL

Trash and refuse collection and disposal services are contracted to private haulers. A partnership is in place for a community recycle center presently located at the Eagle Point Recreation Area with the Ozark Foothills Regional Planning Commission. This not-for-profit organization provides and maintains recycling bins for glass, plastic, newspaper, tin and aluminum to reduce the amount of solid waste going to the landfill. The Wappapello Lions Club also collects, maintains and recycles aluminum cans at various recreation areas at the Dam area. The Wayne County Historical Service provides this service at the Greenville Recreation Area.

9.10 -- WATER AND SEWER – DESIGN CRITERIA

a. Waste Collection and Treatment. Sewer design is to be in accordance with the requirements of the MDNR, and Corps of Engineers Memorandum (EM) 1110-1-400*, Recreation Planning and Design Criteria*, and other standards and conditions as required by the Corps of Engineers.

Generally, sewers will be located to obtain maximum use of gravity flow mains by following contours. Lift stations and force mains were provided as necessary to transfer flow from locations having low ground elevations relative to the ground elevation downstream. Where possible, gravity sewers from several buildings will be grouped to intersect at a common lift station. For planning purposes, gravity sewers are based upon 8-inch diameter PVC service laterals.

Lift Station sizing is based upon all sewage being pumped within an 18 hour day with a peak flow factor of 2.5 times and average of 30 GPD per

person for campers and 5 GPD per person for picnickers using waterborne toilets. Minimum size for force mains is 4-inch diameter.

Sewage treatment is to be in accordance with the requirements of the MDNR, and EM 1110-1-400*, Recreation Planning and Design Criteria* and other standards and conditions as required by the Corps. Facility loading is based upon all camping spaces fully occupied on a weekend day without any additional overflows permitted to occur during seasonal or holiday peaks. The main sewage treatment facility at Wappapello Lake is a land application method. This method of treatment has been found to be more economical with regard to operation and maintenance than the package treatment plants. Two package extended aeration treatment plants have been eliminated at Wappapello Lake since the last update. The land application method of wastewater meets the MDNR requirements and provides the same or better level of treatment as the package treatment facilities.

b. Water System. Water systems design is to be in accordance with the requirements of EM 1110-1-400*, Recreation Planning and Design Criteria,* and other standards and conditions as required by the Corps. At the present time, wells provide for all water needs at Wappapello Lake. Wells are constructed to standards mandated by the MDNR for public water supply wells. Water storage is sized on case-by-case basis as dictated by facilities to be served.

Domestic water demand is based upon 30 GPD average per person assuming that all water consumed in one day is used within 18 hours. The maximum hourly rate of demand is based upon a peak factor of 2.5 times average flow.

Main sizing is based upon peak domestic rate of flow to maintain required residual pressures for flush valves. Looping of water lines has not been provided. Sizing of service line to buildings is based upon fixture units flow requirements in accordance with the *National Plumbing Code*.

The possibility of connection to Wayne County Public Supply District #4 and Public Water Supply District #2 will be considered in the future as a supply of water at certain recreation areas.

9.11 -- POLICIES AND PROCEDURES PUBLICATIONS

a. General policies and procedures for planning, design, operation, and maintenance of recreation facilities at USACE Civil Works projects are given in engineers manuals (EM), engineers regulations (ER), and engineer pamphlets (EP) referenced below:

(1) *EM 1110-1-400. Recreation Planning and Design Criteria*.

(2) *ER 1110-2-400. Design of Recreation Sites, Area, and Facilities*.

(3) *ER 1130-2-550. Recreation Operations and Maintenance Policies*.

(4) EP 1130-2-550. Recreation Operations and Maintenance Guidance and Procedures.

(5) ER 1130-2-400. Management of Natural Resources and Outdoor Recreation at Civil Works Water Resource Projects.

(6) ER 1165-2-400. Water Resource Policies and Authorities, Recreational Planning, Development, and Management Policies.

(7) EP 310-1-6. Graphic Standards Manual.

(8) EP 310-1-6a and b. Sign Standards Manual.

b. These publications guide the development of recreational facilities to assure that the facilities are of the highest quality while serving the health, safety and enjoyment of the visiting public.

SECTION X - SPECIAL PROBLEMS

10.01 -- CULTURAL AND HISTORICAL PRESERVATION

Wappapello Lake Project has several significant archeological, historical and cultural sites and every attempt is being made to protect these sites. They range from ancient Native American sites to settlement sites abandoned as the lake was constructed and flooded. A historical property plan is being developed for the project and is scheduled for implementation this year.

A major and recurring problem is the illegal taking of artifacts from project lands, specifically Native American relics. Occurrences range from removal of arrowheads in fields to illegal excavation of pottery from burial sites. This problem is more prevalent when the lake is at conservation pool.

Corrective measures to be implemented include more frequent and unannounced patrols, and support from local citizens and law enforcement agencies. Locations of archeological sites will not be publicly disseminated. Inventories are scheduled in areas where new construction and management activities are planned.

10.02 -- PIPELINE

Since the development of Wappapello Lake, ownership of the lands on which the MRTC's pipeline lies has been in question. On 28 January 1999, the determination was made that Wappapello Lake owns free title to the land on which the pipeline exists. However, the MRTC has an easement giving them the right of access and the use of this property.

Problems have developed on the pipeline such as unauthorized dumping, off-road vehicle use, damage to wildlife areas, erosion and other violations of Title 36, CFR. These problems will be resolved by the installation of fences and gates, which control key access points. Hopefully, these actions will reduce maintenance and resolve many of the recurring problems. All actions on this matter will be coordinated with MRTC and the United States Forest Service.

10.03 -- BOUNDARY ENCROACHMENTS

To date, approximately 99 percent of the Wappapello Lake Project boundary line is certified. Work is progressing to complete field marking and encroachment resolution. Boundary activities include survey certification and establishment, inspection and maintenance of certified lines, boundary line agreements, fencing agreements and encroachment resolution. Encroachments have posed a significant problem to completion of boundary line certification. An

aggressive boundary maintenance and monitoring program is necessary to enforce established boundary lines and prevent future encroachments.

Government surveys have been the major proponent leading to the discrepancies that result in encroachments. Boundary committees are formed when needed to visit problem areas and make determinations for problem resolution. Some encroachments have existed for several years and may require litigation to resolve, while new encroachments that arise from re-surveys should be resolved quickly. Encroachment resolution requires project personnel working closely with the St. Louis District Office elements to facilitate timely and equitable resolution. The goal of the Wappapello Lake Project staff is to resolve and prevent encroachments on project lands through aggressive public education and continued monitoring to prevent future encroachments.

10.04 -- INHOLDINGS

There are numerous tracts of private land interspersed within the Wappapello Lake Project boundaries that were not purchased when the project was authorized. These areas present several problems, such as inundation from the lake, access via easements for roads and utilities and environmental problems such as habitat degradation and fragmentation. A very prominent reason for purchasing these lands is the prevention of future claims due to flooding and property damage. The acquisition cost of purchasing these areas to prevent future development by private interests may be substantially lower than the cost of paying for re-occurring flood damages.

Land donations and purchase for mitigation are potential methods for obtaining these areas. Mitigation from projects, such as new easements for powerlines and widening of existing major highways, could be used to permit the project to have a “no net loss” of habitat. Donations, mitigation, and acquisition of these areas will be accomplished through purchases from willing sellers.

Authority for purchasing inholdings does not currently exist. Subsequent to identifying an opportunity to acquire an inholding, a real estate design memorandum would then be prepared by Real Estate Division to complete the acquisition.

10.05 -- RELOCATION OF STATE HIGHWAYS AND WAYNE COUNTY ROADS

In July 1997, a Real Estate Design Memorandum was approved that presented the plan for remedial action for State of Missouri highways and Wayne County roads that are being adversely flooded by operation of the Wappapello Lake Project. The state highways to be affected are Routes D, BB and FF. The county roads affected are Roads 221, 380, 523, 526, 531, and 538.

The memorandum was prepared in compliance with Engineering Regulation ER 405-1-12 paragraph 17-64 and serves as the plan for remedial action on the above mentioned state highways and county roads, and established the legal obligation of the federal government. It was determined that changes in the Water Control Plan for Wappapello Lake from the time of original acquisitions to the present caused the roads to be flooded at greater frequency and to a greater depth. As a result, the following actions will be performed.

a. The following State of Missouri highways will be relocated/raised at federal expense:

(1) Highway D (Sites D-1 through D-7)

(2) Highway BB

b. The following Wayne County roads will also be relocated/raised at federal expense:

(1) Road 221

(2) Road 523

(3) Road 526

(4) Road 531

(5) Road 538

Subordination will be used for State Highway FF and Wayne County Road 380. In order to prevent future development of non-federal lands creating isolation of residences due to flooding of FF and County Road 380, it is proposed to acquire in fee title two 80-acre parcels of land, which require access from FF. Subordination of this area will not leave residences isolated from emergency services, mail, or school buses, but will require alternate routes during times of Highway FF flooding.

The relocation will be accomplished by raising or moving the relevant state and county roads to meet the 100-year flood level requirements. For state highways the elevation is 405 feet National Geodetic Vertical Datum (NGVD), which includes two feet of freeboard and for county roads the elevation is 397 feet NGVD which includes two feet of freeboard.

Relocation work has begun and is scheduled to be completed by 2006, provided adequate funding is available.

10.06 -- U.S. ROUTE 67 UPGRADE

The Missouri Department of Transportation is conducting a location study that will examine transportation improvements to U.S. Route 67 in Madison, Wayne and Butler counties in Missouri. The objective of the proposed U.S. Route 67 improvement is to provide a safe, efficient, environmentally sound and economical transportation facility, while addressing projected traffic demands and congestion. This study will look at multiple corridors and determine the best alternative. The St. Louis District is a cooperating agency on this project. Coordination will continue as information is provided on the environmental impacts of the project on Wappapello Lake's land and facilities and required regulatory permits. Coordination is needed to minimize impact and to ensure adequate mitigation and compensation for any land or facility impacted. For lands effected and lost, the acquisition of inholdings and contiguous areas as a means of mitigation will be authorized.

10.07 -- FLOODING OF ADJACENT LANDOWNERS

There are numerous areas around Wappapello Lake where floodwaters inundate USFS and MDC lands and private property. Eighty-three tracts of land have been identified that would flood at 400 feet NGVD. Currently eleven separate flowage easements (162.7 acres of private land) are in place. The government has no control over the construction of structural or mineral activity on these flowage easement tracts.

Flooding of adjacent USFS land is permitted through an agreement from the Secretary of the Department of Agriculture to the Secretary of War on July 27, 1940. The current USFS policy of consolidating ownership can result in land exchanges with private land owners. USFS deeds for these floodable tracts do not contain perpetual rights for the government to flood these tracts in the event they are transferred to private entities. The Corps will work with the USFS to incorporate flowage rights on these deeds.

There are several adjacent MDC and private tracts that flood that are not covered by any type of real estate instrument that gives the government perpetual rights to inundate them with floodwaters of Wappapello Lake.

Changes in the water control plan for Wappapello Lake as discussed in Paragraph 10-5 raised the 100-year flood level to 405.0 feet NGVD. This elevation will impact other additional land presently without flowage easements. Deed corrections to add flowage easements, land swaps and purchasing additional lands are options that are being pursued by the Corps to address this problem.

10.08 -- FOREST MANAGEMENT

Wappapello Lake Project has a variety of forest cover types ranging from central upland hardwood forest to bottomland hardwood forest. These forests provide food and shelter for a variety of game and non-game species. Proper forest stocking, adequate understory growth and herbaceous plants provide excellent watershed filters. This filtering of silt and contaminants helps maintain good water quality for fish and other aquatic wildlife. Proper forest management techniques and ecosystem management principles will be used to improve forest and wildlife habitats, while minimizing environmental damage. Management activities will be accomplished to meet the Corps objective of total ecosystem management, through following specific forest and wildlife management prescriptions developed for each compartment. Treatments and activities scheduled for Wappapello Lake are found in the Project OMP.

a. General Management Techniques.

(1) All forests will be managed on a uneven-aged multiple-use, sustained yield and ecosystem management system. Treatments will be based on specific requirements for improvement of forest and wildlife habitats. Timber harvests shall be performed when necessary to promote accepted wildlife and forest management goals and objectives. Forest stands will not be harvested solely for revenue generation.

(2) Single Tree Selection is the selective removal of low quality, cull, diseased, over-mature or undesirable trees from a stand to achieve target stocking and wildlife habitat objectives. This technique is a tool used in uneven-aged management to encourage wider distribution of tree diameters, dominant species, age class and enhancement of forest reproduction. Because single tree selection promotes denser stands, frequent re-assessments or inventories are required. These re-assessments allow managers the ability to closely monitor compartments, therefore maintaining healthy forest and wildlife habitats.

(3) Group selection is a silvicultural technique requiring removal of large groups of trees to enhance regeneration and provide openings for wildlife. Generally, group selections range in size from one-fourth acre to five acres. Group selections on Wappapello Lake will not exceed three acres unless adequate justification is provided.

(4) Stand composition will be based on site-species relationships. Most of the forestland on Wappapello Lake contains an oak component; therefore, these species will be targeted for propagation. Efforts will be made to prevent monocultures, or single species stands. Exceptions will be made for small plantings of pine stands that do provide a specific habitat type for certain wildlife species. Stands suitable as pine-hardwood will be encouraged because historically, this type was once common on project lands.

(5) Prescribed fire will be utilized for vegetation modification and control where these benefits will promote diversity for wildlife habitats. Examples include old fields, pine stands, glades, and oak savannas. Burn frequency will be dependent on the requirements of the wildlife species, successional stage and fuel loads.

(6) Harvesting of forest products will be performed as a method of improving forest habitats. All harvesting activities will be performed in a manner that minimizes damage to residual trees, reproduction, and soils. This may require restrictions on equipment and the season harvesting as scheduled. Existing roads and trails will be utilized when possible or temporary accesses will be used for the harvesting activities. After harvest, all roads will be planted in wildlife cover crops such as wheat, oats or rye grass. Waterbars will be placed at intervals necessary to prevent erosion. Stream courses will be delineated and protected. Harvesting will be limited to single tree selection in stream management zones. All trees selected for removal will be marked with tree marking paint.

(7) Den trees, or trees that have potential as den trees, will be retained in all stands. Where possible, a standard rule will be to retain or develop 6 to 8 den trees per acre. Dead trees and snags, when not posing a threat to persons or property, will be left.

(8) When wildfire, disease, insects, floods or storms damage extensive numbers or acres of trees, every attempt will be made to remove these trees by salvage sale. Salvage operations will be performed as soon as practicable after the event to prevent deterioration of wood quality.

10.09 -- FLUCTUATION OF LAKE LEVEL

Wappapello Lake fluctuates throughout each year, depending on rainfall, runoff and water control operations. Because of the nature of the topography of the area, the lake has been known to rise and fall more than 40 feet during a flood event. Rises of 20 feet or more are not uncommon. Many of the lake's recreation areas were developed based on use at the area without consideration of flooding. As the level of the lake rises, portions of the areas are inundated, there-by restricting their use. The degree and length of restriction depends upon the severity of the flood. Annual flooding has at least some detrimental effects on recreation and area businesses at the lake. Major recreational developments must be closed, with swimming, camping and boat launching facilities often inundated. Adverse side effects also include the damage to roads, turf, trees along the shoreline, accumulation of driftwood, reduction of visitation and loss of income to area businesses. The fish populations could be adversely affected if spawning coincides with receding high water. The inundated areas are unsightly once the water recedes, leaving behind piles of debris and driftwood. Flooding results in increased maintenance cost for repair and flood cleanup. Management

practices which are planned to reduce the effects of flood on recreation activities include planting of water-tolerant grasses in low lying areas, planting bottomland hardwoods in flood prone fields, raising low portions of access roads (Greenville Campground), widening roads to allow access during times of moderate flooding (Peoples Creek Campground), and design of facilities to withstand flooding with minimal cleanup. Future construction activities will be at the highest possible elevation that is practicable.

One major concern that has been identified is the need for a high-water boat-launching ramp in the northern portion of the lake. Two boat launching ramps at the southern portion of the lake, Redman Creek and Sundowner, remain open through elevation 383 feet NGVD and 378 feet NGVD, respectively. The major accesses on the northern end of the lake, Chaonia Landing, Holliday Landing and Greenville, flood at 370 feet NGVD, 369.5 feet NGVD and 368.5 feet NGVD, respectively. These elevations are reached almost on a yearly basis. The northern part of the lake was examined to find a location that would support a boat launching ramp with 50 plus parking spaces that is within an existing recreation area with good road access. No high-water boat launching ramp was identified in this Master Plan Update, this deficiency has been identified and other solutions will be examined.

10.10 -- RESORT CONCESSION DEVELOPMENT

In the previous Master Plan, three areas were held in reserve for a future concession resort development. These three areas were a portion of the Chaonia Landing Recreation Area, a portion of Possum Creek Recreation Area and the Silva Resort Concession Area. No major interest was shown for these sites. Infrastructure needs appear to be the obstacle for this type of development. The lack of public water and sewer service and the remoteness from major access roads have negatively affected possible developments.

This plan has identified a portion of the 34 Bridge Recreation Area as an area well suited for a possible resort complex. There is good road access and a large amount of land suitable for development. Public water service is scheduled for the area. The area lends itself to an Ozark River theme, including a day use park, lodge, camping, canoeing, horseback riding and/or a hunting/trading post type of resort concession. An invitation for proposals will require a market feasibility study, by interested parties, to verify a genuine need for this type of development being proposed. In the event this area is developed, a cultural resource inventory will be required prior to any development.

SECTION XI – SPECIAL PROGRAMS

11.01 -- HYDRO-POWER

The Wappapello Lake Gatehouse is the location of a small hydroelectric turbine and generator. This generator, rated at 125 kW, 480 volt, 60 Hz, 3-phase, produces electric for use at the project. Facilities presently utilizing hydro-electric power include, the gatehouse, lights on the dam, lights in Redman Creek and Spillway Recreation Areas, Redman Creek Day Use restroom and shelter, Visitor Center overlook shelter and restroom, and Spillway restroom. As a backup source, the Project Office and Visitor Center can be placed on hydropower.

Fluctuating lake levels, discharge rates and mechanical response time can limit the ability of the unit to produce constant voltage and at maximum levels. During these times commercial power is utilized. In August of 1997 a study was made to determine the feasibility of placing the hydroelectric unit on the local commercial system. This would maximize the unit’s production of hydro-electricity. This study helped determine that it was not economically beneficial to proceed with this option. The project will continue to look at ways to maximize the use of this hydroelectric power that are cost effective.

11.02 -- MARINAS

The U.S. Army Corps of Engineers promotes recreational boating at Wappapello Lake by making public land available under lease agreement to private operators for provision of marina facilities and services. There are five existing public marinas on Wappapello Lake. Demand for boat slips on Wappapello Lake has stabilized, with the existing marinas meeting the demand.

Barrett's Resort and Marina is located on the south end of the lake, one mile north of State Hwy RA. Sundowner Marina is located just north of the dam on State Hwy D. Chaonia Landing Resort and Marina is located on the west side of the lake at the end of State Hwy W. Holliday Landing Resort and Marina is located on the west side at the northern end of the lake off State Hwy F. Lost Creek Lodge is located on the Lost Creek Arm of the lake approximately 3 miles from State Hwy BB.

Barrett's Resort and Marina offers 172-boat slips, a store, and fuel sales. A resort with cabins and swimming pool are located on private property adjoining the marina area. At present, the operator has no plans to expand the facility, but does have approval for 22 additional in-water boat slips. The marina is presently 99 percent full.

Sundowner Marina is a full-service boat facility, offering 112 boat slips, fuel, repairs and boat sales. Boat sales and repair are located on private property adjoining the marina area. There are no plans to expand the dock facilities but

the potential for an additional 40-50 slips is available if demand warrants. Presently the marina is 85 percent full.

Chaonia Landing Resort and Marina is the second largest marina on the lake and receives the most year-round use. This 126-boat slip facility also includes fuel sales, cabins, swimming pool, camping, limited dry storage, restaurant and a store. Upgrading of docks is scheduled within the next ten years. Limited potential for dry and wet slip spaces are available; however, the marina is only 75 percent full.

Holliday Landing Resort and Marina includes an 80-boat slip and a 25 dry unit storage area. This facility also includes fuel sales, a 51-unit campground, cabins and a store. The marina is 85 percent full with limited room for expansion. Located on the northern end of the lake, the facility is exposed to strong river currents after a significant rainfall. The marina is protected by a breakwater that diverts current and debris, but also limits the possibility of expansion.

The Lost Creek Lodge is a small facility with 20 boat slips. Eight campsites are located within the lease area with additional campsite and cabins on private property adjacent to the area. The marina is 75 percent full with no plans for expansion.

The previous Master Plan included a marina at the Lake Wappapello State Park. In January 1994, this marina was destroyed by heavy snow and wind and was removed. The State has attempted to re-establish the marina several times without success. A marina replacement is not presently planned for this area; however, this option may be considered in the future.

11.03 -- SHORELINE MANAGEMENT PLAN

The Shoreline Management Plan (formerly entitled Lakeshore Management Plan) for Wappapello Lake was prepared and implemented to protect and manage the shoreline in a manner that will promote the safe and healthful use of these shorelines by the public while maintaining environmental safeguards to ensure a quality resource for use by the public. This Master Plan update will be utilized to make minor revisions to the Shoreline Management Plan for Wappapello Lake, (under separate cover in the Project OMP).

Public comments received in conjunction with the Master Plan Update were considered in this periodic review. One area that received several comments was a request to install a new dock in the Redman Creek cove. This need is presently being served by a commercial marina. Five public boat launching ramps also service this area of the lake. Consequently, this requested change to the Shoreline Management Plan will not be made. The existing plan is working well and is serving and meeting a majority of the community and user needs. Shoreline allocations will remain the same and are delineated on Plate 21. The presence of five commercial mooring facilities (with open slips) and the

twenty-nine public boat launching ramps provide adequate access within a reasonable distance on Wappapello Lake's shoreline. The following minor revisions will be incorporated into the Shoreline Management Plan for Wappapello Lake in accordance with ER 1130-2-406 *Shoreline Management at Civil Works Projects*.

a. Change the name of the plan from *Lakeshore Management Plan for Wappapello Lake* to *Shoreline Management Plan for Wappapello Lake*.

b. Reposition the legend and title on the allocation map and reorient map. Reference Plate 21.

c. Page 9, Section 5.4, 2(b) Existing Permanent Duckblinds. This section will be deleted; no permanent Duck blinds are present on Wappapello Lake.

d. Page 8, Section 5.2, "Existing docks in Limited Development Areas" and 5.3 "Existing Dock in Other Allocated Areas" paragraphs (a) and (b) state, "docks will be allowed to remain in their present location until transfer of ownership, death of the present permittee or repair cost to the facilities exceed 50 percent of the replacement value of that facility (provided that the structure passes annual inspection)." These statements will be removed and replaced with the following: "Existing docks may remain if they meet the three conditions below, except where necessary for immediate use for public purposes or higher public use for a navigation or flood control project:

(1) Such property is maintained in useable and safe conditions;

(2) Such property does not occasion a threat to life or property; and

(3) The holder of the permit is in substantial compliance with the existing permit.

e. Page 10, Section 5.4.e *note* contains the sentence "Unoccupied duckblinds may be used by the first hunter arriving." This sentence will be removed and replaced with "Permitted duckblinds may only be used by the permittee(s) and their guests. Use of unoccupied duck blinds by the general public is prohibited."

f. Page 12, Section 5.11, Duration and Administration Fees. Replace this paragraph with the following. (These are administrative charges; there is no increase in the fees.)

> "Duration and Administration Fees. Permits for private floating facilities will be issued for a period of 5 years. The charge will be $10 for the initial permit, plus a $5 inspection fee per annum for a total of $30 over the life of the permit. Permits for vegetation alteration and erosion control devices will be issued for a period of five years at no charge. Permits for duck

blinds will be issued for a period of one year and there will be a $15 registration fee. All fees for issuance of a permit will be collected in advance of the inspection. In the event that the permit is terminated or revoked before its expiration date, no portion of the fee will be rebated for the unused tenure of the permit. Fees may be paid in the forms of cash, check, or money order payable to FAO USACE, St. Louis. Only the exact amount of the fee due will be accepted. A receipt will be given for all cash transactions. All fees will be collected by the Operations Manager at Wappapello Lake. Fees are collected to cover administrative cost and inspection services and are forwarded as general receipts to the Treasury of the United States."

g. Attachment G, "Permit Fee Schedule", will be changed. The duration for Vegetation Alteration Shoreline Use Permit will be changed from one year to five years.

11.04 -- USER FEES

PL 103-66, the Omnibus Budget Reconciliation Act of 1993, authorized the Corps to expand its recreation user fee program. The act authorizes the charging of user fees for day-use facilities. There is no authority for charging entrance fees at Corps operated recreation areas. Fees will be charged for the use of certain boat launching ramps and designated developed swimming beaches in Corps operated day-use recreation areas. Total day-user fees collected will be no more than $3 per vehicle per day. A day-user fee of $2 will be charged to launch a boat at a ramp in a Corps operated day-use recreation area. A fee will be charged at recreation areas having a boat ramp and one or more of the following facilities: rest rooms, picnicking facilities, swimming facilities, or other developed recreation facilities except where facilities are associated with a campground. No fees will be charged where only a boat ramp and courtesy dock exists or where ramps are located in undeveloped or lightly developed shorelines with minimum security and illumination. A day user fee of $1 per person, whether walk-in or in a vehicle, up to $3 per vehicle, will be charged for the use of a designated, developed swimming beach in a Corps operated day-use recreation area. An annual pass, (in lieu of daily charges), may be purchased for $25 which permits the holder and all accompanying passengers in the vehicle to use any or all boat launch ramps and/or designated, developed swimming beaches at any Corps operated recreation area at any Corps project for that calendar year. An additional annual pass may be purchased for a reduced fee of $5 for a second family vehicle. Only one duplicate pass may be purchased at the $5 fee for each full price annual pass purchased. A Golden Age or Golden Access Passport shall entitle the permittee and any accompanying persons to a 50 percent discount on the day user fee.

11.05 -- ENVIRONMENTAL COMPLIANCE

Action and activities that the Corps proposes must comply with all applicable environmental laws and regulations. Chief among these is the National Environmental Policy Act (NEPA), which requires public officials to make decisions based on an understanding of environmental consequences, and take actions that protect, restore, and enhance the environment. Public involvement is to be encouraged and facilitated for decisions that will affect the quality of the human environment. Environmental consequences of proposed actions and alternatives are to be described in NEPA documents, which are circulated for public review.

According to Corps regulations, many of the items proposed in this Master Plan are categorically excluded from the need for preparation of NEPA documents, because they do not individually or cumulatively have a significant effect on the human environment. Replacement or rehabilitation of existing facilities or forestry activities or construction of new facilities in developed recreation areas such as vault toilets, comfort stations, and picnic tables are examples of categorical exclusions. On the other hand, the preparation of an environmental assessment (EA) is required for actions that may have substantial environmental effects. Examples of such actions are: expansion of a campground into an undeveloped wooded area or construction of water control structures in natural habitats for the purpose of vegetation management. Before construction activities requiring an EA can proceed, the review of environmental consequences must conclude in a Finding of No Significant Impact (FONSI). If the review process results in a finding of significant impact, then an Environmental Impact Statement (EIS) needs to be prepared before construction can commence. An EIS is presently being developed for Wappapello Lake to include the major items planned for the project.

NEPA documentation will be prepared in the future for all actions proposed in this Master Plan that are not categorically excluded. It is the Corps policy to identify and avoid adverse impacts as early in the planning process as possible. Recreational and resource management projects will be designed to avoid and minimize adverse environmental impacts.

11.06 -- WATER SUPPLY

Wayne County Public Water Supply District #4 is a new water district formed on the eastern side of Wappapello Lake. The district encompasses about 4500 persons in a 23 square mile area that includes the dam area of Wappapello Lake. One alternative being considered by the district is to obtain approximately one million gallons of water per day from Wappapello Lake. The Corps supports this project and will continue to cooperate with the water district. A Public Water Supply District #2 has also been formed to service the Patterson area at the northern end of the project.

11.07 -- PARTNERING

Federal reservoirs provide an important recreation resource in the United States. Facilities for support of recreation are expensive to build and operate. Federal involvement is presently limited to provide minimum facilities to meet health and safety requirements of the visiting public. Federal investment of 50 percent of costs is available if non-federal participating agencies provide 50 percent, and operate and maintain the facilities. Marinas are the best known non-federally supplied public recreation service at Corps reservoirs. Scarce funds and other priorities have limited non-federal participation in recreation at federal reservoirs. New Corps regulations allow non-federal partners greater opportunities to participate in the operation and management of recreation facilities and environmental stewardship.

The Wappapello Lake Project continues to seek new partnerships and strengthen existing ones at a means to accomplish project initiatives. All existing partners are identified in Section VI, Coordination and Partnerships, which includes descriptions of those partnerships.

11.08 -- FISHERIES

More visitors fish at Wappapello Lake than participate in any other activity and maintaining a good fishery is essential. On 7 June 1995 the President signed Executive Order 12962 addressing recreational fisheries. The Executive Order recognizes the social, cultural and economic importance of recreational fisheries. Federal agencies are directed to restore and enhance aquatic systems to provide increased recreational fishing opportunities nationwide. The Executive Order also required development of a Recreational Fishery Resources Conservation Plan. The Corps has adopted several implementation strategies related to this plan. Working with our partners, these actions will improve the quality and quantity of fishing opportunities.

The MDC and the Corps recognize the need for improved fisheries and recreational fishing. This partnership has shown that, when possible, water level management during shad spawn can rejuvenate the fishery. Shad spawning usually takes place from mid-April to mid-May when water temperatures are 65° - 72°F. This water level management appears to have provided successful shad spawns over the last 5 years. The increased shad population has greatly improved the quality of fisheries at Wappapello Lake. This activity will be continued as well as the development of other facilities, such as fishing piers, fish cleaning stations, courtesy docks, bank fishing areas and disabled accessible facilities as outlined in this Master Plan.

11.09 -- NORTH AMERICAN WATERFOWL MANAGEMENT PLAN

In 1986, the United States and Canada signed the North American Waterfowl Management Plan (NAWMP) as an outgrowth of concerns over the dramatic loss of wetlands and declines in waterfowl populations. The NAWMP identifies habitat loss and degradation as the major factors limiting waterfowl habitat in North America. To address these problems, the NAWMP is a strategic plan that represents a framework for protecting, restoring, creating and enhancing critical waterfowl habitat in the United States and Canada. The overall goal of the NAWMP is to restore continental waterfowl populations to the levels that existed in the 1970s. This goal is to be achieved primarily through the strategies of protection, restoration and enhancement of wetlands and their associated habitats throughout the United States and Canada.

The NAWMP recognized that a diversity of other wetland-dependent wildlife species will also benefit from implementation of the plan. In addition, significant wetland values, including water quality, ground-water recharge, flood control and recreational opportunities, will be realized. Under the plan, broad strategies are outlined to reverse the widespread destruction of wetland habitats. Waterfowl species are utilized as key indicators of the health of wetland environments.

The recommended strategy for implementation of the plan is to formulate a partnership within a joint venture area. This partnership is to be made up of representatives from governments, privates organizations and individuals who are to cooperate in the planning, funding, and implementation of projects to conserve and enhance wetland habitat within their joint project area. Wappapello Lake is located within the Lower Mississippi Valley Joint Venture. The joint venture objectives are to protect existing wetlands; restore bottomland hardwood forests and emergent wetlands; and enhance agricultural lands for waterfowl, songbirds, shorebirds, mammals and many threatened and endangered species including the bald eagle.

11.10 -- COOPERATING ASSOCIATIONS

Cooperating associations are used to accomplish such broad goals as natural resource management, interpretation, and visitor service activities on civil works water resource projects, fee-owned lands, and other areas for which the Corps has administrative and management responsibilities. Associations aid the Corps through a variety of activities, which may include the following:

a. Supporting special events; interpretive, educational or scientific activities; exhibits and programs; including presentations and demonstrations that further public understanding and appreciation of the mission of the Corps or a particular water resource development project.

b. Supporting natural resource management or public programs at or near Corps projects through conservation and educational activities and special events; and also by providing scientific, logistical, maintenance and other support.

c. Acquiring display materials, historical objects, equipment, supplies, materials, goods or other items, or services appropriate for management, operation, interpretive, educational and visitor service functions.

d. Providing services to visitors through the sale, production, publication, and/or distribution of appropriate interpretive and educational items, such as publications, maps, visual aids, audio tapes, pamphlets, handicrafts and other objects directly related to the recreation, scientific, interpretive and educational goals and mission of a project, a group of projects and/or the Corps as a whole.

e. Acting as a principal distribution medium for those educational and scientific publications of the government and trade that relate to the Corps and/or project mission, mandate or management efforts and provide the public with inexpensive and technically accurate materials.

11.11 -- NATIONAL RECREATION RESERVATION SERVICE

The National Recreation Reservation Service™ (NRRS™) is a joint program of the USDA Forest Service and the Corps to provide customers with access to one-stop shopping reservations for camping facilities managed by these agencies.

With over 49,500 camping facilities to choose from at more than 1,700 locations, the NRRS™ is the largest camping reservation service in North America.

The public may make reservations for campsites and other activities (i.e. shelters) through a toll-free telephone number (1-877-444-6777), by accessing the Internet at http://www.ReserveUSA.com, or at project campgrounds and offices. Customers making reservations are provided a variety of payment options including credit cards, personal checks, or cash.

SECTION XII - OPERATIONAL MANAGEMENT PLAN

12.01 -- INTRODUCTION

The Operational Management Plan (OMP), under separate cover, details implementation of several program areas only conceptually addressed in the Master Plan: recreation, shoreline management, forest management, fire protection, fish and wildlife management and safety.

12.02 -- RECREATION

a. Scope

A detailed discussion of project recreation management is contained in the OMP. The guidelines and policies set forth in this section are the basis for preparation and implementation of the OMP relative to efficient resource management at the lake. The OMP will be updated after approval of the Master Plan.

b. Objective

The goal of the lake's recreation management program is the efficient operation and maintenance of lake facilities to maximize public benefits and implement authorized project purposes. This is accomplished through the effective organization and utilization of human resources and materials.

c. Purpose

In the administration of the lake, management objectives contributing to lake efficiency and requiring the allocation of human resources and funding include:

(1) The provision of a wide range of outdoor recreation opportunities and facilities in a relatively natural setting.

(2) Reduction in conflict of use through activity and area zoning. The administration of lake lands as designated in Paragraph 8-01, and on Plate 2, *Land Classification Map*.

(3) The provision for visitor information regarding natural resources and ecologic areas along with any other unique features.

(4) The development of policies that provide for maximum sustained public use without undue deterioration of lake resources.

(5) The provision of additional recreational opportunities through the issuance of leases to private individuals, state governments and other political subdivisions, for concession and public park development.

(6) The maintenance of facilities and grounds to a high standard. The provision of a safe and rewarding outdoor recreation experience to the visiting public.

(7) The provision of populations of both game and non-game species so that all interest groups using lake facilities will have the opportunity of receiving benefits from wildlife. Paragraph 12.06 discusses in greater detail the goals and objectives of the Fish and Wildlife Management Program.

d. Staffing

The total staff for Operations and Maintenance assigned to Wappapello Lake is 23.6 full time equivalents (FTE), including office, secretarial and management. At present, the total permanent staff, including seasonals, is 26. An additional 8.9 FTE of student help is allocated per year. The project manager and staff are responsible for all aspects of operations, maintenance and administration of a water resource development project and its natural and cultural resources. The ranger staff is responsible for natural resource management, outdoor recreation, administration of service contracts, health and safety of visitors, pollution abatement, visitor assistance, boundary surveys and marking, working with state and local agencies and informing the public of Corps activities. Maintenance workers and contract personnel are responsible for maintenance and service of the hydraulic structures, replacement of sand at beaches, realignment of protective buoys, erosion repair, seeding, fertilizing, tree and shrubbery planting, maintenance of trails, painting, repair of facilities (benches, tables and signs) road maintenance and repair, maintenance of comfort stations, shower buildings, miscellaneous facilities, and preventative maintenance particularly on all buildings.

12.03 -- SHORELINE MANAGEMENT

The subject of shoreline management is fully addressed in the OMP. The Shoreline Management Plan was prepared and implemented as a management tool to lessen the impact of private exclusive use along the public shoreline of Wappapello Lake. The plan was prepared under authority of Title 16 United States Code 460d; Title 36 Code of Federal Regulations 327.30 Shoreline Management at Civil Works Projects as implemented by ER 1130-2-406, 31 October 1990. The objective of the plan is to provide policy and guidance for the protection of desirable environmental characteristics and restoration of shoreline where degradation has occurred through private exclusive use. Four basic considerations were used in formulating the Shoreline Management Plan: a) the demand for water oriented recreational facilities is increasing while the

amount of shoreline is fixed; b) there is a need to manage and protect the shoreline, to establish and maintain acceptable fish and wildlife habitat, aesthetic quality, natural environmental conditions and to promote the safe and healthful use of the lake and shoreline for recreational purposes by all of the public; c) the use of commercial marina concessionaires will be maximized to reduce need for numerous individually owned docks and d) the ownership of land adjoining public projects does not convey special rights or privileges to use of the public land and waters (Plate 21).

12.04 -- FOREST MANAGEMENT

a. Scope

The policies and guidelines established in this section are the basis for the preparation and implementation of the Natural Resource Management Section of the OMP.

This plan provides the necessary information, standards and guidelines required for the implementation of a forest management program that is commensurate with other lake plans and programs.

b. Purpose

Management of the Wappapello Lake forest is for the purpose of protecting, conserving and otherwise improving forest land to be utilized as a recreation, wildlife, watershed, and scenic resource. Forest management techniques better insure the long range protection of the forest environment and support the practice of uneven aged management and diversification of species within the compartments, thus establishing a more stable biotic community and assuring readily available timber, through sustained yield programs. Timber harvests are accomplished for such purposes as timber stand improvement, disease and pest control, fire hazard reduction, removal prior to construction, habitat management and generation of revenue.

c. Plan Preparation

The OMP contains specific information regarding the forest management program in the Natural Resource Management Section. It is prepared through a coordinated District effort. The plan divides the land area into workable compartments and provides a treatment prescription for each consistent with its land use allocation.

d. History

(1) The forest of Wappapello Lake reflects a common history of the entire Ozark Region. Forest land of the southeast Missouri hills prior to the 1930s was subjected to repeated fires and indiscriminate logging. Also, laws of Wayne

County provided open range until 1965. During the late 1930s and early 1940s, acquisition of property for Wappapello Lake curtailed logging on public property. The forest has now recovered; although fire scars are still apparent in many timber stands. While cutting became restricted in the foothills, the hardwoods to the south and east fell to agricultural clearing, channelization, and draining. This resulted in vastly reduced acreage of bottomland hardwoods. A tremendous amount of shortleaf pine was cut during the harvests of the 1930s removing most of that species from the area. As a result most of the project timber is of the oak-hickory type.

(2) A forest inventory was completed in 1972 by personnel of the USFS, Mark Twain National Forest. This inventory included aerial photograph examination and ground check plots of 20,172 acres.

e. Objectives

(1) Forest management shall be administered to meet the following long-range objectives:

(a) To incorporate a total ecosystem management philosophy.

(b) To provide for optimum watershed and erosion protection.

(c) To maintain and improve the native wildlife habitat and healthy indigenous trees for forest cover necessary for the recreational resources.

(d) To keep the forest in a healthy, vigorous growing condition, free from large outbreaks of insects and diseases.

(e) To avoid deterioration of the timber resource.

(f) To assure fully adequate and dependable future resources of readily available timber through sustained yield programs, reforestation, and accepted conservation practices, and to increase the value of such areas for conservation, recreation, and other beneficial uses.

(g) To generate revenues.

(2) Many benefits are obtained from the forest at Wappapello Lake. Among these products are high quality forested watersheds, erosion control, wildlife recreational opportunities, aesthetic beauty, and timber stands. The production of timber is not the ultimate objective at Wappapello Lake, however, in meeting the forest management objectives, timber has been harvested. Sustained yield of all of the products that the forest at Wappapello Lake produces (multiple-use management) is desirable, and management philosophy, guidelines, and technique are geared to achieve this goal when practicable.

(3) Management guidelines for forest lands provide the general procedures for treatments necessary to increase the value of lands for present and future outdoor recreational use. All management must be objectively planned in order to obtain optimum public benefits that insure the conservation and improvement of all resources. These resources will be treated as an integrated whole with continuing concern for environmental quality. All treatments must be coordinated with other areas of reservoir management. Management requirements of public lands are unique as compared to other forest lands of the area, because of intensive recreation use and the quality level of watershed protection.

f. Interagency Cooperation

Cooperation with state and federal agencies presently exists in several aspects of forest management. Extensive portions of project boundary adjoin land of state and federal agencies. Therefore, continued coordination and cooperation is imperative in such areas as fire control, forest insects and disease detection, encroachment, etc. Also an exchange of information is highly beneficial. Cooperating agencies include: USFS Mark Twain National Forest; USFWS Mingo National Wildlife Refuge; Natural Resources Conservation Service; MDC Division of Forestry; University of Missouri; and the MDNR.

g. Land Use Classifications

(1) Use Classifications

All lands in Government fee ownership are managed to upgrade their forest resources. The extent of management practices is largely dependent upon land-use classifications. Lands are continuously and simultaneously available for their primary land use classification as well as forest manipulation. Specific forest management techniques for these land use classifications are contained in the OMP. General management considerations based on land use classifications are described below: (See Plate 2, *Land Classification Map* for the location of each category of land use described).

(a) Recreation Areas Lands. The nature of these lands, when developed, requires intensive management practices to protect and maintain their high aesthetic values. Cultural practices such as pruning and cutting are done only for public safety, construction, to increase tree stand and turf health and vigor, and to improve aesthetics. Planting occurs where needed with top priority given to shade, screening and aesthetic values.

(b) Recreation - Low Density Lands. Developed public use of these lands is more limited than for recreation area lands. Therefore, forest management practices take a more intensive scope. Harvesting is accomplished for construction, wildlife habitat improvement and general forest health. Planting is given priority in old fields where new populations of tree and shrub species create high wildlife and aesthetic value.

(c) Wildlife Management Lands. The management of lands will be oriented toward the improvement of the habitat. Where canopy closure is restricting browse development, selective harvest stimulates plant growth by increasing sunlight to the forest floor. All normal forestry and agricultural practices will be allowed on these lands; however, all of these practices should be aimed at maintaining habitat. These practices also generate revenue. The forest is managed to supply the habitat diversity required by forest and edge wildlife species. This involves a full range of silvicultural practices from planting to thinning and final harvest. The key to successful forest and wildlife management is to keep a healthy, vigorous, balanced forest. The balanced forest contains approximately fifteen percent to twenty percent regeneration. While normal forest management tends toward the balanced forest, special considerations may prevent the forest from reaching a totally balanced condition. Habitat requirements control the size, shape, and location of timber harvests. These requirements are important in providing adequate browse and nesting areas.

(d) Vegetative Management Lands. Management activities for these lands include protection and development of forest and vegetative cover and wetland restoration. All lands in Government fee ownership are being managed to maintain their forest resources for recreation, wildlife, and scenic values.

(e) Environmentally Sensitive-Ecologic Lands. Natural areas are selected to preserve existing unique specimens, unique ecosystems, and unique geological formations in their natural state. Forest management will be undertaken to salvage wind thrown or fire damaged trees, remove insect or disease infestations, and for the purposes of providing access or construction. Paths will be allowed between or within natural areas to provide public access to the extent feasible without damaging the resources. Any newly qualified sites discovered through the years will be recommended for designation through the Master Plan process.

(f) Environmentally Sensitive-Cultural Lands. The trees and grasses will be managed to improve, preserve, and make available the features that have historical significance. Vegetation and trees may be removed if they are deemed dangerous or to uncover structures, allow more light, or to reconstruct parts of the features. No standard forest practices will be undertaken on the site or near enough to detract from its appearance. The historical and archaeological lands will be managed as described above. When public facilities are constructed on lands in this category, they will be managed as Intensive Use Recreation Lands.

(2) Area Classification

(a) Inventory. A forest inventory was completed in 1972, by personnel of the USFS, Mark Twain National Forest. With the exception of Lake Wappapello State Park, the entire lake was examined stereoscopically with aerial photography. Also, ground check plots were established for field examination of

the 20,172 acres. Various types of data were collected on the ground by statistical sampling (variable plot system):

1. Type-Size-Density of the existing timber stands.
2. Volume data by species.
3. Silvicultural needs and recommendations.
4. Amount of defect present.
5. Age and site potential information.

(b) Forest Types. To complete the inventory, the forest was stratified by timber types, size classes, and density classes. The following types are recognized on public property:

1. Oak-Hickory

Stands where plurality of the stocking is upland oak and hickory in mixture. White oak, northern red oak, and a variety of hickories predominate in the Central Forest, although black oak is sometimes prominent. At this southern portion of the central forest, scarlet, southern red and black oaks tend to replace northern red oak. There are many combinations of oaks, hickories and other hardwoods in association. On reservoir property they include: American elm, winged elm, red maple, black walnut, black locust, sweetgum, dogwood and blackgum.

2. Shortleaf Pine

Shortleaf pine is pure or predominant. Its chief hardwood associates are white oak, southern red oak, scarlet oak and black oak. In a subordinate position, hickories, post oak, blackjack oak, blackgum, and red maple. Best sites are rocky, dry, south, slopes and better-drained spur ridges on north slopes.

3. Oak-Pine

Shortleaf pine comprises 25-50 percent of the total stocking, with oaks in the mixtures. The oaks in the type include: white, scarlet, blackjack, black, post and southern red. The association also includes hickories, blackgum, and sweetgum. This type is characteristic of the southern part of the central forest. The hardwood component tends to replace the pine in succession. Found on dry low ridges, flats and south slopes.

4. Bottomland Hardwoods

This group is actually a combination of forest types for simplicity, because of the interspersion of species that occurs on the reservoir lands. The recognized

types included in this category are river birch, sycamore, silver maple American elm, cottonwood, red maple, black willow, slippery elm, white and green ash, sweetgum, and hackberry. The characteristic sites for all are the moist soils along the edges of creeks and rivers in strips and small stands. Cottonwood and willow readily establish themselves along newly made sandbars, front-land ridges, and well-drained flats. Following cottonwood, invaders of the next successional state are sycamore, hackberry, river birch, American elm, silver maple, red maple, and boxelder.

A 'Transition Bottomland Type' has been created along the lakeshore by the fluctuating water levels. At the lower elevation, (360 – 365 feet NVGD) shallow coves occupied by the short-lived, intolerant willows and cottonwoods, gradually experience soil buildup and occupation by successive species. These areas being subject to frequent inundation are mostly void of understory vegetation. While the bottomland' species are relatively invaluable commercially they are extremely beneficial for stream bank stabilization and creation of edge effect beneficial to wildlife.

5. Eastern Redcedar - Hardwood

Eastern redcedar and several hardwoods including red and white oaks, hickories and black walnut predominate. Associated species include shortleaf pine, hackberry, ashes, winged elm, black locust, dogwood and blackgum. This type, which is found on moderately moist hillsides with limestone outcrops, is considered to be temporary and probably succeeded by some types of the oak-hickory group. Cedar occupies 25-50 percent of the stocking.

h. Treatments

Specific treatments for each stand within a component will be addressed in a prescription. It is essential to realize that treatment and its extent will depend on each particular zone and its intended use. Other governing factors include: accessibility, influence zones, economics, weather, development timetable, etc. However, the following priorities generally apply:

(1) Establishment of suitable forest cover on recreation areas. There is a need for vegetative cover to serve as shade, screening, buffers, erosion control, and wildlife cover. Stands will be thinned as needed to maintain vigor. As stands age, more durable and desirable species will be introduced as replacements.

(2) Select those open areas which should be reforested and replant them with desirable species.

(3) Protect steep banks from erosion.

(4) Develop and maintain a high population of desirable wildlife.

(5) Protect heavy-use areas from overuse.

(6) Re-establish suitable vegetative cover on areas denuded by overuse and high water.

All treatment of vegetative cover on public land must be guided by the objectives established for recreation and habitat maintenance. Revenue is also generated through specific timber management practices. An understanding of the requirements of a plant community and the limitations set upon it by the soil, water, insects, disease, and people are essential to any successful change or manipulation. All treatments are to be naturally feasible and not forced through continued maintenance. Specific forest management techniques and practices are outlined in further detail in the OMP. The project is scheduled to be re-inventoried over the next 5 years.

12.05 -- FIRE PROTECTION

a. Scope

The objectives and guidelines established in this section are the basis for the preparation and implementation of that portion of the OMP dealing with fire protection.

b. Purpose

The purpose of this plan is to serve as guide for the Operations Manager and staff in the prevention and suppression of forest and grassland fires at Wappapello Lake. An additional goal of this plan is the reduction in the number of man-caused fires. The plan will also discuss safe application of prescribed burning.

c. Authority

This plan is prepared in accordance with the requirements of ER 1130-2-540, *Environmental Stewardship Operations and Maintenance Policies*.

d. Objectives

(1) Wappapello Lake has 35,949 acres of land at normal recreational pool (359.74 feet NGVD). This forest area contains a variety of vegetation, from dense oak-hickory forest to old fields to cedar thickets. Many residential subdivisions are present or are being built adjacent to the U. S. Government boundary line. This presents a two-fold problem. First, in the event of a fire on government property in the vicinity of these developments, the fire crews must be aware that high-value property may become endangered and fire-fighting efforts may have to be quickly shifted to protect this property. The second part of this problem is expressed in an escalation of the risk factor in these areas. The risk of a wildfire outbreak is greatly increased due to normal activities of the property owners such

as land clearing and debris burning. Quick and decisive response to fires in these areas is necessary. Wildfire control is important throughout the reservoir lands. The function of the forest at Wappapello Lake is to provide watershed protection. Secondary functions are timber, wildlife and recreation. All of the above can be severely damaged by wildfire. Therefore, wildfire control is an expeditious and coordinated effort.

(2) The following guidelines and objectives are established for the Wappapello Lake fire protection plan. Details regarding implementation of these objectives are contained in the OMP.

(a) Fire Prevention. The reduction of the number of man-caused fires is the primary goal of management personnel. Fire problem areas have been determined and are continually reevaluated. Prevention programs are established to create public awareness of the destruction caused by fires.

(b) Presuppression. Presuppression planning establishes an efficient fire control organization utilizing project operations personnel. This fire-fighting force operates in close coordination with similar units provided by the State of Missouri - MDC, USFS, and local fire departments.

(c) Fire Suppression. When fires occur, established procedures for control are implemented. These procedures are outlined in detail in the OMP. The Operations Manager will update the fire protection portion of the plan annually and incorporate improved techniques learned from actual fire-fighting experiences.

(d) Prescribed Burning. Prescribed burning is a valuable management tool when used properly. It is a viable technique for wildlife habitat maintenance, preparing sites for seeding and planting, controlling disease, and reducing hazardous fuels. Prescribed burning entails extensive planning and preparation prior to execution. Details are described in the OMP.

e. Interagency Cooperation

Cooperation with state and federal agencies is presently utilized in all aspects of fire protection. Cooperating agencies include: USFS, MDC, and the Wappapello and Chaonia Volunteer Fire Departments.

12.06 -- FISH AND WILDLIFE MANAGEMENT

a. Scope

The objectives and guidelines established in this section will be the basis for the preparation and implementation of the portion of the OMP dealing with fish and wildlife management practices.

b. Authority

PL 85-624, referred to as the Fish and Wildlife Coordination Act of 1958, states the general policy that fish and wildlife conservation shall receive equal consideration with other project purposes, and be coordinated with other features of water resource development programs. In compliance with PL 85-624, ER 1130-2-540 and EP 1130-2-540, a Corps Fish and Wildlife Management Program will be developed at Wappapello Lake.

c. Policy

As stated in ER 1130-2-540 and EP 1130-2-540, land and water areas, which are suitable for fish and wildlife management and not managed through licenses and cooperative agreements with wildlife agencies, will be managed by the Corps by implementing the Fish and Wildlife Management Plan. The program objective is to provide the maximum number of fish and wildlife species desired for the use and enjoyment of the public, consistent with objectives of the lake and habitat carrying capacity. One purpose of the OMP is to outline the on-going fish and wildlife habitat development and maintenance program for Wappapello Lake. The scope of the plan is to biologically evaluate fish and wildlife habitat on specific areas and prescribe practices for maintaining habitat on these areas; to evaluate the success of the plan as it relates to wildlife production; and to maintain cooperation between the Corps and other federal and state agencies in the development of water resource programs. Non-consumptive uses of wildlife, such as sightseeing and photography, receive equal consideration with consumptive uses, such as hunting and fishing. Vegetative and water level manipulation, and planting of grain crops are the principal methods of fish and wildlife habitat maintenance, and are consistent with other joint uses and basic physical limitations at Wappapello Lake. Lake operation procedures are continually being reevaluated and updated as required to support this program. Coordination is maintained with the MDC to establish criteria and programs for favorable water levels for fish and wildlife habitat.

d. History

(1) Wappapello Lake land reflects a common history of the entire Ozark Region. Forest land of the southeast Missouri hills prior to the 1930s was subjected to repeated fires and indiscriminate logging. Also, laws of Wayne County provided open range until 1965. During the late 1930s and early 1940s, acquisition of property for the Wappapello Project curtailed logging on reservoir property. Most of this land has now recovered; although fire scars are still apparent in many timber stands. While cutting became restricted in the foothills, the hardwoods to the south and east fell into agricultural clearing, channelization, and draining. This resulted in vastly reduced acreage of bottomland habitat.

(2) Acquisition of lake lands for construction and economic conditions in the 1930s and 1940s contributed to the substantial decrease in the number of small

farms in the St. Francis River Valley. This left numerous small fields idle that are still undergoing successional change. Most of these marginal production fields are not utilized for agriculture because of clearing costs and poor productivity.

e. Objectives

The OMP is intended to provide limited technical details of project planning and to establish a general set of guidelines. The objectives of this plan are to meet the multiple use needs of the species under management closely and concisely, and to maintain public land for productive wildlife habitat. The management guides for wildlife will provide the general procedures of treatments necessary to increase the value of lands for present and future outdoor recreational use. All management must be objectively planned in order to obtain optimum public benefits. These resources will be treated as an integrated whole with continuing concern for environmental quality. All treatments must be coordinated with other areas of lake management. Management requirements of reservoir lands are unique, as compared to other lands of the area, because of the intensive recreation use and the quality of watershed protection.

f. Interagency Cooperation

(1) Cooperation with state and federal agencies presently exists in several aspects of wildlife management. Extensive portions of project boundary adjoin land of state and federal agencies. Therefore, continued coordination and cooperation is imperative in such areas as fire control, insect and disease detection, encroachment, water quality, wildlife restoration efforts and land use treatments. Also, an exchange of information is highly beneficial. Cooperating agencies include: USFS Mark Twain National Forest; The USFWS Mingo National Wildlife Refuge and Job Corps; MDC Duck Creek Management Area, Division of Forestry; University of Missouri University Forest, Gaylord Memorial Laboratory; MDNR Lake Wappapello State Park; and the Missouri National Guard.

(2) Wappapello Lake personnel work closely with MDC personnel. The state is responsible for the enforcement of its fish and wildlife statutes on Wappapello Lake.

g. Wildlife Management

Habitat Condition. Some patches of former agricultural and pasture fields bordered by tree-line fencerows are found on public lands at Wappapello Lake. Most of the project, however, consists of oak-hickory forest. The abandoned fields and pastures are being invaded primarily with multiflora rose, hawthorn, coral-berry, persimmon, elm, oak, blackberry, sassafras, etc. The predominant vegetative cover in these fields is, however, an assortment of weeds and grasses. An integral part of developing a wildlife habitat management program will be the recognition of native plants and their important contribution to the

wildlife production quality of the habitat. Habitat management techniques will improve or maintain these native plant species and provide adaptive domestic plants that will enhance the feeding, nesting, and cover habitat of the project.

(1) The lack of proper and prescribed silvicultural treatments to forests on Wappapello Lake Project have allowed for little regeneration of preferred wildlife species such as red and white oak. Stands are composed of tree species that regenerated from harvesting operations in the early 1900s and tend to be of the same general age. Forest prescriptions, based on data obtained from inventories will be developed and implemented to regenerate these stands and improve forest habitats. Adversity of species, age classes, and types will be managed. Specific requirements are outlines in the project OMP.

(2) Most waterfowl species of the Mississippi Flyway are found at Wappapello Lake. However, populations fluctuate because of lack of food sources and suitable habitat. The lake is mainly used for resting during migration. There are presently two waterfowl refuges on the lake.

h. General Management of Terrestrial Species

(1) Extensive wildlife management programs will be applied to a variety of habitats for native game species such as: Bobwhite quail, mourning dove, cottontail rabbit, gray and fox squirrel, ruffed grouse, white-tailed deer and wild turkey. Although general habitat management techniques will be applied to specific species, these same techniques benefit many other game and non-game species not directly mentioned by this plan. When there is a choice of sites to be developed the one that provides most of the environmental requirement of the target species should be given first priority. Whenever sites do not offer these requirements, it may be necessary to provide clearings, or make water available in order to maintain an area for the wildlife involved. Effective, direct maintenance cannot be successful unless the natural factors of the target species is understood and considered.

(2) Successful wildlife management is based on sound habitat management. The variety and numbers of each species are determined directly and often with sensitivity by a specific type of habitat, habitat interspersion, or successional stages of vegetation. If these basic necessities are lacking or not properly balanced, the carrying capacity, and the species composition is adversely affected. Conversely, once existing cover is inadvertently destroyed, efforts to create similar quality habitat can be very expensive, and often unsuccessful. Therefore, the needs of wildlife must be considered before clearing brush lands, cutting or planting timber or engaging in other activities that result in broad habitat changes.

(3) Wildlife habitat consists of four essential elements: food, water, cover and space, although the quality and quantity may vary with each species. For instance, some species may require water continuously or daily while others only

periodically, or seasonally. Others may not rely on free water, but may be able to sustain themselves on water derived from green plants. Viable habitat increases wildlife productivity. However, crowding beyond the carrying capacity may be detrimental to various species. Of the four elements, the one that is least abundant will limit the number of animals that can inhabit any given area of land. Any habitat work that increases the supply or improves the distribution of such elements will tend to increase the carrying capacity of the area up to a level at which the crowding factor limits further expansion of animal numbers. Conversely, any cultural or natural development that decreases the supply or restricts the distribution of food, water, cover, or space will tend to reduce the carrying capacity.

i. Fisheries Management

(1) Lake Fertility. Wappapello Lake is considered to be extremely productive, perhaps to the point of being too productive. Extensive beds of aquatic vegetation have appeared periodically in Wappapello Lake although have not been present since the early 90s. Brittle naiad and Eurasian water milfoil were a principal contributor to the weed beds. However, there is no evidence to suggest that weed growth caused problems in the fish population balance or fish growth.

(2) Water Fluctuation. The water level at Wappapello fluctuates primarily between 354.74 feet NGVD and 359.74 feet NGVD. However, this level frequently rises to approximately 370 feet NGVD or greater with excessive spring or winter rains. These fluctuations (both up and down) during spring spawning may have effects on the success of the spawns. Past flood events have shown minimal impact except on shad populations.

(3) Fish Population. The fish population in Wappapello Lake has developed from the native fauna in the St. Francis River and its tributaries, and introduced species. Pflieger (1971) reported 109 species in the St. Francis drainage in Missouri. The principal reason for this rich diversity is that the St. Francis basin includes portions of both the Ozark upland and Southeastern lowland physiographic regions, each with their own characteristic fish fauna. Relatively few of the native species that are riverine or small stream species have proliferated in the Wappapello Lake environment, and only one, the walleye has been re-introduced to the river above the lake.

(a) Principal sport fishes in Wappapello Lake are the white and black crappie, bluegill, largemouth bass, channel catfish, flathead catfish, white bass, and freshwater drum. Important forage species are gizzard shad, brook silversides, mosquitofish, and a variety of less abundant sunfish and minnows. One fish, the longnose darter, *(Percina nasuta),* is on the national list of rare and endangered species. Construction of impoundments in its natural range has been attributed as the reason for this species' disappearance from the White River system. Only two specimens have been collected recently, both from

St. Francis River. Several species from the St. Francis River system are on a tentative listing of Missouri's rare and endangered species.

(b) Growth and development of the fish population, fish reproductive success and sport fish harvest in Wappapello Lake have been studied since 1946. Management activities have generally been limited to enforcement of regulations with two notable exceptions. An experimental crappie regulation was enforced from 1978 through 1981. This program limited the daily harvest of crappie in an effort to increase average population size. The experiment produced mixed results; however, it formed the basis for future crappie regulations on large reservoirs. The black bass population was also monitored. This study showed a large population of bass 12 inches or less. They were over-competing for food that resulted in slow growth rates. Anglers have been encouraged, through news releases and signs at the boat ramps, to keep their daily limit of bass under 12 inches.

j. Specific Recommendations

The OMP is a coordinated District effort and divides the area into workable compartments. The Plan provides a prescription for each area based upon its use as described in the Master Plan.

12.07 -- SAFETY

a. Purpose

This section outlines objectives and measures to maintain health and safety in all phases of lake operations. This includes construction, maintenance, recreation area development and utilization, visitor protection, and office operations. Objectives and guidelines established in this section will be the basis for the preparation and implementation of the portion of the OMP dealing with the safety program.

b. Authority

EM 385-1-1, *Safety and Health Requirements Manual* and Engineer Regulations in the 385 series establish the safety program requirements for all Corps activities and operations. Pertinent provisions of EM 385-1-1 and other applicable regulations are applied to all activities.

c. Objectives

Development of the safety program is based on the following objectives:

(1) Implement and enforce the provisions of EM 385-1-1 with regard to safety of Corps employees, contract personnel and the visiting public.

(2) Maintain recreation area safety by inspection and adequate maintenance of facilities operated by both Corps and concessionaires.

(3) Establish programs for training lake personnel in all aspects of safety.

(4) Assign responsibilities for administration of a viable safety program.

d. Activities

Measures that are employed to maintain health and safety include, but are not limited to the following:

(1) The Operations Manager has appointed a member of the project staff as the project safety officer. The project safety officer will develop plans and programs to carry out the provisions of EM 385-1-1 and the Engineer Regulations in the 385 series.

(2) Safety education meetings are for Government personnel by immediate supervisors as required by EM 385-1-1.

(3) Resource management training courses and requirements are established and comply with Section 1 and 2 of EM 385-1-1. Hazard abatements are developed and followed by government personnel on the different types of activities performed.

(4) Project personnel promote, develop, and maintain public interest in recreational safety through the establishment of water safety councils. Personnel also participate in and take advantage of programs offered by organizations such as the National Water Safety Congress, National Safe Boating Council, U.S. Coast Guard, Coast Guard Auxiliary, the American Red Cross, and the National Association of State Boating Law Administrations. Guidance and assistance is obtained from the District safety office.

(5) Safety equipment and materials such as first aid kits, search, rescue and recovery equipment, portable signs and barricades, communications equipment, vehicles, motor launches, and fire fighting equipment are maintained.

(6) Restricted areas, swimming areas, danger zones, and hazardous areas are properly marked with the appropriate buoys, markers, signs, or barricades which conform to the current Uniform State Waterway Marking System and the *Manual on Uniform Traffic Control Devices for Streets and Highways* (U.S. Department of Transportation, Federal Highway Commission D6.1, 1978). Such devices are placed and maintained to insure the public is adequately safeguarded against hazards. Tailwater areas and areas immediately above spillways and dams are properly marked with signs, buoys, or other markers. Signs, buoys, and markers have been installed in connection with the outlet control structures. Project roads and boat launching ramps are adequately signed, marked, or barricaded for proper use and protection of the visiting public.

(7) All facilities and equipment comply with applicable Occupational Safety and Health Administration (OSHA) Standards.

(8) Commercial telephones for emergency use are provided in public use areas where feasible.

(9) Adequate security lights are provided at all boat launching ramps when the lights are available at a reasonable cost. In areas where electrical service is not readily available, reflective type signs/markers and solar powered lights have been installed and maintained to identify ramp locations.

(10) Information bulletin boards are provided in the majority of public use areas. They contain location maps, emergency numbers, Title 36 rules and regulations, safety tips and other information of interest to the visitor.

(11) Search, rescue and recovery activities are directed and normally conducted by the state and local authorities and are undertaken by Corps personnel only in cases of emergency where situations dictate their necessity. Coordination with local authorities is essential. The safety of Corps personnel is a major consideration at all times during search and recovery operations. Corps personnel will have proper equipment and training for these activities. An updated search and rescue plan is being developed with the Sheriff departments of Wayne and Butler counties.

Details of specific management techniques for implementation of the safety program are contained in the OMP.

SECTION XIII – FIELD ANALYSIS OF COST

13.01 -- INTRODUCTION

a. General. The following tables show preliminary field analysis of costs for Corps development of proposed new actions and replacement facilities at Wappapello Lake. The quantities and costs represent a typical Corps guide specification level of design and materials. During actual detailed design of each element, variations in types and quantities of materials, modifications of facilities, inflationary trends, and results from additional engineering tests, will undoubtedly occur. Costs are based on current prices received for similar items of work in the St. Louis District. Price level is 1999.

b. Summary of Costs. Field estimates for the proposed new actions are identified on Table 21.

c. Summary of Cost Replacement Action. Field estimates for the proposed replacement facilities are listed in Table 22.

TABLE 21
FIELD ANALYSIS OF COST - NEW PROPOSED FACILITIES

	Item Description By Area New Proposed Facilities	***Qty***	***Unit***	***Unit Price***	***Qty Price***
Redman Creek Day Use R-1					
	Outdoor Shower at Beach	1	ea	$3,500	$3,500
	Water Fountain at Beach	1	ea	$2,065	$2,065
	Horseshoe Pits	2	job	$300	$600
	Lighting for Basketball, Volleyball	1	job	$8,000	$8,000
	Accessible Fishing Pier	1	job	$35,000	$35,000
	Disabled Transfer Station at Boat ramp	1	job	$3,000	$3,000
	SUBTOTAL				**$52,165**
Redman Creek Campground R-1					
	Sewer & Water Hookups, 50 amps Elec.	30	ea	$3,000	$90,000
	Water Fountains	15	ea	$2,065	$30,975
	Convert Park Attendant Pad to Sewer	1	job	$8,000	$8,000
	Convert Vault Restrooms to Sewer	2	ea	$12,000	$24,000
	Portable Tank Dump Stations	2	ea	$7,500	$15,000
	Modify Campsites for Disabled	5	ea	$2,000	$10,000
	Install 2 Parking Spaces	1	job	$2,500	$2,500
	Upgrade Walk-in Sites to Trailer Sites	5	ea	$3,000	$15,000
	SUBTOTAL				**$195,475**

Item Description By Area New Proposed Facilities			*Qty*	*Unit*	*Unit Price*	*Qty Price*
Rockwood Point Recreation Area R-2						
	Outdoor Shower		1	ea	$5,000	$5,000
	Water Fountain		1	ea	$2,065	$2,065
	Security Lighting		1	job	$1,000	$1,000
	Convert Vault Toilet to Waterborne/Relocate		1	job	$75,000	$75,000
	SUBTOTAL					**$83,065**
Chaonia Recreation Area R-5						
	Install Septic system for Vault		1	job	$30,000	$30,000
	Disabled Accessible Fishing Area/Pier		1	job	$20,000	$20,000
	Asphalt Road and Parking Area		1	job	$14,000	$14,000
	SUBTOTAL					**$64,000**
Holliday Landing Recreation Area R-6						
	Raise Road for Flooding		1	job	$70,000	$70,000
	Bulletin Board		1	ea	$800	$800
	SUBTOTAL					**$70,800**
34 Bridge Recreation Area R-7						
	Install Fountain/Hydrant		1	ea	$4,000	$4,000
	SUBTOTAL					**$4,000**
Greenville Recreation Area R-9						
	Walk-in Access to Island		1	job	$1,000	$1,000
	Fish Cleaning Station		1	job	$15,000	$15,000
	Widen Ramp Road for Two-Way Traffic		1	job	$3,000	$3,000
	Disabled Accessible Fishing Area		1	job	$4,000	$4,000
	Provide Septic System for Fish Cleaning Station and Dump Station		1	job	$8,000	$8,000
	Water Fountains		10	ea	$2,065	$20,650
	Accessible Playground		1	job	$40,000	$40,000
	Campsite Expansion/Relocation					
		Roadway	1	job	$75,000	$75,000
		Impact Area, Grill, Table	25	sites	$2,000	$50,000
		Water and Electric	25	sites	$1,500	$37,500
		Parking lot	1	job	$2,500	$2,500
		Electric Distribution	1	job	$5,000	$5,000
	SUBTOTAL					**$261,650**
Possum Creek Recreation Area R-14						
	Expand Parking Area 15 Spaces		1	job	$35,000	$35,000
	SUBTOTAL					**$35,000**

Item Description By Area New Proposed Facilities			*Qty*	*Unit*	*Unit Price*	*Qty Price*
People's Creek Recreation Area R-16						
	Playground		1	job	$30,000	$30,000
	Parking Lot 5 Spaces		1	job	$2,500	$2,500
	Portable Tank Dump Station		1	job	$7,500	$7,500
	Upper Sites Water and Sewer		20	sites	$3,000	$60,000
	Upper Sites Rehab.		20	sites	$1,000	$20,000
	SUBTOTAL					**$120,000**
Sundowner Recreation Area R-17						
	Convert Comfort Station to Waterborne		1	job	$15,000	$15,000
	Add Extra Boatramp Courtesy Lane, (19½')		1	job	$50,000	$50,000
	Courtesy Dock		1	ea	$9,000	$9,000
	Accessible Water Fountain		1	ea	$2,065	$2,065
	Lift Station		1	job	$10,000	$10,000
	SUBTOTAL					**$86,065**
Eagle Point Recreation Area R-18						
	Eliminate North Entrance, Install Cul-de-sac		1	job	$5,000	$5,000
	Playgrounds		2	jobs	$40,000	$80,000
	Horseshoe Pits		4	ea	$300	$1,200
	Volleyball Courts		2	ea	$1,000	$2,000
	Convert Vault Toilet to Waterborne/Relocate		1	ea	$100,000	$100,000
	Improve Roads and Parking Lots		1	ea	$100,000	$100,000
	Parking Lot for Ball Diamond (10 spaces)		1	job	$10,000	$10,000
	Water Fountains		3	ea	$2,065	$6,195
	Trail Boardwalk		1	job	$15,000	$15,000
	SUBTOTAL					**$319,395**
Spillway Recreation Area R-19						
	Disabled Accessible Walkway		1	job	$15,000	$15,000
	Fish Cleaning Station		1	ea	$15,000	$15,000
	Parking Lot for Fish Station (8 spaces)		1	job	$25,000	$25,000
	Parking Lot for Picnic shelter (30 sps)		1	job	$20,000	$20,000
	Accessories to Picnic Shelter					
		Grill	1	ea	$800	$800
		Water Fountain	1	ea	$2,065	$2,065
		Horseshoe Pits	2	ea	$300	$600
		Fountain/Hydrant	1	ea	$2,065	$2,065
	SUBTOTAL					**$80,530**

	Item Description By Area New Proposed Facilities	*Qty*	*Unit*	*Unit Price*	*Qty Price*
Otter Creek MRMA LD-3					
	Fence and Gate Pipeline Easement	1	job	$2,000	$2,000
	SUBTOTAL				**$2,000**
Caldwell Creek MRMA LD-5					
	Habitat Restoration	65	acres	$250	$16,250
	Fence and Gate Pipeline Easement	1	job	$2,000	$2,000
	SUBTOTAL				**$18,250**
Walnut Cove MRMA LD-6					
	Habitat Restoration, Berm, Water Control Structure	10	acres	$6,000	$60,000
	SUBTOTAL				**$60,000**
Lost Creek Landing MRMA LD-7					
	3 Space Parking Lot	1	job	$1,500	$1,500
	Gate at Warner Davis	1	job	$2,000	$2,000
	SUBTOTAL				**$3,500**
Ojibway MRMA VM-3					
	Fence and Gate Pipeline Easement	1	job	$2,000	$2,000
	SUBTOTAL				**$2,000**
St. Francis West MRMA VM-5					
	Enlarge Clark Creek Parking Area PA-50	1	job	$15,000	$15,000
	Spur Trail to Ozark Trail ($^1/_2$ mile)	1	job	$1,000	$1,000
	Enlarge Costner Place Parking Area PA-58	1	job	$15,000	$15,000
	SUBTOTAL				**$31,000**
St. Francis East MRMA VM-6					
	Habitat Restoration	40	acres	$250	$10,000
	SUBTOTAL				**$10,000**
Laconia MRMA VM-7					
	Habitat Restoration	40	acres	$250	$10,000
	SUBTOTAL				**$10,000**
Happy Hollow MRMA VM-8					
	Extend Roadway 2,000 ft. with Parking Lot (5 spaces)	1	job	$10,000	$10,000
	Fence and Gate Pipeline Easement	1	job	$2,000	$2,000
	SUBTOTAL				**$12,000**
Blue Springs MRMA VM-9					
	Habitat Restoration	35	acres	$250	$8,750
	Fence and Gate Pipeline Easement	1	job	$2,000	$2,000
	SUBTOTAL				**$10,750**

	Item Description By Area New Proposed Facilities	Qty	Unit	Unit Price	Qty Price
Deep Muck Fens ESA ES-E-3					
	Self-Guided Trail	1	job	$5,000	$5,000
	SUBTOTAL				**$5,000**
	TOTAL				***$1,536,645***
	CONTINGENCIES 25%				***$384,161***
	GRAND TOTAL				***$1,920,806***

TABLE 22
FIELD ANALYSIS OF COST - REPLACEMENT OF FACILITIES
SEPTEMBER 1999 PRICE LEVEL

	Item Description By Area Replacement Facilities	Qty	Unit	Unit Price	Qty Price
Administration/Maintenance Compound OP-1					
	Relocate Storage Yard	1	job	$10,000	$10,000
	Replace Metal Storage Shed	1	ea	$20,000	$20,000
	SUBTOTAL				**$30,000**
Redman Creek Day Use R-1					
	Relocate/Replace Picnic Comfort Station	1	job	$100,000	$100,000
	Make V.C. Shelter C.S. Accessible	1	job	$30,000	$30,000
	Relocate Picnic Sites From Spillway	6	ea	$1,000	$6,000
	Relocate/Replace Spillway Amphitheater	1	job	$10,000	$10,000
	SUBTOTAL				**$146,000**
Redman Creek Campground R-1					
	Replace Campsite Wiring	34	ea	$2,000	$68,000
	Replace Fountain/Hydrants	18	ea	$2,065	$37,170
	Replace Playgrounds	2	ea	$40,000	$80,000
	Demolish Spillway Amphitheater	1	job	$2,000	$2,000
	SUBTOTAL				**$187,170**
Chaonia Recreation Area R-5					
	Upgrade Sites, Grill, Impact Site, Table, Parking	12	job	$3,000	$36,000
	Replace Fountain/Hydrants	1	ea	$2,065	$2,065
	SUBTOTAL				**$38,065**
34 Bridge Recreation Area R-7					
	Relocate Vault C.S. from Greenville Boat Ramp	1	job	$25,000	$25,000
	SUBTOTAL				**$25,000**

	Item Description By Area Replacement Facilities	*Qty*	*Unit*	*Unit Price*	*Qty Price*
Greenville Recreation Area R-9					
	Upgrade Campsite Electric to 50 Amp	25	ea	$2,500	$62,500
	Replace Fountains/Hydrants	15	ea	$2,065	$30,975
	Raise Entrance Road	1	job	$100,000	$100,000
	Modify Campsites for Disabled Access	7	ea	$2,000	$14,000
	SUBTOTAL				**$207,475**
Possum Creek Recreation Area R-14					
	Relocate Primitive Campsites	2	ea	$2,000	$4,000
	SUBTOTAL				**$4,000**
People's Creek Campground R-16					
	Relocate Boat Ramp Gate to Campground	1	job	$2,000	$2,000
	Relocate Entrance to North	1	job	$50,000	$50,000
	Replace Lower Campground Shower House and C.S. with Centrally Located Accessible Shower House	1	job	$360,000	$360,000
	Replace C.S. in Upper Campground	1	job	$100,000	$100,000
	Replace/Upgrade Campsite Electric	37	ea	$2,000	$74,000
	Replace Water Lines	1	job	$25,000	$25,000
	Replace Fountain/Hydrants	12	ea	$2,065	$24,780
	Relocate Campsite #23	1	job	$4,000	$4,000
	Modify Campsites for Disabled	3	ea	$1,500	$4,500
	Widen Roadway Near Campsite #1	1	job	$3,000	$3,000
	SUBTOTAL				**$647,280**
Eagle Point Recreation Area R-18					
	Replace fountain/hydrants	1	ea	$2,065	$2,065
	Relocate/Replace Two Small Shelters from People's Creek with One Large Shelter	1	job	$30,000	$30,000
	SUBTOTAL				**$32,065**
Spillway Recreation Area R-19					
	Relocate/Replace Peoples Creek Upper Shelter	1	job	$25,000	$25,000
	Relocate/Replace Peoples Creek Boat Ramp Unisex Comfort Station	1	job	$25,000	$25,000
	Relocate Spillway Comfort Station	1	job	$100,000	$100,000
	SUBTOTAL				**$150,000**
Two Islands MRMA LD-1					
	Install/level Impact Sites	5	job	$1,000	$5,000
	Relocate Campsite #1	1	job	$1,000	$1,000
	SUBTOTAL				**$6,000**

	Item Description By Area Replacement Facilities	*Qty*	*Unit*	*Unit Price*	*Qty Price*
Otter Creek MRMA LD-3					
	Demolish Lower Lot and Ramp, Relocate Boat Ramp to Upper Parking Lot, Expand Parking Lot	1	job	$50,000	$50,000
	SUBTOTAL				**$50,000**
Lost Creek Landing MRMA LD-7					
	Rehabilitate Levee	1	job	$5,000	$5,000
	SUBTOTAL				**$5,000**
	TOTAL				***1,528,055***
	CONTINGENCIES 25%				***$382,014***
	GRAND TOTAL				***$1,910,069***

SECTION XIV- CONCLUSIONS AND RECOMMENDATIONS

14.01 -- CONCLUSIONS

Wappapello Lake became operational in 1941. Since that time, it has been a tremendous influence on the Southeastern Missouri region. Its authorized purpose has provided flood control on the St. Francis River Basin, with collateral uses of fish and wildlife conservation and recreation added by subsequent legislation.

Management of the park and recreation areas and water and land use classifications at Wappapello Lake as outlined in this plan will provide quality public facilities. All lake resources will be continually monitored to preserve and protect these resources at a high level of quality.

14.02 -- RECOMMENDATIONS

It is recommended that this updated plan be approved as a basis for further resources and public use management through 2010.