FINDING OF NO SIGNIFICANT IMPACT (FONSI)

NAME OF PROPOSED ACTION: Bull Shoals Lake Master Plan Revision

PURPOSE AND NEED FOR THE PROPOSED ACTION

The revised Master Plan updates Design Memorandum No. 1-G, Updated Master Plan for Development and Management of Bull Shoals Lake approved April 1975. The Master Plan is the strategic land use document that guides the comprehensive management and development of all recreational, natural, and cultural resources throughout the life of the water resource project. It is a vital tool for the efficient and cost-effective stewardship and sustainability of project resources for the benefit of present and future generations.

With the proposed Master Plan revision, an Environmental Assessment (EA) was completed to evaluate existing conditions and potential impacts of proposed alternatives. The EA is prepared pursuant to the National Environmental Policy Act (NEPA), CEQ regulations (40 CFR, 1500–1517), and the Corps implementing regulation, Policy and Procedures for Implementing NEPA, ER 200-2-2, 1988.

ALTERNATIVES: A No Action Alternative, a Moderate Conservation Alternative, a Limited Growth Alternative, and a Maximum Conservation Alternative were evaluated in the Environmental Assessment.

No Action (Alternative 1) - The No Action Alternative land classification, which is based on the 1975 master plan, does not accurately reflect the land use activities or resource management of the lake. In addition, this alternative does not address resource management laws, policies, and regulations that were implemented after the 1975 Bull Shoals Lake Master Plan.

Operation and management of Bull Shoals Lake would continue as outlined in the current Master Plan Update, which designates 8,310.9 acres as High Density recreation and 31,957.3 acres as Low Density recreation. This alternative has the potential to allow for increased land and water based impacts within the Low Density land classification due to the fact this constitutes 57% of available shoreline acreage. There are 11,895.8 acres classified as Environmentally Sensitive areas, 61.8 acres as Project Operations, 3,953.5 acres as Wildlife Management, and 169 acres that currently have no allocation. High Density recreation refers to lands developed for intensive recreational activities for the visiting public including day use areas and/or campgrounds. These could include areas for concessions (marinas, commercial concessions, etc), and quasi- public development.

The Selected Alternative – The Selected Alternative, which is now the Preferred Alternative, is a slightly modified version of Alternative 2, the Moderate Conservation alternative. Under this alternative, High Density lands total 3,937.9 acres; Low Density lands total 7,272.1 acres; Environmentally Sensitive Area lands total 29,048.5 acres; Wildlife Management lands total 15,997.9 acres; and Project Operations lands total 91.8 acres.

The increase in High Density acreage is primarily in response to the public's concerns for additional boat ramps and launch sites, especially during high water events. Four high water ramps and sites have been proposed at the following Corps parks: Dam Site, HWY 125, Buck Creek, and Beaver Creek. In addition, High Density acreage was added back to the future use Elbow Park. Slight boundary line adjustments were also made at Beaver Creek and the Blackwell Ferry Area.

Moderate Conservation (Alternative 2)—Under this alternative, the land classifications would be revised to reflect current management practices and responses to agency and public comments received during the scoping phase. Changes include reclassifying undeveloped High Density land classifications (i.e. future/closed Corps parks) to other land classifications; reclassifying undeveloped Low Density land to Wildlife Management, Project Operations, or Environmentally Sensitive Area; and reclassifying lands that contained active shoreline use permits to Low Density.

The Moderate Conservation Alternative proposes 3,714.6 acres in High Density recreation, representing a 4,596.3 acre decrease from the No Action Alternative. Low Density lands total 7,257.6 acres, representing a reduction of 24,699.7 acres from the No Action Alternative. The majority of the decrease in Low Density acreage would be due to reclassification to Environmentally Sensitive areas (increased to 29,366.9 acres), and Wildlife Management (to 15,917.3 acres). Project Operations lands would total 91.8 acres, an increase of 30.0 acres from the No Action alternative. It should be noted that although the total number of acres of Low Density would be less under Alternative 2 than under the No Action Alternative, there would still be sufficient Low Density land to accommodate projected development demands for the next 10 to 20 years.

Limited Growth Alternative (Alternative 3). The Limited Growth Alternative would classify more lands that contained roads, utility lines, and shoreline use permits to a Low Density land classification. Many future Corps parks would be reclassified from High Density to predominantly Low Density land classification.

This alternative would allow additional low density development above the amount proposed under Alternative 2, mostly due to conversion of Environmentally Sensitive acres to Low Density classification. In comparison to the No Action alternative, High Density lands would be reduced by 4,830.6 acres, resulting in 3,480.3 acres being classified as High Density. Low Density lands would decrease by 20,041.5 acres, resulting in that acreage being 11,915.8 acres. Environmentally Sensitive Area acreage would total 25,190.9, an increase of 13,295.1 acres from the No Action alternative; and Wildlife Management acreage would total 15,669,4, an increase of 11,715.9 acres from the No Action alternative.

Maximum Conservation (Alternative 4). Alternative 4 would reclassify all Low Density Recreation lands identified under Alternative 1 to Environmentally Sensitive Areas. Existing permitted shoreline uses would be grandfathered but there would be no new shoreline use permits issued.

This alternative would create more protected shoreline than all other alternatives, as the 7,252.0 acres of Low Density lands shown in Alternative 2 would be reclassified as Environmentally

Sensitive lands. Under Alternative 4 there would be a total of 36,624.5 acres in the Environmentally Sensitive classification. High Density, Project Operations lands and Wildlife Management lands would remain the same as under Alternative 2.

ANTICIPATED ENVIRONMENTAL IMPACTS: Consideration of the effects disclosed in the EA, and a finding that they are not significant, are necessary to prepare a FONSI. This determination of no significance is required by 40 CFR 1508.13. Additionally, 40 CFR 1508.27 defines significance as it relates to consideration of environmental effects of a direct, indirect or cumulative nature.

Criteria that must be considered in making this finding are addressed below, in terms of both context and intensity. The significance of both short and long term effects must be viewed in several contexts: society as a whole (human, national); the affected region; the affected interests; and the locality. The context for this determination is primarily local. The context for this action is not highly significant geographically, nor is it controversial in any significant way. Consideration of intensity refers to the magnitude and intensity of impact, where impacts may be both beneficial and adverse. Within this context, the magnitude and intensity of impacts resulting from this decision are not significant. The determination for each impact topic is listed below.

1. The degree to which the action results in both beneficial and adverse effects. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial. The EA indicates that there will be beneficial effects from implementation of the Selected Alternative to terrestrial and aquatic resources. The Selected Alternative would also allow for the continued potential development in low density and high density land classifications, yielding a balanced approach.

2. The degree to which the action affects public health or safety. No adverse effects to public health or safety will result from the Selected Alternative. Possible adverse environmental effects may occur from implementation of the No Action Alternative due to potential increased development resulting in more people and watercraft on the lake. Possible adverse economic and socioeconomic effects could potentially occur from implementation of Alternative 4, the Maximum Conservation Alternative.

3. The degree to which the action affects unique characteristics of the potentially affected area, such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas. The Selected Alternative does not threaten any known historic properties. Coordination with Federal, State, and local agencies and Federally Recognized Tribes will be required to avoid, minimize or mitigate potential unforeseen impacts. Park lands, prime farm lands, wetlands, wild and scenic rivers, or ecologically critical areas will not be impacted by implementation of the Selected Alternative.

4. The degree to which effects on the quality of the human environment are likely to be highly controversial. The project will benefit the public through a balance of terrestrial and aquatic resource preservation with recreation provision. Therefore the Little Rock District; Corps of Engineers does not regard this activity as controversial.

5. The degree to which the possible effects on the human environment is highly uncertain or involves unique or unknown risks. The uncertainty of the impacts of this action is low since land reclassification around the lake shoreline results in a projection of known and regulated activities as a result of the implementation of the Selected Alternative.

6. The degree to which the action may establish a precedent for future actions with significant impacts. Because the Selected Alternative involves updating the existing Bull Shoals Lake Master Plan, which provides checks and balances on future lakeshore activities, the action should not establish a precedent for significant future impacts.

7. Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. There are no other known individual actions associated with this project, therefore there are no cumulatively significant impacts identified with this action.

8. The degree to which the action may adversely affect items listed or eligible for listing in the National Register of Historic Places, or other significant scientific, cultural or historic resources. The Selected Alternative does not impact any known historic properties or other significant scientific, cultural, or historical resources. Coordination with Federal, State, and local agencies and Federally Recognized Tribes will be required to avoid, minimize or mitigate potential unforeseen impacts.

9. The degree to which the action may adversely affect an endangered or threatened species or its critical habitat. The Selected Alternative should not adversely affect any Threatened & Endangered species, as areas with known T&E species and species habitat are classified as Environmentally Sensitive lands. The listed T & E species in the area include the Gray Bat and Indiana Bat, which are cave-hibernating and roosting species, and the Tumbling Creek Cavesnail. Lands adjacent to Tumbling Creek Cave, where these T&E species are located are classified as Environmentally Sensitive, allowing for a higher level of protection over other land classifications.

10. Whether the action threatens a violation of Federal, state or local law or requirements imposed for the protection of the environment. No such violations will occur. All applicable Federal, state or local laws and regulations will be complied with during the implementation of the action.

CONCLUSIONS: The impacts identified in the prepared EA have been thoroughly discussed and assessed. No impacts identified in the EA would cause any significant adverse effects to the human environment. Therefore, due to the analysis presented in the EA and comments received from a 30-day public review period that began on July 27, 2015 and ended on September 11, 2015, it is my decision that the preparation of an Environmental Impact Statement (EIS) as required by the National Environmental Policy Act (NEPA) is unwarranted and a "Finding of No Significant Impact" (FONSI) is appropriate. The signing of this document indicates the Corps final decision of the proposed action as it relates to NEPA. The EA and FONSI will be held on file in the Environmental Branch, Planning and Environmental Division of the Little Rock District, Corps of Engineers for future reference. Consultation with regulatory agencies will be ongoing to ensure compliance with all federal, state, regional, and local regulations and guidelines.

30 Dec 2015

Date

COURTNEY W. PAUL
Colonel, US Army

US Army Corps of Engineers
Little Rock District

FINAL Environmental Assessment

Bull Shoals Lake
Master Plan Revision
December 2015

For Further
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BULL SHOALS LAKE
MASTER PLAN REVISION
ENVIRONMENTAL ASSESSMENT

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1.0 INTRODUCTION

The Master Plan is the strategic land use document that guides the comprehensive management and development of all recreational, natural, and cultural resources throughout the life of the water resource project. The Master Plan guides the efficient and cost-effective management, development, and use of project lands. It is a vital tool for the responsible stewardship and sustainability of project resources for the benefit of present and future generations.

The Master Plan guides and articulates Corps' responsibilities pursuant to Federal laws to preserve, conserve, restore, maintain, manage, and develop the project's lands, waters, and associated resources. The Master Plan is a dynamic operational document projecting what could and should happen over the life of the project and is intended to be flexible to respond to changing conditions. The Master Plan deals in concepts, not in details, of design or administration. Detailed management and administration functions are addressed in the Operational Management Plan (OMP), which implements the concepts of the Master Plan into operational actions.

Master Plans are required to be developed and kept current for Civil Works projects operated and maintained by the Corps and they include all land (fee, easements, or other interests) originally acquired for the projects and any subsequent land (fee, easements, or other interests) acquired to support the operations and authorized missions of the project.

The Master Plan is not intended to address the specifics of regional water quality, shoreline management, or water level management; these areas are covered in a project's shoreline management plan or water management plan. However, specific issues identified through the Master Plan revision process can still be communicated and coordinated with the appropriate internal Corps resource (i.e. Operations for shoreline management) or external resource agency (i.e. Arkansas Department of Environmental Quality and Missouri Department of Natural Resources for water quality) responsible for that specific area.

The revised Master Plan updates Design Memorandum No. 1-G, Updated Master Plan for Development and Management of Bull Shoals Lake (USACE 1975).

With the Master Plan revision, an Environmental Assessment (EA) was completed to evaluate existing conditions and potential impacts of proposed alternatives. The EA is prepared pursuant to the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) regulations (40 CFR,1500–1517), and the Corps implementing regulation, Policy and Procedures for Implementing NEPA, Engineer Regulation (ER) 200-2-2 (1988).

2.0 PURPOSE AND NEED FOR ACTION

2.1 Purpose and Need

The purpose of the proposed action is to revise the Bull Shoals Lake Master Plan to set a vision for the next 10 to 20 years and to reflect changing needs for operation of the project's lands, waters, and associated resources.

The need for the proposed action is based on the age of the current plan and the changed conditions around the lake and in lake use. The Master Plan for Bull Shoals Lake was last approved in 1975; and was followed by 31supplements over the last 40 years. During that time, public use patterns have remained similar, but trends, facility and service demands have shifted in the past 40 years due to the need for alternative experiences in recreation and tourism. Visitation to the lake decreased from 2000 to 2010; however, the demand for high quality recreational experiences has remained consistent. Bull Shoals Lake incurs recreation pressure for both private shoreline and public recreation use, resulting in management concerns regarding the overall sustainability of the lake. Reallocation of services needs to be assessed with public use at project facilities. Over the last four decades, management changes involving recreation area closures and improvements have occurred to meet evolving public use. In addition, cooperative agreements are being considered in order to operate and maintain facilities, which would reduce the financial burden on the tax payers.

2.2 Project History

Bull Shoals Lake is a multiple purpose water resource development project initially authorized for two purposes: flood control and hydropower generation. Subsequent authorized uses included: water supply, including providing water storage to supply a minimum flow discharge (Section 132 of the FY 2006 Energy and Water Resources Development Act, Public Law 109-103); recreation; and fish and wildlife (Flood Control Act of 1938, as amended in 1944, 1946, 1954, 1962, 1965 and 1968). Bull Shoals Lake is a major component of a comprehensive plan for water resource development in the White River Basin of Arkansas and Missouri. The project is located in the scenic Ozark Mountain region of southern Missouri (Taney and Ozark counties) and northern Arkansas in Baxter, Boone and Marion counties-Figure 2.1. The total area contained in the Bull Shoals project, including both land and water surface, consists of 104,573.3 acres. Of this total, 12.9 acres are in flowage easement. The region is characterized by narrow ridges between deeply cut valleys that are well wooded with deciduous trees and scattered pine and cedar. When the lake is at the top of the conservation pool (elevation 659 feet above mean sea level), the water area is 48,225.3 surface acres with 822 miles of shoreline within the lands owned in fee. The shoreline is irregular with topography ranging from steep bluffs to gentle slopes.

Construction of Bull Shoals Dam was initiated in June 1947. The dam was completed in July of 1951, and the powerhouse and switchyard were completed in 1953. The lake was declared operational for public use in 1953 under the authority of the Flood Control Act approved 28 June 1938 (Public Law No. 761, 75th Congress, 3rd Session) as modified by the Flood Control Act approved 18 August 1941 (Public Law No. 228, 77th Congress, 1st Session) which included the authorization of the project for flood control and generation of hydroelectric power. Table 2.1 provides pertinent construction and operations data for this lake.

There are 37 public use areas around Bull Shoals Lake. Nine campgrounds and six access points on the lake are operated by the Corps of Engineers. In 2012, a district lead Recreation Adjustment Plan evaluated all the parks on Bull Shoals Lake and for budgetary reasons, leased the camping portion of Dam Site Park and Pontiac Parks. In both cases, the boat ramps continue to be operated and maintained by the Corps. There are twelve parks and ten access points operated by city, county, or state agencies, marinas, church groups, or schools around the lake. The Selected Alternative, described in this final EA, would result in no significant park operational changes. Since 1975, parks have been evaluated using an efficiency review process. Those parks chosen for closure for budgetary reasons were offered for lease through standard leasing procedures. Closed parks could be reopened at such time as adequate funding becomes available. There are three parks Woodard, Spring Creek, and Dam Site that have been reduced to lake access only. One State Park (Bull Shoals-White River State Park) is located on Bull Shoals Lake and the White River and it is operated by the Arkansas Department of Parks and Tourism. Three Parks (Bull Shoals, Ozark Isle, and Pontiac) are operated by a commercial concessionaire. One park (Shadow Rock) is operated by the City of Forsyth, Missouri. Two parks (Highway K and Kissee Mills) are operated by Taney County, Missouri. One park (Lead Hill City Park) is operated by the City of Lead Hill. One park (Shoal Creek) is operated by City of Protem (Protem Volunteer Fire Department). Three parks (Dam Site, Point Return and Danuser City Park) are operated by the City of Bull Shoals; at Dam Site, the City operates the campground and the Corps retains operation and maintenance of the launch ramp. Camp Galilee is a recreation area and is leased to the First United Methodist Church of Harrison, Arkansas. The Arkansas Game and Fish Commission operates a boat launch site within the Camp Galilee recreation area. Elbow Park is not developed, but was kept in the High Density land classification for any potential future use (at the writing of this master plan revision, the Corps does not have future plans to develop this park, but made the decision to keep the park in High Density should any outside entities have future interest in the site).

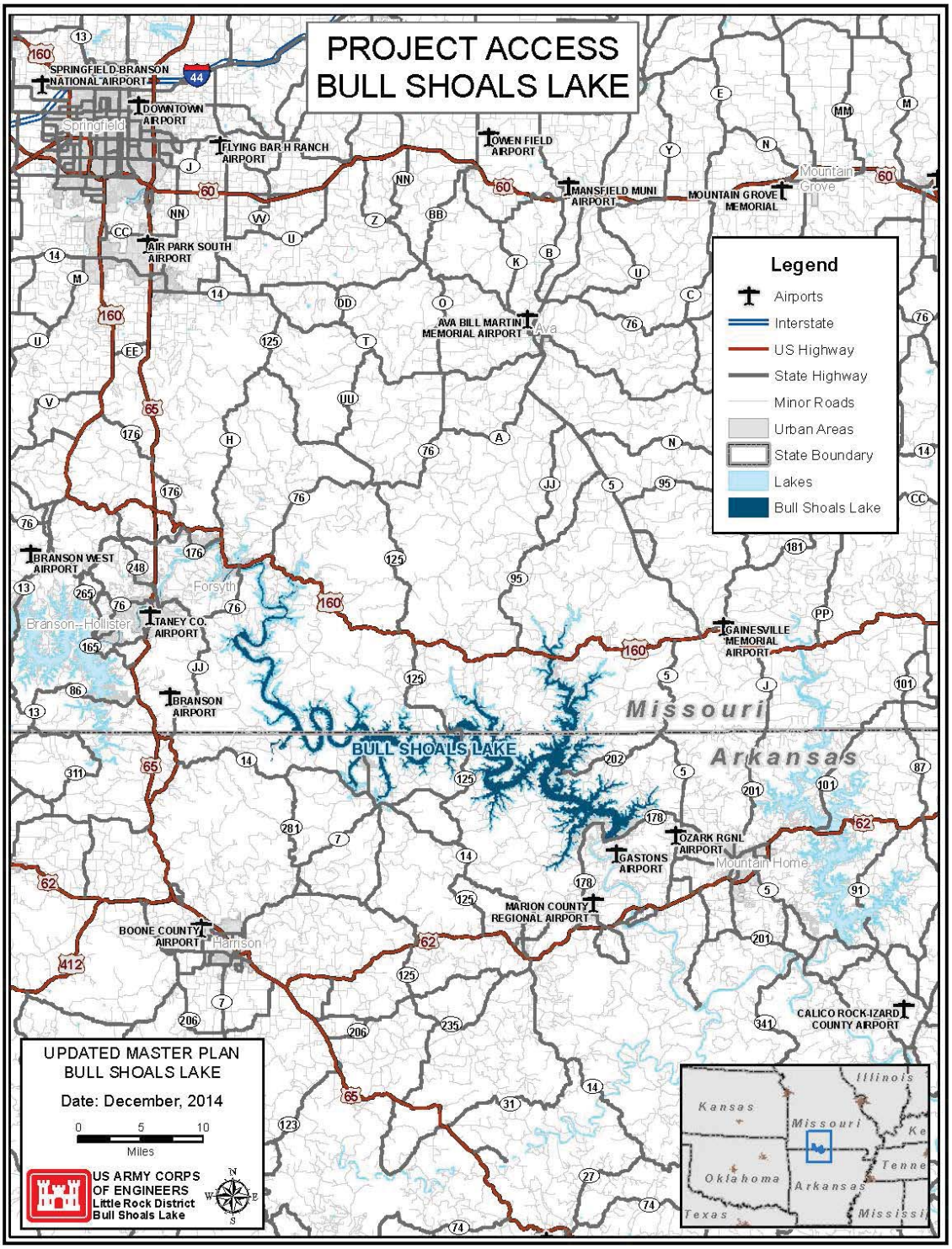


Figure 2.1 Bull Shoals Lake and Surrounding Area

Table 2.1 Pertinent Data of Bull Shoals Dam and Lake

PERTINENT DATA OF THE DAM AND LAKE	
General Information	
Purpose, Stream, States	FC, P, WS, R, F&W White R., Missouri & Arkansas(1)
Drainage area, square miles	6,036
Average annual rainfall over the drainage area, inches, approximately	45.4
Dam	
Length in feet	2,256
Height, feet above streambed	258
Top of dam elevation, feet above mean sea level	708
Generators	
Main units, number	8
Rated capacity each unit, kilowatts	45,000
Station service units, number	2
Rated capacity each unit, kilowatts	700
Lake	
Nominal bottom of power drawdown Elevation, feet above mean sea level	588
Area, acres	20,260
Nominal top of conservation pool Elevation, feet above mean sea level	659
Area, acres	48,225.
Length of shoreline, miles	821
Nominal top of flood-control pool Elevation, feet above mean sea level	695
Area, acres	71,240
Length of shoreline, miles	1,050
Five-Year frequency pool	
Elevation, feet above mean sea level (flood pool)	695
Elevation, feet above mean sea level (drawdown)	628.5
(1) FC – flood control, P – power, WS-water supply, MF-minimum flow,	
R-recreation, F&W-Fish and Wildlife	

3.0 ALTERNATIVES

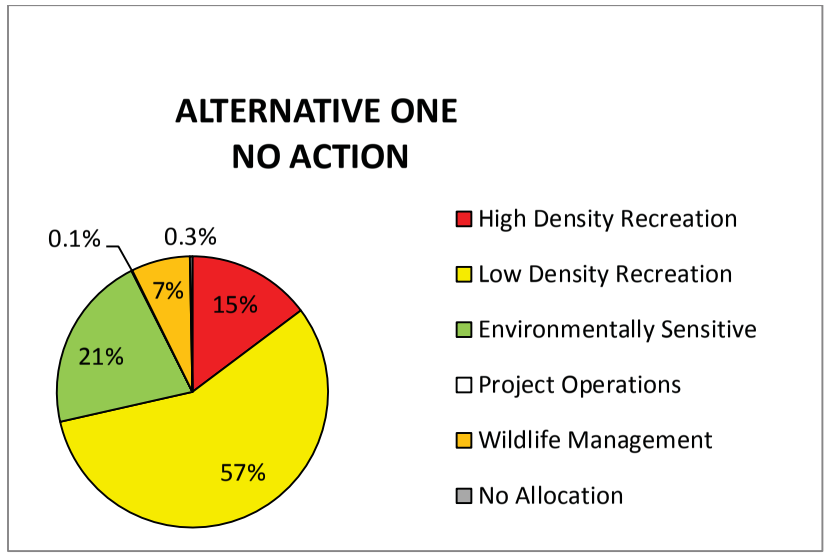
Alternatives evaluated in this EA are depicted in Table 3.1, and in Figure 3.1. The alternatives include: Alternative 1 (No Action); Alternative 2 (Moderate Conservation); Selected Alternative 2 (Moderate Conservation) Modified; Alternative 3 (Limited Growth); and Alternative 4 (Maximum Conservation). For a more detailed map analysis of the Preferred Alternative, refer to Appendix D of the Bull Shoals Master Plan, which contains topographic maps depicting land classification and flowage easement areas around the shoreline. A complete set of maps for each alternative is located in an appendix to this document.

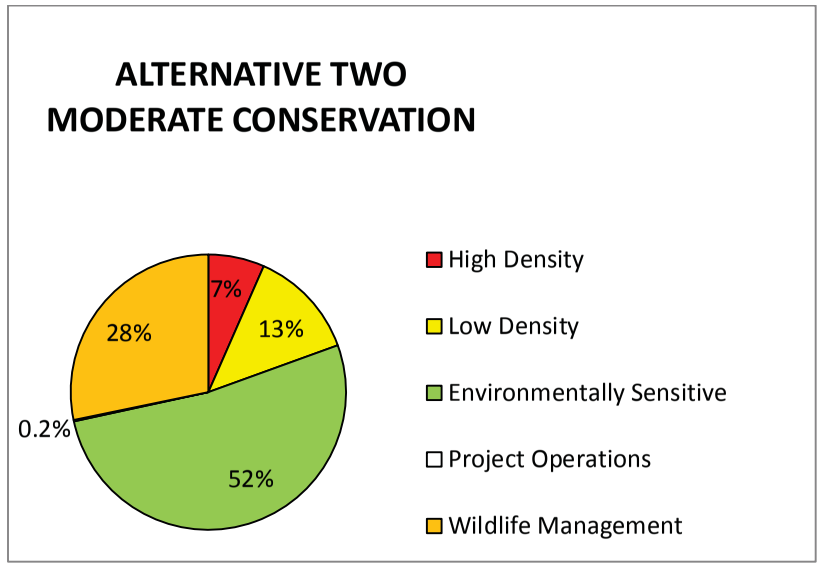
In this EA development, the different alternatives are compared to the No Action Alternative in order to evaluate potential positive and negative effects on the natural and human environment based on the various shoreline acreage classifications determined by each action alternative. All evaluated alternatives were provided for public review after completion of the draft EA. Public comments were collected during the public comment period and considered in the development of the final EA and the final updated Master Plan. Based on public comments received, the final EA would compare all action alternatives to the Preferred Action or to a modified alternative that is developed, based on public preferences. The Final EA presents the Selected Alternative and provides the basis for the agency decision under NEPA.

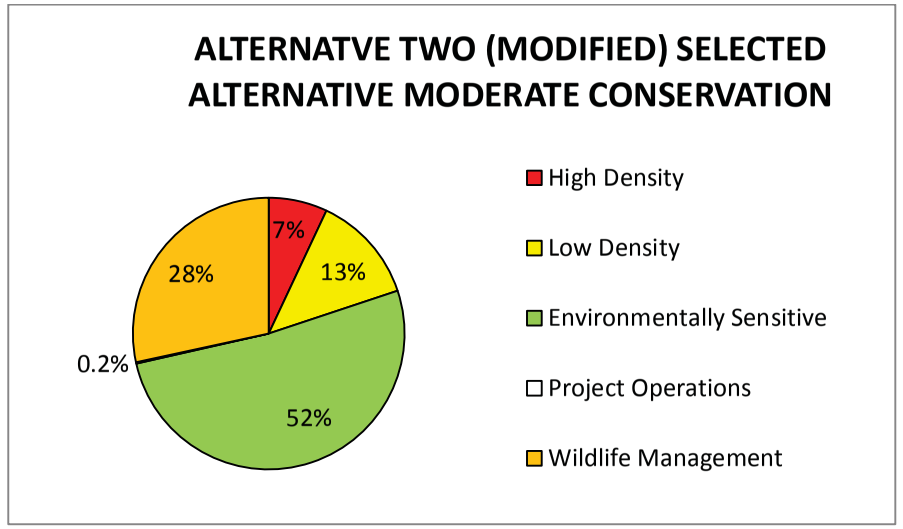
Table 3.1 Comparison of Land Classifications by Alternative

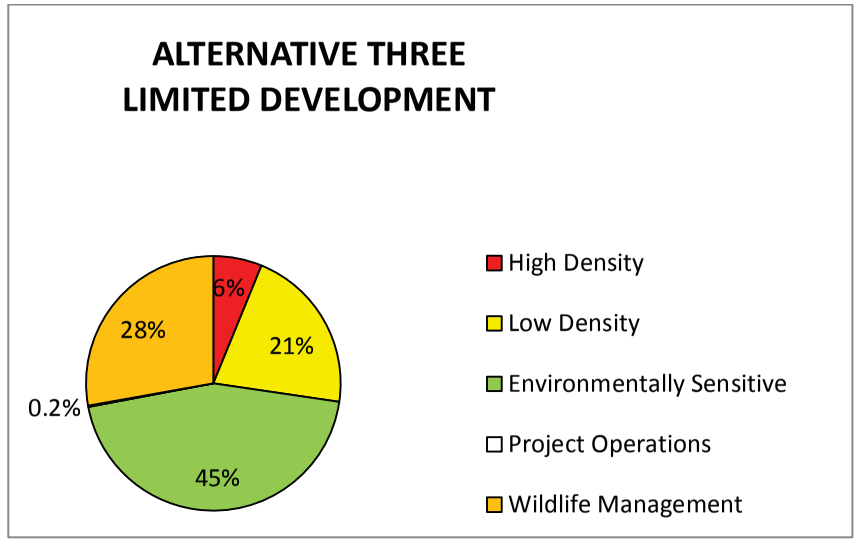
Land Classification	Alternative 1 – No Action		Alternative 2 – Moderate Conservation		Alternative 2 Modified, Selected Alternative— Moderate Conservation		Alternative 3 – Limited Development		Alternative 4 – Maximum Conservation	
	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
High Density	8,310.9	15%	3,714.6	7%	3,937.9	7%	3,480.3	6%	3,714.6	7%
Low Density	31,957.2	57%	7,257.6	13%	7,272.1	13%	11,915.8	21%	0.0	0%
Environmentally Sensitive	11,895.7	21%	29,366.9	52%	29,048.5	52%	25,190.9	45%	36,624.3	65%
Project Operations	61.8	< 1%	91.8	< 1%	91.8	<1%	91.8	< 1%	91.8	< 1%
Wildlife Management	3,953.5	7%	15,917.3	28%	15,997.9	28%	15,669.4	28%	15,917.3	28%
Not Allocated	169.0	< 1%	0.0	0%	0.0	0%	0.0	0%	0.0	0%

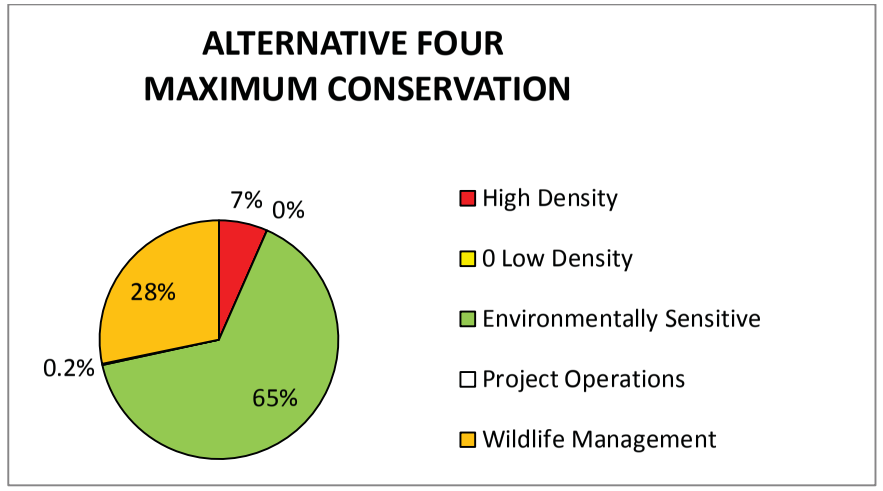
Figure 3.1 Pie Charts for Percentage of Land Classifications for Each Alternative.











3.1 No-Action (Alternative 1)

The No Action Alternative land classification, which is based on the 1975 master plan, does not accurately reflect the land use activities or resource management of the lake. In addition, this alternative does not address resource management laws, policies, and regulations that were implemented after the 1975 Bull Shoals Lake Master Plan.

Operation and management of Bull Shoals Lake would continue as outlined in the current Master Plan Update, which designates 8,310.9 acres as High Density recreation and 31,957.2 acres as Low Density recreation. This alternative has the potential to allow for increased land and water based impacts within the Low Density land classification due to the fact this constitutes 57% of available shoreline acreage. There are 11,895.7 acres classified as Environmentally Sensitive areas, 61.8 acres as Project Operations, 3,953.5 acres as Wildlife Management, and 169 acres that currently have no allocation. High Density recreation refers to lands developed for intensive recreational activities for the visiting public including day use areas and/or campgrounds. These could include areas for concessions (marinas, commercial concessions, etc.), and quasi-public development.

Low Density recreation lands have minimal development or infrastructure that supports a passive public recreational use (e.g. primitive camping, fishing, hunting, trails, wildlife viewing, resorts, etc.).

Environmentally Sensitive areas include those lands where scientific, ecological, cultural or aesthetic features have been identified. Designation of these lands is not limited to just lands that are otherwise protected by laws such as the Endangered Species Act, the National Historic Preservation Act or applicable State statutes. These areas must be considered by management to ensure they are not adversely impacted. Typically, limited or no development of public use is allowed on these lands. No agricultural or grazing uses are permitted on these lands unless necessary for a specific resource management benefit, such as prairie restoration. These restoration areas are typically distinct parcels located within another, and perhaps larger, land classification area.

The Project Operations category includes those lands required for the dam, spillway, switchyard, levees, dikes, offices, maintenance facilities, and other areas that are used solely for the operation of the project.

Wildlife Management lands are designated for stewardship of fish and wildlife resources. Vegetative management lands are designated for stewardship of forest, prairie, and other native vegetative cover.

3.2 Moderate Conservation – (Alternative 2, Modified, Selected Alternative)

The Selected Alternative, which is now the Preferred Alternative, is a slightly modified version of Alternative 2, the Moderate Conservation alternative. Under this alternative, High Density lands total 3,937.9 acres; Low Density lands total 7,272.1 acres; Environmentally Sensitive Area lands total 29,048.5 acres; Wildlife Management lands total 15,997.9 acres; and Project Operations lands total 91.8 acres.

The increase in High Density acreage is primarily in response to the public's concerns for additional boat ramps and launch sites, especially during high water events. Four high water ramps and sites have been proposed at the following Corps parks: Dam Site, HWY 125, Buck Creek, and Beaver Creek. In addition, High Density acreage was added back to the future use Elbow Park. Slight boundary line adjustments were also made at Beaver Creek and the Blackwell Ferry Area. Low Density acreage was added back to the Pot Shoals Nets Pen area to incorporate an existing deteriorated public launch ramp. The Corps proposes to rehab the Pot Shoals launch ramp pending receipt of funding.

3.3 Moderate Conservation (Alternative 2)

Under Alternative 2, the land classifications would be revised to reflect current management practices and responses to agency and public comments received during the scoping phase. Changes included reclassifying undeveloped High Density land classifications (i.e. future/closed Corps parks) to other land classifications; reclassifying undeveloped Low Density land to Wildlife Management, Project Operations, or Environmentally Sensitive Area; and reclassifying lands that contained active shoreline use permits to Low Density.

Alternative 2 proposes 3,714.6 acres in High Density recreation, representing a 4,596.3 acre decrease from the No Action Alternative. Low Density lands total 7,257.6 acres, representing a reduction of 24,699.7 acres from the No Action Alternative. The majority of the decrease in Low Density acreage would be due to reclassification to Environmentally Sensitive areas (increased to 29,366.9 acres), and Wildlife Management (to 15,917.3 acres). It should be noted that although the total number of acres of Low Density would be less under Alternative 2 than under the No Action Alternative, there would still be sufficient Low Density land to accommodate projected development demands for the next 10 to 20 years. Table 3.2 provides a comparison of alternatives in relation to Alternative 2.

3.4 Limited Growth (Alternative 3)

Alternative 3 would classify more lands that contained roads, utility lines, and shoreline use permits to a Low Density land classification. Many future Corps parks would be reclassified from High Density to predominantly Low Density land classification.

This alternative would allow additional low density development above the amount proposed under Alternative 2, mostly due to conversion of Environmentally Sensitive acres to Low Density classification. High Density lands would be reduced by 234.3 acres as compared to Alternative 2, resulting in 3,480.3 acres being classified as High Density. Low Density lands would be increased by 4,659.4 acres, which increases that acreage to 11,913.9 acres. The increase in Low Density as compared to Alternative 2 would primarily come from a reduction in land classified as Environmentally Sensitive (decreased by 4,176.8 acres to 25,192.6 acres), and as Wildlife Management (decreased by 246.9 to 15,669.4 acres).

3.5 Maximum Conservation (Alternative 4)

Alternative 4 would reclassify all Low Density Recreation lands identified under Alternative 1 to Environmentally Sensitive Areas. Existing permitted shoreline uses would be grandfathered but

there would be no new shoreline use permits issued.

This alternative would create more protected shoreline than all other alternatives, as the 7,252.0 acres of Low Density lands shown in Alternative 2 would be reclassified as Environmentally Sensitive lands. Under Alternative 4 there would be a total of 36,624.3 acres in the Environmentally Sensitive classification. High Density, Project operations lands and Wildlife Management lands would remain the same as under Alternative 2.

ALTERNATIVE ONE	CONVERTED TO	SELECTED ALTERNATIVE	ACRES	% of Selected Alt. Land Class		SELECTED ALTERNATIVE	
NO ALLOCATION		LOW DENSITY	7.8	0.1%		Low Density	7,272.1
		ENVIRONMENTALLY SENSITIVE	109.3	0.4%		Environmentally Sensitive	29,048.5
		HIGH DENSITY RECREATION	15.2	0.4%		High Density	3,937.9
		WILDLIFE MANAGEMENT	21.2	0.1%		Wildlife Management	15,997.9
		PROJECT OPERATIONS	15.5	16.9%		Project Operations	91.8
						Total	56,348.3
LOW DENSITY		LOW DENSITY	5,985.5	82.3%			
		ENVIRONMENTALLY SENSITIVE	15,505.8	53.4%			
		HIGH DENSITY RECREATION	244.3	6.2%			
		WILDLIFE MANAGEMENT	10,221.7	63.9%			
		PROJECT OPERATIONS	0.0	0.0%			
ENVIRONMENTALLY SENSITIVE		LOW DENSITY	730.3	10.0%			
		ENVIRONMENTALLY SENSITIVE	10,949.7	37.7%			
		HIGH DENSITY RECREATION	0.9	0.02%			
		WILDLIFE MANAGEMENT	214.8	1.3%			
		PROJECT OPERATIONS	0.0	0.0%			
HIGH DENSITY RECREATION		LOW DENSITY	532.7	7.3%			
		ENVIRONMENTALLY SENSITIVE	2,483.8	8.6%			
		HIGH DENSITY RECREATION	3,677.5	93.4%			
		WILDLIFE MANAGEMENT	1,602.4	10.0%			
		PROJECT OPERATIONS	14.5	15.8%			
WILDLIFE MANAGEMENT		LOW DENSITY	15.7	0.2%			
		ENVIRONMENTALLY SENSITIVE	0.0	0.0%			
		HIGH DENSITY RECREATION	0.0	0.0%			
		WILDLIFE MANAGEMENT	3,937.8	24.6%			
		PROJECT OPERATIONS	0.0	0.0%			
PROJECT OPERATIONS		LOW DENSITY	0.0	0.0%			
		ENVIRONMENTALLY SENSITIVE	0.0	0.0%			
		HIGH DENSITY RECREATION	0.0	0.0%			
		WILDLIFE MANAGEMENT	0.0	0.0%			
		PROJECT OPERATIONS	61.8	67.3%			
		Total=	56,348.3				

Table 3.2 Acreage Matrix

4.0 AFFECTED ENVIRONMENT

4.1 Project Setting

Bull Shoals Lake is a reservoir created by Bull Shoals Dam on the White River, which is located approximately seven miles northwest of Mountain Home, Arkansas. The lake extends from North Central Arkansas in Marion, Boone, and Baxter counties into South Central Missouri in Taney and Ozark counties, as shown in Figure 2.1. A more detailed description of the project location and area is provided in the following sub-sections.

4.2 Climate

Climate within the Bull Shoals Lake watershed is temperate, with summer extremes lasting for longer periods throughout northern Arkansas, and winter temperatures being more influential in the zone's northern reaches in Missouri. Extremes may vary from lows around 0°F in the winter months to highs above 100°F occurring from southern Arkansas to central Missouri during the summer months. Extreme temperatures may occur for short periods of time at any location within the watershed. Heavy rainfall events are common. Average annual rainfall over the watershed varies from 44 to 46 inches. Monthly rainfall varies from 2.5 inches in the winter months to about 5 inches in the spring. Snowfall each year averages from 8 to 16 inches from south to north across the watershed. Snow packs are usually short lived and are not commonly a concern for flooding.

Climate change is an area of concern due to the potential for effects on many aspects of the environment, especially those related to water resources. The U.S. Global Change Research Program (USGCRP) summarized information regarding climate change and its potential effects in regional assessments (http://www.globalchange.gov/publications/reports/scientific-assessments/us-impacts). In the Midwest, which extends from Minnesota to Missouri, extreme events such as heat waves, droughts and heavy rainfall events are projected to occur more frequently. Should these events become significant enough to impact the operation of Bull Shoals Lake, the Master Plan and associated documents (i.e. Operations Management Plan and Shoreline Management Plan) would be reviewed and revised, if necessary.

4.3 Topography, Geology, and Soils

The topography in the Bull Shoals Lake region includes gentle slopes to steep inclines typical of the Ozark Highlands. Bluffs of near vertical relief are present where the original White River channel has eroded the residual limestone substrate. The upper reaches of several small tributaries contain small flood plains and gentle slopes of less than five %. Primary ridges and connecting spur ridges have inclines as great as 10%, with side slopes ranging from 10 to 25% inclines. Aspect, or the direction a slope is facing, is generally described as easterly in nature

for all land occurring on the west side of the reservoir and westerly in nature for land occurring on the east side of the reservoir, however due to the presence of many smaller drainages and resulting ridges, aspects of all directions have been created, making the landform around Bull Shoals very rugged in appearance.

The Ozark Highlands Physiographic Province is underlain mainly by Paleozoic sedimentary rocks composed mainly of limestone and dolomite with lesser amounts of sandstone and shale. Much of the region is underlain by carbonate rocks with extensive karst development, resulting with sink holes and caves being common in this region. Figure 4.1 depicts geological formations and fault lines located in this region.

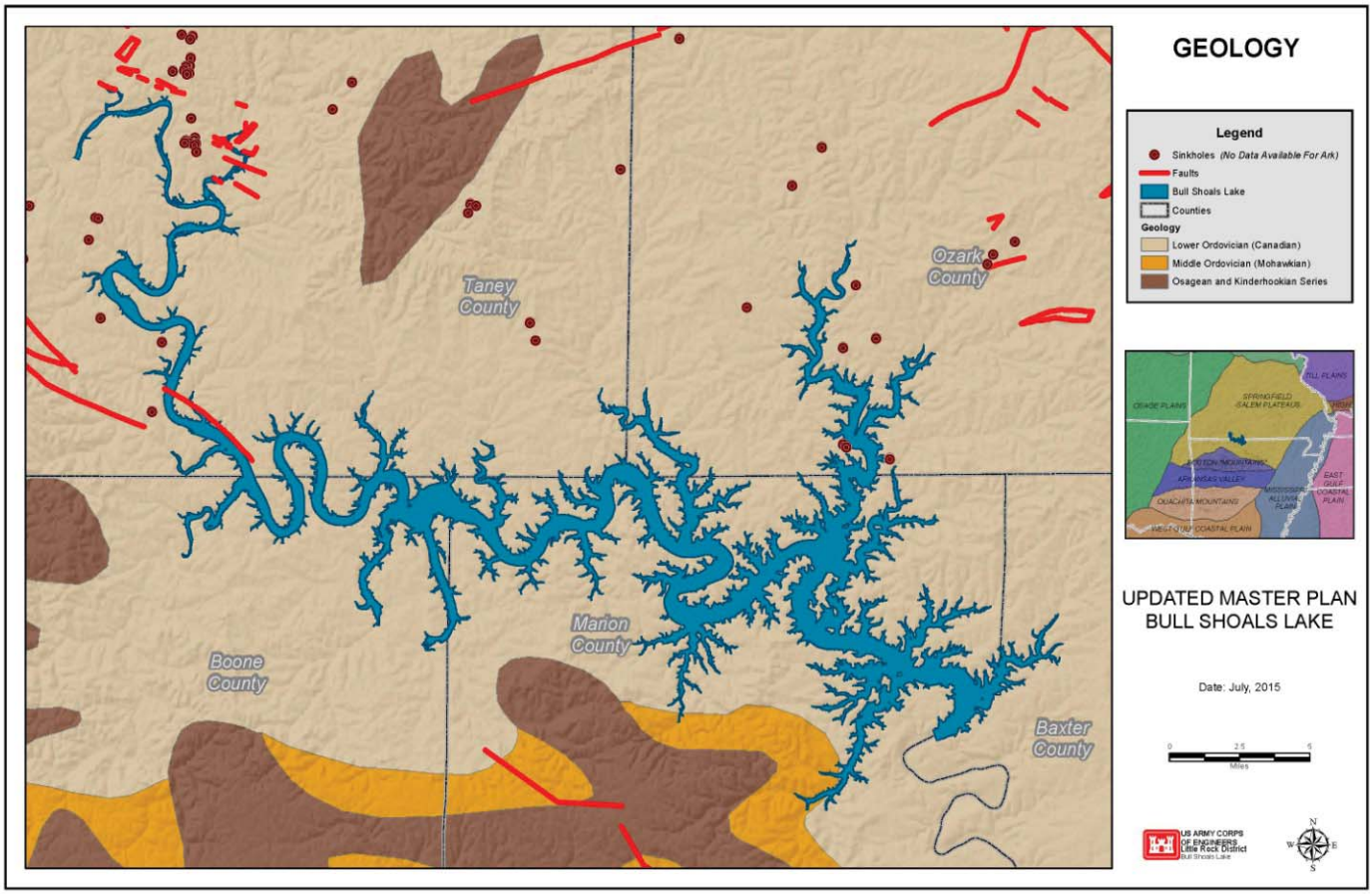


Figure 4.1 Geology of Bull Shoals Lake Watershed

The strata in the region of Bull Shoals Lake have a slight dip to the south. The region is on the southern flank of a large regional dome with its nucleus in the igneous rocks of the St. Francis Mountains, about 200 miles to the northeast. Locally, short anticlines and dome structures with as much as 90 feet of structural relief are noted in the exposures along the White River. Faults with small displacements are found in the vicinity. There is no record of any seismic activity originating in the Bull Shoals Lake area. It is believed that all faults in the region are static and no future movements are expected. Three rock formations of Ordovician age are present above the river level within the region. These formations include the Cotter, Powell, and Everton. The Jefferson City formation underlies the Cotter, and is present only a few feet below river level at Bull Shoals Dam. These formations consist largely of dolomite limestone with

occasional lenses of sandstone and shale. The Everton and Powell formations are not present at the dam, but cap the nearby hills. The capped hills are remnants of the Springfield Plateau surface.

Bull Shoals Lake is located within two physiographic areas of the Ozark Highlands. The Salem Plateau is exposed across northern and central Baxter County, and is characterized by gently sloping to rolling uplands, and steep, stony side slopes with outcrops of dolomite. The elevation ranges from about 700 to 1,000 feet above sea level and there are a few broad areas on uplands that have a gradient of one to eight percent.

The Springfield Plateau is exposed in parts of west central and across most of southern Marion County and most of southern Baxter County, and the Missouri counties of Taney and Ozark, and is adjacent to and higher in elevation than the Salem Plateau. This plateau has been strongly dissected by streams. Steep, V-shaped valleys separated by gently sloping to moderately sloping land characterize it. The side slopes have a gradient of 12 to 50 %. The elevation atop the ridges ranges from about 1,000 to 1,200 feet above sea level. There are areas on uplands where the gradient is one to eight percent and provides a more flat relief.

Ozark streams and rivers are frequently located in narrow, confined valleys and are affected by stream bed elevations that are typically only a few meters above bedrock, which results in stream valleys that are entrenched and commonly less than one-fourth mile wide. The chert content of some limestone and dolomite areas can be relatively high. Formed by rock dissolution and weathering, streams often contains large quantities of chert gravel, which provides an available source of gravel sediment to the river system. For these reasons, most flood plains are less than 1,000 feet wide.

Soil surveys as published by the Natural Resource Conservation Service (NRCS) are available for Baxter, Ozark, and Taney counties, as well as Soil Conservation Service surveys for Boone and Marion counties in Arkansas. These would be utilized for developing specific resource management plans for the Operational Management Plan. In general, most soils adjacent to the lake are classified by the NRCS as Clarksville, Nixa and Gasconade soils. Arkana, Doniphan, Gassville, and Moko soils are the major soils on this plateau surface. Arkana-Moko which is: moderately deep and shallow, gently sloping to steep, well drained, cherty, and stony soils that formed in residuum of dolomite and limestone. Healing, Razort, Wideman, and Britwater soils formed within flood plains of tributary streams.

Soil conservation and management are major considerations when planning natural resource and recreation management practices. While soil movement is influenced by climate, soil type, and topography, which are uncontrollable, it can also be negatively affected by compaction, modification of vegetative cover, and very high lake pool elevations which increase wave action and inundation of unprotected shoreline.

4.4 Aquatic Environment

4.4.1Hydrology and Groundwater

Bull Shoals Lake is located on the White River and was formed by the construction of the Bull Shoals Hydroelectric Dam in Marion County, Arkansas, which began in 1947 and was completed in 1951. The elevation of the top of the conservation pool is approximately 659 feet

NGVD29 with the flood pool being at 695 feet NGVD29. The conservation pool top area is approximately 48,005 surface acres and the flood pool top area is approximately 71,240 surface acres. The shoreline length of the design conservation pool is approximately 740 miles, and the flood pool is approximately 1,050 miles in length. Bull Shoals Lake is located within the White River Drainage Basin, which drains approximately 27,765 square miles in northern Arkansas and southern Missouri. Bull Shoals Lake drains approximately 6,036 square miles of the White River Drainage Basin and has an average depth of 67 feet. With the implementation of the White River Minimum Flow (WRMF) Project, the total water storage capacity of Bull Shoals Lake is 5.408 million acre-feet, with 2.127 million acre-feet of flood control storage, 1.236 million acre-feet of conservation storage, and 2.045 million acre-feet of inactive storage.

Bull Shoals Lake is an impounded area of the White River which begins at an elevation of approximately 2,050 feet Mean Sea Level (MSL) near the Ozark National Forest in northwest Arkansas. The upper end of the lake begins at the tail waters of Powersite Dam, which forms Lake Taneycomo, near Forsyth, Missouri. Major tributaries feeding the lake include Swan Creek and Beaver Creek, entering the north side in Taney County, Missouri and Bear Creek, entering from the south in Boone County, Arkansas.

Most ground water withdrawn from water wells occurs in the Quaternary alluvium in the Bull Shoals Lake area, with most wells being completed at a depth of about 200 – 300 feet below surface. The recharge (outcrop) area for this formation is in southern Missouri. The primary porosity of these rocks has been greatly reduced by compaction and cementation, thus a reduction in their ability to supply large withdrawal rates. Ground water occurs mainly in fractures and joints in the sandstone and in solution openings in the limestone and dolomite.

4.4.2 Water Quality

Overall surface water quality in the Bull Shoals Lake area is very high and has been designated as an Extraordinary Resource Water Body by the Arkansas Department of Environmental Quality (ADEQ). Therefore the area surrounding the lake is subject to more stringent state regulations controlling pollution discharge and in-stream activities. The waters of the Arkansas portion of the White River watershed have all been designated by the ADEQ for fisheries, primary and secondary contact recreation, and domestic, agricultural, and industrial water supplies (ADEQ, 2012). Bull Shoals Lake is classified by ADEQ as a Type A water body, which includes most larger lakes of several thousand acres in size, in upland forest dominated watersheds, having an average depth of 30 to 60 feet, and having low primary production (i.e., having a low trophic status if in natural [unpolluted] condition). This is mainly due to temperature stratification, which is natural and occurs in many deep reservoirs such as Bull Shoals Lake. During the warmer months, lake waters of the upper layer (the epilimnion) are warmer and contain more dissolved oxygen, while the denser, lower layer waters (the hypolimnion) are colder and contain very little or no dissolved oxygen. As the stratified epilimnion cools in the late fall and winter, the layers begin to mix (de-stratify) and dissolved oxygen (DO) is more evenly distributed. This condition is more favorable to the fishery of the lake and overall water quality.

In 2004, ADEQ placed the first three miles of the Bull Shoals tail water on the Water Quality Limited Waterbodies list (303(d) list) due to violation of the 6 mg/L dissolved oxygen (DO) standard. The listed source of the DO violation is hydropower (HP). Section 303(d) of the Clean Water Act requires states to list waters that do not meet Federal water

quality standards or have a significant potential not to meet standards as a result of point source dischargers or non- point source run-off. Subsequent to listing on the 303(d) list, the statute requires that the states develop and set the Total Maximum Daily Load (TMDL) for water bodies on the list within 13 years. A TMDL establishes the maximum amount of a pollutant that can enter a specific water body without violating the water quality standards. Values are normally calculated amounts based on dilution and the assimilative capacity of the water body. TMDLs have been established by ADEQ for the 3.0 miles of the White River below Bull Shoals Dam. While the first three miles below the Bull Shoals dam is listed on the 303 (d) as an impaired water body, Bull Shoals Lake is not a listed water body. In January 2009, USACE completed the WRMF Study, which would increase the minimum flow below the dam to 800 cfs to benefit the aquatic habitat and may result in water quality improvements in the tail water.

For the Missouri portion of Bull Shoals Lake, the Missouri Department of Natural Resources and the Clean Water Commission are responsible for setting and enforcing water quality standards within the State of Missouri. Classified waters in the state are categorized according to their beneficial water usage. Major reservoirs like Bull Shoals Lake are usually several thousand acres in size and are classified by the state as L2 (comparable to Type A in Arkansas). Bull Shoals Lake, in addition to maintaining L2 water quality standards, is also subject to four other water quality standards: (1) livestock and wildlife watering; (2) protection of warm water aquatic life and human health/fish consumption; (3) whole body contact recreation; and (4) boating and canoeing water quality standards (MDNR, 1996b).

4.4.3 Fish Species and Habitat

The impoundment of the White River and other tributary streams and rivers which form Bull Shoals Lake resulted in changes in the composition of the fish populations. Smallmouth bass was the principal game fish found in the White River prior to impoundment. Arkansas Game and Fish Commission (AGFC) and Missouri Department of Conservation (MDC) are the agencies primarily responsible for managing the fishery and through their efforts, a variety of fish species are well-established in the lake. Sport fish species currently found include: largemouth bass, spotted bass, smallmouth bass, white bass, striped bass, hybrid white-striped bass, walleye, flathead catfish, channel catfish, white crappie, black crappie, and various species of sunfish. Due to the quality and diversity of the fishery, Bull Shoals Lake serves as a national fishing destination, hosting hundreds of bass tournaments annually.

Bull Shoals Lake was first impounded in 1951 and much of the standing timber was cut prior to the impoundment. Since impoundment, the few remaining native forests that were submerged provided structure and forage habitat for fish. This limited habitat has degraded over time. Therefore in 1986, USACE, MDC, and AGFC began a large scale artificial habitat improvement project with the primary objective to improve fish habitat within Bull Shoals Lake. Since 1987, 459 fish habitat structures known as “fish attractors” have been placed in Bull Shoals Lake by AGFC and 95 attractors by MDC. Approximately 64,000 trees comprise the attractors which cover over 124 acres of lake bottom, totaling 30 miles in length. AGFC and MDC fund the maintenance of the attractors each year, adding fresh cover to keep the attractors productive and increasing the habitat.

In 2013, MDC began a fish habitat enhancement project on Bull Shoals Lake using standing cut

cedar trees anchored in concrete to provide a vertical habitat structure. When the project is completed, 62 structures would be constructed. Depending upon the structure, up to 300 trees would be constructed parallel to the shore in shallower water and perpendicular to the shore in deeper water to prevent possible boating obstacles. These structures would create approximately 12 acres of fish habitat. In 2014, AGFC began a trial program of adding commercially made artificial fish habitat structures to a small number of existing fish attractors. These structures are being studied for visual esthetics, durability, and usage by fish to determine if they can be used to enhance the existing fish habitat structure program.

The public is also encouraged to place natural fish attractors in Bull Shoals Lake. Each year 50 permits are issued to private individuals to cut cedar trees and place fish attractors at various locations. In 1995, USACE began a program for the public to bring their discarded Christmas trees to be used as fish attractors to enhance fish habitat. Since the program began, thousands of these trees have been placed in the lake by USACE personnel and the public.

The impoundment of Bull Shoals Lake caused environmental changes in the tailwater portion of the White River from the dam to 60 miles downstream. AGFC realized that the cold water discharges from Bull Shoals Lake would necessitate a change in their fisheries management program for the White River as it transformed from a warm water fishery to a cold water fishery. Rainbow trout, cutthroat trout, brook trout, and brown trout were stocked in the White River to replace the warm-water fishery. This cold-water fishery is a success. However, because of the unfavorable environmental factors such as: lack of suitable substrate, the fluctuation of water temperatures, dissolved oxygen levels, water levels and current, trout reproduction is very limited.

In 1955, the Norfork National Fish Hatchery was built by the U.S. Fish and Wildlife Service (USFWS) at nearby Norfork Lake to mitigate the loss of the warm water fishery and provide trout for the cold water fishery below Bull Shoals and Norfork Dams. Each year, an average of approximately 1,184,000 rainbow trout, 105,000 brown trout, 150,000 cutthroat trout, and 34,500 brook trout from the Norfork Hatchery and from the USFWS Fish Hatcheries at Greers Ferry Lake and Mammoth Springs, AR and the Arkansas State Fish Hatchery at Mammoth Springs, AR are stocked in the White River. Since the trout program began, the fishery has flourished and is now known as a “world class trout fishery” and has become a popular international trout fishing destination.

During periods when there is little or no power generation, the water flow in the tailwater area is reduced, resulting in shallow depths and exposed river bottom perimeters. Concerns about the degradation of aquatic habitats for the cold water fishery in the White River due to these exposed areas lead to the implementation of “White River Minimum Flows”. Section 132(a) of the FY06 EWDAA authorizes and directs the implementation of plan BS-3 at Bull Shoals for minimum flows in order to increase the wetted perimeter of the river and improve the habitat for the cold water fishery. Plan BS-3 reallocates 5 feet of flood control storage at Bull Shoals Lake for the minimum flows release of 800 cfs. The conservation pool elevation was raised by 5 feet from 654.0 to 659.0; and the seasonal pool held from May to July for water temperature releases was raised by 5 feet from 657.0 to 662.0 ft.

Walleye, striped bass, hybrid white-striped bass, and rainbow trout have been introduced into Bull Shoals Lake to add diversity to the fishery. Natural reproduction of striped bass and hybrid

white-striped bass does not occur in Bull Shoals Lake and natural production of walleye is considered minimal. Since 2004, AGFC each year stocks approximately 200,000 walleye, 300,000 black crappie, 50,000 channel catfish, 45,000 blue catfish, and 20,000 rainbow trout each year. However, AGFC discontinued stocking rainbow trout into Bull Shoals Lake in 2014. MDC stocks approximately 352,000 walleye and 16,000 striped bass annually in Bull Shoals. While natural reproduction occurs in white crappie, black crappie, largemouth bass, and spotted bass, AGFC and MDC supplement this reproduction by occasional stockings of these species. Historically, there have also been introductions of northern pike, blue catfish, lake trout, and threadfin shad.

In 1963, AGFC constructed an 8 acre fish nursery pond on the west shore of the East Sugar Loaf Creek arm of Bull Shoals Lake for the purpose of rearing game fish for stocking purposes. In 1975, AGFC constructed a net pen fish hatchery in the Pot Shoals Arm of Bull Shoals Lake. Typically over 10,000 Channel and blue catfish were raised in the summer months and 15,000 rainbow trout in the winter months for stocking purposes. In 2007, the AGFC replaced the 8 acre nursery pond on East Sugar Loaf Creek with the construction of the larger 21 acre Dr. Ralph Bowers/Tommy Donohoe Bull Shoals Lake Nursery Pond located on the east shore of the West Sugar Loaf Creek arm. This fish nursery pond is used to alternately rear black crappie and walleye for stocking directly into the lake. In 2013, the Pot Shoals net pen operation was discontinued and the facilities permanently closed in 2014 due to the possible spreading of invasive zebra mussels to other bodies of water through the stocking program.

4.5 Terrestrial Resources

4.5.1 Wildlife

White-tailed deer and eastern wild turkey are common game animals found and hunted in the Bull Shoals Lake area. Black bear have also become common in the area and are hunted on the Arkansas side of Bull Shoals Lake. The principal small game species found in the open upland areas include bobwhite quail, cottontail rabbit, and mourning dove. Gray and fox squirrels are common in upland wooded areas and are also popular for sportsmen. Furbearing animals found in the Bull Shoals Lake area include coyote, red fox, gray fox, otter, mink, muskrat, beaver, bobcat, and raccoon. Habitat management that includes wildlife food plot plantings, mowing, soil disturbance, removal of exotic species and application of prescribed fire provide benefit to these populations.

The common goldeneye, hooded merganser, and bufflehead are the predominant migratory waterfowl species visiting Bull Shoals Lake. Mallards, gadwall, and other duck species are also present; however, they are only transient visitors as their characteristic feeding habits of obtaining food from shallow waters discourage them from obtaining food from the deep, clear waters of Bull Shoals Lake. Migratory geese common to the area are Canada geese of the Eastern Prairie Population. Giant and Greater Canada geese were introduced to the area by the MDC in 1971 and 1972 and have become established as a resident population. Resident Canada geese are so numerous in many coves and recreation areas that their presence has become a nuisance. Many of the recreation areas on Bull Shoals Lake are closed to camping and opened for Canada goose hunting during the hunting season to help control their population.

Ring-billed gulls frequent the Bull Shoals area. Bull Shoals has also become a popular place for observation of bald eagles. Fifty or more birds commonly winter here and 6-8 breeding pairs can be found during the nesting period of March to June. Greater and lesser yellow legs and large flocks of horned grebes are also seen during their peak migration in the spring and fall. Bull Shoals Lake is also one of the few places where visitors can see both the turkey vulture and the black vulture at the same time in the winter. In fact, wintering black vulture numbers have become so large, they have become a nuisance to the public and in causing destruction to the infrastructure of Bull Shoals Dam. From 2012 to present day, it is estimated the vultures have done several hundred thousand dollars in damage to the dam, including the roof of the powerhouse and associated facilities. The vultures pick apart anything that resembles rubber and vulture droppings on these facilities are very caustic. Lethal permits were obtained from the USFWS in 2013, 2014, and 2015 when other measures, such as pyrotechnics, noise-making devices, and chemical repellant were all found to be ineffective. The permits are required for compliance with the Migratory Bird Treaty Act of 1918.

4.5.2 Vegetation

The Ozark Highlands Ecoregion is characterized as a high plateau dissected by deep rugged valleys formed by streams and rivers. Vegetation types within this region include oak-hickory forests, oak-hickory-pine forests, bluestem prairies and cedar glades. Post oaks, blackjack oaks, and black hickory are the dominant species found in the dry upland forests. Sandstone bedrock areas contain species such as shortleaf pine and various species of oak. The mesic slope forests include species such as white oak, northern red oak, bitternut hickory, and flowering dogwood. Dolomite/limestone glades, which are characterized by barrens-like communities of prairie type native forbs and grasses, occur on the shallow soil over outcroppings of bedrock. USACE conducts a prescribed fire program to help to maintain these specialized vegetative ecosystems in the Bull Shoals Lake area. Along the rivers, streams, and lake shores the riparian habitats are characterized by birch and silver maple. Normal operational water level fluctuation at Bull Shoals Lake has created regions along the shoreline that has little or no vegetation, but upslope of these regions the shoreline is generally undeveloped and heavily forested.

4.6 Threatened and Endangered Species

There are many species in the Ozarks that are considered either threatened, endangered, or state species of concern. Species become listed for a variety of reasons including over-hunting, over fishing, and habitat loss as a result of human development and pollution; of these, habitat loss is the main contributor that imperils most species. A threatened species is one that is likely to become endangered within the foreseeable future. An endangered species is one in danger of extinction throughout all or a significant portion of its range. The bald eagle (*Halieetus leucocephalus*) is common during the winter months around Bull Shoals Lake. In addition, several bald eagle nests are located around the lake. Although the bald eagle was delisted by USFWS in 2007 due to recovery of the species, both the bald and golden eagles are still protected in accordance with the Bald and Golden Eagle Protection Act. Transient populations of gray and Indiana bats (*Myotis grisescens and Myotis sodalis)* - federally endangered species- are documented in caves located on and near the Bull Shoals Lake area. In addition, populations of the northern long-eared bat (*Myotis septentrionalis*), which has been proposed for federal listing, also occur around the lake.

The Tumbling Creek cave snail (*Antrobia culveri*), is a small crustacean known to exist only in the Tumbling Creek Cave and in the karst groundwater system that connects the cave to the springs on Big Creek and Bear Cave Hollow located in the Bull Shoals Lake area in Taney County, Missouri. USACE works closely with the U.S. Fish and Wildlife Service to protect the 100 acres of USACE owned cave recharge area and manage the project lands and waters of Bull Shoals Lake to protect the cave snail and aid in its recovery.

Table 4-1 lists species known to occur on project lands as reported from the U.S. Fish and Wildlife Service's federally classified status list of species and the Arkansas and Missouri Natural Heritage data sets. There are other threatened and endangered species that are known to be in the general area.

Table 4-1 Threatened, Endangered, and Species of Concern

Common Name	Scientific Name	Federal/State Status	State/Global Rank
Bald Eagle	*Halieetus leucocephalus*	*Protected under Bald and Golden Eagle Protection Act	
Gray Bat	*Myotis grisescens*	E/E	S3/G3
Indiana Bat	*Myotis sodalis*	E/E	S3/G3
Tumbling Creek cave snail	*Antrobia culveri*	E/E	S2/G3

E = Endangered; S2: Imperiled: Imperiled in the state because of rarity or because of some factor(s) making it very vulnerable to extirpation from the nation or state (1,000 to 3,000)-typically 6 to 20 occurrences or few remaining individuals (1,000 to 3,000); S3: Vulnerable: Vulnerable in the state either because rare and uncommon, or found only in a restricted range (even if abundant at some locations), or because of other factors making it vulnerable to extirpation. Typically 21 to 100 occurrences or between 3,000 and 10,000 individuals; G3: Vulnerable: Vulnerable globally either because very rare and local throughout its range, found only in a restricted range (even if abundant at some locations), or because of other factors making it vulnerable to extinction or elimination. Typically 21 to 100 occurrences or between 3,000 and 10,000 individuals.

4.5.1Invasive Species

In accordance with Executive Order (EO) 13112, an invasive species means an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health. Invasive species can be microbes, plants, or animals that are non-native to an ecosystem. In contrast, exotic species, as defined by EO 11987, include all plants and animals not naturally occurring, either presently or historically, in any ecosystem of the United States. Invasive species can take over and out- compete native species by consuming their food, taking over their territory, and altering the ecosystem in ways that harm native species. Invasive species can be accidentally transported or they can be deliberately introduced because they are thought to be helpful in some way. Invasive species cost local, state, and federal agencies billions of dollars every year.

The Bull Shoals Project is not protected from the spread of invasive species. Locally the project office works with its partners, AGFC, MDC, University of Arkansas Extension Services and United States Department of Agriculture, to help stop the spread of some of the Ozarks most unwanted species. Invasive species include feral hogs (*Sus scrofa*), zebra mussels (*Dreissena polymorpha*), sericea lespedeza (*Lespedeza cuneata*), gypsy moth (*Lymantria dispar*) and the emerald ash borer (*Agrilus planipennis*). Project rangers post signage in all the recreation areas to communicate the dangers of spreading invasive species on project lands and waters. Rangers also place emerald ash borer and gypsy moth traps on project lands to monitor any infestations of this species.

4.6 Archaeological and Historic Resources

4.6.1 Paleontology

North central Arkansas and south central Missouri are located on the Salem Plateau. Geologically the plateau is made up of relatively flat-lying Paleozoic age strata consisting of dolostones, sandstones, and limestones. The Ordovician aged Cotter and Jefferson City Dolomite is the primary outcropping formation in the area. Few fossils are known to exist in the Jefferson City Dolomite. Fossils from the Cotter Dolomite are rare but include gastropods, cephalopods, and reef-building algae. The Ordovician aged Powell Dolomite and Everton Formation also outcrop in the general area although to a lesser extent.

4.6.2 Cultural Resources

The following is a brief history of the human occupation of the Bull Shoals Lake area:

Paleo-Indian (12,000-8,000 B.C.) – The earliest documented archeological manifestation in the Ozark area relates to what the Paleo-Indian or Early Hunting Horizon. There is evidence of Paleo-Indian inhabitants in the Ozark Highlands indicated by the presence of Clovis, Cumberland, and Folsom bifaces in isolated instances in Boone and Newton Counties, Arkansas. No Paleo-Indian sites have been excavated in the Ozarks, only surface sites and multi-component shelter sites are present.

Archaic (8,000-500 B.C.) - Around 8,000 years ago, the climate began to change. The Pleistocene epoch gave way to the Holocene. Warmer temperatures, along with increased hunting efficiency, brought about the extinction of the megafauna that the Paleo-Indians had followed. Archaic people relied on the animals and plants that we see today. Settlement patterns were seasonal, with bands of people staying in one area for entire seasons before moving on to the next settlement. From these base camps, hunting parties were sent out, sometimes for days, to kill game. Archaic period hunting camps abound in the White River area.

Woodland (500 B.C. – A.D. 900) - One major technological change marked the beginning of the Woodland period- pottery. Ceramics had begun to appear during the Archaic period, but their proliferation marked the beginning of the Woodland period. Pottery signified an increasing reliance on domesticated plants. Horticulture had now spread throughout most of the Eastern Woodlands, with the White River area being no exception. The bow and arrow became a part of the tool assemblage, further increasing the efficiency of hunting game. For the most part, however, the Woodland period is very poorly understood in the White River area.

Unfortunately, only a few sites containing Woodland period components have been studied.

Mississippian (A.D. 900 – 1541) - The Mississippian period generally marked the transition to full-scale agriculture and a chiefdom level of politics. An influence of religion from Mesoamerica spread rapidly throughout the southeastern U.S. Large mound sites were constructed, elaborate trade networks were established, and populations dramatically increased. Ozark adaptations, however, were unique during the Mississippian period. Domesticated crops were grown in the river valleys, but hunting and gathering likely made up the bulk of the food supply. Small Mississippian period mound sites did exist in the White River area, such as the Loftin Site, inundated by Table Rock Lake. Other Mississippian sites in the area included open-air village sites and rock shelters. It had been speculated that these communities were "outposts" of the Caddo culture located to the southwest. Recently, however, researchers have demonstrated that these societies simply interacted with one another on a frequent basis, with no evidence of Caddo colonization.

Protohistoric / Historic Periods (A.D. 1541 –1865) - The Protohistoric period began with the De Soto expedition into the Southeastern United States. Generally speaking, De Soto did not enter the Ozarks, but the aftermath of his expedition definitely did enter the area. Diseases the Spaniard and his men brought with them, such as smallpox and influenza, had a devastating effect. The tribes inhabiting the area had no immunity against these diseases, and up to 90 percent of the populations were decimated. During this time period, the Ozarks were primarily being used as a hunting ground for the Osage, who were centered more to the north.

Euro-American settlement began in the Ozarks in the late 18th century. People generally subsisted on a combination of hunting wild game and herding domesticated animals. With the creation of the Arkansas Territory in 1819, people from the upland South, or Appalachia, began to move into the Ozarks. These people brought with them many aspects of their culture, including fundamentalist religion, unique architectural styles, and an aptitude for farming rocky terrain. Although slave holding was not unheard of, it certainly was not the norm. A few major battles of the Civil War, such as Pea Ridge, were fought in the area. Theoretically, the battle of Pea Ridge solidified Union control over southern Missouri. In reality, the entire Ozark region was hostage to Bushwhackers, or outlaws that roamed the land and robbed people indiscriminately.

Previous Investigations in the Bull Shoals Lake Area

The most recent broad cultural resources inventory for Bull Shoals Lake was conducted in 1988 for the *Cultural Resources Priority Plan for the U.S. Army Engineer District, Little Rock* (Blakely and Bennett, Jr., 1988). Table 4-2 lists previous surveys performed along the Bull Shoals Lake. Table 4-2 includes the most up to date survey information according the records of the Arkansas Archeological Survey and the Missouri Department of Natural Resources.

Table 4-2 Previous Archeological Investigations on Bull Shoals Lake

Author	Title	Year
Howard, Lynn E	Archeological Survey in Bull Shoals Region of Arkansas	1963
Spears, Carol, Nancy Myer, Hester Davis	Watershed Summary of Archeological and Historic Resources in the White River Basins, Arkansas and Missouri.	1975
Novick, Lee and Charles Cantlry	Bull Shoals Lake: An Archeological Survey of a Portion of Bull Shoals Lake Shoreline.	1979
Lee, Aubra Lane	Cultural Resources Investigations at Bull Shoals Lake, Arkansas	1986
Blakely, Jeffrey A. and W.J. Bennett Jr.	Cultural Resources Priority Plan for the U.S. Army Engineer District	1988

Recorded Cultural Resources in the Bull Shoals Lake Area

Today, the Bull Shoals Project is home to approximately 138 identified archeological sites made up of camp sites, shelter and cave sites, rock cairns, and earthen mound sites. A vast majority of these sites were submerged by impoundment of the White River. Less than five percent of the known sites within the lake area were investigated any further than documentation. Table 4.3 summarizes the previously recorded resources at Bull Shoals Lake.

Table 4.3 Previously Recorded Resources at Bull Shoals Lake

Type of Site	Number of Sites
Historic	4
Prehistoric	114
Multicomponent	20
Total	138
National Register Eligibility Status	
Not Evaluated	132
Not Eligible	5
Eligible	1

4.7 Air Quality

Bull Shoals Lake is located in the Ozark Mountains, remote from heavy emission-producing industry or large mining operations. The air is clean with low levels of air emissions below local emission thresholds. There have been no violations of the current National Ambient Air Quality Standards (NAAQS) established by EPA. Air monitoring requirements are established by EPA and are dictated under their guidance and monitoring objectives. Monitoring sites are placed in areas believed to have higher concentration of pollutants, which generally consist of the state's larger metropolitan areas. These areas, called Metropolitan Statistical Areas (MSA's) are defined by the larger population centers and surrounding counties. Based on these guidelines, the Branson MSA has one air quality monitoring site, with ozone the only constituent being monitored. The ozone concentration is consistently below the 75 parts per billion (ppb) established by EPA for this pollutant.

4.8 Socio-Economic Resources

There are five counties that surround Bull Shoals Lake, three in Arkansas and two in Missouri. Table 4.4 provides a comparative summary of population trends within those five counties that are adjacent to the project area. The total population of those counties in 2010 was 156,467, with the 2013 population estimated at 148,368. The 2013 population represents a -5.45% decrease since 2010. During the same time period the United States of America had population increase of
2.33%.

Table 4.4 Population Trends

	Population 2013	Population 2010	Percent Change (2010-2013)
Boone County, AR	37,396	36,903	1.3%
Marion County, AR	16,430	16,653	-1.3%
Baxter County, AR	40,957	41,513	-1.3%
Ozark County, MO	9.560	9,723	-1.7%
Taney County, MO	53,575	51,675	3.7%
Total	148,368	156,467	0.70%
Data from www.census.gov			

Table 4.5 portrays selected housing characteristics related to number of units, median value, vacancy rate and size of household. In 2010 there were a total of 83,672 housing units within the surrounding counties according to the 2010 U.S. Census. Approximately 74% of the housing units are owner occupied, with the average household size being approximately 2.3 people per unit.

As indicated in Table 4-5 the median value of owner-occupied housing in 2010 was $106,400.

Table 4.5 Housing Characteristics, 2010

	Total Housing Units	Percent Owner Occupied	Median Value (owner occupied)	Average Household Size (owner occupied)
Boone County, AR	16,831	72.6	106,400	2.43
Marion County, AR	9,354	79.5	92,700	2.34
Baxter County, AR	22,580	76.5	120,000	2.24
Ozark County, MO	5,652	79.1	89,900	2.35
Taney County, MO	29,255	63.2	129,100	2.45
Total	83,672	74.1	106,400	2.36
Data from www.census.gov				

Median household incomes from 2009-2013 was $35,343 in the five counties surrounding Bull Shoals Lake according to the U.S. Census American Community Survey. Almost 22% of the population within those counties was considered to be below the poverty level in 2010 according to the 2010 U.S. Census (Table 4.6). The relative share of the population below the poverty level for the project area is higher than for the State of Arkansas (19.7%), and the State of Missouri (15.9%). Around 84% of the population from the counties surrounding the lake have at least a high school diploma, and 15% have a bachelor's degree or higher.

Table 4.6 Income and Education, 2009-2013

	Median Income	Persons Below Poverty Level (percent)	High School Graduates (percent)	Bachelors or Higher (percent)
Boone County, AR	38,506	21.2	85.4	15.4
Marion County, AR	34,494	21.4	83.6	12.9
Baxter County, AR	35,343	17.7	87.6	16.5
Ozark County, MO	32,078	25.2	82.8	12.5
Taney County, MO	38,461	19.9	84.7	18.6
Total	35,343	21.08	84.7	15.4
Data from www.census.gov				

According to the 2010 U.S. Census, 3.6% of the population within the project area consisted of demographic minority populations in 2010 as compared to 20% for the State of Arkansas and 16% for the State of Missouri (Table 4.7).

Table 4.7 Population by Race and Origin, 2010

	White	Black	Other	Hispanic or Latino Origin
Boone County, AR	96.5	0.2	.03	1.8
Marion County, AR	95.9	0.2	2.2	1.7
Baxter County, MO	96.9	0.2	1.2	1.7
Ozark County, MO	97.4	0.1	1.2	1.3
Taney County, MO	93.6	0.9	0.7	4.8
Total	97.0	0.3	1.05	2.26
Data from www.census.gov				

4.9 Recreation Resources

The recreational resource of the Bull Shoals Lake is considered to be of great importance to this Ozark Mountain region. Tourism and lake visitation is a major source of income for the counties surrounding this lake. The Project offers many recreational activities such as swimming, SCUBA diving, boating, water skiing, fishing, picnics, and camping, as well as hiking and biking trails. There are 38 public use areas around Bull Shoals Lake. Nine campgrounds and six access points on the lake are operated by the Corps of Engineers. In 2012, a district lead Recreation Adjustment Plan evaluated all the parks on Bull Shoals Lake and for budgetary reasons, leased the camping portion of Dam Site Park and Pontiac Park. In both cases, the boat ramps continue to be operated and maintained by the Mountain Home Project Office. There are twelve parks and ten access points operated by city, county, or state agencies, marinas, church groups, or schools around the lake.

For a detailed description of the recreational resources, as well as visitation data at Bull Shoals Lake, see Chapter 2 of the Bull Shoals Revised Master Plan.

4.10 Health and Safety

Safety of project visitors and project staff are the highest priority in daily project operations. Facilities and recreational areas are routinely evaluated to ensure sites are safe for visitor use. Project staff conducts numerous water safety programs and public announcements to educate children and project visitors about ways to be safe on the lake.

In coordination with the Missouri State Highway Patrol (MSHP), no wake zones are marked with buoys. Park Rangers provide visitor assistance and work with county law enforcement agencies to ensure public safety. Park Rangers, MSHP, and Arkansas Game and Fish personnel provide water safety and enforcement patrols on the lake as their budgets allow.

4.11 Aesthetics

Management objectives include maintaining scenic vistas while limiting impacts that would negatively affect aesthetics. Natural landscapes and views of undeveloped lands are an important feature that enhances the recreational experience. The perimeter lands around Bull Shoals Lake provide a natural setting that is aesthetically pleasing as well as buffering the lake from development and negative impacts such as erosion and storm water runoff. However, there are problems in maintaining these aesthetic qualities. Project resource staff is continually investigating trespasses that include activities such as timber cutting and land destruction by unauthorized off road vehicles. In addition, litter and illegal trash dumping both on project lands and project waters are continual problems. Vandalism within recreation areas also occurs. Other concerns that impact aesthetics are demands put upon project resources for uses such as road and utility line corridors.

5.0 ENVIRONMENTAL CONSEQUENCES

The following table summarizes the resources that are likely to be affected by each of the alternatives for an update of the Bull Shoals Master Plan including the No Action alternative. A detailed discussion of the potential impacts of each of the alternatives follows the synopsis provided in the table.

From draft to final, the Selected Alternative, which is now the Preferred Alternative, is a slightly modified version of Alternative 2, the Moderate Conservation alternative. Under this alternative, High Density lands total 3,937.9 acres; Low Density lands total 7,272.1 acres; Environmentally Sensitive Area lands total 29,048.5 acres; Wildlife Management lands total 15,997.9 acres; and Project Operations lands total 91.8 acres.

The increase in High Density acreage is primarily in response to the public's concerns for additional boat ramps and launch sites, especially during high water events. Four high water ramps and sites have been proposed at the following Corps parks: Dam Site, HWY 125, Buck Creek, and Beaver Creek. In addition, High Density acreage was added back to the future use Elbow Park. Slight boundary line adjustments were also made at Beaver Creek and the Blackwell Ferry Area.

This slightly modified change in Alternative 2 is described in the following table and synopsis. Since the change is not significant, the descriptions will be very similar to ones used for Alternative 2.

Table 5.1 Resource Impact with Implementation of Alternatives

Resource Category	Alternative 1 No Action	Alternative 2 Moderate Conservation	Alternative 2 Modified Moderate Conservation (Selected)	Alternative 3 Limited Growth	Alternative 4 Maximum Conservation
Climate, Topography, Geology and Soils	There would be an impact, although not significant, on climate, topography and geology as a result of implementation of the No Action Alternative due to the potential for new development around the lake provided by a larger proportion of high density designated lands.	The Moderate Conservation Alternative would be more protective than the No Action Alternative in terms of potential impacts on climate, topography, geology and soils due to a reduction in low density acreage.	The modified Moderate Conservation Alternative would be more protective than the No Action Alternative in terms of potential impacts on climate, topography, geology and soils due to a reduction in low density acreage.	The Limited Growth Alternative would have less potential impacts on climate, topography, geology and soils than the No Action Alternative due to a reduction in low density acreage.	The Maximum Conservation Alternative is the most protective of all alternatives in terms of potential impacts on climate, topography, geology, and soils due to the classification of all low density acreage to environmentally sensitive.
Aquatic Environment	The hydrology and groundwater components of Bull Shoals Lake would not change from the existing condition due to the implementation of the No Action Alternative. Water quality may be minimally impacted due to a greater amount of high density designated land which results in a higher risk for new development.	The Moderate Conservation Alternative is similar to the No Action Alternative in terms of potential impacts to the hydrology and groundwater components of the aquatic environment, but water quality would be enhanced due to reduced potential for new development.	The modified Moderate Conservation Alternative is similar to the No Action Alternative in terms of potential impacts to the hydrology and groundwater components of the aquatic environment, but water quality would be enhanced due to reduced potential for new development.	The Limited Growth Alternative would result in little to no impacts on the hydrology and groundwater components of the aquatic environment Water quality impacts would likely be negligible under this alternative.	The Maximum Conservation Alternative is similar to the Conservation Alternative in potential impacts on the hydrology and groundwater components of the aquatic environment, but should be more protective of water quality due to the elimination of low density lands and the potential for new development.

Resource Category	Alternative 1 (No Action)	Alternative 2 Moderate Conservation	Alternative 2 Modified Moderate Conservation (Selected)	Alternative 3 Limited Growth	Alternative 4 Maximum Conservation
Terrestrial Resources	Under the No Action Alternative there is no modification of existing low density acres. Based on this, the potential exists for continual degradation of shoreline vegetation due to probable increased development and subsequent vegetation removal/mowing activities.	Implementation of the Moderate Conservation Alternative would have a positive impact on terrestrial resources in comparison to the No Action Alternative. Due to an increase in environmentally sensitive and wildlife management lands, this would have a positive benefit to the acreage around the lake.	Implementation of the modified Moderate Conservation Alternative would have a positive impact on terrestrial resources in comparison to the No Action Alternative. Due to an increase in environmentally sensitive and wildlife management lands, this would have a positive benefit to the acreage around the lake.	The Limited Growth Alternative would be similar to the Conservation Alternative, however small portion of environmentally sensitive lands would convert to low density under this alternative. This may result in minimal impacts to wildlife and vegetation due to the land conversion and potential for additional development.	The Maximum Conservation Alternative would have the greatest positive impact on the lakeside terrestrial resources of all the alternatives evaluated due to the elimination of low density lands and the reduction in potential new development.
Threatened & Endangered Species	The No Action Alternative would have no significant impact on any listed Threatened, Endangered, Protected, or Species of State Concern.	The Moderate Conservation Alternative would likely have no significant on any listed Threatened, Endangered, Protected, or Species of State Concern. Due to the increase in Environmentally Sensitive and Wildlife Management lands, there may be some positive benefits to any or all the listed species.	The modified Moderate Conservation Alternative would likely have no significant on any listed Threatened, Endangered, Protected, or Species of State Concern. Due to the increase in Environmentally Sensitive and Wildlife Management lands, there may be some positive benefits to any or all the listed species	The Limited Growth Alternative would likely have little to no impacts on any species listed Threatened, Endangered, Protected, or Species of State Concern	The Maximum Conservation Alternative could have a significant positive impact on Threatened, Endangered, Protected, or Species of State Concern, due to the fact that this alternative would eliminate all low density lands reducing the potential for future development. There would be positive effects on lakeside flora and fauna due to shoreline protection.

Resource Category	Alternative 1 (No Action)	Alternative 2 Moderate Conservation	Alternative 2 Modified Moderate Conservation (Selected)	Alternative 3 Limited Growth	Alternative 4 Maximum Conservation
Archaeological & Historic Resources	Under the No Action Alternative, the greatest potential for effects to cultural resources and historic properties would occur in the areas classified as Low Density, High Density, and No Allocation.	The Moderate Conservation Alternative would likely have no significant on any listed Threatened, Endangered, Protected, or Species of State Concern. Due to the increase in Environmentally Sensitive and Wildlife Management lands, there may be some positive benefits to any or all the listed species	The modified Moderate Conservation Alternative would likely have no significant on any listed Threatened, Endangered, Protected, or Species of State Concern. Due to the increase in Environmentally Sensitive and Wildlife Management lands, there may be some positive benefits to any or all the listed species	Under the Limited Growth Alternative, the amount of Low Density acreage would increase. This alternative would slightly raise the potential for impacts on cultural resource sites or historic properties.	The Maximum Growth Alternative would have the highest potential to avoid and decrease impacts on cultural resource sites and historic properties compared to all the alternatives due to the reclassification of all Low Density acreage to Environmentally Sensitive lands.
Air Quality	Under the No Action Alternative, the air quality around the lake would remain the same as currently exists. There could be an increase in vehicular exhaust emissions due to localized development, and associated construction equipment. No violations of the current National Ambient Air Quality Standards (NAAQS) established by the EPA would be expected under this alternative.	Implementation of the Moderate Conservation Alternative would result in some reduction in negative air quality impacts as compared to the No Action Alternative due to a decrease in Low Density acreage and thereby a decrease in future development.	Implementation of the Moderate Conservation Alternative would result in some reduction in negative air quality impacts as compared to the No Action Alternative due to a decrease in Low Density acreage and thereby a decrease in future development.	Implementation of the Limited Growth Alternative would result in less potential impact to existing air quality compared to the No Action Alternative due to a decrease in Low Density acreage and thereby a decrease in future development.	Implementation of the Maximum Conservation Alternative would have the greatest positive impact to air quality of all the evaluated alternatives due to the elimination of Low Density lands and thereby a decrease in future development

Resource Category	Alternative 1 (No Action)	Alternative 2 Moderate Conservation	Alternative 2 Modified Moderate Conservation (Selected)	Alternative 3 Limited Growth	Alternative 4 Maximum Conservation
Socio-economics	The No Action Alternative would likely have the most impact on the socio-economic situation in the counties surrounding Bull Shoals Lake due to the potential for future development in the Low Density and High Density land classifications.	The Moderate Conservation Alternative would likely have minimal impact on the socio-economic situation in the counties surrounding Bull Shoals Lake since this alternative reflects how the lake is currently managed and operated.	The modified Moderate Conservation Alternative would likely have minimal impact on the socio-economic situation in the counties surrounding Bull Shoals Lake since this alternative reflects how the lake is currently managed and operated.	Alternative 3 could have some positive effect on the socio-economic situation in the counties surrounding Bull Shoals Lake due to the potential for future development in the Low Density land classification.	The Maximum Conservation Alternative may have negative impacts on the socio-economic situation in the counties surrounding Bull Shoals Lake due to the reclassification of all Low Density lands to Environmentally Sensitive acreage.
Recreation Resources	Provision of recreational facilities and services would continue at Bull Shoals Lake without an update to the Bull Shoals Lake Master Plan. However, the master plan would not accurately reflect the current status of project facilities. Lands with no classification would remain unclassified.	The Moderate Conservation Alternative would reclassify shoreline acreage to reflect current uses. Implementation of this alternative would allow continued public use of the lake while sustaining the natural, cultural, and socio- economic resources of the area. Current unclassified lands would have a land classification.	The modified Moderate Conservation Alternative would reclassify shoreline acreage to reflect current uses. Implementation of this alternative would allow continued public use of the lake while sustaining the natural, cultural, and socio- economic resources of the area. Current unclassified lands would have a land classification.	The Limited Growth Alternative would have some positive recreation impact as potential opportunities would be increased, due to an increase in Low Density lands.	Under the Maximum Conservation Alternative, areas around Bull Shoals would receive greater protection since all Low Density lands would be reclassified as Environmentally Sensitive. This may enhance the recreational experience for wildlife viewing, hunting, fishing, and lake aesthetics.

Resource Category	Alternative 1 (No Action)	Alternative 2 Moderate Conservation	Alternative 2 Modified Moderate Conservation (Selected)	Alternative 3 Limited Growth	Alternative 4 Maximum Conservation
Health & Safety	The No Action Alternative would retain current land classifications, in which potential development could impact water quality. Continued development may lead to increased water traffic, with the potential for increased accidents and pollution.	The Moderate Conservation Alternative would still allow potential development opportunities, but not to the degree to cause significant boat congestion or increase water related accidents. The increase in Environmentally Sensitive and Wildlife Management areas could result in an increase in human exposure to insects and wildlife. The availability of recreational opportunities, balanced with conservation of natural environment could lead to better health, both mental and physical, of visiting populations.	The modified Moderate Conservation Alternative would still allow potential development opportunities, but not to the degree to cause significant boat congestion or increase water related accidents. The increase in Environmentally Sensitive and Wildlife Management areas could result in an increase in human exposure to insects and wildlife. The availability of recreational opportunities, balanced with conservation of natural environment could lead to better health, both mental and physical, of visiting populations.	Under the Limited Growth Alternative, access to Bull Shoals Lake would be enhanced, with a potential for an increase in water-based recreational opportunities. Land-based recreational opportunities, such as hiking, hunting, and wildlife observation could also be slightly altered.	The Maximum Conservation Alternative would most likely promote a safer lake environment, by indirectly reducing boat traffic due to the conversion of all Low Density lands to Environmentally Sensitive. Recreational boating experiences and boater satisfaction may be impacted.
Aesthetics	Under the No Action Alternative the visual characteristics surrounding the Bull Shoals Lake landscape could potentially change due to continued development in High and Low Density land classifications.	Under the Moderate Conservation Alternative, the wide panorama of Bull Shoals Lake and the nearby shore would continue to convey a sense of enormity of the lake, and the limited development would continue to promote the sense of a relatively pristine shoreline. The developed areas are, for the most part, shielded from the lake view, which preserves the viewscapes of those recreating on the lake.	Under the modified Moderate Conservation Alternative, the wide panorama of Bull Shoals Lake and the nearby shore would continue to convey a sense of enormity of the lake, and the limited development would continue to promote the sense of a relatively pristine shoreline. The developed areas are, for the most part, shielded from the lake view, which preserves the viewscapes of those recreating on the lake.	The Limited Growth Alternative would allow more potential development, but not to a degree that would significantly impact the scenic beauty and/or aesthetics of the lake.	Under the Maximum Conservation Alternative, the conversion of all Low Density lands to Environmentally Sensitive would enhance the unspoiled and untamed aesthetic of this landscape. This alternative would maintain the area of pristine shoreline and preserve regions of boulders, bluffs, and mature forest flora that currently dominate views.

5.1 Climate

5.1.1 No-Action (Alternative 1)

There could be some potential impact to climate as a result of implementation of the No Action alternative. Of the 56,348 total land acres, 40,268.1 acres are classified as either High Density or Low Density lands under this alternative. This potential for development could modify the vegetation component near the shoreline, allowing more sunlight penetration. Greater temperature fluctuations generally occur when woody vegetation is removed from an area. Reduced ground cover could cause an increase in sedimentation during rainfall events, which could increase the turbidity of the water, resulting in a potential for a small increase in water temperature.

5.1.2 Modified Moderate Conservation (Selected Alternative 2)

The modified Moderate Conservation Alternative is more protective than the No Action Alternative in terms of potential impacts on air and water temperature modification. A conversion of both High Density and Low Density lands to Environmentally Sensitive lands would reduce the potential for development, which reduces the potential impact on climate due to vegetation removal. This reclassification would provide a better buffering effect which would result in storm water velocity reduction and act as a filtering mechanism. This would help reduce erosion and sediment deposition in the lake.

5.1.3 Moderate Conservation (Alternative 2)

The Moderate Conservation Alternative is more protective than the No Action Alternative in terms of potential impacts on air and water temperature modification. A conversion of both High Density and Low Density lands to Environmentally Sensitive lands would reduce the potential for development, which reduces the potential impact on climate due to vegetation removal. This reclassification would provide a better buffering effect which would result in storm water velocity reduction and act as a filtering mechanism. This would help reduce erosion and sediment deposition in the lake.

5.1.4 Limited Growth (Alternative 3)

The Limited Growth Alternative allows for more potential development, but still less than the No Action Alternative, and should have a greater, but still insignificant, impact on climate around Bull Shoals Lake. The most significant change from Alternative 2 is the conversion of 4,167 acres of Environmentally Sensitive lands to Low Density, resulting in 11,911.4 acres in this classification, and with the 3,480.3 acres of High Density lands in this alternative, the combination represents 27% of available acreage around the lake.

5.1.5 Maximum Conservation (Alternative 4)

The Maximum Conservation Alternative is the most protective alternative in terms of potential impacts on climate. While this alternative retains 3,714.6 acres of High Density lands, 31,952 acres of Low Density lands were converted to either Environmentally Sensitive or Wildlife Management lands. The combination represents 93% of available acreage around the lake which protects the shoreline from vegetation modification. This reclassification would provide the best buffering effect of any alternative, which would result in storm water velocity reduction and act as a sediment filtering mechanism.

5.2 Topography, Geology and Soils

5.2.1 No-Action (Alternative 1)

Soil erosion would persist due to development being allowed under this alternative. Approximately 72% of available acreage (56,348 acres) around the lake is currently classified as High and Low Density recreation (15% and 57%, respectively). High Density acreage would allow development of intense recreational activities including campgrounds, parks, marinas, resorts and other public development infrastructure. This development results in soil disturbance, vegetation removal and transforming some pervious surfaces to impervious areas. It also promotes erosion during construction activities and increased runoff velocity after development is completed. The remaining pervious surfaces around these developed areas would become more impervious due to increased foot traffic from recreational activity. Of the activities associated with Low Density land classification—primitive camping, fishing, hunting, trails, wildlife viewing and shoreline use permits—the shoreline use permits would typically have the greatest impacts on soil disturbance due to potential vegetation removal and conversion of pervious surfaces to impervious.

5.2.2 Modified Moderate Conservation (Selected Alternative 2)

The modified Moderate Conservation Alternative is more restrictive than the No Action Alternative in terms of potential impacts to topography, geology and soils. There would be little to no change in impacts on the existing conditions regarding these features due to the fact that this alternative reflects current lake usage patterns. High Density Recreation acreage would be reduced from the No Action Alternative (8,310.9 acres) to 3,937.9 acres, and the Low Density recreation acreage has been reduced from 31,957.2 to 7,272.1 acres. These lands would be reclassified to Environmentally Sensitive and Wildlife Management lands, which provide a vegetated lake buffer area. This vegetation helps to reduce storm water velocity and acts as a filtering mechanism. This would help reduce erosion and sediment deposition in the lake.

5.2.3 Moderate Conservation (Alternative 2)

The Moderate Conservation Alternative is more restrictive than the No Action Alternative in terms of potential impacts to topography, geology and soils. There would be little to no change in impacts on the existing conditions regarding these features due to the fact that this alternative reflects current lake usage patterns. High Density Recreation acreage would be reduced from the No Action Alternative (8,310.9 acres) to 3,714.6 acres, and the Low Density recreation acreage has been reduced from 31,957.2 to 7,254.8 acres. These lands would be reclassified to Environmentally Sensitive and Wildlife Management lands, which provide a vegetated lake buffer area. This vegetation helps to reduce storm water velocity and acts as a filtering mechanism. This would help reduce erosion and sediment deposition in the lake.

5.2.4 Limited Growth (Alternative 3)

The Limited Growth Alternative would decrease Low Density lands by 20,043.3 acres as compared to the No Action Alternative, but would increase Low Density by 4,659 acres over the Moderate Conservation Alternative. This would allow potential development on the additional Low Density acreage, but due to the fragmentation of this acreage around the shoreline, there would be little to no impact on the topography, geology and soils. High Density recreation acreage would decrease by 234 acres, which would further minimize the potential for soil erosion due to development. The combination of High Density and Low Density recreation lands represents only 27% of available acreage around the lake. With Environmentally Sensitive and Wildlife Management lands

comprising a majority of the shoreline acreage, minimal impacts from erosion and sedimentation would result from the implementation of this alternative.

5.2.5 Maximum Conservation (Alternative 4)

The Maximum Conservation Alternative is different from the No Action Alternative in terms of potential impacts to topography, geology and soils. There would be less impact to the existing conditions regarding these features. High Density recreation acreage would remain at 3714.6 acres, representing less than 7% of the lake shore acreage, while the Low Density have been reclassified to Environmentally Sensitive lands. Under this alternative the combination of Environmentally Sensitive and Wildlife Management lands would represent 93% of available acreage around the lake. This alternative would have significant positive effects due to reduced erosion and lake sedimentation due to vegetation retention. This additional buffer helps reduce storm water velocity and surface scour during storm events.

5.3 Aquatic Environment

5.3.1 Hydrology and Groundwater

5.3.1.1 No-Action (Alternative 1)

The hydrology and groundwater components of Bull Shoals Lake would not change from the existing condition due to the implementation of a No Action Alternative. The potential for additional development under this alternative would have some effect on reducing percolation through the soil layers due to ground cover removal, and potentially increasing storm water velocity.

Wetland areas are relatively limited within Bull Shoals Lake and throughout the adjacent government property surrounding the lake and would not undergo any significant change from existing conditions due to implementation of the No Action Alternative.

5.3.1.2 Modified Moderate Conservation (Selected Alternative 2)

The modified Moderate Conservation Alternative is different than the No Action Alternative in terms of potential impacts to the hydrology and groundwater components of the aquatic environment. The hydrology and groundwater conditions are generally a function of the watershed drainage and existing geology of the area, but having only 19% of the shoreline classified as High and Low Density lands in the modified Moderate Conservation Alternative, as compared to over 71% in the No Action Alternative, would enhance rainfall absorption and slow runoff velocity due to retention of Environmentally Sensitive and Wildlife Management land shoreline vegetation.

5.3.1.3 Moderate Conservation (Alternative 2)

The Moderate Conservation Alternative is different than the No Action Alternative in terms of potential impacts to the hydrology and groundwater components of the aquatic environment. The hydrology and groundwater conditions are generally a function of the watershed drainage and existing geology of the area, but having only 19% of the shoreline classified as High and Low Density lands in the Moderate Conservation Alternative, as compared to over 71% in the No Action Alternative, would enhance rainfall absorption and slow runoff velocity due to retention of

Environmentally Sensitive and Wildlife Management land shoreline vegetation.

5.3.1.4 Limited Growth (Alternative 3)

The Limited Growth Alternative is would have a positive impact on the hydrology and groundwater components of the aquatic environment as compared to the No Action Alternative. The High and Low Density lands comprise 27% of the shoreline in this alternative, with the remainder dominated by Environmentally Sensitive and Wildlife Management lands which enhance hydrology and groundwater conditions and function.

5.3.1.5 Maximum Conservation (Alternative 4)

The Maximum Conservation Alternative is likely to be more protective than the No Action Alternative in terms of potential impact on the hydrology and groundwater components of the aquatic environment. The hydrology and groundwater conditions are generally controlled by the watershed drainage and existing geology of the area, but when 93% of the shoreline is classified as Environmentally Sensitive and Wildlife Management, rainfall would be much more likely to be absorbed, thereby replenishing the groundwater to a greater degree.

There would be little to no change in the wetland status from the existing condition due to implementation of the Maximum Conservation alternative. Most of the limited wetland acreage has been identified in the lower reaches of the major tributary streams, therefore the limited High Density shoreline development near the lower end of the lake, as reflected in this alternative, would have little impact to this resource.

5.3.2Water Quality

5.3.2.1 No Action (Alternative 1)

Lake fluctuations, associated with power production and flood control procedures, result in change in the environment along the shoreline of the lake. Turbidity from heavy rainfall has a temporary, adverse effect on Bull Shoals Lake. During these periods of increased runoff, urban areas and other parts of the terrain, especially those that have had the protective vegetation removed, contribute silt and other suspended particles to the tributaries. While implementation of the No Action Alternative is relatively independent of the existing watershed drainage on the lake water quality, potential continued development around the lake shoreline would exacerbate water quality issues due to potential increased erosion, localized increases in turbidity and increased sedimentation in the lake following storm events. Under the No Action Alternative, High Density recreation land classification would be 8,310.9 acres (15% of total available area), Low Density recreation lands would be 31,957.2 acres (57%), Environmentally Sensitive lands include 11,895.7 acres (21%), Wildlife Management lands total 3,953.5 acres (7%), while 169 acres have no current classification. Based on the current classification, the potential exists for continual degradation of shoreline vegetation due to potential increased development and subsequent vegetation removal and mowing activities. This would result in negative impacts to water quality due to increased storm water velocity, scour and sedimentation.

5.3.2.2 Modified Moderate Conservation (Selected Alternative 2)

Implementation of the modified Moderate Conservation Alternative may result in positive benefits to water quality due to a reduction in both High Density and Low Density acreage by 4,373.1 and 24,685.2 acres respectively as compared to the No Action Alternative. There is a corresponding major

increase in Environmentally Sensitive acreage, from 11,895.8 acres to 29,048.5 acres, which represents a gain of 17,152.8 acres. These land reclassifications would serve to limit development on these lands, thereby reducing impacts to ground disturbance and subsequent increased erosion. Wildlife Management lands increased from 3,953.5 acres to 15,997.9 acres, representing a gain of 12,044.4 acres. These factors would reduce erosion sedimentation and pollutants scoured from reduced impervious surfaces, with additional benefits of retention of more shoreline vegetation, better fishery habitat, increased water clarity and cooler water temperature conditions due to the decrease of turbidity and sediment deposition.

5.3.2.3 Moderate Conservation (Alternative 2)

Implementation of the Moderate Conservation Alternative may result in positive benefits to water quality due to a reduction in both High Density and Low Density acreage by 4,596.3 and 24,699.7 acres respectively as compared to the No Action Alternative. There is a corresponding major increase in Environmentally Sensitive acreage, from 11,895.7 acres to 29,369.4 acres, which represents a gain of 17,473.7 acres. These land reclassifications would serve to limit development on these lands, thereby reducing impacts to ground disturbance and subsequent increased erosion. Wildlife Management lands increased from 3,953.5 acres to 15,917.3 acres, representing a gain of 11, 963.8 acres. These factors would reduce erosion sedimentation and pollutants scoured from reduced impervious surfaces, with additional benefits of retention of more shoreline vegetation, better fishery habitat, increased water clarity and cooler water temperature conditions due to the decrease of turbidity and sediment deposition.

5.3.2.4 Limited Growth (Alternative 3)

The Limited Growth alternative would reduce Low Density acreage by 20,043.3 (62%) and High Density acreage by 4,830.6 (6%) compared to the No Action Alternative. This alternative represents a 44% reduction in potentially developable shoreline acreage, which would have a positive effect on lake water quality due to the rainwater filtering benefits from shoreline vegetation buffer associated with Environmentally Sensitive and Wildlife Management lands. These land classifications would represent 73% of the shoreline acreage under the Limited Growth Alternative. Similar to the Moderate Conservation Alternative, these land reclassifications would serve to limit development on these lands, thereby reducing potential impacts from ground disturbance and subsequent increased erosion.

5.3.2.5 Maximum Conservation (Alternative 4)

The Maximum Conservation Alternative would result in the greatest degree of water quality protection, as compared to the No Action Alternative. Potentially developable lands in this alternative consist of only 3,714.6 acres of High Density lands, representing only7% of the available shoreline acreage. The remaining 93% is classified as Environmentally Sensitive (65%) and Wildlife Management (28%). There would be no acreage in the Low Density land classification under this alternative. These land classifications would retain the highest amount of vegetated shoreline and create the greatest potential for the maintenance of water quality of all evaluated alternatives.

5.3.3Fish Species and Habitat

5.3.2.1 No Action (Alternative 1)

The fishery of Bull Shoals Lake may have potential minor impacts from the implementation of the No Action alternative, which has 72% of available shoreline acreage classified as High and Low Density lands. Implementation of the No Action alternative would allow potential development

around much of the shoreline. Development often results in vegetation removal down to water's edge, which impacts shoreline stability, removes fish cover provided by overhanging vegetation, tree trunks and roots, and exacerbates storm water erosion and sedimentation. During the spring spawning season this sedimentation has the potential to disrupt spawning activity and productivity in the coves and lake arms where spawning commonly occurs.

5.3.2.2 Modified Moderate Conservation (Selected Alternative 2)

Implementation of the modified Moderate Conservation Alternative would have a positive effect on the lake fishery resource as compared to the No Action Alternative. There is a 24,685.2 acre reduction in Low Density recreation land classification (-44%), a 4,373.1 acre reduction in High Density lands (-8%), a 30% increase in Environmentally Sensitive lands classification (29,048.5 total acres) and an increase in Wildlife Management lands from 3,953.5 acres to 15,997.9 acres, which results in 28% of available acreage classified as Wildlife Management lands. The increases in lands classified in these two areas would serve as additional protection for lakeside vegetation and preservation of overhanging vegetation, which provides cover for fish, reduces storm flow velocity, reduces erosion scour, and reduces sedimentation. These factors improve spawning habitat, thereby potentially enhancing fish population dynamics in the lake.

5.3.2.3 Moderate Conservation (Alternative 2)

Implementation of the Moderate Conservation Alternative would have a positive effect on the lake fishery resource as compared to the No Action Alternative. There is a 24,699.7 acre reduction in Low Density recreation land classification (-44%), a 4,596.3 acre reduction in High Density lands (-8%), a 31% increase in Environmentally Sensitive lands classification (29,369.4 total acres) and an increase in Wildlife Management lands from 3,953.5 acres to 15, 917.3 acres, which results in 28% of available acreage classified as Wildlife Management lands. The increases in lands classified in these two areas would serve as additional protection for lakeside vegetation and preservation of overhanging vegetation, which provides cover for fish, reduces storm flow velocity, reduces erosion scour, and reduces sedimentation. These factors improve spawning habitat, thereby potentially enhancing fish population dynamics in the lake.

5.3.2.4 Limited Growth (Alternative 3)

The Limited Growth alternative is similar to the Conservation Alternative in terms of potential positive benefits to the lake fishery. A comparison with the No Action Alternative shows a reduction of 20,043.3 acres of Low Density lands, as well as a reduction of 4,830.6 acres of High Density lands. In this alternative, 73% of the available shoreline acreage would be classified as Environmentally Sensitive and Wildlife Management lands, preserving a majority of the natural shoreline vegetation along the shoreline. Similar to the positive effects discussed in the Moderate Conservation Alternative, this alternative should have a beneficial effect on the fish and fish habitat of Bull Shoals Lake.

5.3.2.5 Maximum Conservation (Alternative 4)

The Maximum Conservation Alternative would enhance the fish resources in Bull Shoals Lake to the greatest degree of all evaluated alternatives. A comparison with the No Action Alternative shows a 4,596.3 acre reduction in High Density lands, with all Low Density lands being converted to Environmentally Sensitive lands. The resulting acreage (36,624.3 acres) represents 65% of total shoreline acreage. Along with the 15,917.3 acres of Wildlife Management lands in this alternative, 93% of the total shoreline acreage would retain its natural shoreline vegetation. Shoreline vegetation provides a buffer area that would attenuate storm water runoff, reduce scour and sedimentation, improve fish cover

and spawning habitat, and provide a cleaner substrate for macro-invertebrate colonization, which improves the food supply for fish.

5.4 Terrestrial Resources

5.4.1 Wildlife

5.4.1.1 No Action (Alternative 1)

Under the No Action Alternative, shoreline lands would be classified into High Density recreation lands (8,310.9 acres, or 15% of total available area), Low Density recreation lands (31,957.2 acres or 57%), Environmentally Sensitive lands (11,895.7 acres or 21%), and Wildlife Management lands (3,953.5 acres or 7%), while 169 acres have no current classification. Based on the current shoreline classification, the potential exists for continual degradation of shoreline vegetation due to increased development and potential vegetation removal and mowing activities. Unclassified lands are potentially developable, resulting in over 72% of the shoreline acreage subject to possible increased or new development. This would result in negative effects to wildlife due to potential removal of trees and understory vegetation (with the highest potential in the High Density lands), thus altering food sources and migratory patterns of insects, birds and mammal species.

5.4.1.2 Modified Moderate Conservation (Selected Alternative 2)

Implementation of the modified Moderate Conservation Alternative would have a positive effect on terrestrial resources, when compared to the No Action alternative. There would be a 24,685.2 acre reduction in Low Density recreation land classification (to 7,272.1 acres), a 4,373.1 acre reduction in High Density lands (to 3,937.9 acres), a 30% increase in Environmentally Sensitive lands classification (29,048.5 total acres) and an increase in Wildlife Management lands from 3,953.5 acres to 15,997.9 acres. This would result in 28% of available acreage classified as Wildlife Management lands. The increases in lands classified as Environmentally Sensitive and Wildlife Management land would provide additional protection for lakeside vegetation, and preservation of habitat for wildlife and migratory bird species. The buffer of natural vegetation that remains along the shoreline from this designated acreage would potentially enhance migration and feeding activities for many species of wildlife.

5.4.1.3 Moderate Conservation (Alternative 2)

Implementation of the Moderate Conservation Alternative would have a positive effect on terrestrial resources, when compared to the No Action alternative. There would be a 24,699.7 acre reduction in Low Density recreation land classification (to 7,254.8 acres), a 4,956 acre reduction in High Density lands (to 3,714.6), a 31% increase in Environmentally Sensitive lands classification (29,369.4 total acres) and an increase in Wildlife Management lands from 3,953.5 acres to 15,917.3 acres. This would result in 28% of available acreage classified as Wildlife Management lands. The increases in lands classified as Environmentally Sensitive and Wildlife Management land would provide additional protection for lakeside vegetation, and preservation of habitat for wildlife and migratory bird species. The buffer of natural vegetation that remains along the shoreline from this designated acreage would potentially enhance migration and feeding activities for many species of wildlife.

5.4.1.4 Limited Growth (Alternative 3)

The Limited Growth alternative is more similar to the Conservation Alternative than the No Action Alternative in terms of potential effects to the terrestrial resources and land use patterns. A proposed decrease in Low Density lands of 20,043.3 acres, would result in 21% of available

acreage classified as Low Density, which would potentially be available for development. This amount of Low Density land would likely have some, but still insignificant effect, on wildlife species and activity. In spite of this increase in Low Density lands over the Moderate Conservation Alternative, the majority of natural shoreline vegetation would likely remain in the Low Density acreage. High Density lands are reduced by 4,830.6 acres from the original 8,310.9 acres in the No Action Alternative. Good habitat for wildlife would still be abundant under this alternative.

5.4.1.5 Maximum Conservation (Alternative 4)

The Maximum Conservation Alternative would convert all of the existing Low Density lands to Environmentally Sensitive and Wildlife Management acreage. Based on this reclassification, this alternative would result in significant positive effects on terrestrial resources around the shoreline of the lake. White-tailed deer and eastern wild turkey are common game animals found and hunted in the Bull Shoals Lake area. Black bear have also become common in the area and are hunted on the areas of Bull Shoals Lake located in Arkansas. Gray and fox squirrels are common in upland wooded areas and are also popular with sportsmen. All these wildlife species fare better in a natural, undeveloped vegetation cover. This alternative would provide the most wildlife benefits in this regard. Some habitat management activities, including wildlife food plot plantings, removal of exotic species and application of prescribed fire would potentially benefit these populations as well.

5.4.2Vegetation

5.4.2.1 No Action (Alternative 1)

Under the No Action Alternative, shoreline lands would be classified into High Density recreation lands (8,310.9 acres, or 15% of total available area), Low Density recreation lands (31,957.2 acres or 57%), Environmentally Sensitive lands (11,895.7 acres or 21%), and Wildlife Management lands (3,953.5 acres or 7%), while 169 acres have no current classification. Based on this, the potential exists for continued degradation of shoreline vegetation due to increased development and subsequent vegetation removal and mowing activities. Unclassified lands are potentially developable, resulting in over 72% of the shoreline acreage subject to possible increased or new development. This would result in potential negative effects to the natural shoreline vegetation composition due to potential removal of trees and understory vegetation, thus possibly altering food sources and migratory patterns of insects, birds and mammal species, as well as increasing a potential for increased storm water erosion effects.

5.4.2.2 Modified Moderate Conservation (Selected Alternative 2)

Implementation of the modified Moderate Conservation Alternative would have a positive effect on the shore line vegetation, when compared to the No Action alternative. There would be a 24,685.2 acre reduction in Low Density recreation land classification (7,272.1 acres), a 4,373.1 acre reduction in High Density lands (3,937.9 total acres), a 30% increase in Environmentally Sensitive lands classification (29,048.5 total acres) and an increase in Wildlife Management lands from 3,953.5 acres to 15,997.9 acres, which results in 28% of available acreage classified as Wildlife Management lands. The increases in lands classified as Environmentally Sensitive and Wildlife Management land would serve as additional protection for lakeside vegetation and subsequent preservation of habitat for wildlife and migratory bird species. The buffer of natural vegetation that remains along the shoreline from this designated acreage would enhance migration and feeding activities for many species of wildlife, as well as mediate storm water velocity and scour.

5.4.2.3 Moderate Conservation (Alternative 2)

Implementation of the Moderate Conservation Alternative would have a positive effect on the shore line vegetation, when compared to the No Action alternative. There would be a 24,699.7 acre reduction in Low Density recreation land classification (7,254.8 acres), a 4,956 acre reduction in High Density lands (3,714.6), a 31% increase in Environmentally Sensitive lands classification (29,369.4 total acres) and an increase in Wildlife Management lands from 3,953.5 acres to 15,917.3 acres, which results in 28% of available acreage classified as Wildlife Management lands. The increases in lands classified as Environmentally Sensitive and Wildlife Management land would serve as additional protection for lakeside vegetation and subsequent preservation of habitat for wildlife and migratory bird species. The buffer of natural vegetation that remains along the shoreline from this designated acreage would enhance migration and feeding activities for many species of wildlife, as well as mediate storm water velocity and scour.

5.4.2.4 Limited Growth (Alternative 3)

The Limited Growth alternative is more similar to the Conservation Alternative in terms of potential effects to the lakeshore vegetation than that of the No Action Alternative. A proposed decrease in Low Density lands of 20,043.3 acres, would result in 21% of available acreage for potential development, would likely have some, but still insignificant effect, on shoreline vegetation. High Density lands would be reduced by 4,830.6 acres from the original 8,310.9 acres in the No Action Alternative. In spite of this increase in Low Density lands over the Moderate Conservation Alternative, the majority of natural shoreline vegetation could be relatively unaffected in the Low Density acreage, based on the type of development proposed.

5.4.2.5 Maximum Conservation (Alternative 4)

The Maximum Conservation Alternative would convert all the existing Low Density lands and 4,596.3 acres of High Density lands to Environmentally Sensitive and Wildlife Management acreage. Based on this reclassification of 36,553.5 acres, this alternative would result in significant positive effects on the vegetation resources around the shoreline of the lake due to the restrictions placed on vegetation modification actions under the majority of the land classifications remaining. Some habitat management activities, including wildlife food plot plantings, removal of exotic species and application of prescribed fire would still take place under this alternative and could potentially be beneficial to the area.

5.5 Threatened and Endangered Species

5.5.1 No Action (Alternative 1)

Of the species listed in Table 4.1 of Section 4.0, AFFECTED ENVIRONMENT, two species would be most affected by implementation of the No Action Alternative. The Gray Bat, *Myotis grisescens*, and the Tumbling Creek Cavesnail, *Antrobia culveri*, are located in areas currently classified as Low Density lands. Potential development could occur in this land classification that might have a significant impact on the ecology of Tumbling Creek Cave, in which these species live. The Bald Eagle, *Haliaeetus leucocephalus*, was removed from the threatened listing in 2007 by the USFWS, but it still remains a protected species. While there have been reports of nesting in some locations around the lake perimeter, this species is not confined to a particular area around the lake, and should not be significantly affected by implementation of this alternative.

5.5.2 Modified Moderate Conservation (Selected Alternative 2)

The modified Moderate Conservation Alternative would likely have little to no negative effects on any listed threatened, endangered, protected, or species of state concern based on the documentation and justification noted in the No Action Alternative. Due to the reclassification of 29,058.3 acres from High and Low Density lands to Environmentally Sensitive (including the Tumbling Creek Cave area) and Wildlife Management lands classifications, there may be potential positive benefits to any or all the listed species, and possibly other yet undiscovered species that may exist in the area. This is due to the higher level of protection offered by the Environmentally Sensitive and Wildlife Management land classifications.

5.5.3 Moderate Conservation (Alternative 2)

The Moderate Conservation Alternative would likely have little to no negative effects on any listed threatened, endangered, protected, or species of state concern based on the documentation and justification noted in the No Action Alternative. Due to the reclassification of 29,296.0 acres from High and Low Density lands to Environmentally Sensitive (including the Tumbling Creek Cave area) and Wildlife Management lands classifications, there may be potential positive benefits to any or all the listed species, and possibly other yet undiscovered species that may exist in the area. This is due to the higher level of protection offered by the Environmentally Sensitive and Wildlife Management land classifications.

5.5.4 Limited Growth (Alternative 3)

Similar to Alternative 2, the Limited Growth alternative would likely have little to no effects on any listed Threatened, Endangered, Protected, or Species of State Concern based on the proposed reduction of potentially developable acreage from the amount listed in the No Action Alternative. A proposed decrease in Low Density lands of 20,043.3 acres, resulting in 21% of available acreage for potential Low Density development. This may result in some potential minor negative effects to listed species based on possible development activity in Low Density lands.

5.5.5 Maximum Conservation (Alternative 4)

The Maximum Conservation Alternative would likely provide the most protection for any species listed as Threatened, Endangered, Protected, or Species of State Concern due to the reclassification of 29,298.6acres from High and Low Density lands to Environmentally Sensitive and Wildlife Management lands. Potentially developable lands under this alternative include only 3,714.6 acres of High Density lands, representing 7% of available shoreline acreage. Due to the significant increase of Environmentally Sensitive and Wildlife Management acreage from the No Action land classifications, there may be potential positive benefits to any or all the listed species, and possibly other yet undiscovered species that may exist in the area.

5.6 Archaeological and Historic Resources

5.6.1 No-Action (Alternative 1)

Under the No-Action Alternative there would be no change in the current Master Plan land classifications as designated under the 1975 MP. Under this alternative, the greatest potential for effects on cultural resources and historic properties would occur in the areas classified as Low and High Density Recreation and those lands with no classification. Cultural Resources under the No Action Alternative would be at risk of disturbance in areas where the land classification would allow for intensive development. Any new ground disturbing activities on USACE lands would require a permit to be issued prior to commencement of the activity. Through the site review process prior to issuance of a permit or any federal action, unknown sites would be identified, and known sites would be evaluated for their significance and eligibility for the National Register of Historic Places pursuant to 36 CFR Part 800 of the National Historic Preservation Act. Cultural Resource sites within Low Density or High Density classification areas could potentially undergo the most severe impact due to the fact that activities such as boat dock construction and shoreline use permits result in a degree of ground disturbance which could pose a threat to intact cultural deposits. Potential mitigation for impact to cultural or historic sites would be the requirement for a cultural or historic resource site evaluation. If evaluation of site identifies a cultural or historic resource, avoidance of the action would be recommended.

5.6.2 Modified Moderate Conservation (Selected Alternative 2)

Under the modified Moderate Conservation Alternative, the area classified as Environmentally Sensitive and Wildlife Management would increase. With the proposed increases in both the Wildlife Management Areas and Environmentally Sensitive Area classifications, there would be minimal potential for ground disturbing activities along the shoreline, thus decreasing the potential for effects on cultural resources. In areas that were classified as Low Density under the No Action Alternative and that have no permits or houses, and undeveloped lots, would be changed to Environmentally Sensitive in effort to preserve the scenic, historical, archaeological, scientific, water quality, or ecological value of the overall project. In areas where the land has been previously classified as High Density, but it has not yet been identified for development, these lands would be converted to Environmentally Sensitive or Wildlife Management.

5.6.3 Moderate Conservation (Alternative 2)

Under the Moderate Conservation Alternative, the area classified as Environmentally Sensitive and Wildlife Management would increase. With the proposed increases in both the Wildlife Management Areas and Environmentally Sensitive Area classifications, there would be minimal potential for ground disturbing activities along the shoreline, thus decreasing the potential for effects on cultural resources. In areas that were classified as Low Density under the No Action Alternative and that have no permits or houses, and undeveloped lots, would be changed to Environmentally Sensitive in effort to preserve the scenic, historical, archaeological, scientific, water quality, or ecological value of the overall project. In areas where the land has been previously classified as High Density, but it has not yet been identified for development, these lands would be converted to Environmentally Sensitive or Wildlife Management.

5.6.4 Limited Growth (Alternative 3)

Under the Limited Growth Alternative, High Density Recreation classifications would be decreased around Bull Shoals Lake; Low Density would also be decreased, but less than under he Preferred Action, while Environmentally Sensitive and Wildlife Management Areas would be increased, thus retaining a limited approach to development. This alternative, while having a larger potential for development as compared to the Preferred Action, would still result in a benefit to cultural resources based on the large decrease in the Low Density land classification as compared to the No Action Alternative.

5.6.5 Maximum Conservation (Alternative 4)

The Maximum Conservation Alternative would result in the greatest benefit to preservation of cultural resource sites and historic properties. Under this alternative, there would not be any areas identified as Low Density and approximately 93% of all land would be classified as Environmentally Sensitive and Wildlife Management. This alternative is very preservation-oriented and would constitute the best opportunity to minimize any potential effects to cultural resource sites and historic properties. High Density recreation would decrease by 4,596.3 acres to approximately 7 % of the land coverage. This would minimize the amount of development potential on lands adjacent to Bull Shoals Lake, and subsequently minimize adverse effects on cultural resources.

5.7 Socio-Economic Resources

5.7.1 No Action (Alternative 1)

The No Action Alternative may have the most effect on the socio-economic situation in the counties surrounding Bull Shoals Lake due to the fact that 72% of the available shoreline acreage is classified as either High or Low Density lands. While the potential for some development exists around the lake, current population growth and the demographic makeup of the population are expected to remain similar to the current rates and percentages the area experiences now. Housing units and their values would not be affected if the No Action alternative is implemented. It is likely that changes in the socio-economic conditions of the Bull Shoals area would be the result of outside influences, and not those created by the No Action alternative.

5.7.2 Modified Moderate Conservation (Selected Alternative 2)

The modified Moderate Conservation Alternative would likely have less of a positive effect on the socio-economic situation in the counties surrounding Bull Shoals Lake than the No Action Alternative. Population would be expected to stay the same or decline slightly due to the decreased High Density acreage and the conversion of 24,685.2 acres of Low Density lands to Environmentally Sensitive and Wildlife Management lands. Although under the Preferred Action, the demographic makeup of the population would likely be unaffected. Total housing units would stay the same or decrease due to the decreased availability of recreation at the lake, but it is unlikely that housing values would change as a result of the alternative. The economy of the area would likely stay the same or have a slight decline if this alternative is implemented.

5.7.3 Moderate Conservation (Alternative 2)

The Moderate Conservation Alternative would likely have less of a positive effect on the socio-economic situation in the counties surrounding Bull Shoals Lake than the No Action Alternative. Population would be expected to stay the same or decline slightly due to the decreased High Density acreage and the conversion of 24,699.7 acres of Low Density lands to Environmentally

Sensitive and Wildlife Management lands. Although under the Preferred Action, the demographic makeup of the population would likely be unaffected. Total housing units would stay the same or decrease due to the decreased availability of recreation at the lake, but it is unlikely that housing values would change as a result of the alternative. The economy of the area would likely stay the same or have a slight decline if this alternative is implemented.

5.7.4 Limited Growth (Alternative 3)

The Limited Growth Alternative would result in a similar socio-economic situation as Alternative 2, but possibly would have less of a positive effect as compared to the No Action Alternative. Low Density acreage in this alternative would be 11,913.9 acres, representing 21% of available shoreline acreage. The economy in the area could possibly grow slightly due to a potential increased opportunity for recreation.

5.7.5 Maximum Conservation (Alternative 4)

The Maximum Conservation Alternative would have an effect on the socio-economic situation in the counties that surround Bull Shoals Lake due to the decreased High Density acreage and the reclassification of all Low Density lands to Environmentally Sensitive and Wildlife Management acreage. An indirect impact from this alternative would be a reduction in tax revenue to local counties, essentially reducing their economic development, due to the fact that the Corps would note grant new permits allowing expansion or new development. Total housing units would likely stay the same due to the decreased availability of recreation (private shoreline uses) at the lake resulting in minimal new development, but it is unlikely that property values would change. It is unlikely that other facets of socio-economics would change due to the implementation of this alternative.

5.8 Recreation Resources

5.8.1 No-Action (Alternative 1)

Provision of recreational facilities and services would continue at Bull Shoals Lake without an update to the Bull Shoals Lake Master Plan. However, the plan by which the Resource Manager and staff operate would not accurately reflect the current status of project facilities. Nor would there be additional measures in place, such as trail corridors and additional land use designations, to better accommodate recreational needs while protecting the natural resources. Currently, there are several boat docks outside of areas currently zoned for them and under the No Action Alternative these uses would remain inconsistent with the Master Plan. A total of 169 acres of shoreline would remain unclassified generating confusion about which uses are allowed in these areas.

5.8.2 Modified Moderate Conservation (Selected Alternative 2)

Under the modified Moderate Conservation Alternative, all lands would be classified and some of the existing classifications would be changed. This proposed update in classification would be structured to achieve a balance based on the present public use of the lake while sustaining the natural, cultural, and socio- economic resources of the area and reflecting the current management and operation of lands at Bull Shoals Lake. Under Alternative 2, the current High and Low Density lands, comprising 71% of available shoreline acreage, would be reduced to 20%, while Environmentally Sensitive and Wildlife Management lands, at 21% and 7%, respectively, would

increase to 52% and 28% of shoreline acreage. These classifications reflect current lake usage, with fishing, boating, hunting and wildlife viewing dominating the recreational activity on the lake. The proposed increase in Wildlife Management and Environmentally Sensitive classified lands action would assist in forging partnerships between public and private entities for recreational and wildlife conservation opportunities. The retention of a major percentage of the natural shoreline vegetation would lead to improved water quality, due to the buffering and filtering capability of this vegetation.

5.8.3 Moderate Conservation (Alternative 2)

Under the Moderate Conservation Alternative, all lands would be classified and some of the existing classifications would be changed. This proposed update in classification would be structured to achieve a balance based on the present public use of the lake while sustaining the natural, cultural, and socio- economic resources of the area and reflecting the current management and operation of lands at Bull Shoals Lake. Under Alternative 2, the current High and Low Density lands, comprising 71% of available shoreline acreage, would be reduced to 20%, while Environmentally Sensitive and Wildlife Management lands, at 21% and 7%, respectively, would increase to 52% and 28% of shoreline acreage. These classifications reflect current lake usage, with fishing, boating, hunting and wildlife viewing dominating the recreational activity on the lake. The proposed increase in Wildlife Management and Environmentally Sensitive classified lands action would assist in forging partnerships between public and private entities for recreational and wildlife conservation opportunities. The retention of a major percentage of the natural shoreline vegetation would lead to improved water quality, due to the buffering and filtering capability of this vegetation.

5.8.4 Limited Growth (Alternative 3)

The Limited Growth Alternative would not deviate significantly from the Conservation Alternative in terms of provision of recreational opportunities on the lake. The 4,259.1 acres of shoreline that would be reclassified to Low Density recreation from Environmentally Sensitive lands would allow for the potential to have additional private boat docks for fishing and lake access, as well as the potential to develop nature trails and wildlife viewing areas, thus potentially increasing recreational traffic along Bull Shoals and its adjacent lands.

5.8.5 Maximum Conservation (Alternative 4)

Under the Maximum Conservation Alternative, some recreation opportunities would be reduced, such as private boat docks, due to an increase in the area classified as Environmentally Sensitive, which does not allow most types of development. This alternative would also limit commercial opportunities based on the proposed 3,714.6 acres of High Density classification. Although it minimizes potential for development, it would improve land-based recreational opportunities such as hunting, hiking, bird watching. This alternative also would improve viewscapes along the lake since it would allow for native flora and fauna to thrive.

5.9 Air Quality

5.9.1 No Action (Alternative 1)

Under the No Action alternative, the air quality around the lake would remain the same as currently exists. There would likely be increases in vehicular exhaust emissions due to localized development, and the associated construction equipment and traffic in the area. However, no violations of the current National Ambient Air Quality Standards (NAAQS) established by EPA

would be expected as a result of the implementation of this alternative.

5.9.2 Modified Moderate Conservation (Selected Alternative 2)

Implementation of the modified Moderate Conservation Alternative would also result in no change in air quality impacts as noted under the No Action Alternative. Since this alternative would incorporate more shoreline acreage into the Environmentally Sensitive and Wildlife Management land classification, there would likely be a reduction in potential development, local vehicular exhaust emissions, and construction equipment activity, which would avoid or reduce potential impacts on localized air quality. No violations of the current NAAQS established by EPA would be expected as a result of the implementation of this alternative.

5.9.3 Moderate Conservation (Alternative 2)

Implementation of the Moderate Conservation Alternative would also result in no change in air quality impacts as noted under the No Action Alternative. Since this alternative would incorporate more shoreline acreage into the Environmentally Sensitive and Wildlife Management land classification, there would likely be a reduction in potential development, local vehicular exhaust emissions, and construction equipment activity, which would avoid or reduce potential impacts on localized air quality. No violations of the current NAAQS established by EPA would be expected as a result of the implementation of this alternative.

5.9.4 Limited Growth (Alternative 3)

Mirroring the Conservation Alternative, the Limited Growth Alternative would result in fewer air quality effects as compared to the No Action Alternative. This alternative would reclassify less Low Density to Environmentally Sensitive as compared to the Preferred Action, resulting in approximately 4,659 more acres of Low Density under Alternative 3 as compared to the Preferred Action. This additional Low Density acreage would result in a greater potential for additional development, which could lead to increased local vehicular exhaust emissions. However, this effect would not be significant based on the small amount of change that could result from this development and increased lake usage activities. No violations of the current NAAQS established by EPA would be expected as a result of the implementation of this alternative.

5.9.5 Maximum Conservation (Alternative 4)

Implementation of the Maximum Conservation alternative would result in less of an impact to existing air quality due to the reduction in lands classified for development around the Bull Shoals Lake shoreline. Since the majority of the available acreage would be classified as Environmentally Sensitive and Wildlife Management lands (93% of total available acreage), this would result in much less potential vehicular traffic, boat traffic, construction equipment usage, and mower exhaust emissions on these lands.

5.10 Health & Safety

5.10.1 No Action (Alternative 1)

Safety of project visitors and project staff are highest priority in daily project operations. The No Action Alternative would have 72% of available shoreline acreage classified for High and Low Density development, would allow for the highest potential for a reduction in lake water quality, as described in Section 5.3.2.. There could potentially be an increase in boat traffic on the

lake and a possible increase in congestion, creating additional safety issues. The lake could experience increased user conflict, for example, boats vs. personal watercrafts. Under the No Action Alternative, populations who recreate at the lake could be exposed to health risks associated with impaired water quality, such as *E. coli*, and potential hazardous run off due to the overall potential for increased recreation at the lake.

5.10.2 Modified Moderate Conservation (Selected Alternative 2)

The recreational opportunities, balanced with conservation of natural environment could lead to better health, both mental and physical, of the visiting population. Implementation of the modified Moderate Conservation Alternative would likely result in reduced traffic congestion on the water, and a lower potential for water related incidents. The increase in Environmentally Sensitive and Wildlife Management Areas could potentially increase exposure to insects and animals, which is generally understood by the public who utilize these lands.

5.10.3 Moderate Conservation (Alternative 2)

The recreational opportunities, balanced with conservation of natural environment could lead to better health, both mental and physical, of the visiting population. Implementation of the Moderate Conservation Alternative would likely result in reduced traffic congestion on the water, and a lower potential for water related incidents. The increase in Environmentally Sensitive and Wildlife Management Areas could potentially increase exposure to insects and animals, which is generally understood by the public who utilize these lands.

5.10.4 Limited Growth (Alternative 3)

Similar to the impacts in Alternative 2, the Limited Growth Alternative could also create a potential for additional boat docks being built due to a greater amount of Low Density lands than in the Preferred Action. This alternative would potentially result in a small increase of traffic congestion on the water, thus water related incidents could potentially become an issue under this alternative, but to a lesser potential in comparison to the No Action Alternative.

5.10.5 Maximum Conservation (Alternative 4)

This alternative limits development to 3,714.6 acres of High Density lands, which would imply that there would be more limited access to Bull Shoals Lake, potentially causing a decrease in water-based recreational opportunities. Although water-based activities would be impacted, there would be an increase in land-based recreation opportunities such as hiking, hunting and wildlife observation. There could also be some partnership opportunities with conservation-based organizations within the region. The decrease in rate of development could also have positive impacts on water quality by reducing runoff quantity and velocity from rainfall events, which would increase sedimentation and shoreline contaminants to the water.

5.11 Aesthetics

5.11.1 No-Action (Alternative 1)

Aesthetics is an important feature that enhances the recreational experience. Lands around Bull Shoals Lake provide a natural setting that is aesthetically pleasing as well as buffering the lake from views of development and clearings.

Under the No-Action Alternative the visual character of the landscape would slowly change due to potential continued development increasing the amount of land with views of development and human structures. This would increase the amount of visual contrast between the natural and developed landscapes around the lake. Visual contrast is a measure of impact on visual quality and aesthetics. Dock development would eliminate the unspoiled and untamed aesthetic of this landscape. Road and utility line corridors also impact aesthetics and visual resources at Bull Shoals. Since the lake is partially surrounded by pockets of residential and commercial development, these demands would continue to increase. In many instances, requests for new shoreline use permits are in areas where the natural vegetation and landscape would be disturbed.

5.11.2 Modified Moderate Conservation (Selected Alternative 2)

The wide panorama of Bull Shoals Lake and the nearby shore conveys a sense of enormity to the lake, and the conversion of 24,685.2 acres of Low Density lands and 4,373.1 acres of High Density lands to Environmentally Sensitive and Wildlife Management acreage would continue to preserve the sense of relatively pristine shoreline. The natural vegetation along the shoreline would enhance the viewscapes of the people recreating on the lake, while potentially impeding the view of the lake from the shore. Under this proposed alternative, property owners could work with Corps staff to determine the appropriate vegetation management measures for their specific property location adjacent to the shoreline of the lake.

5.11.2 Moderate Conservation (Alternative 2)

The wide panorama of Bull Shoals Lake and the nearby shore conveys a sense of enormity to the lake, and the conversion of 20,041.5 acres of Low Density lands and 4,830.6 acres of High Density lands to Environmentally Sensitive and Wildlife Management acreage would continue to preserve the sense of relatively pristine shoreline. The natural vegetation along the shoreline would enhance the viewscapes of the people recreating on the lake, while potentially impeding the view of the lake from the shore. Under this proposed alternative, property owners could work with Corps staff to determine the appropriate vegetation management measures for their specific property location adjacent to the shoreline of the lake.

5.11.3 Limited Growth (Alternative 3)

Implementation of the Limited Growth Alternative would be similar in regards to aesthetics as the Moderate Conservation Alternative. Under Alternative 3 there would be 4,259.2 more acres of Low Density lands compared to the Preferred Action, which would have the potential for additional boat dock construction and vegetation modification permits, but no significant impacts to aesthetics would be expected.

5.11.4 Maximum Conservation (Alternative 4)

Implementation of the Maximum Conservation Alternative would minimize all activities which could disturb the scenic beauty and aesthetics of the lake. This alternative would be the most aesthetically pleasing for those recreating along the lake, but could potentially be a hindrance to property owners and their viewshed of the lake. The user experience in areas such as Corps parks would still be relatively peaceful at most times, with the aesthetic of domesticated nature. However, some of the more developed and heavily used parks could experience annual wear and deterioration of acreage and existing facilities due to the potential increased usage of these parks.

5.12 Cumulative Impacts

Cumulative impacts are those that may result from the incremental impact of the evaluated alternatives added to those of other past, present, or reasonably foreseeable future actions in the local area. The Master Plan for Bull Shoals Lake was last approved in 1975; this was followed by multiple supplements over the last 40 years. During that time, public use patterns have remained similar, but trends, facility and service demands have shifted in the past 40 years due to the need for alternative experiences in recreation and tourism. Visitation to the lake has decreased from 2000 to 2010; however, the demand for high quality recreational experiences remain. Bull Shoals Lake receives pressure for both private shoreline and public recreation use, resulting in management concerns regarding the overall sustainability of the lake. With public use at project facilities changing, reallocations of services at these facilities need to be addressed. Changes involving recreation area closures and improvements have occurred during the last four decades to meet the evolving public use. In addition, cooperative agreements are being considered in order to operate and maintain facilities, which would reduce the financial burden on the tax payers.

Two main themes came out of the scoping process, which was a cumulative exercise involving private and public entities, and local, state and federal agencies—improved water quality and maintenance of the environmental setting around the lake. Preservation of the natural shoreline and lack of extensive development has enhanced and maintained good water quality since the lake was constructed. The Arkansas Department of Environmental Quality has classified Bull Shoals Lake as an Extraordinary Resource Water and the Missouri Department of Natural Resources has designated it as a Class A waterbody. Existing conditions at the lake allow for some degree of development on 71% of available acreage, with an additional 169 acres having no specific land classification, but it should be noted that reclassification of lands under the Selected Alternative would enhance water quality by restricting Low Density recreation development, increasing the amount of Environmentally Sensitive and Wildlife Management acreage, thereby retaining more of the natural shoreline vegetation. Approximately 80% of the linear shoreline would have a natural vegetated shoreline due to these land reclassifications identified in the Selected Alternative. There would be insignificant impacts to climate, topography, geology and soils under this alternative. The aquatic environment of the lake should benefit from a potential reduction in storm water runoff velocity, reduced sedimentation, improved water quality, and a cleaner substrate for macroinvertebrate production and fish spawning activity. This alternative would also enhance wildlife foraging and movement patterns, offer more protection for threatened and endangered species that inhabit the area, and result in minimal impacts to cultural resources. A provision for additional potential development opportunities coupled with an abundance of lands remaining in their natural condition would balance and enhance recreational experiences, which would potentially stimulate the socio-economics of the area. This balanced approach should provide a safe and aesthetically pleasing recreational experience for the public that visits and/or lives at Bull Shoals Lake.

Continued collaboration and coordination with state and federal resource agencies, as well as local agencies and watershed groups, is necessary to monitor, evaluate and remediate aging infrastructure, failing septic systems around the shoreline, and potential water quality impacts. Coordination with these entities could also evaluate and promote watershed enhancement programs that would serve to institute stream bank stabilization, land improvement and conservation programs, and implementation of best management practices to reduce watershed runoff and erosion.

As management of Bull Shoals Lake ensues, the Corps would continue to coordinate with Federal, State, and local agencies to avoid, minimize or mitigate potential impacts.

6.0 ENVIRONMENTAL COMPLIANCE

Compliance with Federal Acts and Executive Orders are summarized in the following table.

Act/Executive Order	Status	Compliance
Wetlands (EO 11990)	No effect	C
Prime/Unique Farmlands	N/A	N/A
Floodplain Management (EO 11988)	N/A	N/A
Clean Water Act		
Section 404	No effect	N/A
Section 401	No effect	N/A
NPDES	No effect	N/A
Fish and Wildlife Coordination Act	No effect	C
Endangered Species Act	No effect	C
National Historic Preservation Act	No effect	C
Environmental Justice (EO 12898)	No effect	C
Clean Air Act	No effect	C
Comprehensive Environmental Response Compensation and Liability Act (CERCLA)	N/A	N/A
Resource Conservation and Recovery Act (RCRA)	N/A	N/A
Wild and Scenic Rivers Act	N/A	N/A
Rivers and Harbors Act	N/A	N/A
N/A—not applicable C--Compliant		

Table 6: Federal Act/Executive Order Compliance

6.1 Fish and Wildlife Coordination Act

The Corps is required to coordinate with the USFWS and MDNR under the Fish and Wildlife Coordination Act (FWCA) (48 Stat. 401, as amended; 16 USC 661 et. seq.). Coordination was initiated with a scoping notice; no concerns were raised by these agencies. Review of the Environmental Assessment was completed during the draft release; no concerns were identified.

6.2 Endangered Species Act

The Endangered Species Act (ESA) requires the determination of possible effects on species or degradation of habitat critical to Federally-listed endangered or threatened species. Implementation of an updated Master Plan is not likely to affect threatened or endangered species. Individual requests for use of project lands would be evaluated to ensure compliance with this Act.

6.3 Environmental Justice

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations* requires Federal agencies to promote "nondiscrimination in Federal programs substantially affecting human health and environment". In response to this directive, Federal Agencies must identify and address a disproportionately high and adverse human health and environmental effects of their programs, policies, and activities on minority and low-income

populations. The final step in the environmental justice evaluation process is to evaluate the impact of the project on the population and to ascertain whether target populations are affected more adversely than other residents.

Implementing the Master Plan Revision would not disproportionately affect minority or low-income populations.

6.4 Cultural Resource Requirement

Section 106 of the National Historic Preservation Act of 1966 requires the Corps to identify historic properties affected by the Selected Alternative and to evaluate the eligibility of those properties for the National Register of Historic Places. Section 110 of the Act requires the Corps to assume responsibility for the preservation of historic properties in its ownership. The Act also requires Federal agencies to provide the Advisory Council on Historic Preservation an opportunity to comment on undertakings through the process outlined in the Council's regulations (36 CFR 800).

There would be no effect on cultural resources with implementation of an updated Master Plan. Individual requests for use of project lands would be evaluated on a case-by-case basis to ensure compliance with this act.

7.0 Scoping and Public Concern

7.1 Introduction

No single agency has complete oversight of stewardship activities on the public lands and waters surrounding Bull Shoals Lake. Responsibility for natural resource and recreation management falls to several agencies that own or have jurisdiction over these public lands and waters.

Increasingly, competition for the use of these lands and waters and their natural resources can create conflicts and concerns among stakeholders. The need to coordinate a cooperative approach to protect and sustain these resources is compelling. Many opportunities exist to increase the effectiveness of Federal programs through collaboration among agencies and to facilitate the process of partnering between government and non-government agencies.
To sustain healthy and productive public lands and water with the most efficient approach requires individuals and organizations to recognize their unique ability to contribute to commonly held goals. The key to progress is building on the strengths of each sector, achieving goals collectively that could not be reasonably achieved individually. Given the inter-jurisdictional nature of Bull Shoals Lake, partnering opportunities exist and can promote the leveraging of limited financial and human resources. Partnering and identification of innovative approaches to deliver justified levels of service defuse polarization among interest groups, and lead to a common understanding and appreciation of individual roles, priorities, and responsibilities.

To the extent practical, this Master Plan and a proactive approach to partnering would position Bull Shoals Lake to aggressively leverage project financial capability and human resources in order to identify and satisfy customer expectations, protect and sustain natural and cultural resources and recreational infrastructure, and programmatically bring Corps management efforts and outputs up to a justified level of service. Public involvement and extensive coordination within the Corps of Engineers and with other affected agencies and organizations is a critical feature required in developing or revising a Project Master Plan.

Agency and public involvement and coordination have been a key element in every phase of the Bull Shoals Lake Master Plan revision.

7.2 Scoping

One agency and five public scoping workshops were held in late August 2014 with 776 people registering their attendance. To prepare for the scoping workshops, the Corps contracted with CDM-Smith.

From the scoping process, a Scoping Report was finalized in December 2014. The report summarizes the public participation process for, and the public comments resulting from, the Bull Shoals Lake MP Revision public scoping workshops and comment period. “Scoping” is the process of determining the scope, focus, and content of a NEPA document. Scoping workshops are a useful tool to obtain information from the public and governmental agencies. For a

planning process such as the MP revision, the scoping process was also used as an opportunity to get input from the public and agencies about the vision for the MP update and the issues that the MP should address where possible. The Scoping Report is located on the Bull Shoals Lake Master Plan website, http://www.swl.usace.army.mil/Missions/Planning/BullShoalsLakeMasterPlanRevision.aspx

7.3 Focus Groups

The PDT made the decision to work with focus groups during the scoping process, in part due to the high interest in the Master Plan revision process from other agencies and the public. The focus groups were formed in response to the top three concerns heard from the public during the scoping process: Water Quality, Environmental, and Recreation.

The initial focus group meetings were held on the 24th and 25th of February 2014 at the Mt. Home Project Office. A 'cross talk' focus group meeting, which included team leaders chosen from each of the three focus groups, was held on the 2th of April 2014. The idea behind this meeting was to allow all three focus groups to hear from each other on feedback and comments given to that point on the preliminary draft master plan.

A final focus group meeting was held on April 2, 2015 to allow the PDT to discuss with the focus groups on how their feedback and comments were included into the draft MP.

7.4 Draft Master Plan/Draft Environmental Assessment.

The Draft Master Plan/Draft Environmental Assessment was released to the public on July 27, 2015. A public review period was held from July 27 through September 11, 2015.

Similar to the Scoping workshops, a contract with CDM-Smith was established to help with the facilitation of the draft documents release. Comparable workshop support documentation was developed, such as post card notification, comment cards, news articles, news releases, Fact sheets, and poster boards.

Public workshops were held the week of August 3rd; in total, five public workshops were held around Bull Shoals Lake, including Mountain Home, Flippin, and Harrison, AR; Theodosia and Forsyth, MO. The workshops were scheduled from 4PM to 7PM to accommodate public attendance. A short movie (10-minute video) was shown to attendees that provided background information about Bull Shoals Lake and the Master Plan revision process.

The video briefly described the 4 alternatives that were formulated during the process. Attendees were then free to move on to an adjoining room where maps were available to look at and Corps representatives were on hand to ask questions of and discuss key issues. Copies of the draft Master Plan/draft EA, fact sheet, comment card, and video were also made available on the Bull Shoals Lake Master Plan website: http://www.swl.usace.army.mil/Missions/Planning/BullShoalsLakeMasterPlanRevision.aspx

During the draft release, over 500 attendees participated in the public workshops held around Bull Shoals Lake. Post public review period, the Corps received a total of 263 comment

submittals (Comment cards, Fax, Letters, Email, and Oral comments). A complete breakdown of comments can be found in the Draft Comment Analysis Report.

7.5 Final Master Plan/Final EA.

The Final Master Plan was completed in January 2016.

A series of workshops will be held at the end of January 2016 to unveil the final Master Plan and answer any questions the public may have about the plan. No comments will be accepted as this is the final version.

A similar public workshop format will be used for the Final Master Plan unveiling.

8.0 Conclusions

The Master Plan for Bull Shoals Lake was last approved in 1975; this was followed by multiple supplements over the last 40 years. During that time, public use patterns have remained similar, but trends, facility and service demands have shifted in the past 40 years due to the need for alternative experiences in recreation and tourism. Visitation to the lake has decreased from 2000 to 2010; however, the demand for high quality recreational experiences remain. Bull Shoals Lake receives pressure for both private shoreline and public recreation use, resulting in management concerns regarding the overall sustainability of the lake. With public use at project facilities changing, reallocations of services at these facilities need to be addressed. Changes involving recreation area closures and improvements have occurred during the last four decades to meet the evolving public use. In addition, cooperative agreements are being considered in order to operate and maintain facilities, which would reduce the financial burden on the tax payers

The Master Plan is not intended to address the specifics of regional water quality, shoreline management, or water level management; these areas are covered in a project's shoreline management plan or water management plan. However, specific issues identified through the Master Plan revision process can still be communicated and coordinated with the appropriate internal Corps resource (i.e. Operations for shoreline management) or external resource agency (i.e. Missouri Department of Natural Resources and Arkansas Dept. of Environmental Quality for water quality) responsible for that specific area. To facilitate this action, the current Master Plan development evaluated four alternatives relative to their potential impacts on the land and water resources of Bull Shoals Lake.

These alternatives spanned the gamut of increased shoreline protection to increased shoreline development and the potential effects on the human, terrestrial, and aquatic environment from their implementation. A no action alternative looked at leaving the lake as it currently exists in terms of developable areas and protected areas. Of the 56,348 acres of available land around the lake, 71% of this is classified as High and Low density recreation (15% high), with potential future development occurring. While 21% of available acreage is classified as Environmentally Sensitive lands, 169 acres of land currently has no classification. Under each of the action alternatives, the lands with no classification are allocated to one of the land classifications.

The action alternatives included a Modified Moderate Conservation, Moderate Conservation Alternative, a Limited Development Alternative, and a Maximum Conservation Alternative. The Maximum Conservation Alternative (Alternative 4) shifted the majority of the available shoreline acreage toward future preservation, with 7% classified as High Density recreation, 65% classified as Environmentally Sensitive, and 28% classified as Wildlife Management lands. Potential effects from this would be decreased vegetation removal and a reduction in soil erosion due to the reclassification of lands previously included as high and low density lands, having the potential for construction and conversion of pervious surfaces to impervious. This construction activity is generally detrimental to water quality and terrestrial and aquatic wildlife species. Development has the potential to increase the number of boats on the lake,

increased health and safety issues, aesthetic impacts, and impaired recreational experiences for many visitors. The Modified Moderate Conservation and Moderate Conservation Alternatives (both Alternative 2) also include the 7% High Density lands, while reducing the 57% of Low Density lands to 13%, with the 44% difference going to the Environmentally Sensitive and Wildlife Management classifications. This action would preserve shoreline vegetation, reduce stormwater runoff quantity and velocity, resulting in less in-lake sedimentation and turbidity, and improve water quality. This action also has the potential to improve health and safety issues, aesthetics, terrestrial and aquatic wildlife habitat. The Conservation Alternative seeks to balance all components of lake usage, including the provision for growth and recreation potential, while protecting and preserving terrestrial and aquatic resources. A detailed description of the modifications is located in Chapter 5 of the Master Plan.

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