



**US Army Corps
of Engineers®**

Little Rock District

Final Environmental Assessment

Little Rock District Master Plan Revision McClellan-Kerr Arkansas River Navigation System

July 2023

Prepared By:

Regional Planning and Environmental Center

Environmental Branch

U.S. Army Corps of Engineers

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FINDING OF NO SIGNIFICANT IMPACT

McCLELLAN-KERR ARKANSAS RIVER NAVIGATION SYSTEM MASTER PLAN REVISION ENVIRONMENTAL ASSESSMENT ARKANSAS

The U.S. Army Corps of Engineers, Little Rock District (Corps) has conducted an environmental analysis in accordance with the National Environmental Policy Act of 1969, as amended for the McClellan-Kerr Arkansas River Navigation System (MKARNS) Master Plan (MP) Revision and Environmental Assessment (EA) dated July 2023. The MKARNS Master Plan Revision consolidates plans for Pools 1-9 and 13, Ozark Jetta-Taylor Lock and Dam, and Dardanelle Dam and Lake. 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.

The Final EA dated July 2023 addresses the comprehensive management and development of all recreational, natural, and cultural resources; opportunities; and feasibility along the MKARNS extent within the State of Arkansas, which begins at the Arkansas/Oklahoma State line near Fort Smith at River Mile 308.7. The project is bordered on the north by the Boston Mountains Ecoregion and on the south by the Ouachita Mountains Ecoregion. The riparian corridor of the Arkansas River lies within the Arkansas River Valley Ecoregion. As the river enters central Arkansas, it is bordered by the Mississippi Alluvial Plain Ecoregion to its confluence with the Mississippi River. The elevation of the river changes approximately 282 feet as it traverses the state.

The Final MP/EA, incorporated herein by reference, evaluated two action alternatives as well as a “no action” alternative to include existing conditions and potential impacts of land reclassifications considered in the listed alternatives. The recommended plan is the implementation of Alternative 2, as follows:

Preexisting 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 Recreation (i.e. future or closed Corps parks) to other land classifications; reclassifying undeveloped Low Density Recreation to Wildlife Management, Project Operations, Future or Inactive Recreation Area, or Environmentally Sensitive Area; and reclassifying lands that contained active shoreline use permits to low density.

Alternative 2 proposes 4,965.4 acres in High Density Recreation, representing a 3,375.1-acre decrease from the No Action Alternative. Low Density Recreation totals 5,418.0 acres, representing a reduction of 15,723.6 acres from the No Action Alternative. Most of the acreage lost in High Density and Low Density Recreation is to be reclassified as Wildlife Management Area (increased from 8,756.4 acres to 31,111.5 acres). Environmentally Sensitive lands increased by 1,324.9 acres, totaling 2,500.9 acres. Project Operations increased from 39.4 acres to 2,115.0 acres, primarily from reclassifying unallocated lands bordering the 13

locks and dams in the river system. Future or Inactive Recreation Area lands total 320.0 acres in this alternative.

In addition to a “no action” alternative described in Section 3.1 of the EA, one additional alternative, Alternative 3, was evaluated. The components of this alternative are described in Section 3.3 of the EA.

For all alternatives, potential effects to the human and physical environment were evaluated, as appropriate. A summary assessment of the potential effects of the selected plan are listed in Table 1 below.

Table 1: Summary of Potential Effects of the Recommended Plan

	Insignificant effects	Insignificant effects as a result of mitigation*	Resource unaffected by action
Aesthetics	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Air quality	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aquatic resources/wetlands	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Invasive species	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fish and wildlife habitat	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Threatened/Endangered species/critical habitat	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Historic properties	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other cultural resources	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Floodplains	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hazardous, toxic & radioactive waste	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Hydrology	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Land use	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Navigation	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Noise levels	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Public infrastructure	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Socio-economics	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Environmental justice	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Soils	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tribal trust resources	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Water quality	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Climate change	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

All practicable and appropriate means to avoid or minimize adverse environmental effects have been analyzed and incorporated into the proposed plan. No compensatory mitigation is required as part of the recommended plan. The proposed plan will not entail any ground-disturbing activities. Future ground-disturbing activities on USACE property will be subject to all necessary environmental evaluations and compliance regulations.

Public review of the Draft MP/EA occurred from January 16 to March 2, 2023. All comments submitted during the draft review period were evaluated and considered in the Final MP/EA and FONSI, as appropriate.

Pursuant to Section 7 of the Endangered Species Act of 1973, as amended, the U.S. Army Corps of Engineers has determined that the proposed plan will have no effect on federally listed species or their designated critical habitat.

Pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended, the U.S. Army Corps of Engineers has determined that the recommended plan has no effect on historic properties.

Park lands, prime farmlands, wetlands, wild and scenic rivers, and ecologically critical areas will not be negatively impacted by implementation of the recommended plan.

All applicable environmental laws have been considered and coordination with appropriate agencies and officials has been completed.

All applicable laws, executive orders, regulations, and local government plans were considered in evaluation of alternatives. Based on this EA, the reviews by other Federal, State, and local agencies, Tribal Nations, input of the public, and review by my staff, it is my determination that the proposed plan would not cause significant adverse impacts on the quality of the human environment; therefore, preparation of an Environmental Impact Statement is not required.

5 July 2023

Date

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Damon Knarr
Colonel, U.S. Army Corps of Engineers
District Commander

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MEMORANDUM FOR RECORD

SUBJECT: Approval of the McClellan-Kerr Arkansas River Navigational System (MKARNS) Master Plan Revision, dated July 2023

1. References:

- a. Finding of No Significant Impact (FONSI) – McClellan-Kerr Arkansas River Navigation System Master Plan Revision Environmental Assessment, July 2023
- b. Final Environmental Assessment – Little Rock District Master Plan Revision, McClellan-Kerr Arkansas River Navigation System, July 2023

2. The McClellan-Kerr Arkansas River Navigational System (MKARNS) Master Plan Revision is approved. Enclosed is the MKARNS Master Plan.

3. This memorandum for record serves as the approval of the MKARNS Master Plan Revision.

4. My point of contact for this memorandum for record is Mr. John "Tyler" Mays, Project Manager for PPMD (CESWL-PM), at (501) 324-5657 or John.T.Mays@usace.army.mil.

Encl

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MASTER PLAN REVISION
McCLELLAN-KERR ARKANSAS RIVER NAVIGATION SYSTEM (MKARNS)
ENVIRONMENTAL ASSESSMENT

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List of Acronyms

AAS	Arkansas Archeology Survey
ABB	American Burying Beetle
ACI	Archeological Consultants, Inc.
ACQR	Air Quality Control Regions
ADEE	Arkansas Department of Energy and Environment
ADEQ	Arkansas Department of Environmental Quality
AGFC	Arkansas Game and Fish Commission
ANHC	Arkansas Natural Heritage Commission
ARDOT	Arkansas Department of Transportation
ARPA	Archeological Resources Protection Act
CAA	Clean Air Act of 1977, as amended
CEI	Coastal Environments, Inc.
CEQ	Council on Environmental Quality
EA	Environmental Assessment
EM	Engineer Manual
EO	Executive Order
EPA	Environmental Protection Agency
ER	Engineer Regulation
ERDC	USACE Engineering Research and Development Center
ESA	Endangered Species Act
FWCA	Fish and Wildlife Coordination Act
GNIS	Geographic Names Information System
ILT	Interior Least Tern
IPaC	USFWS Information for Planning and Consultation
MKARNS	McClellan-Kerr Arkansas River Navigation System
MSL	Mean Sea Level
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NAGPRA	Native American Graves Protection and Repatriation Act
NM	Navigation Mile
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
OMP	Operational Management Plan
PDT	Project Delivery Team
SHPO	State Historic Preservation Office
T&E	Threatened and Endangered
TMDL	Total Daily Maximum Load
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
WMA	Wildlife Management Area
ZOI	Zone of Influence

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1. INTRODUCTION

The Master Plan is the strategic land use management document that guides the comprehensive management and development of all project 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 the 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.

The Master Plan will be developed and kept current for Civil Works projects operated and maintained by the Corps and will 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 Energy and Environment for water quality) responsible for that specific area.

The revised Master Plan updates Design Memorandum 6-3, Design Memorandum No. 8, Design Memorandum 9, and Design Memorandum 13, MKARNS Master Plan (USACE 1976,1977).

With the proposed Master Plan update, an Environmental Assessment (EA) is 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. PURPOSE AND NEED FOR ACTION

2.1 Purpose and Need

The purpose of the Proposed Action to revise the McClellan-Kerr Arkansas River Navigation System Master Plan is 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 McClellan-Kerr Arkansas River Navigation System. The Master Plans for the McClellan Kerr Arkansas River Navigation System were last approved in 1976 and 1977; and were followed by 39 supplements over the last 46 years. Since the 1976 and 1977 master plan revisions, forecasted public use and development in the McClellan-Kerr Arkansas River Navigation System region has not occurred as planned on the public lands and resources of the project. Based on this information and to bring in line with current management practices at the project, as well as new guidance and directives within U.S. Army Corps of Engineers (USACE), these actions have dictated the preparation of this Master Plan revision.

2.2 Project History

The Arkansas River begins high in the Rocky Mountains of Colorado. The river descends the eastern slopes of the Continental Divide as a clear mountain stream, flowing through the breathtaking Royal Gorge on a long journey to the Mississippi River. The Arkansas River moves into the wheat lands of Kansas and then meanders through oil-rich northern Oklahoma before it crosses the border into Arkansas. In the 1,450-mile journey, the Arkansas River drains an area of 160,000 square miles.

The Rivers & Harbors Act of July 24, 1946, authorized the development of the Arkansas River and its tributaries for the purposes of navigation, flood control, hydropower, water supply, recreation, and fish and wildlife. Public Law 91-629 stated that the project would be known as the McClellan-Kerr Arkansas River Navigation System (MKARNS). For the purposes of this study, the navigation system and its associated reservoirs are hereafter referred to as the “MKARNS”. Several reservoirs on the Arkansas River and its tributaries support water control on the MKARNS and are operated as part of the navigation system. MKARNS project purposes include navigation, flood control, hydropower, water supply, recreation, and fish and wildlife. Development of and construction on the MKARNS began in 1952 and was completed in 1971 at a cost of \$1.3 billion.

The 445-mile Navigation System reached Little Rock in December 1968, Fort Smith in December 1969, and the Port of Catoosa, the head of the Navigation System, in December 1970. The MKARNS begins at the confluence of the White River and the Mississippi River, proceeds 10-miles upstream on the White River to the manmade Arkansas Post Canal, and then 9-miles through the canal to the Arkansas River. The Navigation System then crosses the State of Arkansas into Oklahoma on the Arkansas River to the mouth of the Verdigris River at Muskogee, Oklahoma. The Navigation System terminates 51-miles upstream on the Verdigris River at the Port of Catoosa near Tulsa, Oklahoma.

There are 18 locks and dams in the navigation system, with 13 located in Arkansas (Figure 2-1). The project, for the purposes of updating the master plan, begins at the Arkansas/Oklahoma State line near Fort Smith at River Mile 308.7, is bordered on the north by the Boston Mountains Ecoregion and on the south by the Ouachita Mountains Ecoregion. The riparian corridor of the Arkansas River lies within the Arkansas River Valley Ecoregion. As the river enters central Arkansas, it is bordered by the Mississippi Alluvial Plain Ecoregion to its confluence with the Mississippi River. The elevation of the river changes approximately 282 feet as it traverses the state, with an elevation of 392 feet mean sea level (msl) near Fort Smith, and 110 msl at the confluence of the Mississippi River. A total of 18 counties border the Arkansas River within the state (Figure 2-2). The total area contained in the Arkansas portion of the MKARNS project, including both land and water surface, consists of 92,594.3 acres. Additionally, there are 88,194.8 acres in flowage easements. Project access to the MKARNS area is depicted in Figure 2-3.

Figure 2-1: MKARNS in Oklahoma and Arkansas

McClellan-Kerr Arkansas River Navigation System

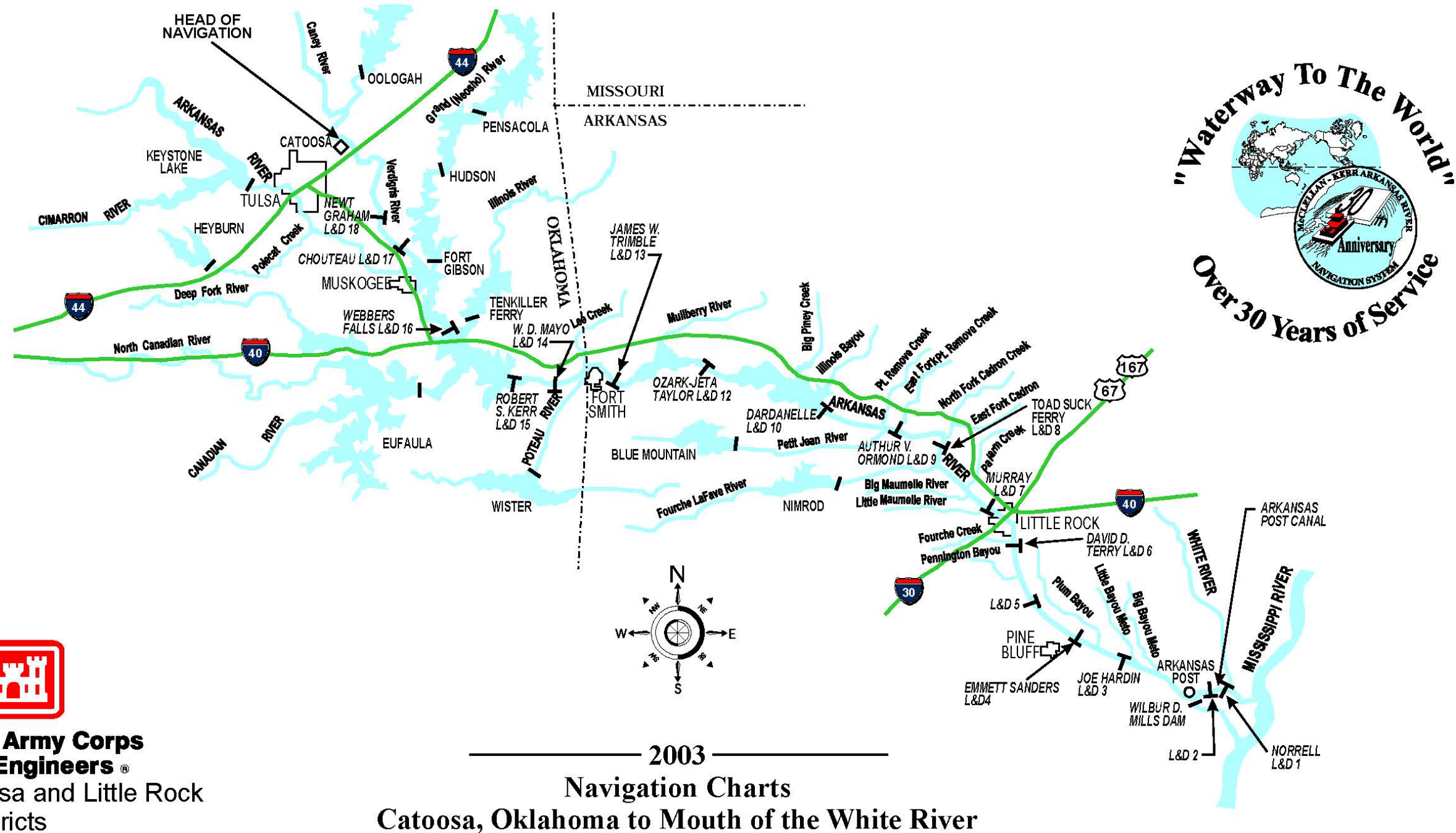
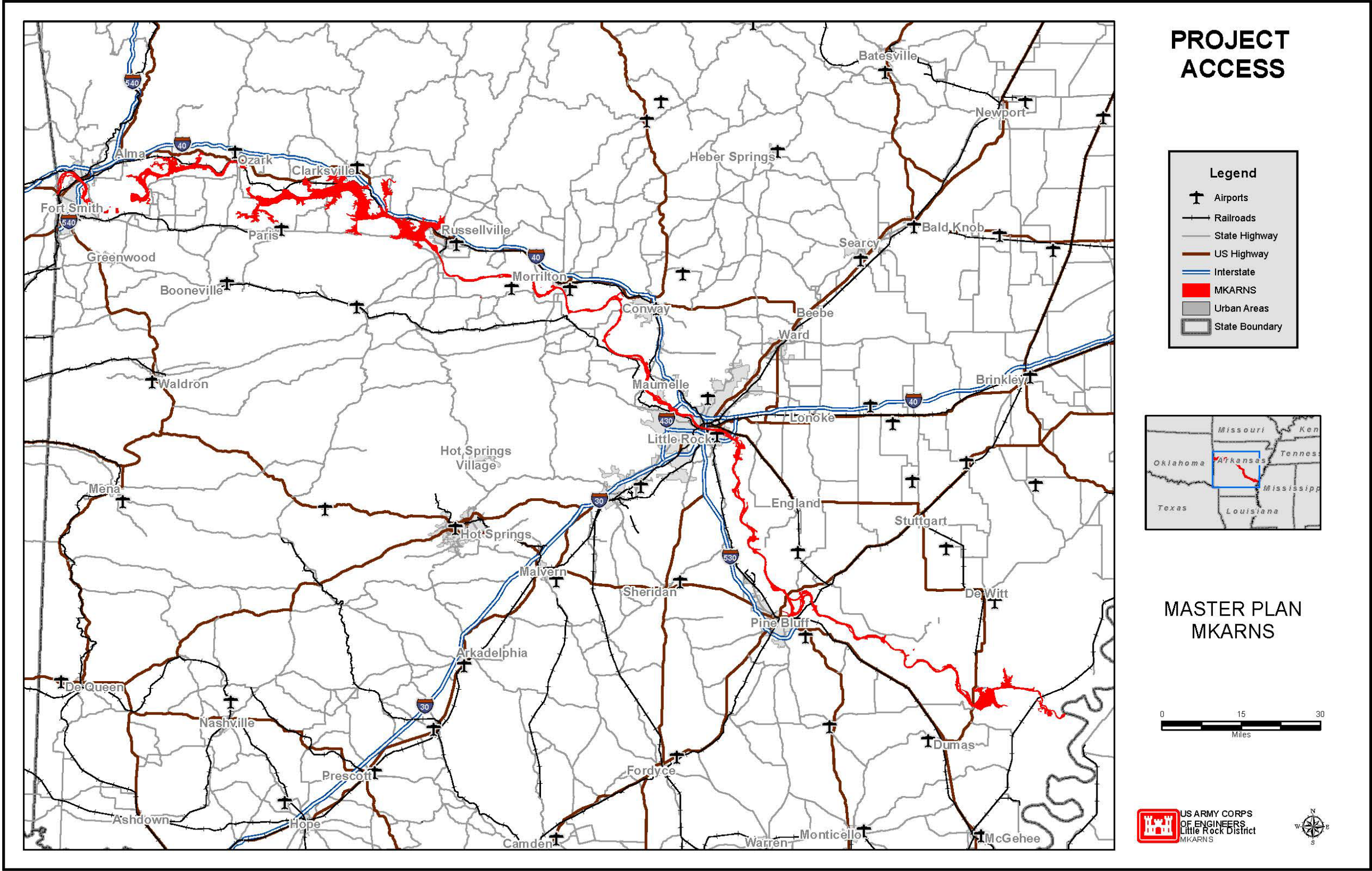


Figure 2-2: MKARNS Project Access



3. 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 (Selected Alternative); and Alternative 3. A complete set of detailed maps for each alternative is located in Appendix C to this EA, including the Selected Alternative (formerly the Preferred Alternative).

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 are being 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. The final EA compares all action alternatives to the No Action that was developed, taking into consideration comments received during the draft release comment period from both resource agencies and the public. The Final EA presents the selected alternative and provides the basis for the agency decision under NEPA.

Table 3-1: Change in Land Classification by Alternative

Alternative 1 (No Action)	Acres	% of Land
Total Land and Water	92,594.3	
Total Water	46,163.5	
Restricted Water	68.6	
Fish and Wildlife Sanctuary	342.7	
Open Recreation Water	45,752.2	
Land	46,430.7	
High Density Recreation	8,340.5	18%
Low Density Recreation	21,141.6	46%
Environmentally Sensitive Area	1,175.9	3%
Project Operations	39.4	0.1%
Wildlife Management	8,756.4	19%
Future or Inactive Recreation Area (0 acres)	0.0	0%
No Allocation	6,976.8	15%

Alternative 2 (Selected)	Acres	% of Land	+/-Acres	% +/- Change
Total Land and Water	92,594.3			
Total Water	46,163.5			
Restricted Water	68.6			
Fish and Wildlife Sanctuary	342.7			
Open Recreation Water	45,752.2			
Land	46,430.7			
High Density Recreation	4,965.4	11%	-3,375.1	-7%
Low Density Recreation	5,418.0	12%	-15,723.6	-34%
Environmentally Sensitive Area	2,500.9	5%	1,324.9	3%
Project Operations	2,115.0	5%	2,075.6	4%
Wildlife Management	31,111.5	67%	22,355.1	48%
Future or Inactive Recreation Area	320.0	1%	320.0	1%

Alternative 3	Acres	% of Land	+/-Acres	% +/- Change
Total Land and Water	92,594.3			
Total Water	46,163.5			
Restricted Water	68.6			
Fish and Wildlife Sanctuary	342.7			
Open Recreation Water	45,752.2			
Land	46,430.7			
High Density Recreation	5,806.5	13%	-2,534.0	-5%
Low Density Recreation	5,324.9	11%	-15,816.7	-34%
Environmentally Sensitive Area	2,500.9	5%	1,324.9	3%
Project Operations	2,115.0	5%	2,075.6	4%
Wildlife Management	30,683.5	66%	21,927.0	47%
Future or Inactive Recreation Area (0 acres)	0.0	0%	0.0	0%

Figure 3-1: Percentage of Land Classifications for Each Alternative

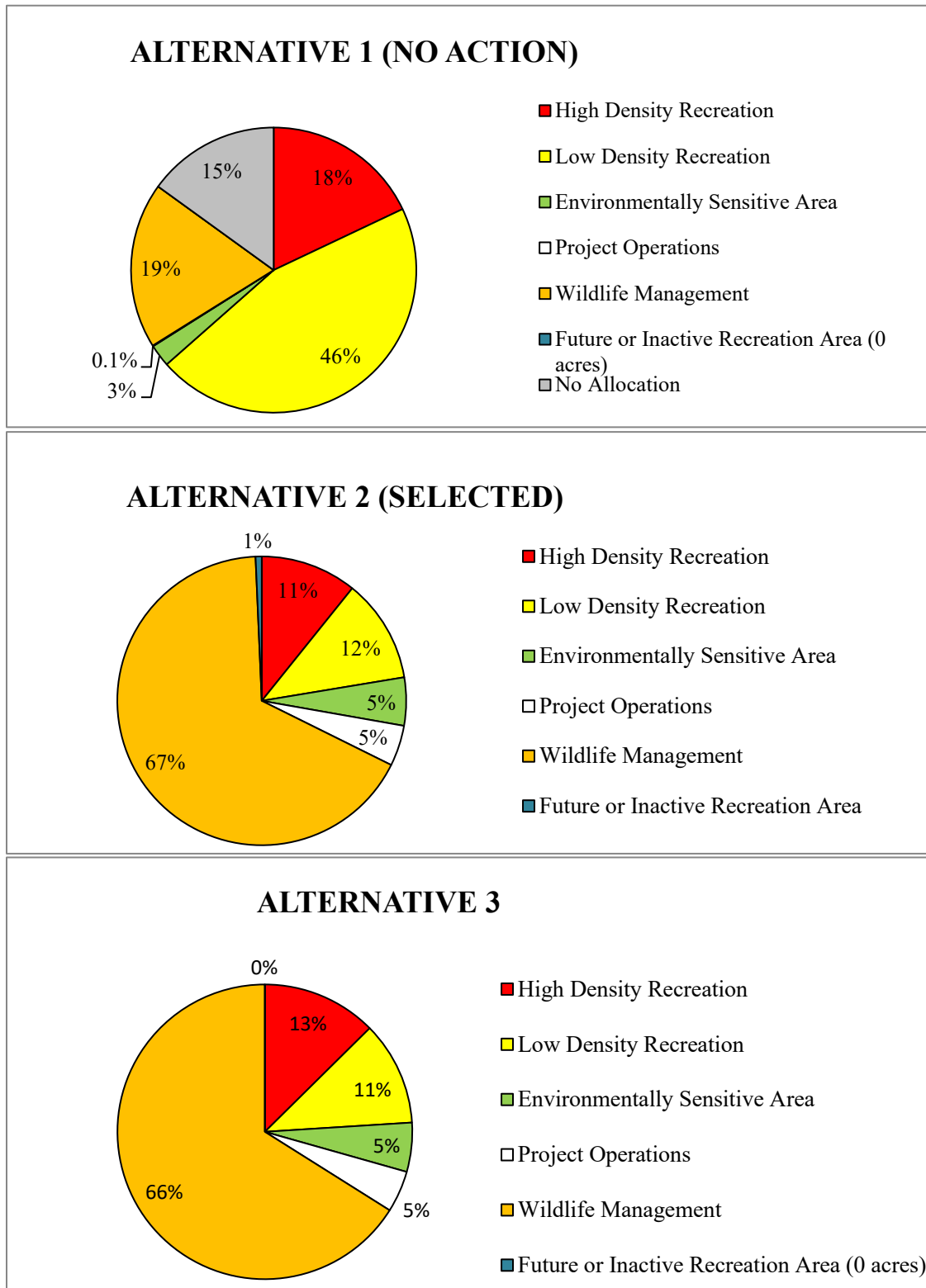


Table 3-2: Comparison of Alternatives and Change Compared to Alternative 1

Land Classification	Alternative 1 – No Action		Alternative 2 – Selected		Alternative 3	
	Acres	Percent	Acres	Percent	Acres	Percent
High Density	8,340.5	18	4,965.4	11	5,806.5	13
Low Density	21,141.6	46	5,418.0	12	5,324.9	11
Environmentally Sensitive	1,175.9	3	2,500.9	5	2,500.9	5
Project Operations	39.4	0.1	2,115.0	5	2,115.0	5
Wildlife Management	8,756.4	19	31,111.5	67	30,683.5	66
Future/Inactive Rec Areas	0	0	320.0	1	0	0
Not Allocated	6,976.8	15	0.0	0	0	0
<i>Change compared to Alternative 1</i>		<i>Decrease</i>	<i>Increase</i>		<i>No Change</i>	

3.1 Alternative 1 (No Action)

The No Action Alternative land classification, which is based on the 1976 and 1977 MKARNS Master Plans, does not accurately reflect the land use activities or resource management of the MKARNS. In addition, this alternative does not address resource management laws, policies, and regulations that were implemented after the 1976 and 1977 MKARNS Master Plans.

Operation and management of the MKARNS would continue as outlined in the current Master Plan Update, which designates 8,340.5 acres as High Density recreation and 21,141.6 acres as Low Density recreation. There are 1,175.9 acres classified as Environmentally Sensitive areas, 39.4 acres as Project Operations, 8,756.4 acres as Wildlife Management, and 6,976.8 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.). This alternative has the potential to allow for increased land and water-based impacts within the Low Density land classification as this classification constitutes 46% of available shoreline acreage.

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.

The Project Operations category includes those lands required for the locks and dams, switch yards, 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.

3.2 Alternative 2 (Selected)

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, Future or Inactive Recreation Areas, or Environmentally Sensitive Areas; and reclassifying lands that contain active shoreline use permits to Low Density.

Alternative 2 proposes 4,965.4 acres in High Density recreation, representing a 3,375.1 acre decrease from the No Action Alternative. Low Density lands total 5,418.0 acres, representing a reduction of 15,723.3 acres from the No Action Alternative. Most of the decreases in High Density and Low Density acreage result from reclassification to Wildlife Management Areas (increased from 8,756.4 acres to 31,111.5 acres). Environmentally Sensitive lands increased by 1,324.9 acres, totaling 2,500.9 acres. Project Operations increased from 39.4 acres to 2,115.0 acres, primarily from reclassifying unallocated lands bordering the 13 locks and dams in the river system. Future or Inactive Recreation Area lands total 320.0 acres in this alternative. Table 3-2 compares all three alternatives, while Table 3-3 compares the No Action Alternative to the Selected Alternative.

Table 3-3: Land Classification Changes from No Action to Alternative 2 (Selected)

<u>No Action</u> <u>(1976/1977 MP)</u>	<u>Converted to</u>	<u>Alternative 2</u>	<u>Acres</u>	<u>% from No</u> <u>Action</u>
No Allocation	Converted to	High Density Recreation	92	1%
		Low Density Recreation	142	2%
		Wildlife Management Areas	5,230	75%
		Environmentally Sensitive Areas	564	8%
		Project Operations	949	14%
		Future or Inactive Recreation Areas	-	0%
High Density Recreation	Converted to	High Density Recreation	4,690	56%
		Low Density Recreation	807	10%
		Wildlife Management Areas	2,005	24%
		Environmentally Sensitive Areas	237	3%
		Project Operations	282	3%
		Future or Inactive Recreation Areas	320	0%
Low Density Recreation	Converted to	High Density Recreation	170	1%
		Low Density Recreation	3,732	18%
		Wildlife Management Areas	15,248	72%
		Environmentally Sensitive Areas	1,216	6%
		Project Operations	775	4%
		Future or Inactive Recreation Areas	-	0%
Wildlife Management Areas	Converted to	High Density Recreation	11	0.1%
		Low Density Recreation	728	8%
		Wildlife Management Areas	7,926	91%
		Environmentally Sensitive Areas	44	0.5%
		Project Operations	47	0.5%
		Future or Inactive Recreation Areas	-	0%
Environmentally Sensitive Areas	Converted to	High Density Recreation	-	0%
		Low Density Recreation	1	0.1%
		Wildlife Management Areas	702	60%
		Environmentally Sensitive Areas	440	37%
		Project Operations	33	3%
		Future or Inactive Recreation Areas	0.1	0%
Project Operations	Converted to	High Density Recreation	2	5%
		Low Density Recreation	8	20%
		Wildlife Management Areas	-	0%
		Environmentally Sensitive Areas	-	0%
		Project Operations	30	75%
		Future or Inactive Recreation Areas	-	0%
Total			46,430.7 acres	

3.3 Alternative 3

Alternative 3 would reclassify most Low Density lands identified under Alternative 1 to Wildlife Management Areas. Justification for this reclassification includes the presence of active agricultural leases for habitat improvement and proposed Arkansas Game and Fish Commission special use areas and wildlife management areas.

This alternative would essentially protect the same land acreage as Alternative 2 (76% compared to 77%). The primary difference in Alternative 3 compared to Alternative 2 is a larger High Density Recreation land acreage (5,806.5 compared to 4,965.4 acres). Under Alternative 3, there would be a total of 2,500.9 acres classified as Environmentally Sensitive Areas. Wildlife Management lands increase from 8,756.4 acres in the No Action Alternative to 30,683.5 acres in this alternative. Table 3-2 compares all three alternatives, while Table 3-4 provides a comparison of the No Action Alternative to Alternative 3.

Table 3-4: Land Classification Changes from No Action to Alternative 3

<u>No Action</u> <u>(1976/1977 MP)</u>	<u>Converted to</u>	<u>Alternative 3</u>	<u>Acres</u>	<u>% from No</u> <u>Action</u>
No Allocation	Converted to	High Density Recreation	92	1%
		Low Density Recreation	176	3%
		Wildlife Management Areas	5,196	74%
		Environmentally Sensitive Areas	564	8%
		Project Operations	949	14%
		Future or Inactive Recreation Areas	-	0%
High Density Recreation	Converted to	High Density Recreation	5,523	66%
		Low Density Recreation	613	7%
		Wildlife Management Areas	1,685	20%
		Environmentally Sensitive Areas	237	3%
		Project Operations	282	3%
		Future or Inactive Recreation Areas	-	0%
Low Density Recreation	Converted to	High Density Recreation	178	1%
		Low Density Recreation	3,746	18%
		Wildlife Management Areas	15,226	72%
		Environmentally Sensitive Areas	1,216	6%
		Project Operations	775	4%
		Future or Inactive Recreation Areas	-	0%
Wildlife Management Areas	Converted to	High Density Recreation	11	0.1%
		Low Density Recreation	779	9%
		Wildlife Management Areas	7,875	90%
		Environmentally Sensitive Areas	44	0.5%
		Project Operations	47	0.5%
		Future or Inactive Recreation Areas	-	0%
Environmentally Sensitive Areas	Converted to	High Density Recreation	0.1	0%
		Low Density Recreation	1	0%
		Wildlife Management Areas	702	60%
		Environmentally Sensitive Areas	440	37%
		Project Operations	33	3%
		Future or Inactive Recreation Areas	-	0%
Project Operations	Converted to	High Density Recreation	2	5%
		Low Density Recreation	8	20%
		Wildlife Management Areas	-	0%
		Environmentally Sensitive Areas	-	0%
		Project Operations	30	75%
		Future or Inactive Recreation Areas	-	0%
Total			46,430.7 acres	

4. AFFECTED ENVIRONMENT AND CONSEQUENCES

This section describes the natural and human environments that exist at the project and the potential impacts of Alternative 1 (No Action Alternative), Alternative 2 (Selected Alternative), and Alternative 3, outlined in Section 3 of this document. Only those resources that have the potential to be affected by any of the alternatives are described, as per CEQ guidance (40 CFR § 1501.7 [3]). Some topics are limited in scope due to the lack of direct effect from Alternatives 2 and 3 on the resource or because that particular resource or subject matter topic is not located, or is not a factor, within the project area.

Impacts (consequence or effect) can be either beneficial or adverse and can be either directly related to the action or indirectly caused by the action. Direct effects are caused by the action and occur at the same time and place (40 CFR § 1508.8[a]). Indirect effects are caused by the action and are later in time or further removed in distance but are still reasonably foreseeable (40 CFR § 1508.8[b]). As discussed in this section, the alternatives may create temporary (less than 1 year), short-term (up to 3 years), long-term (3 to 10 years) or permanent effects.

In considering whether the effects of the Proposed Alternative and Alternative 3 are significant, agencies shall analyze the potentially affected environment and degree of the effects of the action (40 CFR 1501.3). Impacts on each resource can vary in degree or magnitude from a slightly noticeable change to a total change in the environment. For this analysis, the intensity of impacts would be classified as negligible, minor, moderate, or major. The intensity thresholds are defined as follows:

- Negligible: A resource would not be affected, or the effects would be at or below the level of detection, and changes would not be of any measurable or perceptible consequence.
- Minor: Effects on a resource would be detectable, although the effects would be localized, small, and of little consequence to the sustainability of the resource. Mitigation measures, if needed to offset adverse effects, would be simple and achievable.
- Moderate: Effects on a resource would be readily detectable, long-term, localized, and measurable. Mitigation measures, if needed to offset adverse effects, would be extensive and likely achievable.
- Major: Effects on a resource would be obvious and long-term and would have substantial consequences on a regional scale. Mitigation measures to offset adverse effects would be required and extensive, and success of the mitigation measures would not be guaranteed.

In considering the potentially affected environment, agencies should consider, as appropriate to the specific action, the affected area (national, regional, or local) and its resources, such as listed species and designated critical habitat under the Endangered Species Act. Significance varies with the setting of the Selected Alternative, and significance is dependent on the extent of the affected area. In considering the degree of the effects, agencies should consider the following, as appropriate to the specific action:

- Both short- and long-term effects.

- Both beneficial and adverse effects.
- Effects on public health and safety.
- Effects that would violate Federal, State, Tribal, or local law protecting the environment.

4.1 Project Setting

The MKARNS project, for the purposes of updating the Master Plan, begins at the Arkansas/Oklahoma State line near Fort Smith at River Mile 308.7. It is bordered on the north by the Boston Mountains Ecoregion and on the south by the Ouachita Mountains Ecoregion. The riparian corridor of the Arkansas River lies within the Arkansas River Valley Ecoregion. As the river enters central Arkansas, it is bordered by the Mississippi Alluvial Plain Ecoregion to its confluence with the Mississippi River in southeast Arkansas. A more detailed description of the project location and area is provided in the following sub-sections.

4.2 Climate

Climate within the MKARNS watershed is temperate, with summer extremes lasting for longer periods throughout central and southeast Arkansas, and winter temperatures being more influential in the zone's western reaches at higher elevations of the river corridor. Extremes may vary from lows around 0°F in the winter months to highs above 100°F occurring from western Arkansas to central portions of the state during the summer months. Extreme temperatures may occur for short periods of time at any location within the state. Heavy rainfall events are common. Average annual rainfall in the western portion of the state is around 46 inches, with slight increases in the central and southeast portions varying from 48 to 50 inches. Monthly rainfall varies from 2.5 inches in the winter months to about 5 inches in the spring. Snowfall each year averages from 3 to 6 inches, with heavier amounts occurring in the western portion of the state. Snowpacks 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 summarized information regarding climate change and its potential effects in regional assessments (U.S. Global, 2009). 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 the MKARNS, the Master Plan and associated documents (i.e., Operations Management Plan and Shoreline Management Plan) would be reviewed and revised, if necessary.

4.2.1 Alternative 1 (No Action)

Under the No Action Alternative, there is potential for negligible, long-term adverse impacts to the climate along the MKARNS. This alternative classifies 64% of the total land as either High or Low density lands and 15% as unallocated lands, which could all be potentially developed. If development occurs, a negative impact on climate along the MKARNS is possible due to potential vegetation removal resulting from development. Modifying vegetation near the shoreline would allow more sunlight penetration, resulting in greater temperature fluctuations where woody vegetation is removed. 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. Further development could also potentially increase greenhouse gas emissions during construction and post construction from higher visitation rates. Increased emissions can cause temperature increases, which in turn have an adverse impact on the project area.

4.2.2 Alternative 2 (Selected)

Alternative 2 is more protective than the No Action Alternative in terms of potential impacts on air and water temperature modification, likely resulting in negligible, indirect beneficial impacts over time. A conversion of both High Density and Low Density lands to Environmentally Sensitive and Wildlife Management would reduce the potential for development, which reduces the potential adverse impact on climate due to vegetation removal and increased greenhouse gas emissions. This reclassification would provide a better buffering effect which would result in stormwater velocity reduction and act as a filtering mechanism. Erosion and sediment deposition would be reduced in the impoundments of the river.

4.2.3 Alternative 3

Alternative 3 also poses fewer threats to the climate compared to the No Action Alternative, and there is potential for negligible, indirect beneficial impacts. In this alternative, much of the land currently classified as High or Low Density is converted to Environmentally Sensitive or Wildlife Management. Alternative 3 allocates 5,806.5 acres as High Density, compared to the Selected Alternative that allocates 4,965.4 acres. This reallocation reduces the potential development opportunities, although not as much as the Selected Alternative, by protecting preexisting natural vegetation. Vegetated shorelines result in reduced ground temperatures due to shade, reduced erosion potential, cooler rainfall runoff, and a reduction in water temperature. Lessening the possibility of further development also reduces potential greenhouse gas emissions.

4.3 Topography, Geology, and Soils

The MKARNS in western Arkansas is bordered on the north by the Boston Mountains Ecoregion and by the Ouachita Mountains Ecoregion on the south. The Arkansas River Valley Ecoregion encompasses the river corridor and its riparian area eastward through central Arkansas. As the river enters Faulkner and Perry Counties, then northwest Pulaski County, it dissects the Fourche Mountains portion of the Ouachita Mountains Ecoregion. As the river passes through Little Rock in the southeast portion of Pulaski County, it flows through a narrow strip of the Arkansas/Ouachita River Holocene Meander Belts portion of the Mississippi Alluvial Plain Ecoregion all the way to its confluence with the Mississippi River in the southeastern portion of the state. The Mississippi Alluvial Plain is a broad, relatively flat floodplain with deep alluvial soils which generally have poor drainage. The flat, deep soils and poor drainage allow for conditions that are suitable for wetlands; however, most of the natural wetlands have been cleared for cultivation. Figures 4.1 and 4.2 depict the ecoregions bordering the Arkansas River from the western state line to the confluence with the Mississippi River.

The geologic formations bordering the MKARNS are depicted by a series of Lock and Dam impoundment (Pool) maps, beginning with the Montgomery Point Lock and Dam, and proceeding upstream (Pools 1-13). These maps are included in Appendix E of the Master Plan.

The landscape adjacent to the Arkansas River varies depending on the portion of the Arkansas Valley Ecoregion it dissects. The highest elevation in the state is in this ecoregion, Magazine Mountain (2753 feet), in the Scattered High Ridges and Mountains sub-ecoregion located south of the Arkansas River. The Arkansas River Floodplain sub-ecoregion, which is located near Fort Smith, is veneered with Holocene alluvium and includes natural levees, meander scars, oxbow lakes, point bars, swales, and backswamps. The soil mosaic includes mollisols, entisols, alfisols, and inceptisols. As the river flows through Franklin County toward the Ozark pool, it is bordered on the north by the Arkansas Valley Hills sub-ecoregion, which is underlain by Pennsylvanian sandstone and shale. Ultisols are common and support a potential natural vegetation of oak-hickory-pine forest. The area south of the river is bordered by the Arkansas Valley Plains sub-ecoregion. Here, the topography is mostly undulating slopes and valleys, with scattered hills and ridges. Nutrient rich soils support the primary, current land uses of pastureland and hay production. The river then dissects another segment of Arkansas River Floodplain, prior to widening into the Lake Dardanelle pool. Lake Dardanelle is bordered primarily by the Arkansas Valley Plains down through Russellville in Pope County. From this point, the river primarily dissects a narrow band of the Arkansas River Floodplain to Little Rock in central Arkansas. From Little Rock to its confluence with the Mississippi River, the Arkansas River is primarily bordered by the Arkansas/Ouachita River Backswamps sub-ecoregion of the Mississippi Alluvial Plain Ecoregion. This area of the state is a flat to nearly flat floodplain containing the meander belts of the present and past courses of the lower Arkansas and Ouachita rivers. Point bars, natural levees, swales, abandoned channels marked by meander scars, and oxbow lakes are common and characteristic. Soils on natural levees are relatively coarse-textured, well drained, and higher than those on levee back slopes and point bars. Woody vegetation of bottomland forests consists of cypress, water tupelo, overcup oak and water hickory. Cropland is abundant in this region of the state, consisting mainly of soybeans, rice, and wheat.

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 river flow conditions which increase wave action and inundation of adjacent floodplains.

The Farmland Protection Policy Act of 1981 (Public Law 97-98), as amended, is intended to minimize the impact Federal programs have on the unnecessary and irreversible conversion of farmland to nonagricultural uses so as to not impair the productive capacity of American agriculture. Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is also available for these uses. Unique farmland is land other than prime farmland that is used for the production of specific high-value food and fiber crops. It has the special combination of soil quality, location, growing season, and moisture supply needed to economically produce sustained high-quality and/or high yields of a specific crop. Using the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service Web Soil Survey tool, it was determined that 17% of the MKARNS lands are classified as prime farmland, 15% are farmland of statewide importance, and 65% are not prime farmland. The remaining 3% qualify as prime farmland if protected from flooding or not frequently flooded during the growing season, or if drained and either protected

form flooding or not frequently flooded during the growing season. While protected farmland classifications exist within the study area, the MKARNS Master Plan Revision is not expected to affect agricultural productivity as construction and conversion of pervious lands to impervious surfaces will not occur in any of the alternatives. Current agricultural leases will remain and no alternative will restrict the future creation of additional agricultural leases.

Figure 4-1: Upper MKARNS Ecoregions

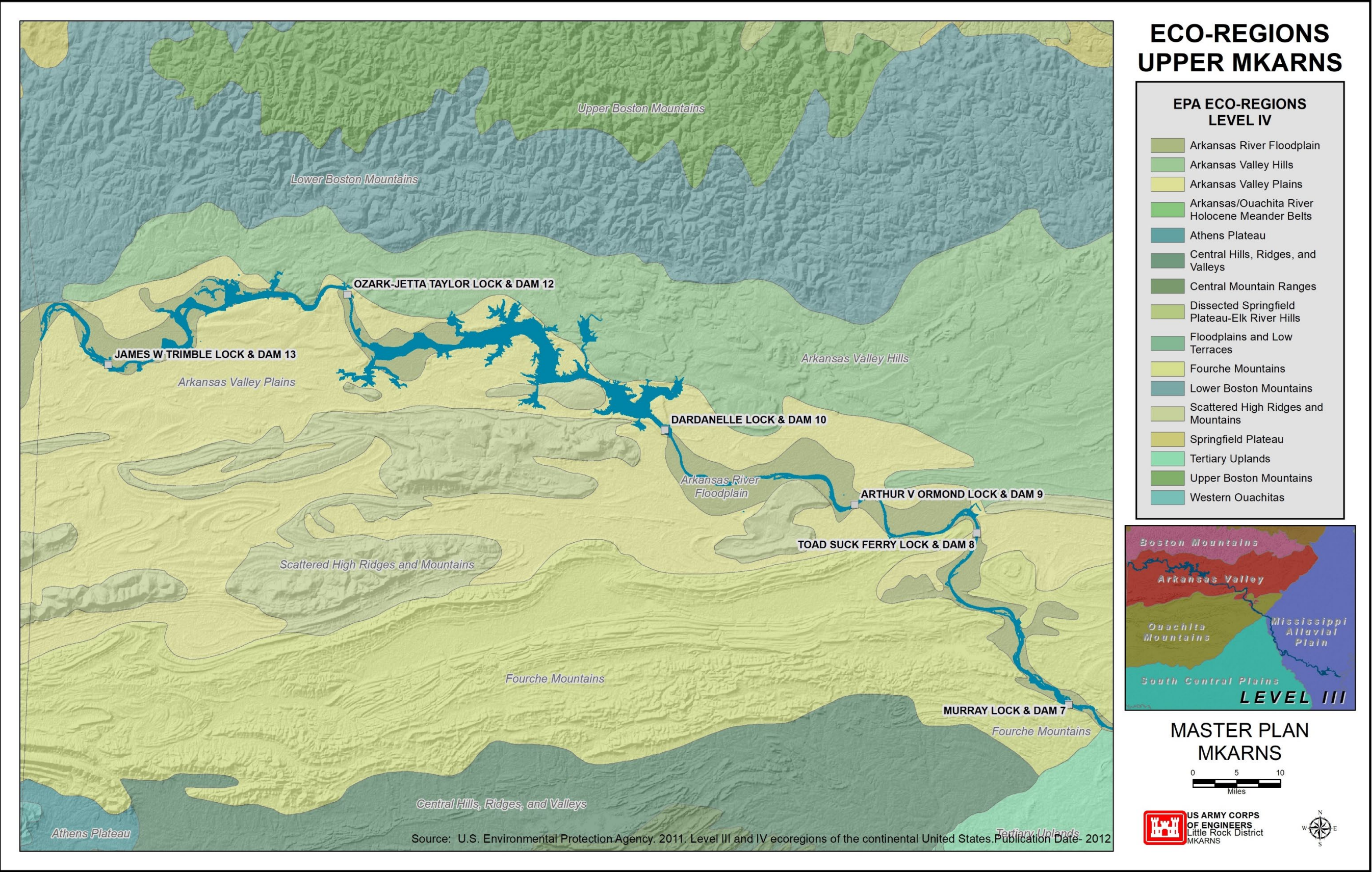


Figure 4-2: Lower MKARNS Ecoregions



4.3.1 Alternative 1 (No Action)

The No Action Alternative presents a potential for negligible, long-term adverse impacts to topography, geology, and soils. Under the No Action Alternative, soil erosion would persist if further development occurs. Approximately 64% of available acreage (29,482 acres) along the MKARNS is currently classified as High and Low Density Recreation (18% and 46%, respectively). Unallocated lands provide an additional 6,076.8 acres with a development potential. High Density Recreation 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 Recreation 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.

4.3.2 Alternative 2 (Selected)

The Selected Alternative would result little to no change in impacts on the existing topography, geology, and soil conditions as it reflects current usage patterns. High Density Recreation acreage would be reduced from 8,340.5 acres in the No Action Alternative to 4,965.4 acres, and the Low Density Recreation acreage has been reduced from 21,141.6 to 5,418.0 acres. These lands, along with the unallocated land acreage, would be reclassified primarily to Environmentally Sensitive Areas and Wildlife Management lands, which provide a vegetated river buffer area and limit further development. Maintaining this vegetation helps to reduce storm water velocity and acts as a filtering mechanism, reducing erosion and sediment deposition in the river.

4.3.3 Alternative 3

Under Alternative 3, negligible, long-term adverse impacts would be expected. Alternative 3 would decrease High Density lands by 2,534.0 acres and Low Density Recreation by 15,816.4 acres as compared to the No Action Alternative. These lands, along with the unallocated land acreage, would be reclassified primarily as Environmentally Sensitive Areas and Wildlife Management lands. This preservation of the natural vegetation would have a positive impact on the topography, geology, and soils compared to the No Action Alternative, but allows for more development and therefore potential erosion and sedimentation than the Selected Alternative. The combination of High Density and Low Density Recreation lands would represent only 24% of available acreage along the MKARNS. With Environmentally Sensitive Areas and Wildlife Management lands comprising a vast majority of the shoreline acreage, minimal impacts from erosion and sedimentation would result from the implementation of this alternative.

4.4 Water Resources

4.4.1 Hydrology and Groundwater

The Arkansas River at the confluence of the Mississippi River has a drainage area of 160,576

miles. Prior to entering Arkansas, the river flows through Colorado, Kansas, and Oklahoma, and receives runoff waters from New Mexico, Colorado, Kansas, Texas, and Oklahoma. The drainage area of the river within the state encompasses 10,409 square miles. Significant tributaries entering the Arkansas River within the state from an upstream to downstream direction include Lee Creek, Mulberry River, Piney Creek, Point Remove Creek, Six Mile Creek, Petit Jean River, Fourche LaFave River, Cadron Creek, Maumelle River, Little Maumelle River, Fourche Creek, Plum Bayou, Little Bayou Meto, and Big Bayou Meto. Major tributaries, based on size of the drainage area, entering the MKARNS include Lee Creek (451 square mile watershed) entering the river at Navigation Mile (NM) 302.4; Petit Jean River (1,083 sq. mi.) entering at NM 187; Fourche LaFave River (1,116 sq. mi.) entering at NM 146.5; and Big Bayou Meto (998 sq. mi.) entering the MKARNS at NM 31.2.

Surface water of the MKARNS is regulated by upstream Oklahoma Reservoirs and the series of Locks and Dams in the system. Available groundwater along the MKARNS study area also comes largely from alluvial aquifers of the Arkansas and the Mississippi River. These high yielding aquifers consist of sand, gravel, silt, and clay. Highest water storage is found in the Mississippi River Alluvial Plain Section physiographic region from Little Rock to the confluence of the MKARNS with the Mississippi River. The Ozark Plateau Province and the Ouachita Mountain Province Aquifer systems in northwestern Arkansas also provide groundwater resources along the study area. The alluvium aquifer adjacent to the MKARNS is currently providing domestic water supply for individuals and communities down to the Russellville area of the state.

4.4.1.1 Alternative 1 (No Action)

The hydrology and groundwater components of the MKARNS could change from the existing condition due to the implementation of the No Action Alternative. The potential for additional development under this alternative within the High Density, Low Density, and Unallocated classifications could create minor, long-term adverse impacts by reducing percolation through the soil layers due to ground cover removal and construction of impervious substrate, thereby potentially increasing storm water velocity, reducing replenishment of the alluvial aquifer, and increasing the risk of flooding.

4.4.1.2 Alternative 2 (Selected)

The Selected Alternative would allow land management and land uses to be compatible with the goals of water resources stewardship. Under this alternative, the net conversion of High and Low Density Recreation allocations to Environmentally Sensitive Areas and Wildlife Management will limit future intensive development, thus reducing the potential for erosion and sedimentation. Natural vegetation communities act as buffers to trap runoff, thus potentially reducing sedimentation. By maintaining this vegetation, rainfall absorption would be enhanced, and runoff velocity would be slowed compared to developed areas. Potential beneficial impacts would likely be negligible, and no direct impacts to groundwater are anticipated with the implementation of the Selected Alternative.

4.4.1.3 Alternative 3

Alternative 3 would have an effect similar to the Selected Alternative on hydrology and groundwater components of the MKARNS, with no direct or indirect impacts to groundwater

expected. The High and Low Density Recreation classifications comprise 24% of the land in this alternative, with the remainder dominated by Environmentally Sensitive Areas and Wildlife Management lands, which could negligibly enhance hydrology and groundwater conditions and function.

4.4.2 Water Quality

Historically, the Arkansas River was a ‘polluted’ stream, even prior to city and industrial development along its banks. This ‘pollution’ was in the form of natural pollution such as silt, sediment, and dissolved minerals from upstream watershed runoff containing varied sources of contaminants. The completion of the MKARNS has led to great improvements in water quality primarily through a reduction in salt and sediment contents due to the settling out of these substances in the pools formed by the series of dams in the navigation system.

Overall surface water quality in the MKARNS area is good, and the river has water quality suitable for primary and secondary contact; fisheries; and domestic, industrial, and agricultural water supply, as designated by the Arkansas Department of Energy and Environment (ADEE). The Arkansas River water quality standards are determined by ADEE, based on watershed size and ecoregion characteristics that influence overall water quality. Specific water quality standards for the river and all other waters of the state are outlined in Arkansas Department of Energy and Environment, Environmental Quality (ADEQ) Regulation Number 2, titled Regulation Establishing Water Quality Standards for Surface Waters of the State of Arkansas. Water quality standards are designed to enhance the quality, value, and beneficial uses of the water resources of the State of Arkansas; aid in the prevention, control, and abatement of water pollution; provide for the protection and propagation of fish and wildlife; and provide for recreation in and on the water. To maintain water quality, ADEE establishes permit limitations on point source discharges of municipal and industrial wastes into the state surface water. Compliance is attained by having a network of ambient water quality monitoring stations in all regions of the state, which are sampled on a monthly schedule. There are 11 ambient water quality monitoring stations on the Arkansas River, with locations above and below Fort Smith, Ozark, Russellville, Morrilton, Conway, Little Rock, David D. Terry Lock and Dam, Colonel Charles D. Maynard Lock and Dam # 5, Pine Bluff, and Post Canal.

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 to not to meet standards as a result of point source dischargers or non- point source run-off. Subsequent on the 303(d) list, the statute requires that the states develop and set the Total Maximum Daily Load (TMDL) for listed water bodies 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.

4.4.2.1 Alternative 1 (No Action)

Water level fluctuations, associated with power production and flood water management procedures, result in change in the environment along the pools of the system. Turbidity from heavy rainfall has a temporary, adverse effect on the MKARNS. During these periods of increased runoff, urban areas and other parts of the terrain, especially those that have had protective vegetation removed, contribute silt and other suspended particles to the river. While

implementation of the No Action Alternative is relatively independent of the existing watershed drainage on the river water quality, potential continued development along the MKARNS shoreline would exacerbate water quality issues due to potential increased erosion, localized increases in turbidity and increased sedimentation in the river following storm events. Under the No Action Alternative, High Density Recreation land classification would be 8,340.5 acres (18% of total available area), Low Density Recreation lands would be 21,141.6 acres (46%), Environmentally Sensitive Areas include 1,175.9 acres (3%), Wildlife Management lands total 8,756.4 acres (19%), while 6,976.8 acres have no current classification. Based on the current classification, the potential exists for further ground cover alteration due to potential increased development and subsequent vegetation removal and mowing activities. This could result in direct negligible adverse impacts to water quality due to increased storm water velocity, scour, and sedimentation.

4.4.2.2 Alternative 2 (Selected)

Implementation of the Selected Alternative may result in minor, long-term beneficial impacts to water quality due to a reduction in both High Density and Low Density Recreation acreage by 3,375.1 acres and 15,723.3 acres respectively as compared to the No Action Alternative. There is an increase in both Environmentally Sensitive Area acreage, from 1,179.5 acres to 2,500.9 acres, and Wildlife Management acreage, from 8,756.4 acres to 31,111.5 acres. These reclassifications would serve to limit development on these lands, thereby reducing impacts to ground disturbance and subsequent increased erosion. These factors would reduce erosion, sedimentation, and pollutants scoured from reduced impervious surfaces, with additional benefits of retention of more shoreline vegetation, increased water clarity, and cooler water temperature conditions due to the decrease of turbidity and sediment deposition.

4.4.2.3 Alternative 3

Implementation of Alternative 3 would reduce Low Density Recreation acreage by 15,815.4 (34%) and High Density Recreation acreage by 2,534.0 (5%) compared to the No Action Alternative. Including the 15% of unallocated lands in the No Action Alternative, this alternative represents a 54% reduction in potentially developable acreage, which would have a positive effect on water quality due to the rainwater filtering benefits from the shoreline vegetation buffer associated with Environmentally Sensitive Areas and Wildlife Management lands. These land classifications would represent 71% of the acreage under this alternative. Similar to the Selected Alternative, these land reclassifications would serve to limit development on these lands, thereby reducing potential impacts from ground disturbance and subsequent increased erosion. Alternative 3 would have minor, long-term beneficial impacts to water quality.

4.4.3 Fish Species and Habitat

The construction of the Lock and Dam system during the development of the MKARNS changed the composition of the fish populations by converting a free-flowing river habitat to a series of impoundments formed by each lock and dam. Pre-MKARNS construction, fish composition of the Arkansas River was a function of available habitat and quality. Prior to construction of the MKARNS, the Arkansas River was reported to fluctuate from very low flows to very high flows. During periods of low flow, sandbars occupied most of the riverbed. High-flow periods flooded riverbanks and adjacent low-lying areas, exposing new habitat and providing additional food

sources for aquatic species. High flows during pre-MKARNS construction were also important in maintaining the river's hydrological connection to various oxbow lakes. After the completion of the MKARNS's impoundments, river flows stabilized and formed large pools, which increased surface water, deep water, and backwater acreage. Consequently, the aquatic habitats of the system were altered. These changes increased available habitat for some species while decreasing habitat for others. Habitat declination is potentially responsible for the absence of four species in current collections including the plains minnow, speckled chub, Arkansas River shiner, and suckermouth minnow. Commercial fishing for catfishes and buffalo (suckers) has been an important industry along the river since the completion of the MKARNS. The diverse aquatic environments throughout the MKARNS currently provide productive habitat for a variety of fishes.

The modification of the Arkansas River to establish the MKARNS's series of Locks and Dams resulted in an increase in fisheries habitat and a diverse species composition. Arkansas Game and Fish Commission (AGFC) is the primary agency responsible in regulating and managing the fisheries, and through these efforts multiple species of fish are well-established. Project waters provide habitat for largemouth bass (*Micropterus salmoides*), white bass (*Morone chrysops*), striped bass (*Morone saxatilis*), crappie (*Pomoxis*), blue catfish (*Ictalurus furcatus*), channel catfish (*Ictalurus punctatus*), flathead catfish (*Pylodictis olivaris*), green sunfish (*Lepomis cyanellus*), redear sunfish (*Lepomis microlophus*), other sunfish species, bluegill (*Lepomis macrochirus*), sauger (*Sander canadensis*), carp (*Cyprinidae*), buffalo (*Ictiobus*), gar (*Lepisosteidae*), drum (*Sciaenidae*), and paddlefish (*Polyodontidae*). Paddlefish populations had decreased over past years primarily due to fishing for caviar production; however, AGFC has since implemented seasonal and commercial licensing regulations to facilitate population stability. Non-game species include a variety of minnows, shad, and silversides, as well as several mussel species. In 1990, the pallid sturgeon was listed as an endangered species for the lower White and Arkansas Rivers due to their proximity to the Mississippi River. The U.S. Fish and Wildlife Service (USFWS) considers this area to be a high priority recovery (management) area for this species. During 2011-2012, three radio-tagged pallid sturgeon were documented using the lower 40 river miles of the Arkansas River from the confluence with the Mississippi River upstream to the Wilbur D. Mills Dam (Dam 2). These individuals were recorded during late winter through spring (Kuntz 2012, and Kuntz and Schramm 2012). Personal communication with Dr. Hal Schramm (U.S. Geological Survey) and Paul Hartsfield (USFWS) indicated that presence of the pallid sturgeon in the lower Arkansas River was incidental and likely limited to high water events on the Mississippi River when the fish seek refuge from high flows.

AGFC monitors fish populations through electro-shocking, netting, and observing commercial fishermen. These sampling techniques aid in determining age composition, species densities, and health characteristics. In the past the AGFC operated a 100-acre nursery pond near Knoxville, Arkansas that was constructed on Lake Dardanelle. Potential plans for the future of this area may include consideration for other restricted fishing and hunting purposes.

Numerous bass tournaments are held on the MKARNS each year. The Annual Big Bass Bonanza is the largest yearly bass tournament, ranging across the state from Fort Smith to Dumas, Arkansas. While smaller community tournaments may be found at nearly any boat ramp

on the lake throughout the week, Arkansas State Parks has constructed a professional-quality tournament area to host regional and national tournaments. It consists of a multi-lane launching ramp, multiple parking areas, and a weigh-in facility at Lake Dardanelle State Park, Russellville area. The facility was greatly needed, as no local State Park or Corps facility could efficiently handle large bass tournaments that are becoming increasingly popular on the project.

4.4.3.1 Alternative 1 (No Action)

The fisheries on the MKARNS may have potential negligible, adverse impacts from the implementation of the No Action alternative, which has 79% of available shoreline acreage classified as High and Low Density and unallocated lands. Implementation of the No Action alternative would allow potential development around much of the shoreline. Development often results in vegetation removal down to the 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 bays feeding the river.

4.4.3.2 Alternative 2 (Selected)

Implementation of the Selected Alternative would have a minor beneficial effect on the MKARNS fishery resource as compared to the No Action Alternative. There is a 15,723.3 acre reduction in Low Density Recreation land classification (-34%), a 3,375.1 acre reduction in High Density Recreation lands (-7%), and a 48% increase in Wildlife Management lands from 8,756.4 acres to 31,111.5 acres, which results in 67% of available acreage classified as Wildlife Management lands. The increase in lands classified in this area would serve as additional protection for riverside 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 pools of the MKARNS.

4.4.3.3 Alternative 3

Similar to the Selected Alternative, Alternative 3 potentially results in minor beneficial impacts to the MKARNS fishery resources. A comparison with the No Action Alternative shows a reduction of 15,816.4 acres of Low Density Recreation lands. In this alternative, 71% of the available acreage would be classified as Environmentally Sensitive Areas and Wildlife Management lands, preserving a majority of the natural vegetation along the shoreline and therefore providing cover for fish while reducing storm flow velocity, erosion scour, and sedimentation.

4.5 Terrestrial Resources

4.5.1 Wildlife

Wildlife management objectives are directed towards providing optimum recreational use by both the consumptive and non-consumptive users, while maintaining natural resources, and are accomplished in a collaborative effort with the AGFC through the designation of Lake Dardanelle and Ozark Lake public lands such as Lake Dardanelle and Ozark Lake Wildlife Management Areas (WMA). All fee land encompassing Lake Dardanelle and Ozark Lake is

under a license agreement with AGFC to create and manage these two WMAs. Most of the fee land in Pools 0-9 and 13 is contained in the recreation areas and around the damsites. The management for wildlife in these small, scattered areas is restricted to habitat improvement practices which will invite small mammals, birds, and both game and non-game species. Some management applications include planting native tree species such as mast producing oak and hickory species, timber stand improvement methods, and mowing to maintain openings for wildlife. Project personnel are responsible for management, wildlife habitat improvement, and administration of the agricultural and grazing lease program for wildlife enhancement on fee owned land.

Wildlife habitat management will be applied to accommodate a diversity of wildlife. Habitats which are considered vital, as well as threatened or endangered species of plants and animals on the MKARNS, will be protected. From Pool 3 through Pool 6, multiple perennial plant species have been planted in low volume areas. The primary species managed on the project include the white-tailed deer (*Odocoileus virginianus*), gray and fox squirrels (*Sciurus carolinensis*, *Sciurus niger*), gray and red fox (*Urocyon cinereoargenteus*, *Vulpes vulpes*), cottontail and swamp rabbit (*Sylvilagus floridanus*, *Sylvilagus aquaticus*), interior least tern (*Sterna antillarum athalassos*), bald eagle (*Haliaeetus leucocephalus*), eastern wild turkey (*Meleagris gallopavo*), bobwhite quail (*Colinus virginianus*), and a variety of migratory waterfowl and non-game bird species. White-tailed deer, small game, and waterfowl are the primary species hunted on the MKARNS. There has been an increased emphasis on small game management by the AGFC on Lake Dardanelle and Ozark Lake. Several open grassland areas along these two lakes have been managed for small game species and are utilized for hunting.

Some species, such as beaver (*Castor canadensis*) and resident populations of Canada geese (*Branta canadensis*), have become overpopulated in certain areas and must be managed to control their populations. Management efforts include trapping beavers in areas where they have blocked drainage areas and damaged desirable trees. Canada geese populations have contributed to sanitary and water quality problems on the beach and recreation areas around the MKARNS. Black vultures (*Coragyps atratus*) have also become a nuisance to the public, causing damage to vehicles and USACE infrastructure. In some instances, the USDA has provided humane measures to reduce flock growth and stabilize local geese populations, as well as measures to increase deterrence or reduce the abundance of the black vulture populations.

Many avian species migrate during peak times along the Arkansas River. White pelicans (*Pelecanus erythrorhynchos*), cormorants (*Phalacrocoracidae*), gulls (*Larinae*), and other species migrate during peak winter months. The population density for bald eagles is high at the MKARNS, and these birds can be observed year-round along the project lands and waters. Common migratory waterfowl species visiting the MKARNS include mallard (*Anas platyrhynchos*), pintail (*Anas acuta*), American wigeon (*Anas americana*), gadwall (*Mareca strepera*), shoveler (*Spatula clypeata*), scaup (*Aythya affinis*, *Aythya marila*), ring-neck (*Aythya collaris*), wood duck (*Aix sponsa*), teal (*Anas crecca*), common goldeneye (*Bucephala clangula*), merganser (*Lophodytes cucullatus*), bufflehead (*Bucephala albeola*), and other duck species. Waterfowl hunters, both in and out of state, travel to hunt waterfowl along project land and waters. A positive economic impact is created from waterfowl hunting in the lower pools, where habitat and agriculture practices assist the attraction of migrating waterfowl. Waterfowl

management areas on Lake Dardanelle and Ozark Lake also assist in attracting waterfowl to allow for public hunting access or to provide rest areas for the birds. From the 1990s through the early 2000s, six waterfowl areas were constructed under partnership agreements with the AGFC, Natural Resource Conservation Service, Ducks Unlimited, and the USACE. Three of these areas serve as waterfowl rest areas and three allow for waterfowl hunting. These areas are operated and managed by the AGFC under partnership with USACE. Five waterfowl areas are located on Lake Dardanelle, including Johnson County Waterfowl Rest Area, Bob Young/Carbon City Waterfowl Rest Area, Horsehead Waterfowl Rest Area, Potters Pothole Waterfowl Unit, and McKennon Bottoms Waterfowl Unit. Dyer Lake Waterfowl Unit is located on Ozark Lake in Pool 12.

4.5.2 Invasive 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 MKARNS Project is not protected from the spread of invasive species. Locally, project personnel work with partners including the AGFC, the University of Arkansas Extension Services, and the USDA to prevent the spread of some of the Arkansas River's most unwanted species. Invasive species include feral hogs (*Sus scrofa*), zebra mussels (*Dreissena polymorpha*), sericea lespedeza (*Lespedeza cuneata*), gypsy moth (*Lymantria dispar*), emerald ash borer (*Agrilus planipennis*), alligator weed (*Alternanthera philoxeroides*), water hyacinth (*Eichornia crassipes*), coontail (*Ceratophyllum demersum*), and multiple other invasive trees and shrubs causing a decline in native vegetation populations and a shift in species diversity. Another recent invasive, black algae (*Lyngbya wollei*), can cause skin irritation to swimmers.

Efforts are being implemented to assist in the control of invasive species on the MKARNS. The USACE Engineering Research and Development Center (ERDC), universities, and office staff are conducting research projects utilizing biological methods to control alligator weed, which have been deployed on several pools along the MKARNS. Each year, traps are deployed for gypsy moth and emerald ash borer on project lands utilizing office staff and state personnel to monitor any infestations of these species in cooperation with the Arkansas State Plant Board. In 2021, a Memorandum of Understanding was signed with the USDA Animal and Plant Health Inspection Service to allow for aerial hunting operations and trapping on Lake Dardanelle and Ozark Lake to assist in controlling the feral swine population. AGFC also partners to trap feral swine in these two Wildlife Management Areas.

4.5.2.1 Alternative 1 (No Action)

Under the No Action Alternative, lands would be classified into High Density Recreation

(8,340.5 acres, representing 18% of total available area), Low Density Recreation (21,141.5 acres, 46%), Environmentally Sensitive Areas (1,175.9 acres, 3%), and Wildlife Management (8,756.4 acres, 19%), while 6,976.8 acres have no current classification. Unclassified lands are potentially developable, resulting in 79% of the acreage subject to possible increased or new development. If further development occurs, the potential exists for vegetation removal and mowing activities. This would result in minor adverse impacts to wildlife due to potential removal of trees and understory vegetation (with the highest potential in the Low Density Recreation lands), thus altering habitat, food sources, and migratory patterns of insects, birds, and mammal species.

4.5.2.2 Alternative 2 (Selected)

Implementation of the Selected Alternative would have a minor beneficial effect on terrestrial resources, when compared to the No Action alternative. There would be a 15,723.3 acre reduction in Low Density Recreation land classification (to 5,418.0 acres), a 3,375.1 acre reduction in High Density Recreation lands (to 4,965.4), a 3% increase in Environmentally Sensitive Areas classification (2,500.9 total acres) and an increase in Wildlife Management lands from 8,756.4 acres to 31,111.5 acres. This would result in 67% of available acreage classified as Wildlife Management lands. This increase would provide additional protection for riverside 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 multiple wildlife species.

4.5.2.3 Alternative 3

Similar to the Selected Alternative, Alternative 3 has potential positive effects on the terrestrial resources and land use patterns of the MKARNS as compared to the No Action Alternative. A proposed decrease in Low Density Recreation lands of 15,816.4 acres would result in 11% of available acreage classified as Low Density Recreation, which would potentially be available for development. Recreation Most of the natural vegetation would likely remain in this alternative. High Density Recreation lands are reduced by 2,534.0 acres from the original 8,340.5 acres in the No Action Alternative. With 71% of the land classified as Environmentally Sensitive Areas and Wildlife Management, suitable habitat for wildlife would still be abundant under this alternative.

4.5.3 Vegetation

Generally, most lands along the Arkansas River are privately owned, therefore land-use planning on those acres is outside the jurisdiction of the Federal Government. Most fee owned property is located around Lake Dardanelle and Ozark Lake. Lower land elevations along the Arkansas River are generally used for agriculture, and the upper elevations are usually forested. Over 75 species of trees have been reported on the MKARNS, including at least 14 oak species. Dominant evergreens are eastern red cedar (*Juniperus virginiana*) and short leaf pine (*Pinus echinata*), while dominant hardwood species include eastern cottonwood (*Populus deltoides*), sweetgum (*Liquidambar styraciflua*), box elder (*Acer negundo*), elm species (*Ulmus*), green ash (*Fraxinus pennsylvanica*), willow oak (*Quercus phellos*), and water oak (*Quercus nigra*). Figure 4-3 depicts current land cover along and around the MKARNS.

Vegetation adjacent to the Arkansas River are those typical of a major bottom system. Major forest vegetation types occurring in these areas include green ash, box elder, eastern cottonwood,

water oak, willow oak, hackberry (*Celtis occidentalis*), black willow (*Salix nigra*), river birch (*Betula nigra*), roughleaf dogwood (*Cornus drummondii*), gray dogwood (*Cornus racemosa*), flowering dogwood (*Cornus florida*), red mulberry (*Morus rubra*), overcup oak (*Quercus lyrata*), shumard oak (*Quercus shumardii*), native pecan (*Carya illinoensis*), bur oak (*Quercus macrocarpa*), and associated midstory and understory species.

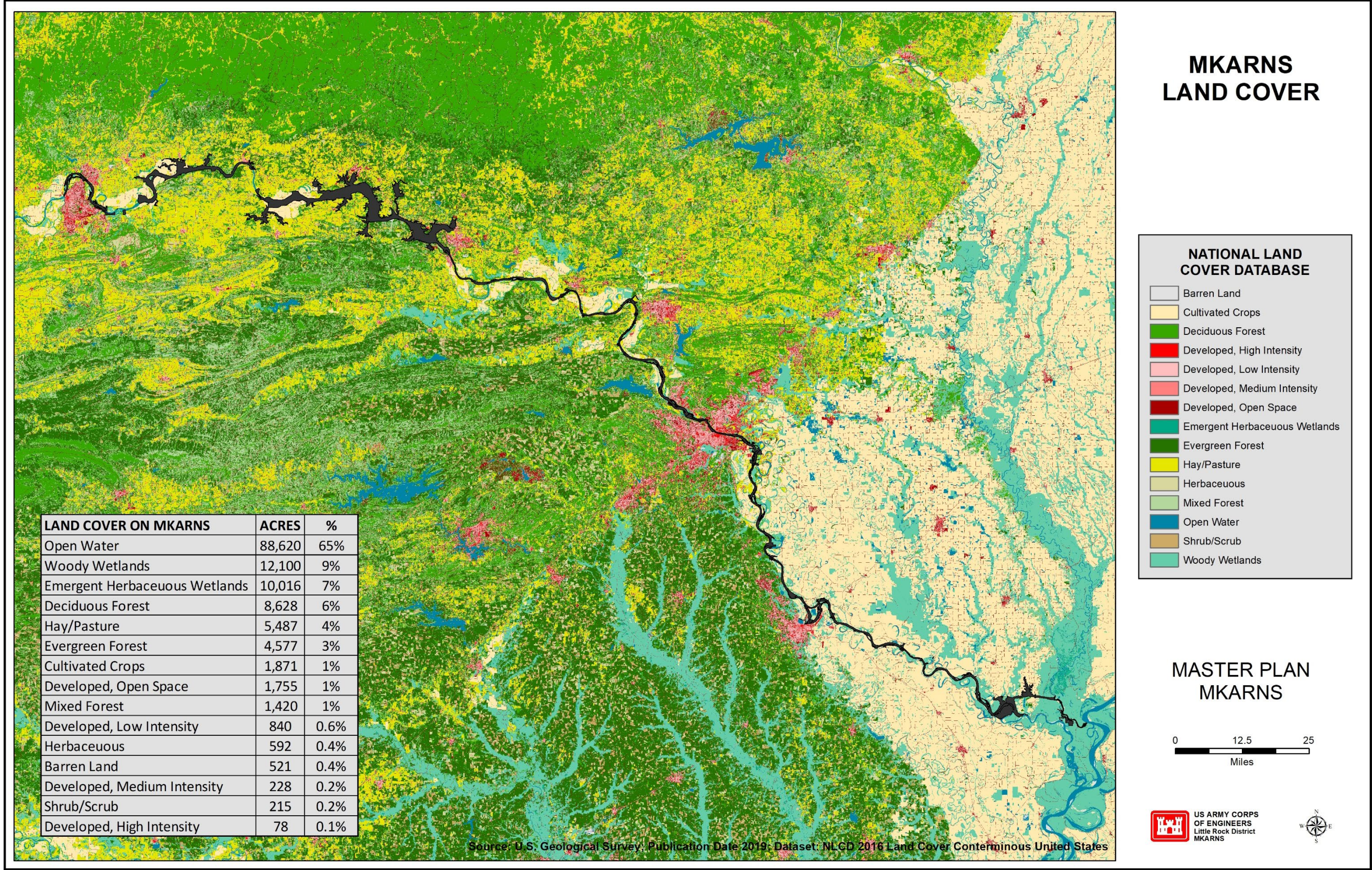
Vegetation along the flat, gradual tributaries is those typically associated with minor bottom systems. Dominant vegetative types in these areas include water oak, pin oak (*Quercus palustris*), willow oak, shumard oak, cherrybark oak (*Quercus pagoda*), overcup oak, bur oak, green ash, sycamore (*Platanus occidentalis*), silver maple (*Acer saccharinum*), red mulberry, black willow, elm, water hickory (*Carya aquatica*), swamp privet (*Forestiera acuminata*), and associated midstory and understory species.

Narrow tributary streams descending from adjacent mountain ranges are dominated by upland hardwoods, shortleaf pine, or mixed upland pine-hardwood. Examples of upland hardwoods would include white oak (*Quercus alba*), post oak (*Quercus stellata*), southern red oak (*Quercus falcata*), northern red oak (*Quercus rubra*), blackjack oak (*Quercus marilandica*), mockernut hickory (*Carya tomentosa*), black gum (*Nyssa sylvatica*), and eastern red cedar with a variety of midstory and understory species such as flowering dogwood, pawpaw (*Asimina triloba*), black cherry (*Prunus serotina*), and elm.

Wildflowers on moist and less exposed sites include trillium (*Trillium*), trout lily (*Erythronium americanum*), mayapple (*Podophyllum*), solomons-seal (*Polygonatum*), bellwort (*Uvularia grandiflora*), geranium (*Geranium*), columbine (*Aquilegia*), bloodroot (*Sanguinaria*), phlox (*Phlox*), golden ragwort (*Packera aurea*), and violets (*Viola*). Wildflowers found on dry sites include wild verbena (*Verbena bonariensis*), phlox, spiderwort (*Tradescantia*), birdsfoot violet (*Viola pedate*), bluet (*Houstonia*), false garlic (*Nothoscordum*), prickly pear cactus (*Opuntia*), sunflowers (*Helianthus*), goldenrod (*Solidago*), asters (*Aster*), and blazing star (*Liatris*).

The Arkansas River Valley provides nutrient rich soils which allow for the success of Arkansas' agriculture industry. Large portions of land along the river valley are utilized for row crop production purposes, with major products being wheat, soybeans, and corn in the upper portions and cotton, rice, wheat, soybeans, and corn in the lower portions of the project. Some fee land is leased for agricultural purposes. These leases are solicited and awarded to the highest bidder. The leases are utilized for livestock grazing, hay production, or row crop production under the USACE, Land-Use Regulations. In 2022, there are approximately 6,212 acres on the MKARNS under the agriculture and grazing lease program. Most of these leases occur on Lake Dardanelle and Ozark Lake.

Figure 4-3: Land Cover of the MKARNS Corridor



4.5.3.1 Alternative 1 (No Action)

Under the No Action Alternative, lands would be classified into High Density Recreation (8,340.5 acres, representing 18% of total available area), Low Density Recreation (21,141.6 acres, 46%), Environmentally Sensitive Areas (1,175.9 acres, 3%), and Wildlife Management (8,756.4 acres, 19%), while 6,976.8 acres have no current classification. Including Unclassified land designations, 79% of the acreage attributed to the MKARNS is subject to possible increased or new development. In this 79% of land, potential exists for continued degradation of vegetation due to increased development and subsequent vegetation removal and mowing activities. This would result in potential negative effects to the natural vegetation composition due to 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.

4.5.3.2 Alternative 2 (Selected)

Implementation of the Selected Alternative would have a minor, beneficial impact on vegetation compared to the No Action alternative. There would be a 15,723.3 acre reduction in Low Density Recreation land classification (to 5,418.0 acres), a 3,375.1 acre reduction in High Density Recreation lands (to 4,965.4 acres), an increase in Environmentally Sensitive Areas classification (to 2,500.9 total acres), and an increase in Wildlife Management lands (to 31,111.5 total acres). This would result in 67% of available acreage classified as Wildlife Management lands. The increase in lands classified as Wildlife Management would provide additional protection for 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 multiple wildlife species, as well as mediate storm water velocity and scour.

4.5.3.3 Alternative 3

Alternative 3 is similar to the Selected Alternative in terms of potential positive effects to vegetation compared to that of the No Action Alternative. A proposed decrease in Low Density Recreation lands of 15,816.4 acres, resulting in 11% of available acreage for potential development, would likely have some, but still negligible, effect on shoreline vegetation. High Density Recreation lands are reduced by 2,534.0 acres from the original 8,340.5 acres in the No Action Alternative. With 71% of the shoreline in Environmentally Sensitive Areas and Wildlife Management lands, natural vegetation would still be abundant under this alternative.

4.6 Threatened and Endangered Species

There are many species in the MKARNS project area that are considered nationally threatened or endangered (T&E) or are a 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 USFWS Information for Planning and Consultation (IPaC) online tool was utilized to generate a list of Federally listed threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary the

proposed project. The IPaC report can be found in Appendix F of the Master Plan. Coordination with the Arkansas Natural Heritage Commission also occurred to establish state listed threatened and endangered species.

In 2020, the USFWS reclassified the American burying beetle (ABB) (*Nicrophorus americanus*) from endangered to threatened. ABB is within the consultation areas for all areas on Pool 13 and Pool 12 on Lake Ozark and portions of Pool 10 on Lake Dardanelle. No known representatives of the species have been observed within these areas. When the species were listed as endangered, a Conservation Management Plan for ABB was developed and approved by USFWS. The plan places 1,546 acres aside for mitigation in neighboring Blue Mountain Lake in response to land management practices determined to be detrimental to the consultation areas of the species identified by the USFWS in the Lake Dardanelle, Ozark Lake, and Blue Mountain Lake fee land area.

The interior least tern (ILT) (*Sterna antillarum athalassos*) was listed in 1985. Since 2000, the USACE has partnered with Arkansas Tech University to survey for ILT. In 2021, the USFWS issued a final rule to remove the inland population from the Endangered Species Act (ESA) and in turn add the ILT to the delisting monitoring period. The USFWS in cooperation with the USACE and Arkansas Tech University will continue to monitor the ILT population and manage habitat under guidance established by the Southwestern Division Conservation Plan. The ESA requires a minimum post monitoring period of 5-year and, considering the longevity of the species, this time could increase.

There are several endangered bat species in Arkansas: Ozark big-eared (*Corynorhinus townsendii ingens*), gray bat (*Myotis grisescens*), and Indiana bat (*Myotis sodalis*). The northern long-eared bat (*Myotis septentrionalis*) is currently listed as threatened, with a proposal to be reclassified as endangered in the near future. The tri-colored bat (*Perimyotis subflavus*) is currently being petitioned for listing. A comprehensive baseline bat survey is necessary to determine what species of bats are present on the MKARNS Project. Transient populations of gray, Indiana, and northern long-eared bats might be present in the upper pools of the MKARNS. Northern long-eared bats have been captured in mist nets in the Spadra Creek region of Pool 10. Recent telemetry surveys of Indiana bats hibernating in northern Arkansas recorded migrating individuals of this species occurring on the Nimrod Project Area, located approximately 35 miles west of the MKARNS Project on the Fourche La Fave River, a tributary to the Arkansas River (Ewing, 2021). As such, it's likely that this species also roosts in mature pine and hardwood trees that border the Arkansas River, including the MKARNS Project Area. No known populations, hibernacula, or roosting sites for gray or Ozark big-eared bats are known to be located on the MKARNS. One hibernaculum utilized by gray bats is in proximity of the USACE fee property on Lake Dardanelle near Old Post Road Park.

Attention is provided when conducting prescribed burning as to not negatively impact to important habitat. Tree cutting as a forestry practice will only occur in coordination with the USFWS to remove timber during the winter months or with a negative population survey for harvesting in the summer months.

The bald eagle (*Haliaeetus leucocephalus*) is common during the winter months around the

MKARNS. In addition, bald eagle nests are frequently dispersed around the Arkansas River. Although the bald eagle was delisted by the 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. USACE works closely with the USFWS to protect the USACE owned riparian areas surrounding eagle critical habitat while managing the project lands and waters of the MKARNS to protect the water and habitat quality of T&E species.

Other species are candidates, proposed to be listed, or under review. The monarch butterfly (*Danaus plexippus*) is a candidate species under consideration for official listing for which there is sufficient information to support a listing. The alligator snapping turtle (*Macrochelys temminckii*) is proposed to become threatened. Alligator snapping turtles are associated with deeper water such as large rivers, major tributaries, bayous, swamps, and lakes with structure and high canopy cover or undercut stream banks. The USFWS has recently initiated a Species Status Assessment Review of the western chicken turtle (*Deirochelys reticularia miaria*) to determine if the species will be listed as a candidate species under the ESA. Western chicken turtle habitat includes semi-aquatic areas that contain slow-moving and shallow water, such as ponds, lakes, streams, and swamps. The chicken turtle is only active from March to June and are an uncommon species. The tricolored bat (*Perimyotis subflavus*) is currently under review to be listed as endangered due to the impacts of white-nose syndrome plaguing the species. These species are known to be present in certain locations along the MKARNS. If these species become listed, this would influence mission operations and both forestry and wildlife management applications on project lands.

The following species listed in Tables 4-1 and 4-2 are from the USFWS's Federally classified status list of species and the Arkansas Natural Heritage Commission (ANHC) data sets which have been reported on project lands.

Table 4-1: USFWS Special Status Threatened and Endangered Species

Pool	Common Name	Scientific Name	Federal Status
Project Wide	bald eagle	<i>Haliaeetus leucocephalus</i>	BGEPA*
Project Wide	eastern black rail	<i>Laterallus jamaicensis jamaicensis</i>	LT
Project Wide	piping plover	<i>Charadrius melodus</i>	LT
Project Wide	red knot	<i>Calidris canutus rufa</i>	LT
Project Wide	interior least tern	<i>Sternula antillarum athalassos</i>	***
Pool 1	pallid sturgeon	<i>Scaphirhynchus albus</i>	LE
Pool 1	fat pocketbook	<i>Potamilus capax</i>	LE
Pool 1	rabbitsfoot	<i>Quadrula cylindrica cylindrica</i>	LT
Pool 1	pink mucket	<i>Lampsilis abrupta</i>	LE
Pool 2	rabbitsfoot	<i>Quadrula cylindrica cylindrica</i>	LT
Pool 7	Indiana bat	<i>Myotis sodalis</i>	LE
Pool 8	harperella	<i>Ptilimnium nodosum</i>	LE
Pool 8	Indiana bat	<i>Myotis sodalis</i>	LE
Pool 9	northern long-eared bat	<i>Myotis septentrionalis</i>	LT**
Pool 9	Indiana bat	<i>Myotis sodalis</i>	LE
Pool 9	Ozark big-eared bat	<i>Corynorhinus townsendii ingens</i>	LE
Pool 10	harperella	<i>Ptilimnium nodosum</i>	LE
Pool 10	American burying beetle	<i>Nicrophorus americanus</i>	LT
Pool 10	gray bat	<i>Myotis grisescens</i>	LE
Pool 10	northern long-eared bat	<i>Myotis septentrionalis</i>	LT*
Pool 10	Indiana bat	<i>Myotis sodalis</i>	LE
Pool 10	Ozark big-eared bat	<i>Corynorhinus townsendii ingens</i>	LE
Pool 12	American burying beetle	<i>Nicrophorus americanus</i>	LT
Pool 12	Indiana bat	<i>Myotis sodalis</i>	LE
Pool 12	northern long-eared bat	<i>Myotis septentrionalis</i>	LT**
Pool 12	Ozark big-eared bat	<i>Corynorhinus townsendii ingens</i>	LE
Pool 13	American burying beetle	<i>Nicrophorus americanus</i>	LT
Pool 13	Indiana bat	<i>Myotis sodalis</i>	LE
Pool 13	northern long-eared bat	<i>Myotis septentrionalis</i>	LT**
Pool 13	Ozark big-eared bat	<i>Corynorhinus townsendii ingens</i>	LE
<p>* Protected under Bald and Golden Eagle Protection Act.</p> <p>**NLEB listed threatened, proposed to be reclassified to endangered.</p> <p>*** ILT has been delisted - ESA requires the Service, in cooperation with states, and USACE to monitor species after delisting to ensure species remains stable.</p>			

Table 4-2: Arkansas Natural Heritage Special Status Species

Common Name	Scientific Name	Federal/State Status	State/Global Rank
Bald Eagle	<i>Haliaeetus leucocephalus</i>	*Protected under Bald and Golden Eagle Protection Act	S3/G5
Gray Bat	<i>Myotis grisescens</i>	L/E	S2/S3/G4
Little Brown Bat	<i>Myotis lucifugus</i>	Species of Concern (SOC)	S1/G3
Northern Long-Eared Bat	<i>Myotis septentrionalis</i>	SOC	S1/S2
Rafinesque's big-eared bat	<i>Corynorhinus rafinesqui</i>	SOC	S3/G3G4
Alligator Gar	<i>Atractosteus spatula</i>	SOC	S2/G3 G4
American eel	<i>Anguilla rostrata</i>	SOC	S3/G4
Alabama snow wreath	<i>Neviusia alabamensis</i>	SOC	S1S2/G3
Arkansas twistflower	<i>Streptanthus maculatus</i>	SOC	S3/G3T3Q
Bank Swallow	<i>Riparia riparia</i>	SOC	S3B/G5
California bullrush	<i>Schoenoplectus californicus</i>	SOC	S1S2/G5
Catchfly prairie gentian	<i>Eustoma exaltatum</i>	SOC	S2/G5
Clasping dogbane	<i>Apocynum sibiricum</i>	SOC	S1/GNR
Crawfish frog	<i>Lithobates aerolatus</i>	SOC	S2/G4
Fragrant ladies' tresses	<i>Spiranthes odorata</i>	SOC	S1/G5
Goldeye	<i>Hiodon alosoides</i>	SOC	S2/G5
Interior least tern	<i>Sternula antillarum athalassos</i>	SOC	S3B/G4T3Q
Lake chubsucker	<i>Erimyzon sucetta</i>	SOC	S3/G5
Least Bittern	<i>Ixobrychus exilis</i>	SOC	S2B/G4G5
Ohio shrimp	<i>Macrobrachium ohione</i>	SOC	S1S2/G4
Osage Burrowing Crayfish	<i>Procambarus liberorum</i>	SOC	S3S4/G3G4
Ozark cornsalad	<i>Valerianella ozarkana</i>	SOC	S3/G3
Paddlefish	<i>Polyodon spathula</i>	SOC	S3/G4
Pealip Redhorse	<i>Moxostoma pisolabrum</i>	SOC	S2/G5
Phlox heliotrope	<i>Heloptropium convolvulaceum</i>	SOC	S2/G5
Purple Gallinule	<i>Porphyrio martinicus</i>	SOC	S1B/G5
Queensnake	<i>Regina septemvittata</i>	SOC	S1/G5
Riddell's spike-moss	<i>Selaginella arenicola</i>	SOC	S3/G4T4
Shoal chub	<i>Macrhybopsis hyostoma</i>	SOC	S3/G5
Six-angle spurge	<i>Euphorbia hexagona</i>	SOC	S2/G5
Small flower ground cherry	<i>Physalis cinerascens</i>	SOC	S1/G4G5T3T5

Strecker's Chorus Frog	<i>Pseudacris streckeri</i>	SOC	S2/G5
Swainson's Warbler	<i>Limnothlypis swainsonii</i>	SOC	S3B/G4
Texas bergia	<i>Bergia texana</i>	SOC	S2/G5
Western dwarf-dandelion	<i>Krigia occidentalis</i>	SOC	S3/G5
White liptooth	<i>Daedalochila peregrina</i>	SOC	SNR/G2
Wooly prairie clover	<i>Dalea lanata</i>	SOC	S2S3/G5TNR

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.

G5: Secure: Common; widespread and abundant (although it may be rare in parts of its range, particularly on the periphery). Not vulnerable in most of its range. Typically, with considerably more than 100 occurrences and more than 10,000 individuals.

4.6.1 Alternative 1 (No Action)

Of the species listed in Table 4-1, five species could potentially face indirect impacts through future projects from the implementation of the No Action Alternative. The gray bat, Indiana bat, and northern long-eared bat potentially roost in various species of pine and hardwood trees located in areas currently classified as High and Low Density Recreation lands and unallocated lands. The ABB has been documented in riparian area soils adjacent to Pools 10, 12, and 13 of the MKARNS. Potential development could occur in these land classifications that might have an impact on the ecology of habitat used by these species. The bald eagle was delisted in 2007 by the USFWS but remains a protected species under the Bald and Golden Eagle Protection Act. While there have been reports of nesting in some locations along the MKARNS, this species is not confined to a particular area, so implementation of this alternative may result in potential removal of large trees used as nesting sites. The No Action Alternative is not anticipated to have any direct adverse impacts on threatened or endangered species, but it allows for future development in the High Density Recreation land classification which could. While retaining the quantity of High Density Recreation lands allows for further development, any ground-disturbing activities proposed as the result of implementation of this alternative would require a separate NEPA analysis and coordination under section 7 of the ESA. Because of this, the USACE has determined that implementation of the No Action Alternative would have No Effect on any Federally-listed species that may occur in the project area.

4.6.2 Alternative 2 (Selected)

The Selected Alternative would have no effect 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 net reclassification of over 18,650 acres from High and Low Density Recreation lands to Environmentally Sensitive Areas and Wildlife Management lands classifications, there may be potential positive impacts 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 Areas and Wildlife Management land classifications, which constitute 72% of total acreage. USACE has determined that

implementation of Alternative 2 would have No Effect on any federally-listed species that may occur in the project area. Any ground-disturbing activities proposed as the result of implementation of this alternative would require a separate NEPA analysis and coordination under Section 7 of the ESA.

4.6.3 Alternative 3

Alternative 3 would likely have no impact to 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 Recreation lands of 15,816.4 acres, would result in 11% of available acreage for potential development. High Density Recreation lands are reduced by 2,534.0 acres from the original 8,340.5 acres in the No Action Alternative. With 71% of the available acreage in Environmentally Sensitive Areas and Wildlife Management lands, natural shoreline vegetation would still be abundant and provide protection for Threatened and Endangered species and other Special Status Species. USACE has determined that implementation of Alternative 3 would have No Effect on any federally-listed species that may occur in the project area. Any ground-disturbing activities proposed as the result of implementation of this alternative would require a separate NEPA analysis and coordination under Section 7 of the ESA.

4.7 Wetlands

Wetlands are complex habitats that transition from dry land to open water, and they have soil, water, and plant components. Wetlands are defined as those areas inundated or saturated by surface or ground water at a frequency and duration to support a prevalence of vegetation typically adapted for life in saturated soil conditions. Many common species of waterfowl, fish, birds, mammals, and amphibians utilize wetlands during certain life stages.

In accordance with national USACE policy, wetlands at operational projects are inventoried using the protocol established by the USFWS in their Classification of Wetlands and Deepwater Habitats of the United States. While the main river channel of the MKARNS is classified as lacustrine (open water), the shoreline acreage in the system is classified as palustrine (standing dead timber and vegetated shorelines). Palustrine wetlands include freshwater ponds, freshwater emergent, and shoreline wetlands, which include a mixture of scrub/shrub (species of 6 meters or less in height) or forested (species of greater than 6 meters in height) wetland species. Palustrine forested/shrub wetlands also occur in the feeder streams' floodplains and are called riverine wetlands. According to the USFWS National Wetlands Inventory (NWI), palustrine wetlands occupy approximately 10,467 acres of the 46,430.7 acres in the project area. Wetland acreages designated by the NWI are subdivided by pools created by the locks and dams in the navigation system and listed in the subsequent paragraphs.

Pool 2, upstream of Lock 2, includes approximately 3,562 acres of palustrine wetland types, including freshwater emergent and freshwater forested/shrub wetlands.

Pool 12, which is formed by the Ozark-Jeta Taylor Lock and Dam, is 36 miles long, with this portion of the river valley bounded on the north by the Boston Mountains of the Ozark Plateau and on the south by the Fourche Mountains of the Ouachita Province. The topography of the lands surrounding the lake is level to undulating with many long sharp ridges and broad-top

conical hills and mountains rising above the plain. A main tributary on this pool is the Mulberry River, which has been designated as a National Wild and Scenic River. Within the project owned lands of Pool 12 there are approximately 2,965 acres of wetlands.

The next largest wetland acreage lies within the boundaries of Pool 10 at 2,106 acres, which is formed by the construction of the Dardanelle Lock and Dam. This pool, known as Lake Dardanelle, is 51.3 miles long. The lower third of the lake is surrounded by tree covered, rocky slopes of the Ozark Mountains. The upper two-thirds of the project is bordered by a broad, flat, fertile alluvial valley. Numerous clear water streams enter the Arkansas River within the Lake Dardanelle Pool. Several of them create large embayments, including the Illinois Bayou, Big Piney Creek, and Shoal Creek.

Montgomery Point (Pool 0), formed by the construction of Montgomery Point Lock and Dam, extends upstream 9.8 miles to the Norrell Lock and Dam. It consists of approximately 980 acres of wetlands, primarily under the freshwater forested/shrub wetland classification. Adjacent lands are heavily forested with bottomland hardwood. The upper end of the pool is surrounded by the White River National Wildlife Refuge and Trusten Holder Wildlife Management Area. Common woody wetland species typically include buttonbush, willow, green ash, hackberry, elm, willow oak, water oak, overcup oak, sweetgum, red maple, and river birch. Some locations may support cypress as well.

The remaining eight pools in the MKARNS system have smaller amounts of wetlands, which are dictated by the project owned acreage bordering the river. These pools provide a total of 855 additional acres of wetlands.

4.7.1 Alternative 1 (No Action)

Under the No Action Alternative, lands would remain classified as High Density Recreation (8,340.5 acres, representing 18% of total available area), Low Density Recreation (21,141.6 acres, representing 46% of total available area), Environmentally Sensitive (1,175.9 acres, representing 3% of total available area), Wildlife Management (8,756.4 acres, representing 19% of total available area), and 6,976.8 acres with no current classification. Within the High and Low Density Recreation allocations as well as Unclassified lands, the potential exists for continued degradation of wetland vegetation due to increased development and subsequent vegetation removal and mowing activities. This would result in potential long-term adverse impacts to the existing natural wetland habitat due to potential removal of trees, as well as understory and emergent vegetation, thus possibly altering food sources of wetland inhabitants, including insects, amphibians, reptiles, birds, and mammal species that utilize these areas.

4.7.2 Alternative 2 (Selected)

Implementation of the Selected Alternative would potentially result in long-term, minor beneficial impacts on wetlands as compared to the No Action Alternative. There would be a 15,723.3 acre reduction in Low Density Recreation classification (to 5,418.0 acres), a 3,375.1 acre reduction in High Density Recreation (to 4,965.4), a 3% increase in Environmentally Sensitive Area classification (2,500.9 total acres), and an increase in Wildlife Management from 8,756.4 acres to 31,111.5 acres. This would result in 67% of available acreage classified as Wildlife Management lands. This increase in Wildlife Management lands would provide additional protection for wetland vegetation by preventing destruction of wetland plant and

animal species from potential development activity.

4.7.3 Alternative 3

Alternative 3 is similar to the Selected Alternative in terms of potential beneficial effects on the wetland vegetation, as compared to the No Action Alternative. High Density Recreation lands are reduced by 2,534.0 acres from the original 8,340.5 acres in the No Action Alternative. With 71% of the land classified as Environmentally Sensitive Areas or Wildlife Management, compared to 72% classified as such in the Selected Alternative, natural wetland vegetation would still be protected under this alternative.

4.8 Archaeological and Historic Resources

4.8.1 Cultural Resources

Stewardship of cultural resources on USACE Civil Works water resources projects is an important part of the overall Federal responsibility. Numerous laws pertaining to identification, evaluation, and protection of cultural resources, Native American rights, curation and collections management, and the protection of resources from looting and vandalism establish the importance of cultural resources to our Nation's heritage. Guidance is derived from numerous cultural resources laws and regulations, including Sections 106 and 110 of the National Historic Preservation Act (NHPA) of 1966; Archaeological Resources Protection Act (ARPA) of 1979; Native American Graves Protection and Repatriation Act (NAGPRA); and 36 CFR Part 79, Curation of Federally-Owned and Administered Archeological Collections. Implementing regulations for Section 106 of the NHPA and NAGPRA are 36 CFR Part 800 and 43 CFR Part 10, respectively. All cultural resources laws and regulations should be addressed under the requirements of the National Environmental Policy Act (NEPA) of 1969, as applicable.

4.8.2 Cultural Resources along the MKARNS

This section presents information on archeological and architectural resources located on USACE lands in the MKARNS system and associated properties. The discussion includes a description of methods used to identify existing archeological and architectural resources, and the number and types of archeological and architectural resources known within the areas owned in fee and the number of archeological and architectural resources that are listed or eligible for the National Register of Historic Places (NRHP) in those areas.

Cultural resources are prehistoric and historic sites, structures, districts, artifacts, or any other physical evidence of human activity considered important to a culture, subculture, or community for traditional, religious, scientific, or any other reason. Cultural resources are discussed in terms of archeological sites, which include both prehistoric and historical occupations either submerged or on land, and architectural resources. Archeological sites can become submerged when they are inundated following impoundment of rivers, and shipwrecks are a specific type of submerged archeological site.

Use of the Arkansas River system as a major means of travel, commerce, and for military purposes predates European contact. Cultural resources are present along the river spanning the period of human occupation in the region, from Paleoindian through the historic era to the

present. Sites in the project area include lithic scatters, rock or bluff shelters, camps, villages, special use/resource extraction sites, fish weirs, mounds, burials, middens, historic sites such as farmstead and town sites, ferry landings, wharfs, mills, dams, bridges, and watercraft – including canoes, boats, flatboats, barges, keelboats, dredges, and steamboats. These sites may be on land or submerged beneath the waters of the system. Only a small portion of the MKARNS system has been systematically surveyed for cultural resources, so the known cultural resources are discussed below for each pool. These resources include all archeological sites and architectural resources, including those listed on and eligible for the NRHP or listed in the State inventory.

Mouth of the White River

There are no recorded archeological or architectural resources on USACE lands in the White River segment of the MKARNS.

Little of this area has been previously surveyed prior to construction of the MKARNS system. Construction of a new lock and dam complex at Montgomery Point, NM 0.5, was completed in 2005. Survey for cultural resources prior to the construction of the new lock and dam covering the river channel and banks from NM 0-2 occurred in 1989 (Bennett et al 1989b); only one archaeological site was identified in this segment, primarily because most the sediments are extremely young.

Pool 1: Norrell Lock & Dam No. 1

Only two archeological sites were identified on USACE lands at Pool 1. This is probably due to the fact that Pool 1 is a short, artificial canal, excavated into the relatively recent river-deposited sediments of the Arkansas/White River floodplains and drainage divide. There are also no NRHP-listed architectural resources within USACE properties at Pool 1.

Previous archeological investigations at the pool include emergency survey near the canal in 1965 (Davis and Baker 1975) initiated after the start of construction. The surveyed area began at Lock and Dam #1, NM 10, and went to about NM 22.4, Pendleton Ferry, but no sites within the survey area of Pool 1 were identified. Scholtz and Hoffman (1968) may have surveyed some portions of Pool 1 prior to construction of the MKARNS system, but no sites were identified in this area.

Archeological Consultants, Inc. (ACI) and Coastal Environments, Inc. (CEI) conducted a cultural resource assessment survey of six areas (Haroldton Access, Sweeden, Fletcher Bend, Maumelle Day Use Area, Merrisach, Rifle Pit) within the MKARNS in 2019. The Massey Cemetery (3AR0242) was discovered in the Merrisach survey. The headstone for Pvt. Massey dates from 1936, but he died in 1920. There appeared to be several other unmarked graves in the cemetery, which has been fenced on three sides with hog-wire. Although cemeteries are generally ineligible for inclusion in NRHP, preservation and avoidance of the site was recommended. It was also recommended that a ground penetrating radar survey of the area be conducted to determine if other unmarked graves are in the area, and if so, make sure that they are marked for preservation/avoidance (Almy et al. 2020).

In 2021, the Little Rock District conducted a Cultural Resources Survey for the Three Rivers Project. Site 3AR243 is on USACE Fee Land and the precontact site is determined eligible for the NRHP. The recorded and evaluated architecture for three rivers (the Historic cutoff structure, the Arkansas-White Containment Structure and the Owens Weir) is on USACE fee land. None of these structures were determined to be eligible for the NRHP (Lopinot et al 2022).

Pool 2: Wilbur Mills Lock & Dam No. 2

No architectural resources were identified on USACE lands at Pool 2. Previous archeological investigations at Pool 2 include emergency survey of the Arkansas Post Canal in 1965 (Davis and Baker 1975) initiated after the start of construction. One site within Pool 2 had almost been destroyed by canal construction (3AR33) when it was identified. No features or undisturbed contexts were observed, and only a surface collection, primarily of ceramics, was made, indicating a Woodland Period occupation. Scholtz and Hoffman (1968) surveyed some portions of Pool 2 prior to construction of the MKARNS. Bennett et al. (1989a) surveyed portions of Pool 2, examining the geomorphology with regard to identifying landforms that have some probability for containing archeological sites; however, no sites were identified within the vicinity of Pool 2. Two sites were recorded through archival research, and neither was recorded by fieldwork. Both sites (3AR217 & 3AR218) were civil war earthworks associated with Fort Hindman at Arkansas Post.

Archeological Consultants, Inc. and CEI conducted a cultural resource assessment survey of six areas (Haroldton Access, Sweeden, Fletcher Bend, Maumelle Day Use Area, Merrisach, Rifle Pit) within the MKARNS in 2019. No cultural resources were recorded in the Rifle Pit area of this pool (Almy et al. 2020).

Pool 3: Joe Hardin Lock & Dam No.3

No archeological sites or architectural resources were identified on USACE lands at Pool 3. Previous archeological investigations in Pool 3 include a survey of some portions by Scholtz and Hoffman (1968) prior to construction of the MKARNS. More recently, Bennett et al. (1989a) surveyed portions of Pool 3, examining the geomorphology with regard to identifying landforms that have some probability for containing archeological sites. No cultural resources were identified.

Pool 4: Emmett Sanders Lock & Dam, Lake Langhofer

No archeological sites or architectural resources were identified on USACE lands at Pool 4. Previous archeological investigations in Pool 4 include a survey of some portions by Scholtz and Hoffman (1968) prior to construction of the MKARNS, however, no cultural resources were identified within the APE of Pool 4. In 1978, the Arkansas Archeological Survey recorded a levee partially on USACE land north of Lake Langhofer dating to 1908. More recently, Bennett et al. (1989a) surveyed portions of Pool 4, examining the geomorphology with regard to identifying landforms that have some probability for containing archeological sites. However, no cultural resources were identified. In 1991, McClurkan surveyed the route for the Lock and Dam Number Four Demonstration Project for the Arkansas Department of Transportation. Again, no cultural resources were identified on USACE lands. In 2001, the Operations Project

manager for the Pine Bluff Project Office recorded a historic artifact scatter that had been extensively disturbed from construction activities.

Pool 5: Lock & Dam 5

No archeological sites or architectural resources have been identified on USACE lands at Pool 5. Previous archeological investigations in the area include a survey by Scholtz and Hoffman (1968) of some portions of Pool 5 prior to construction of the MKARNS, and Bennett et al.'s geomorphological study (1989a) that included a pedestrian survey. Neither survey identified archeological sites on USACE lands in Pool 5.

Pool 6: David D. Terry Lake, David D. Terry Lock & Dam No. 6

Previous archeological investigations in the area include Scholtz and Hoffman's survey of the David D. Terry Lock & Dam site and some public use areas (1968), and Bennett et al.'s geomorphological study of MKARNS pools 1-9 (1989a). No sites in the project area were located during either project. Three landforms in Pool 6 were identified as having some likelihood of buried cultural deposits (Bennett et al. 1989a: 52-53). Stewart-Abernathy recorded a submerged cypress barge or wharf boat (3PU257) that was discovered during river dredging, but no report on this investigation was filed. Davies recorded the Farmers Home Cemetery (3PU761) in 2005, an African American cemetery dating to the early 20th century near Murray Lock and Dam.

Pool 7: Murray Lake, Murray Lock & Dam

Seven archeological sites have been identified on USACE lands at Pool 7. These include four prehistoric sites, a portion of one historic cemetery, one historic bridge, and one historic road. None of these sites are currently listed on the NRHP. None of the sites have been evaluated for NRHP eligibility. No architectural resources listed on the NRHP occur in Pool 7.

Only a small portion of Pool 7 has been surveyed for archeological resources. Bennett et al.'s geomorphological study (1989a) included a pedestrian survey. Seven landforms in Pool 7 were identified as having some likelihood of buried cultural deposits (Bennett, et al 1989a: 52-53). Four locations have high potential for buried sites, including the Palarm Creek floodplain, the Maumelle River floodplain, the Little Maumelle River floodplain, and the Fourche La Fave Creek floodplain. Three locations have moderate potential for buried sites, including the mouth of the Maumelle River NM 130, south of Easterwood Mountain NM 147, and northeast of Beaverdam Island. NM 126 and NM 132 have low potential for buried sites.

The 2019 ACI and CEI survey identified one isolated flake (FB-1) that was discovered within the Fletcher Bend tract and two isolates (MDUA-1, nail and MDUA-2, glass) that were discovered within the Maumelle Day Use Area. None of these is a significant resource (Almy et al. 2020).

Pool 8: Toad Suck Ferry Lake, Toad Suck Ferry Lock & Dam

A total of four archeological sites have been identified on USACE lands at Pool 8. One is listed on the NRHP, the Cadron Settlement or Cedar Creek site (listed 5/17/1974), a historic French Trading post in the late 1700s which was later settled by Cherokee who immigrated to the area in

the early 18th century until they were removed to Indian Territory. Prehistoric components are also present at the site. The other three sites are prehistoric with unknown NRHP eligibility. No architectural resources are located in Pool 8 that are listed on the NRHP.

A brief archeological survey at Pool 8 was conducted in 1968 by Scholtz and Hoffman. Bennett et al.'s geomorphological study of MKARNS (1989a) included a pedestrian survey in Pool 8. They identified two landforms in Pool 8 as having some likelihood of buried cultural deposits, including the Cadron Creek floodplain, which has high potential for buried sites, and the area southwest of Morrilton and north of Willow Bend, which has moderate potential for buried sites (Bennett et al. 1989a: 52).

Pool 9: Winthrop Rockefeller Lake, Arthur V. Ormond Lock & Dam

A total of five archeological sites and four isolated finds have been identified on USACE lands at Pool 9. There are no architectural resources in Pool 9 that are listed on the NRHP. Site 3PP21 is a multicomponent site with unknown eligibility for listing on the NRHP.

Bennett et al.'s geomorphological study of MKARNS (1989a) included a pedestrian survey in Pool 9, and they identified one landform as having low/moderate potential of buried cultural deposits, the area north of Crane Island, at NM 189 (Bennett et al. 1989a: 52).

The 2019 ACI and CEI survey identified four sites and four isolates were discovered within the Sweeden survey area. Site 3PP1393 is a culturally indeterminate lithic scatter with a couple of historic artifacts. It is not considered eligible for listing in the NRHP. Sites 3PP1394 and 3PP1395 are historic home sites that are considered potentially eligible for listing in the NRHP as they have structural remains and may provide data on the occupation of the region. Site 3PP1396 is a vehicle disposal area dating from the mid-20th century. It is not considered a significant resource because of its low research potential. The four isolates in the Sweeden area consist of three isolated flake (S-3, S-5, S-7) and an isolated piece of whiteware (S-4). None of these resources are eligible for the NRHP (Almy et al. 2020).

Pool 10: Lake Dardanelle, Dardanelle Lock & Dam

A number of archeological surveys have been conducted at the Lake Dardanelle reservoir bottom, at all non-inundated fee land, and at all of the public use areas. To date, 258 archeological sites have been recorded on USACE lands at Pool 10 (Almy et al 2018, Almy et al 2019, Almy et al 2020, Bennet et al 1986, Caldwell 1960, Cole 1969, Greengo 1957, Hogan et al 2021, Klinger 2001, Klinger 2008, Northrip and Bennet 1988, Thomas et al 2022b). Of the sites, 182 are prehistoric, dating to the Archaic, Woodland, Mississippian and Caddoan periods. The archeological record at these sites is composed primarily of isolated finds, deflated surface scatters of lithic debris, as well as some intact deposits. Forty-seven archeological sites are historic and twenty-nine of the recorded sites are multicomponent. Two of the prehistoric sites and two of the historic sites are considered eligible for listing on the NRHP. One prehistoric and one historic site are considered ineligible for listing, and the remaining sites are unevaluated. No architectural resources occur on USACE lands at Pool 10 that are listed on the NRHP.

Pool 12: Ozark Lake, Ozark-Jeta Taylor Lock & Dam

Archeological studies have been conducted on much of the Pool 12 fee land and public use areas, resulting in the identification of 92 sites on USACE lands (Weinstein et al 2019, Bennet et al 1985, Bennet et al 1987, Almy et al 2019, Thomas et al 2022a). The archeological record at the 70 prehistoric sites is composed primarily of isolated finds, deflated surface scatters of lithic debris, and locations at which intact deposits are documented or suspected, and are from the Archaic, Woodland, and Mississippian periods. Eleven historic period sites and eleven multicomponent sites were also identified. None of the archeological sites are listed on the NRHP. Fifteen sites have been determined to be not eligible for inclusion. The remaining 77 sites have not been evaluated for NRHP eligibility status.

The Merle Whitman Tourist Cabin is a historic traveler's accommodation at 200 North Bell Street in Ozark, Arkansas. It is a distinctively styled vernacular structure, built out of local fieldstone, cut sandstone, and concrete. Built in 1933–34, it is the only known tourist building in Franklin County using this combination of materials. It was used as tourist accommodation until the 1960s, when it was purchased by USACE as part of land acquisition for the Jeta Taylor Lock and Dam project. It housed the offices of the local chamber of commerce between 1966 and 1995. The cabin was listed on the National Register of Historic Places in 2006.

Pool 13: John Paul Hammerschmidt Lake, James W. Trimble Lock & Dam

Only four archeological sites have been identified within Arkansas at Pool 13. None of these sites have been evaluated for eligibility for inclusion to the NRHP. Sites 3SB0011 and 3SB0012 are described prehistoric sites that may have been destroyed due to construction activities. No architectural resources occur in Pool 13 within Arkansas that are listed on the NRHP.

The 2019 ACI and CEI survey identified site 3CW1336 as a low density historic scatter within the Haroldton Access property and 3CW1237, as contained within the survey area, as a low density multicomponent artifact scatter. Neither site, as contained within the survey area, is considered eligible for listing in the NRHP due to the low artifact density and diversity, lack of association with important individuals or events, and a subsequent low research potential (Almy et al. 2020).

Table 4-3: Summary of Archeological Sites on USACE Owned Lands on the MKARNS

Type of Site	Number of Sites
Historic	70
Prehistoric	265
Multicomponent	42
Total	377
National Register Eligibility Status	
Not Evaluated	349
Not Eligible	21
Eligible	6
Listed	1

Submerged Cultural Resources Along MKARNS

Shipwrecks, the sunken remains of boats, barges, steamboats, and other watercrafts, are documented throughout the Arkansas River system. Historic accounts, including newspapers, diaries, and military records, describe some of these events (Branam 2003; Wright 1930). Some of the wrecks were salvaged immediately, but others quickly disappeared. Remnants of wrecked vessels may remain in the river if they were quickly buried by protective sediments, while some were likely destroyed by the river current, subsequent dredging activities, or were simply washed downstream into the Mississippi River. Shipwrecks have sometimes been found buried in abandoned river channels that are now on dry land. Wrecks were usually caused by boiler explosions, shoaling, or hitting snags and submerged objects. Consequently, the potential exists for the Selected Alternative to impact undiscovered shipwrecks in the MKARNS, both on dry land, and on land now submerged by the pools. Information on the shipwrecks was collected to facilitate future identification of these resources.

Branam (2003) provided a list of known wrecks in the Arkansas and nearby rivers. Culled from newspaper accounts and steamboat references, many of the locations are general and vague. In addition, some of the place names are no longer used. In order to locate the wrecks within the MKARNS project segments, it was necessary to run the unknown location names through Geographic Names Information System (GNIS). The Arkansas Archeology Survey (AAS) prepared an index of the locations shown on the 1870 USACE map of the Arkansas River system. Of the 158 known wrecks in Branam's database, 89 had enough information to be assigned to 1 or 2 project segments (wrecks could be in 2 segments because the locations fell at a segment boundary, e.g. Little Rock, and Fort Smith). One additional wreck has been identified by the Oklahoma State Historic Preservation Office (SHPO) in the project area (but has not yet been ground-truthed or reported as a site), bringing known shipwreck total to 90. An additional 6 wrecks from Branam have location information found in the 1870 USACE map index, but the data are insufficient for generating project segments or NM locations at this time.

A survey for submerged cultural resources in the White River basin by Panamerican Consultants did not extend to the White River mouth, which is part of MKARNS (Buchner and Krivor 2001). Shipwrecks are more common in the lower reaches of the river, probably because there was more shipping activity there. Shipping in the upper portions of the river gradually extended from Fort Smith in 1822, to Three Forks, near present day Fort Gibson in 1827. It was not until 1878 that the first steamboat ascended the river as far as Arkansas City, Kansas (Wright 1930:71). Also, river flow was unpredictable, so in dry seasons, boats were often stranded and could not move upstream.

Ninety shipwrecks have known, general locations in MKARNS, but their actual remains have not been discovered.

The 25 years since the last major cultural resource analysis of the system has left the historic context of the MKARNS currently outdated with large data gaps. To date, the MKARNS has not been formally evaluated for eligibility for listing on the NRHP. As such, USACE is treating the built environment of the MKARNS as eligible for listing on the NRHP until a formal evaluation takes place, which is expected to occur in 2023 or 2024.

4.8.3 Alternative 1 (No Action)

Under the No Action Alternative there would be no change in the current Master Plan land classifications as designated under the 1976 and 1977 Master Plans. 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. Cultural resource sites within Low Density or High Density Recreation classification areas could potentially undergo the most severe impact because activities such as new park development, boat dock construction, and shoreline use permits result in a degree of ground disturbance which could pose a threat to intact cultural deposits. Possible impacts could also ensue from other infrastructure 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. Potential mitigation for impacts 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.

4.8.4 Alternative 2 (Selected)

Under the Selected Alternative, the land classified as Environmentally Sensitive Areas would have an increase of 1,324.9 acres, while Wildlife Management lands would increase by 22,354.8 acres. With these proposed modifications, there would be minimal potential for ground disturbing activities, thus decreasing the potential for effects on cultural resources and providing long-term, minor beneficial impacts. Areas that were classified as Low Density Recreation under the No Action Alternative and that have no permits would be changed to Environmentally Sensitive Areas in an effort to preserve the scenic, historical, archaeological, scientific, water quality, and/or ecological value of the overall project. Some areas where the land has been previously classified as High Density Recreation but not yet identified for development would be converted to Environmentally Sensitive Areas or Wildlife Management.

4.8.5 Alternative 3

Under Alternative 3, High Density Recreation classifications would be decreased along the MKARNS. Low Density Recreation would also be decreased to a slightly greater amount than under the Selected Alternative, while Environmentally Sensitive and Wildlife Management Areas would be increased, thus reducing the potential for development. This alternative, while having a slightly larger potential for development as compared to the Selected Alternative, would still result in minor, long-term beneficial impacts to cultural resources based on the large increase in Wildlife Management lands and large decreases in High and Low Density Recreation land classifications, as compared to the No Action Alternative.

4.9 Air Quality

The U.S. Environmental Protection Agency (EPA) has the primary responsibility for regulating air quality nationwide. The Clean Air Act (42 U.S.C. 7401 *et seq.*), as amended, requires the EPA to set National Ambient Air Quality Standards (NAAQS) for wide-spread pollutants from

numerous and diverse sources considered harmful to public health and the environment. The Clean Air Act of 1977 (CAA) established two types of national air quality standards classified as either “primary” or “secondary.” Primary standards set limits to protect public health, including the health of at-risk populations such as people with pre-existing heart or lung diseases (such as asthmatics), children, and older adults. Secondary standards set limits to protect public welfare, including protection against visibility impairment, damage to animals, crops, vegetation, and buildings.

The EPA has set NAAQS for six principal pollutants, which are called “criteria” pollutants. These criteria pollutants include carbon monoxide (CO), nitrogen dioxide (NO₂), ozone (O₃), particulate matter less than 10 microns (PM₁₀), particulate matter less than 2.5 microns (PM_{2.5}), sulfur dioxide (SO₂) and lead (Pb). If the concentration of one or more criteria pollutants in a geographic area is found to exceed the regulated “threshold” level for one or more of the NAAQS, the area may be classified as a non-attainment area. Areas with concentrations of criteria pollutants that are below the levels established by the NAAQS are considered either attainment or unclassifiable areas.

According to the ADEE, the entire state of Arkansas is compliant with all EPA ambient air quality standards. Only ozone concentrations occasionally approach the limit of the standard. The Conformity Rule of the CAA, as amended, states that all Federal actions must conform to appropriate State Implementation Plans (SIPs). This rule took effect on January 31, 1994, and at present applies only to Federal actions in non-attainment areas (those not meeting the National Ambient Air Quality Standards for the criteria pollutants in the CAA). The state of Arkansas, including the MKARNS corridor, is considered an attainment area and is therefore exempt from the Conformity Rule of the CAA.

The MKARNS Project area has two Air Quality Control Regions (ACQR) that monitor air quality within the Arkansas River corridor in the state. The Metropolitan Fort Smith Interstate ACQR covers Benton, Washington, Crawford, and Sebastian counties, while the Central Arkansas Intrastate ACQR covers Chicot, Clark, Cleveland, Conway, Dallas, Desha, Drew, Faulkner, Garland, Grant, Hot Spring, Jefferson, Lincoln, Lonoke, Perry, Pope, Pulaski, Saline, and Yell counties. The air is clean with low levels of air emissions below national emission standards. There have been no violations of the current NAAQS established by EPA. Pollution sources along the MKARNS include local industries and vehicular emissions, including air traffic, towboats (barge traffic), pleasure boats, automobiles, and cargo hauling trucks.

4.9.1 Alternative 1 (No Action)

Under the No Action Alternative, the air quality around the MKARNS would remain the same as it 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 NAAQS established by EPA would be expected as a result of the implementation of this alternative.

4.9.2 Alternative 2 (Selected)

Implementation of the Selected Alternative would result in improved air quality impacts compared to the No Action Alternative. Since this alternative would incorporate more acreage into the Wildlife Management land classification, there would likely be a reduction

in potential development, which could lead to decreased local vehicular exhaust emissions and construction equipment activity. The increased vegetation cover would result in increased oxygen production through photosynthesis, and lower air temperatures from additional shade. No violations of the current NAAQS established by EPA would be expected as a result of the implementation of this alternative.

4.9.3 Alternative 3

Similar to the Selected Alternative, Alternative 3 would result in fewer air quality effects as compared to the No Action Alternative. This alternative would reclassify more High and Low Density Recreation to Environmentally Sensitive Areas, as compared to Alternative 2, which converted more to Wildlife Management lands. This conversion to Environmentally Sensitive Areas and Wildlife Management lands acreage would result in a reduced potential for additional development, which could lead to decreased local vehicular exhaust emissions. The increased vegetation cover would result in increased oxygen production through photosynthesis, and lower air temperatures from additional shade. No violations of the current NAAQS established by EPA would be expected as a result of the implementation of this alternative.

4.10 Demographic and Socioeconomic Resources

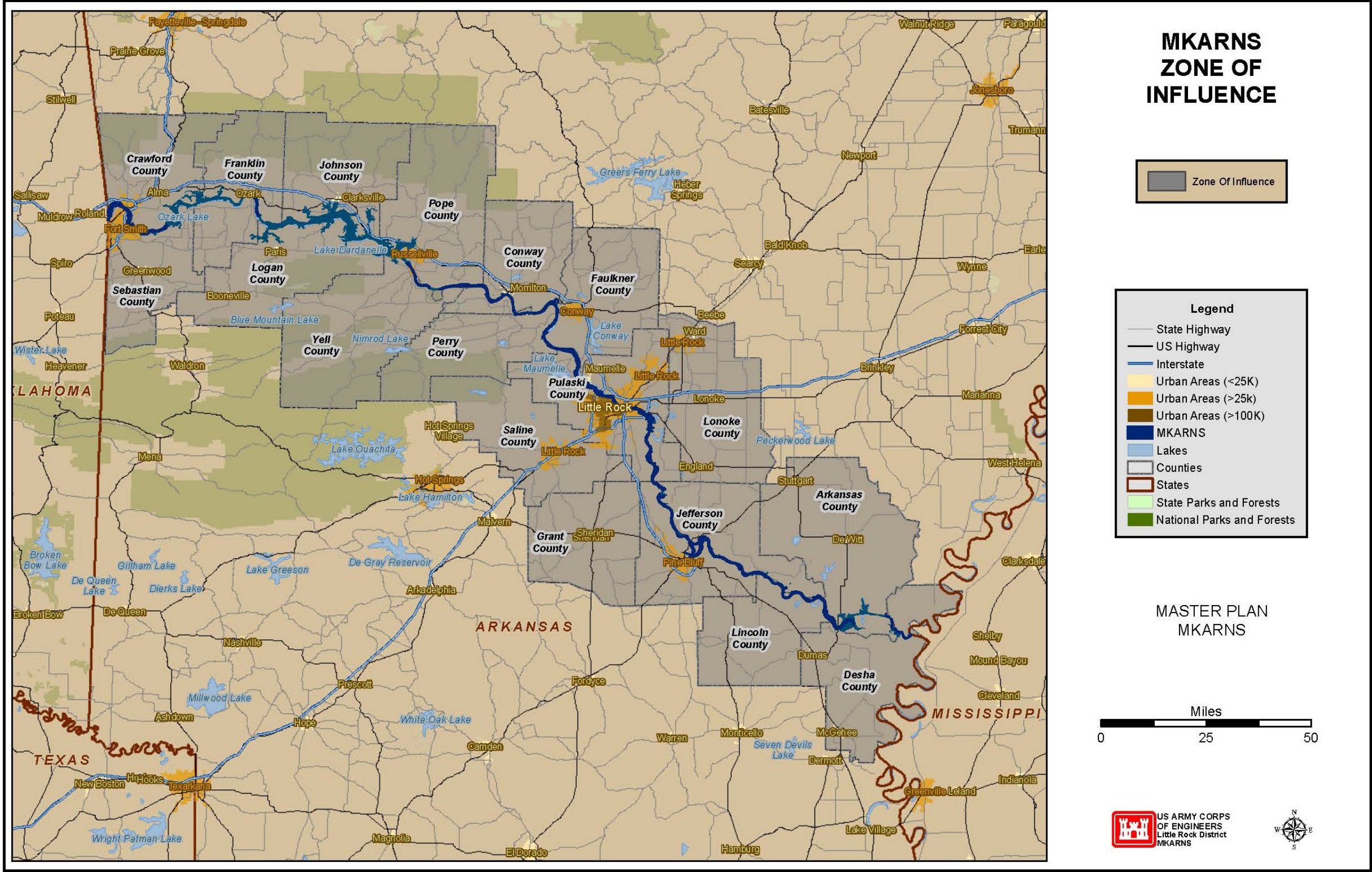
This section describes the demographic and socioeconomic characteristics for the geographic areas surrounding the MKARNS. The area of analysis includes 18 Arkansas counties (Table 4-4). The “zone of influence” (ZOI) for the purpose of this Master Plan is defined as those areas within 50-mile wide corridor centered on the MKARNS defined area (Figure 4-4). The MKARNS system under study is comprised of Dardanelle Lake, Ozark Lake, Pools 0-9, and Pool 13.

This ZOI was based primarily on historic visitation information. The demographic and socioeconomic description for the ZOI in this section of the report is summarized at the county level. The data for the counties has been aggregated into the “zone of influence” totals in the tables and figures. To determine which counties were included in the summary tables and figures, all counties that intersected or fell within the 50-mile driving radius were identified. When the ZOI is referenced in this section, it is referring to the aggregate socioeconomic and demographic data for the area. Demographic and socioeconomic data for Arkansas and the United States are provided for comparison purposes.

Table 4-4: Arkansas Counties within the MKARNS ZOI

Arkansas ZOI Counties		
Sebastian	Yell	Arkansas
Crawford	Faulkner	Jefferson
Lonoke	Grant	Johnson
Perry	Pulaski	Logan
Conway	Saline	Franklin
Pope	Lincoln	Desha

Figure 4-4: MKARNS Zone of Influence



4.10.1 Population

Data from the 2010 Census, the U.S. Bureau of Labor Statistics, and the 2020 American Community Survey were used to summarize socioeconomic conditions in the project area. Table 4-5 depicts 2010 and 2020 population estimates, as well as the estimated annual growth rate for each county in the area. The annual growth rate in recent years (2010-2020) has been a mix of positive and negative in the individual counties within the ZOI, but overall was positive for the ZOI. The sum of the annual growth rate in the ZOI between 2010 and 2020 was 2.9%. During the same timeframe, the growth rate was 0.74% in the United States and 0.33% in Arkansas. Total ZOI population was 1,181,175 (2010) and 1,215,474 (2020).

Table 4-5: Population Estimates and Trends in the MKARNS ZOI

Population	2010	2020	% Change
United States	308,745,538	331,449,281	7.354%
State of Arkansas	2,915,918	3,011,524	3.28%
Arkansas	19,019	16,722	-12.08%
Conway	21,273	20,873	-1.88%
Crawford	61,948	60,378	-2.53%
Desha	13,008	11,090	-14.74%
Faulkner	113,237	125,106	10.48%
Franklin	18,125	17,173	-5.25%
Grant	17,853	18,090	1.33%
Jefferson	77,435	65,861	-14.95%
Johnson	25,540	25,845	1.19%
Lincoln	14,134	13,037	-7.76%
Logan	22,253	21,215	-4.66%
Lonoke	68,356	74,722	9.31%
Perry	10,445	9,964	-4.61%
Pope	61,754	63,789	3.30%
Pulaski	382,748	397,821	3.94%
Saline	107,118	125,233	16.91%
Sebastian	124,744	128,400	2.93%
Yell	22,185	20,155	-9.15%
Zone of Influence (avg)	65,621	67,526	2.90%

4.10.2 Income and Employment

Key income indicators (median household income and per capita income) are presented in Table 4-6. Per capita income for counties in the project area varies, but the average capita income for the ZOI was \$25,325 in 2020. By comparison, per capita income was \$35,384 in the United States and \$27,724 in the State of Arkansas. Median household income is not available for the zone of influence but ranges from a low of \$31,855 in Desha County to a high of \$66,876 in Saline County for an average of \$47,974. The largest majority of the ZOI is employed in the

Management, Business, Science, and Arts Occupations, followed by Sales and Office Occupations, Service Occupations, Production, Transportation, and Material Moving Occupations, and Natural Resources, Construction, and Maintenance Occupations being the least occupied. Compared to the Nation and the State of Arkansas, the ZOI demonstrates the same general distribution of the overall workforce.

Table 4-6: Income and Employment Bureau of the Census, American Community Survey (2020 Estimate)

	Per Capita Income	Median Income	Total Civilian Workforce	Management, Business, Science, and Arts	Service	Sales and Office Workers	Natural Resource, Construction and Maintenance	Production and Transportation
United States	\$35,384	\$64,994	155,888,980	61,526,906	27,095,654	33,247,878	13,620,436	20,398,106
State of Arkansas	\$27,724	\$49,475	1,309,748	456,538	217,074	278,061	131,748	226,327
Arkansas	\$26,969	\$51,000	7,929	2,483	1,216	1,526	974	1,730
Conway	\$28,539	\$44,456	8,992	2,576	1,582	1,623	1,420	1,791
Crawford	\$25,460	\$48,980	25,924	7,596	4,249	6,129	2,606	5,344
Desha	\$19,090	\$31,855	4,377	1,236	889	946	535	771
Faulkner	\$27,414	\$54,191	59,134	23,803	10,129	12,703	5,084	7,415
Franklin	\$20,639	\$37,561	6,898	1,982	965	1,380	876	1,695
Grant	\$30,639	\$59,051	8,048	2,778	1,176	1,548	1,073	1,473
Jefferson	\$21,941	\$40,402	25,271	7,499	5,345	4,603	1,904	5,920
Johnson	\$22,077	\$39,346	10,398	2,966	1,601	1,949	1,100	2,782
Lincoln	\$14,182	\$46,554	3,347	938	556	713	473	667
Logan	\$22,632	\$44,232	8,991	2,219	1,568	1,695	1,105	2,404
Lonoke	\$28,446	\$59,278	33,170	11,876	4,781	7,679	4,089	4,745
Perry	\$23,030	\$44,962	3,677	1,074	531	728	557	787
Pope	\$27,414	\$46,004	26,827	8,670	5,410	4,880	2,562	5,305
Pulaski	\$33,773	\$52,930	183,975	78,697	29,390	42,471	11,484	21,933
Saline	\$31,973	\$66,876	57,987	22,124	8,266	14,231	5,659	7,707
Sebastian	\$28,623	\$47,878	58,496	19,612	9,883	12,591	5,598	10,812
Yell	\$23,008	\$47,981	9,476	2,115	1,685	1,958	1,217	2,501
Zone of Influence Totals	--	--	30,162	11,125	4,957	6,631	2,684	4,766

4.10.3 Environmental Justice

Executive Order 12898, entitled “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,” addresses potential disproportionate human health and environmental impacts that a project may have on minority or low-income communities. Thus, the environmental effects of the project on minority and low-income communities or Native American populations must be disclosed, and agencies must evaluate projects to ensure that they do not disproportionately impact any such community. If such impacts are identified, appropriate mitigation measures must be implemented.

To determine whether a project has a disproportionate effect on potential environmental justice communities (i.e., minority or low-income population), the demographics of an affected population within the vicinity of the project must be considered in the context of the overall region. Guidance from the CEQ states that “minority populations should be identified where either: (a) the minority population of the affected areas exceeds 50 percent, or (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis” (CEQ 1997).

Table 4-7 displays census data summarizing racial and ethnic characteristics of the ZOI. Table 4-8 displays poverty indicators for the ZOI. The purpose is to analyze whether the demographics of the affected area differ in the context of the broader region; and if so, do differences meet CEQ criteria for an Environmental Justice community. Based on the analysis, it does not appear that minority or low-income populations in the project area are disproportionately affected.

The poverty indicators presented in Table 4-8 indicate the ZOI is reflective of the State of Arkansas. The ZOI has a poverty percentage that is 4% greater compared to the United States.

Table 4-7: Population Distribution by Race and Ethnicity (2019)

	White Alone	Black or African American alone	American Indian and Alaska Native alone	Asian Alone	Native Hawaiian and Other Pacific Islander alone	Two or more races	Hispanic or Latino (of any race)
United States	76.4%	13.5%	1.4%	6.0%	0.2%	2.8%	18.5%
State of Arkansas	79.1%	15.8%	1.1%	1.8%	0.5%	2.2%	7.8%
Arkansas	71.8%	25.1%	0.3%	0.8%	0.0%	1.9%	3.4%
Conway	84.8%	11.4%	0.9%	0.4%	0.0%	2.5%	4.0%
Crawford	90.7%	1.7%	2.6%	1.5%	0.1%	3.3%	8.1%
Desha	49.4%	47.9%	0.5%	0.7%	0.1%	1.4%	6.4%
Faulkner	83.6%	12.2%	0.7%	1.3%	0.1%	2.2%	4.2%
Franklin	94.4%	0.9%	1.6%	1.1%	0.2%	1.8%	3.2%
Grant	94.7%	2.7%	0.5%	0.4%	0.1%	1.7%	3.0%
Jefferson	39.8%	57.4%	0.4%	0.9%	0.1%	1.4%	2.2%
Johnson	91.6%	2.2%	1.2%	2.7%	0.1%	2.1%	14.3%
Lincoln	67.6%	30.0%	0.6%	0.4%	0.0%	1.5%	4.2%
Logan	93.2%	1.5%	1.2%	2.3%	0.0%	1.9%	3.0%
Lonoke	89.8%	6.3%	0.7%	0.9%	0.1%	2.1%	4.6%
Perry	94.5%	2.0%	1.0%	0.4%	0.0%	2.1%	3.1%
Pope	92.1%	3.3%	1.0%	1.2%	10.0%	2.3%	9.6%
Pulaski	57.2%	37.9%	0.4%	2.3%	0.1%	2.2%	6.2%
Saline	87.9%	8.4%	0.6%	1.3%	0.1%	1.6%	5.1%
Sebastian	81.8%	7.0%	2.4%	4.7%	0.2%	3.8%	14.8%
Yell	93.9%	2.1%	1.1%	1.4%	0.1%	1.5%	20.5%
Zone of Influence (avg)	81.0%	14.4%	1.0%	1.4%	0.6%	2.1%	6.7%

Table 4-8: Poverty Indicators and Number of Children

Area	Unemployment Rate	Percent of Population in Poverty	Percent of Population Under 18 Years Old
United States	3.7%	11.4%	18.5%
Arkansas	3.2%	15.2%	23.7%
Zone of Influence (avg)	3.5%	15.4%	23%
Source: U.S. Bureau of the Census, American Community Survey (2019 Estimate)			

4.10.4 Alternative 1 (No Action)

It is expected that the No Action Alternative would have no direct or indirect impacts to socioeconomics in the counties surrounding the MKARNS. Of the available land acreage, 79% is classified as either High Density Recreation, Low Density Recreation, or has no allocation. While the potential for some development exists along the MKARNS in these classifications, the current population growth and demographic makeup of the population are expected to remain

similar to the rates and percentages the area currently experiences. Housing units and their values would not be affected if the No Action Alternative is implemented. It is likely that changes in the socioeconomic conditions of the MKARNS area would be the result of outside influences and not those created by the No Action Alternative.

4.10.5 Alternative 2 (Selected)

The Selected Alternative is likely to have no direct or indirect impacts on socioeconomics in the counties surrounding MKARNS as it conforms to current recreational usage patterns. Under Alternative 2, it is unlikely that the demographic makeup of the population would be affected. While visitation to the MKARNS may increase if further recreational development occurs, it is not expected that housing units and their values or the economy would change as a result of this alternative. It is likely that changes in the socioeconomic conditions of the MKARNS area would be the result of outside influences and not those created by the Selected Alternative.

4.10.6 Alternative 3

Similar to the Selected Alternative, Alternative 3 is expected to have less-than-significant impacts on socioeconomics as it conforms to current recreational usage patterns. This alternative allocates 24% of available acreage along the MKARNS as High or Low Density Recreation, allowing for potential development to occur; however, no impacts to population growth, demographic, or economic factors are anticipated as a result of this potential further development. It is likely that changes in the socioeconomic conditions of the MKARNS area would be the result of outside influences and not those created by Alternative 3.

4.11 Recreation Resources

The recreational opportunities and potential of the MKARNS is of great importance to the Northwest, Central, and Lower Delta regions of Arkansas. The McClellan-Kerr Project offers many recreational activities such as swimming, boating, fishing, picnicking, camping, hunting, hiking, wildlife viewing, and other sports-related activities. There are 91 recreation areas on the Arkansas River. Of these public use areas, the Corps of Engineers operates 17 campgrounds, 10 day-use areas, 14 water access points, and two land access points. In 2012, the Little Rock District prepared a Recreation Adjustment Plan that evaluated all the parks on the Arkansas River. Implementation of the plan led to full and partial closures, and/or the leasing of several public use areas along the river which included Bigelow, Old Ferry Landing, Pontoon, Sequoya, Cypress Creek, Sweeden Island, Cabin Creek, Cane Creek, Delaware, Dwight Mission, Dublin, Citadel Bluff, Reed Mountain, and River Ridge parks.

No significant park operational changes from current management practices are included in this Master Plan. Since 1988, parks have been evaluated using an efficiency review process. Those parks chosen for closure due to operational efficiencies were offered for lease through standard leasing procedures. All leased parks returned to the USACE that do not qualify for the exceptions to policy in Appendix B of ER 1130-2-550 will be closed. The criteria discussed in this section are of a basic nature to be used for the planning, development, and management of the MKARNS Project's public use areas with consideration being given to the latest trends in recreational activities and needs. These criteria furnish guidelines for determining the type and number of facilities needed to satisfy the current and projected demand and furnishes guidelines for serviceability, operation, and maintenance of facilities. Universal accessibility will be

included in the design of new facilities. Engineering and Design Recreational Facility and Customer Service Standards can be referenced in Engineer Manual (EM 1110-1-400. This manual provides guidance for the rehabilitation of existing and the design and construction of new recreation areas and facilities, and recreation program evaluation activities at recreation areas managed by the USACE.

The setting of facilities and development of parks should be of the highest quality, should be safe, and should promote the health, welfare, and aesthetic enjoyment of the public. The setting of each facility should result in the compromise between conservation of the natural environment and providing for public use. Only the most adaptable terrain should be used for setting of overall facilities with consideration given to the natural features so that the most scenic parts of the site may remain undeveloped for the enjoyment of visitors. Facility setting should be in harmony as much as feasible with the environment in which they are to be placed to avoid excessive grading and clearing for site preparation.

Multiple parks, boat ramps, land access points, etc. exist on the Arkansas River. Some are Corps-operated, and some are operated by non-profit organizations, city, county, or state agencies. Park maps can be found in Appendix C of the Master Plan. If adequate funding becomes available for park operation, recreation areas or portions of recreation areas will be brought up to current design standards and future development may occur in the MKARNS parks and recreation areas.

The MKARNS project contains 66 High Density recreation areas and 19 Low Density recreation areas. These areas are enumerated by navigation pool due to the large geographical area covered by the project. Within each navigation pool, areas are further split out to delineate high- and low-density recreation land classifications. Only minimal development and infrastructure that supports passive recreational use should occur in low density areas. If the area is leased, operational costs are the responsibility of the Lessee. Table 4-9 depicts the number of High Density and Low Density recreation areas characteristic of each pool. Chapter 2, Section 2.17.2 of the updated Master Plan provides pool by pool descriptions of these recreation areas.

Table 4-9: Number of High Density and Low Density Recreation Areas by Pool

Pool	# of HD Recreation Areas	# of LD Recreation Areas
Pool 1	1	0
Pool 2	8	0
Pool 3	3	0
Pool 4	2	0
Pool 5	2	1
Pool 6	4	0
Pool 7	5	0
Pool 8	5	0
Pool 9	3	0
Pool 10 (Lake Dardanelle)	20	14
Pool 12 (Ozark Lake)	10	3
Pool 13	3	1

4.11.1 Alternative 1 (No Action)

Under the No Action Alternative, there would be no direct or indirect impacts on recreation resources within the MKARNS. Provision of recreational facilities and services would continue along the MKARNS without an update to the MKARNS Master Plan. The No Action Alternative consists of 8,340.5 acres classified as High Density Recreation and 21,141.6 acres are classified as Low Density Recreation. However, these designations do not represent the real uses of the MKARNS lands. The plan by which the Resource Manager and staff operate under the No Action Alternative 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. A total of 6,976.8 acres would remain unclassified, generating confusion about which uses are allowed in these areas.

4.11.2 Alternative 2 (Selected)

Under the Selected 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 MKARNS while sustaining the natural, cultural, and socioeconomic resources of the area and reflecting the current management and operation of lands at MKARNS. Current High and Low Density Recreation lands, comprising 64% of available acreage, would be reduced to 23%, while Environmentally Sensitive Areas and Wildlife Management lands, at 3% and 19%, respectively, would change to 5% and 67% of available acreage. While this alternative decreases the amount of land classified for recreation, these reclassifications reflect current usage, with fishing, boating, hunting, and wildlife viewing dominating the recreational activity on the MKARNS. The proposed increase in Wildlife Management and Environmentally Sensitive Areas classified lands would assist in forging partnerships between public and private entities for recreational and wildlife conservation opportunities. The land that would be reclassified from Low and High Density Recreation to Environmentally Sensitive Areas and Wildlife Management would create a reduced potential for additional private boat docks for fishing and water access but would increase the potential to develop nature trails and wildlife viewing areas, thus potentially benefitting recreation around the MKARNS and its adjacent lands. Because these reallocations reflect current recreation and usage patterns, no significant direct or indirect impacts are expected to result from the implementation of the Selected Alternative.

4.11.3 Alternative 3

Alternative 3 does not deviate significantly from the Selected Alternative in terms of provision of recreational opportunities on the MKARNS. The land that would be reclassified from Low and High Density Recreation to Environmentally Sensitive Areas and Wildlife Management would create a reduced potential for additional private boat docks for fishing and water access but would increase the potential to develop nature trails and wildlife viewing areas, thus potentially benefitting recreation around the MKARNS and its adjacent lands. No significant direct or indirect impacts are expected as a result of Alternative 3.

4.12 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.

MKARNS Project staff conduct numerous water safety programs and public announcements to educate children and project visitors about ways to be safe in recreation areas and on the water.

Park Rangers provide visitor assistance and work with city, county, and state law enforcement agencies to ensure public safety on public lands. In coordination with the U.S. Coast Guard and AGFC, water safety is provided and regulations are enforced on the Arkansas River, as their respective budgets will allow.

4.12.1 Alternative 1 (No Action)

Safety of project visitors and project staff are highest priority in daily project operations. The No Action Alternative designates 69% of available acreage as High or Low Density Recreation, under which the land could be developed. Development of improved or new recreation facilities could potentially increase recreation on the MKARNS and result in increased congestion, creating additional safety issues. Additional development could also degrade water quality, resulting in potential health issues. Negligible adverse impacts are expected under the No Action Alternative.

4.12.2 Alternative 2 (Selected)

The recreational opportunities, balanced with conservation of the natural environment, could lead to better health, both mental and physical, of the visiting population. Implementation of the Selected Alternative would likely reduce the potential for recreation congestion. The increase in Wildlife Management Areas could potentially increase exposure to insects and animals, which is generally understood by the public who utilize these lands. No significant direct or indirect impacts to health and safety are expected under the Selected Alternative.

4.12.3 Alternative 3

Similar to the impacts in the Selected Alternative, Alternative 3 could reduce the potential for additional park development as High Density Recreation acreage decreased. This alternative would potentially decrease recreation congestion while promoting alternative recreation in Wildlife Management lands, increasing exposure to insects and animals. No significant direct or indirect impacts to health and safety are expected under Alternative 3.

4.13 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 the MKARNS in many areas provide a natural setting that is aesthetically pleasing, as well as buffering the river 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, mowing, 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.

4.13.1 Alternative 1 (No Action)

Under the No Action Alternative, the visual character of the landscape could slowly change due to potential continued development. Previously natural areas could be converted to developed facilities. This would increase the amount of visual contrast between the natural and developed landscapes along the river. Visual contrast is a measure of impact on visual quality and aesthetics. Park development would eliminate the unspoiled and untamed aesthetic of this landscape. Road and utility line corridors also impact aesthetics and visual resources along the MKARNS. Since the river is partially surrounded by pockets of residential and commercial development, these demands would continue to increase. In some instances, requests for new shoreline use permits are in areas where the natural vegetation and landscape would be disturbed. Under the No Action Alternative, there are potential long-term, minor impacts to local aesthetics if development ensues.

4.13.2 Alternative 2 (Selected)

The conversion of Low Density and High Density Recreation lands to Wildlife Management acreage under the Selected Alternative would continue to preserve the sense of relatively undeveloped land. The natural vegetation would enhance the views of the people recreating on the MKARNS. Under this alternative, property owners could work with USACE staff to determine the appropriate vegetation management measures for their specific property location adjacent to the shoreline of Lake Dardanelle. Under the Selected Alternative, development would be limited and Wildlife Management and Environmentally Sensitive Area land classifications increased. While the Selected Alternative protects natural lands, this reflects current usage patterns, therefore no significant direct or indirect impacts to aesthetics are expected.

4.13.3 Alternative 3

Implementation of Alternative 3 would have similar aesthetic impacts as the Selected Alternative. Under this alternative, most of the High and Low Density Recreation acreage would be converted to Environmentally Sensitive Areas and Wildlife Management lands. This reduces the potential for additional development and clearing, thus preserving the natural scenic beauty of the river. As the land reclassifications reflect current land use, no significant direct or indirect impacts to aesthetics are expected.

4.14 SUMMARY OF ENVIRONMENTAL CONSEQUENCES

The following table summarizes the consequences and benefits resulting from Alternative 1 (No Action), Alternative 2 (Selected Alternative), and Alternative 3 for each of the assessed resource categories.

Table 4-10: Resources Likely Affected with Implementation of Alternatives

Resource Category	Alternative 1 (No Action)	Alternative 2 (Selected)	Alternative 3
Climate, Topography, Geology and Soils	Under the No Action Alternative, there is potential for long-term negligible adverse impacts to climate, topography, geology, and soils. Further development along the river and pool impoundments could result in increases in greenhouse gas emissions, vegetation removal, erosion, sedimentation, and increases in impervious surfaces.	Under the Selected Alternative, increases in Wildlife Management and Environmentally Sensitive lands would likely result in negligible beneficial impacts over time to climate, topography, geology, and soils. This alternative prevents excesses development, therefore reducing potential greenhouse gas emissions, maintaining natural vegetation, and preventing erosion and sedimentation.	Alternative 3 would likely result in negligible beneficial impacts over time to climate, topography, geology, and soils as it limits potential future development and increases Wildlife Management and Environmentally Sensitive allocations. Potential greenhouse gas emissions, vegetation removal, and erosion and sedimentation would be reduced.
Water Resources	The hydrology and groundwater components of the MKARNS would not change from the existing condition due to the implementation of the No Action Alternative. If development occurs within the High and Low Density allocations, water quality may face negligible adverse impacts from increased storm water velocity, scour, and sedimentation. Fish species and habitat may incur negligible adverse impacts from vegetation removal and water quality depletion.	The Selected Alternative would likely result in negligible beneficial impacts to hydrology and groundwater as maintaining natural vegetation increases rainfall absorption and slows runoff velocity. Minor long-term benefits to water quality are expected as protecting vegetation would reduce erosion, sedimentation, and pollutants; increase water clarity; and decrease turbidity and sediment deposition. These benefits would also serve to improve fish habitat.	Alternative 3 would result in impacts similar to the Selected Alternative, with negligible beneficial impacts to hydrology and groundwater, minor long-term impacts to water quality, and minor beneficial impacts to fishery resources.

Resource Category	Alternative 1 (No Action)	Alternative 2 (Selected)	Alternative 3
Terrestrial Resources	Under the No Action Alternative, there is no modification of existing Low or High density acreage. Based on this, the potential exists for continual degradation of shoreline vegetation due to probable increased development and subsequent vegetation removal/mowing activities, resulting in minor adverse impacts to flora and fauna species.	Implementation of the Selected Alternative would likely have a minor beneficial impact on flora and fauna species as a result of increasing Wildlife Management and Environmentally Sensitive land designations, thereby preserving natural vegetation and maintaining habitat and food sources.	Similar to the Selected Alternative, Alternative 3 would likely have a minor beneficial impact on flora and fauna species as a result of increasing Wildlife Management and Environmentally Sensitive land designations, thereby preserving natural vegetation and maintaining habitat and food sources. However, there is greater potential for development within Low Density designations as compared to the Selected Alternative.
Threatened & Endangered Species	The No Action Alternative could have adverse impact on any listed Threatened, Endangered, Protected, or Special Status Species due to the potential for vegetation removal in the High and Low Density acreage.	The Selected Alternative would likely have no impact on listed Threatened, Endangered, Protected, or Special Status Species. Due to the increase in Wildlife Management lands, vegetation would be protected and there may be some benefits to both terrestrial and aquatic listed species, however land use patterns would remain the same, so no direct impact is expected. USACE has determined that implementation of Alternative 2 would have No Effect on any federally-listed species that may occur in the Project Area.	Alternative 3 would likely have no impact on Threatened, Endangered, Protected, or Special Status Species. Increases in Wildlife Management lands protect habitat from development, so there may be some positive impacts to listed species. Potential development in Low Density lands is not expected to cause significant impacts. USACE has determined that implementation of Alternative 3 would have No Effect on any federally-listed species that may occur in the Project Area.
Wetlands	The No Action Alternative could have minor long-term adverse impact on wetlands around the river due to the potential for vegetation removal in the High and Low Density shoreline acreage.	The Selected Alternative would likely have long-term, negligible benefits to wetlands. Due to the increase in Wildlife Management lands, there may be some positive benefits to wetlands by retaining shoreline vegetation in the bottom land hardwood wetlands along the inlet bays and river shoreline.	Alternative 3 would likely have long-term, negligible benefits to wetlands around the lake. Positive impacts come from retention of shoreline vegetation, which helps preserve terrestrial wetlands and enhances aquatic wetland habitat quality.

Resource Category	Alternative 1 (No Action)	Alternative 2 (Selected)	Alternative 3
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 potential development.	Under the Selected Alternative, increases in Wildlife Management and Environmentally Sensitive acreage would protect cultural resources and historic properties from development, therefore providing long-term, minor beneficial impacts.	Under Alternative 3, the amount of Low Density and High Density acreage would decrease. This alternative, while having a slightly larger potential for development as compared to the Selected Action, would still result in long-term, minor beneficial impacts to cultural resources
Air Quality	Under the No Action Alternative, no direct or indirect impacts to air quality around the lake are expected. There could be an increase in vehicular exhaust emissions due to localized development and associated construction equipment, however this would be less-than-significant. No violations of the current National Ambient Air Quality Standards (NAAQS) established by the EPA would be expected under this alternative.	Implementation of the Selected Alternative would reduce negative air quality impacts as compared to the No Action Alternative due to a decrease in High and Low Density acreage and thereby a decrease in future development. This potential beneficial impact is expected to be negligible.	Implementation of Alternative 3 would reduce potential impact to existing air quality compared to the No Action Alternative due to a decrease in High and Low Density acreage and thereby a decrease in future development. This potential beneficial impact is expected to be negligible.

Resource Category	Alternative 1 (No Action)	Alternative 2 (Selected)	Alternative 3
Socioeconomics	No direct or indirect impacts to socioeconomics are expected to result from the No Action Alternative. While this alternative allows for potential for future development in the Low Density, High Density, and No Allocation land classifications, further development is expected to have a less-than-significant impact on socioeconomics.	The Selected Alternative is likely to have no direct or indirect impacts to socioeconomics in the counties surrounding the MKARNS. While this alternative limits potential future development, it conforms to current usage patterns, therefore the land reclassification is not expected to impact present socioeconomic factors.	Similar to the Selected Alternative, Alternative 3 is likely to have no direct or indirect impacts to socioeconomics in the counties surrounding the MKARNS. While this alternative limits potential future development, it conforms to current usage patterns, therefore the land reclassification is not expected to impact present socioeconomic factors.
Recreation Resources	Provision of recreational facilities and services would continue at the MKARNS without an update to the MKARNS Master Plan, therefore no direct or indirect impacts to recreation are expected. However, the Master Plan would not accurately reflect the current status of project facilities. Lands with no classification would remain unclassified.	The Selected Alternative would reclassify land to reflect current uses, therefore no direct or indirect impacts to recreation resources are expected. Implementation of this alternative would allow continued public use of the MKARNS while sustaining the natural, cultural, and socioeconomic resources of the area. Current unclassified lands would have a land classification.	Alternative 3 would likely have no significant direct or indirect impacts to recreation resources. This alternative would allow for continued public use of the MKARNS while balancing natural, cultural, and socioeconomic objectives.

Resource Category	Alternative 1 (No Action)	Alternative 2 (Selected)	Alternative 3
Health & Safety	<p>The No Action Alternative would retain current land classifications, in which potential development could impact water quality. Continued development may lead to increased water and land traffic, with the potential for increased accidents and pollution. No impact to a negligible adverse impact is expected.</p>	<p>Under the Selected Alternative, the availability of recreational opportunities, balanced with conservation of natural environment, could lead to better health, both mental and physical, of visiting populations. Risks associated with recreation will not change. No significant direct or indirect impacts to health and safety are expected.</p>	<p>Under Alternative 3, potential for land-based recreational opportunities, such as hiking, hunting, and wildlife observation as well as fishing and boating experiences remain available. Risks associated with recreation will not change. No significant direct or indirect impacts to health and safety are expected.</p>
Aesthetics	<p>Under the No Action Alternative, the visual characteristics surrounding the MKARNS landscape could potentially change due to continued development in High and Low Density land classifications. This could result in long-term, minor adverse impacts to the aesthetics along the MKARNS.</p>	<p>Under the Selected Alternative, the wide scenic variety of the MKARNS would be protected from potential development in Wildlife Management and Environmentally Sensitive allocations. A majority of the natural landscape will be preserved, therefore no significant direct or indirect impacts to aesthetics are expected.</p>	<p>Alternative 3 would allow less potential development by converting High and Low Density lands to Wildlife Management and Environmentally Sensitive, which would maintain the present scenic beauty and/or aesthetics of the MKARNS corridor and result in no direct or indirect impacts.</p>

5. 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 current MKARNS Master Plans were developed over 46 years ago (1976, 1977), and original estimates of future population and land use do not align with current demographics. The Master Plan revision will reclassify the Government lands managed by USACE along the MKARNS based on environmental and socioeconomic considerations, public input, and an evaluation of past, present, and forecasted trends.

5.1 Past Impacts Within the Zone of Interest

The Rivers and Harbors Act of 1946 authorized the development of the Arkansas River and its tributaries for the purposes of navigation, flood control, hydropower, and recreation. Public Law 91-649 stated that the project would be known as the McClellan-Kerr Arkansas River Navigation System. Subsequent acts authorized water supply and fish and wildlife as project purposes. Construction of the project began in 1957 and was opened to navigation in 1971.

After flood events, most recently the flood of 2019, maintenance to recreation facilities, dams, levees, hydroelectric power plants, and other structures along the Arkansas Rivers occurred. Dredging was also implemented after channel sediments migrated and depths decreased below the nine-foot depths required for navigation. In addition to emergency maintenance, routine maintenance occurs periodically to ensure all functions of the MKARNS are operating properly and safely.

5.2 Current and Reasonably Foreseeable Projects Within and Near the Zone of Interest

Multiple cities, including Fort Smith, Russellville, Conway, Little Rock, and Pine Bluff, exist along the Arkansas River. Demographic trends in these urban cities show slight population growth, so it can be expected that urban growth will continue.

To accommodate this urban growth, the Arkansas Department of Transportation (ARDOT) and other local stakeholders are constantly working to combat traffic and safety issues. Currently, ARDOT is working to reconstruct and expand I-30 between Little Rock and North Little Rock, where the highway crosses the Arkansas River. ARDOT is also planning to construct I-49 from Highway 22 in Sebastian County to I-40 in Crawford County, and this undertaking entails a bridge crossing over the Arkansas River near Barling. In the future, ARDOT will continue to maintain bridges crossing the Arkansas River, including repairs and expansions as conditions warrant.

Additional proposed projects in or along the Arkansas River are detailed below.

5.2.1 MKARNS 12 Foot Channel Deepening

To optimize commercial navigation productivity, plans are in place to deepen the Arkansas River

channel from a minimum depth of nine feet to a minimum depth of 12 feet. Deepening the channel would likely result in an increase in barge traffic; however, this alteration is not likely to have a significant impact on the MKARNS environmental conditions as a majority of the channel is already 15 feet or greater in depth. Additionally, some approved dredged material disposal sites have reached capacity and new disposal sites are required to continue channel maintenance activities. Mitigation would be conducted for adverse impacts associated with the channel deepening project. Mitigation for terrestrial and aquatic impacts would consist of a combination of avoidance, minimization, and compensation. The mitigation has been developed in coordination with the USFWS, AGFC, and the Oklahoma Department of Wildlife and Conservation. The terrestrial habitat mitigation plan has been thoroughly evaluated. The mitigation plan provides for significant further study of habitat to be used to adapt mitigation features in conjunction with close interagency coordination. Mitigation would be associated with:

- Terrestrial habitat loss associated with the disposal of dredged material;
- Aquatic resources impacts and habitat loss associated with dredging and dredged material disposal;
- Aquatic habitat loss associated with raising and extending dikes and revetments; and
- Federal threatened and endangered species (USACE 2005).

5.2.2 MKARNS Modifications, Three Rivers Southeast Arkansas

In 2018, the Three Rivers Southeast Arkansas Feasibility Report and Integrated Environmental Assessment was completed. This study was conducted by the USACE at the request of the Arkansas Waterways Commission to evaluate modifying the MKARNS to ensure the long-term sustainability of reliable navigation on the MKARNS. The study area is located at the confluence of the Arkansas, White, and Mississippi rivers in Arkansas and Desha counties, Arkansas. Here, head cutting and erosion across the present isthmus is a concern and could result in an increased likelihood that a cutoff could form between the Arkansas and White rivers. If a cutoff formed, navigation through the project area would cease for extended periods, sediment deposition would increase dredging requirements, and an estimated 200 acres of bottomland hardwood forest in the path of a cutoff would be destroyed as land converted to open water.

To prevent formation of a cutoff, USACE Little Rock District is constructing a multi-component soil-cement system consisting of a new containment structure, a relief channel through the historic cutoff, and opening the Owens Lake structure between Owens Lake and White River. Opening the Historic Cutoff would reduce maximum head differentials across the isthmus allowing USACE to better control the location of future overtopping events and would decrease the duration of head differentials and flow velocities, and hence erosion across the isthmus. Additionally, the opening would restore ecosystem functions of Webfoot Lake and reduce erosion on its east side. Planned modifications near the Melinda Structure would reconnect Owens Lake to its former southern limb, thereby returning open water ecosystem functions to the oxbow portion of the flooded bottomland hardwood forest.

This Recommended Plan balances structural and environmental sustainability requirements. The plan would have few long-term environmental impacts and would result in habitat loss of only 4.4 Functional Capacity Units in the form of lost bottomland hardwood forest. Mitigation would consist of purchasing and reforesting 20 acres of fallow fields near or adjacent to the Dale

Bumpers White River National Wildlife Refuge. Short-term impacts during construction such as increased turbidity, decreased air and visual quality, disruption in wildlife and aquatic use of the construction area would be temporary and return to baseline conditions after construction (USACE, 2018).

5.3 Analysis of Cumulative Analysis of Cumulative Impacts

Impacts on each resource were analyzed according to how other actions and projects within the zone of interest might be affected by the No Action Alternative and Selected Alternative. Impacts can vary in degree or magnitude from a slightly noticeable change to a total change in the environment. For the purpose of this analysis, the intensity of impacts will be classified as negligible, minor, moderate, or major. These intensity thresholds are defined in Section 4.0. Moderate growth and development are expected to continue in the vicinity of the MKARNS, as well as various projects associated with the navigation channel operation. Impacts associated with the MKARNS 12' channel dredging will be fully mitigated, resulting in no net loss of habitat quality. Therefore, significant cumulative adverse impacts on resources would not be expected when added to the impacts and activities associated with the No Action Alternative, Alternative 2, or the Selected Alternative. A summary of the anticipated cumulative impacts is presented below.

5.3.1 Climate

The Selected Alternative would neither affect nor be affected by the climate, and it is not likely that any current or future projects would either. Therefore, implementation of the revised land use classifications in the 2022 Master Plan Revision, when combined with other existing and proposed projects in the region, would not result in major cumulative impacts on climate.

5.3.2 Topography, Geology, and Soils

Cumulative impacts resulting from the Selected Alternative on topography, geology, and soils within the area surrounding the MKARNS, when combined with past and Selected Alternatives in the region, are expected to be minimal. Dredging anticipated to occur in the MKARNS 12' Channel Deepening would only impact select areas along the Arkansas River. Dredged materials would be deposited at predetermined sites, which may alter the topography of said sites, but planned mitigation measures and use of Best Management Practices would alleviate much of the impact.

Cumulative impacts on topography, geology, and soils within the area surrounding the MKARNS, when combined with past and proposed actions in the region, are anticipated to be short-term and minor.

5.3.3 Aquatic Environment

The Selected Alternative would likely result in negligible, indirect benefits to aquatic resources by slowing runoff velocity, improving water quality and clarity, and decreasing turbidity and sediment deposition. These impacts would thereby improve fish habitat.

The dredging anticipated in the MKARNS 12' Channel Deepening project is likely to have temporary adverse impacts on the aquatic environment. Dredging could reduce water levels;

cause increased water velocity downstream and thereby possible flooding; directly affect physical habitat; and disrupt riverine processes. As the USACE plans this project, considerations will be made to minimize if not avoid altogether these potential risks to aquatic resources.

Although this project would cause adverse impacts to the water resources, enhancements to fish habitat have been made in conjunction of the project since the early 2000s. Habitat improvement is periodically conducted by notching dikes and revetments, also known as river training structures, along the MKARNS to create calmer, more stable waters behind these structures to be used by various fish species for refuge during high flows as well as spawning.

Cumulative impacts on water resources within the MKARNS area, when combined with past actions in the region and the Selected Alternative, are anticipated to be short-term, negligible adverse effects.

5.3.4 Terrestrial Resources

The Selected Alternative would allow land management and land uses to be compatible with the goals of good stewardship of natural resources. The Selected Alternative would support missions associated with wildlife conservation while complying with conservation principles and objectives outlined in the 2022 MKARNS Master Plan revision. Direct, long-term, beneficial impacts on terrestrial resources would occur as a result of implementing the reclassifications outlined in the 2022 Master Plan Revision.

The MARNS 12' Channel Deepening project would allot area along the Arkansas River as dredged material disposal sites to be used during the project's dredging operations or reserved for future use. Any terrestrial resources, including vegetation and wildlife habitat, lost during this operation will be mitigated for according to all applicable Federal laws. The same principle would apply to any natural resources harmed or lost in the construction of the Three Rivers project.

Therefore, implementation of this new Master Plan, when combined with other existing and proposed projects on the region, would result in no net adverse cumulative impacts on terrestrial resources along the MKARNS.

5.3.5 Threatened and Endangered Species

All three alternatives considered would not adversely impact threatened, endangered, or special status species within the project area. Increasing land area under the Wildlife Management and Environmentally Sensitive Area classifications will beneficially protect important habitat. Should Federally listed species change in the future (i.e. delisting of the Least Turn or other species or listing of new species), associated requirements will be reflected in revised land management practices in coordination with the USFWS. The USACE would continue to work with the USFWS and ANHC to preserve, enhance, and protect critical wildlife habitat resources.

Projects proposed along the MKARNS system are not anticipated to impact threatened and endangered species as they will be coordinated with the appropriate resource agencies. Mitigation efforts for the MKARNS 12' Channel Deepening and Three Rivers projects will reinstate any habitat lost during the projects to achieve no net loss. No ESA violations are expected to occur as a result of the 12' Channel Deepening as no Federally-listed mussel species

exist within the project extent.

The Selected Alternative and current and future projects in area would result in no net direct or indirect adverse cumulative impacts to threatened and endangered species.

5.3.6 Wetlands

The Selected Alternative is likely to have long-term, negligible benefits to wetlands as the land reclassifications would protect an increased area under Wildlife Management Lands, resulting in shoreline vegetation retention in the bottomland hardwood wetlands along the inlet bays and river shoreline. The proposed MKARNS 12' project and Three Rivers project both include in-channel construction or dredging and disposal of dredged material that would adversely impact wetlands. Under both projects, mitigation efforts to account for lost bottomland hardwood habitat and waters of the U.S. would comply with all Federal laws and regulations. While these future projects may significantly, adversely impact wetlands, these effects would be short-term as mitigation efforts would compensate for the adverse impacts. Collectively, the 2022 MKARNS Master Plan Revision with current and future projects is likely to have no significant direct or indirect cumulative impacts to wetlands.

5.3.7 Archaeological and Historic Resources

Under the Selected Alternative, increases in Wildlife Management and Environmentally Sensitive acreage would protect cultural resources and historic properties from development, therefore providing long-term, minor beneficial impacts. Dredging and/or construction along the Arkansas River could adversely disturb known or unknown cultural resources or historic properties, but the entities conducting these activities would follow all regulations pertaining to cultural resources, so no impact is expected. Cumulatively, the Selected Alternative and current and proposed projects within the study area are not likely to have any direct or indirect impacts to archaeological and historic resources.

5.3.8 Air Quality

Along Federal lands surrounding the MKARNS, activities that could adversely contribute to air emissions in the area are likely few and slight in nature. Vehicle traffic along area roadways and routine daily activities in nearby communities contribute to current and future emission sources. Further growth and development could cause cumulative impacts to air quality in the study area. Emissions from the proposed civil works construction projects would likely have minor, short-term adverse impacts on air quality within project radii as a result of fuel-powered heavy equipment and dust and dirt agitation. Urban growth and development could have negligible, long-term adverse impacts if population density continues to rise in communities around the MKARNS. The Selected Alternative along with current and proposed projects within the project footprint are likely to have cumulative short-term, negligible adverse impacts to air quality.

5.3.9 Demographic and Socioeconomic Resources

The Selected Alternative would not result in the displacement of persons (minority, low-income, children, or otherwise) as a result of implementing the proposed land reclassifications, resources objectives, or resource plans proposed in the 2022 Master Plan. Current and future construction projects have the opportunity enhance navigation, provide local jobs, and enable connectivity, providing minor beneficial impacts to socioeconomics within the study area. Therefore, the

effects of the Selected Alternative and other current and projected projects would have both direct and indirect minor, beneficial effect on socioeconomic resources within the project footprint.

5.3.10 Recreation Resources

Cumulatively, current and foreseeable projects are not likely to impact recreation resources within the study area footprint. Recreation availability on and along the MKARNS will continue under the proposed land reclassifications, and these changes reflect historic visitation and current usage patterns. The conversion of these lands would have no effect on current or projected public use, nor should any other current or future projects. Therefore, the Selected Alternative, when combined with other existing and proposed projects in the region, would result in no cumulative impacts on recreation resources.

5.3.11 Health and Safety

No health or safety risks would be created by the Selected Alternative. The purpose of the MKARNS 12' Channel Deeping project is to reduce flooding along the Arkansas River to promote reliable navigation by managing flow, which inherently reduces risks to health and safety of local community members. The effects of implementing the 2022 MKARNS Master Plan Revision, when combined with other ongoing and proposed projects in the MKARNS area, is not likely to create any direct or indirect adverse impacts within the study area.

5.3.12 Aesthetics

No significant direct or indirect impacts to aesthetic resources along the MKARNS system are expected from the implementation of the 2022 MKARNS Master Plan. Activities within the channel including dredging and construction may detract from the visual appeal of the river system; however, these would be negligible and temporary in nature. Construction of the I-49 expansion would create a new highway crossing the Arkansas River, which would detract from the scenery; however, there is a pre-existing highway, I-59, just upstream of the proposed expansion, so the aesthetics of that specific river segment would not be altered significantly. Cumulatively, the Selected Alternative combined with current and future projects in the region would result in negligible adverse cumulative impacts on the aesthetic resources along the MKARNS.

6. ENVIRONMENTAL COMPLIANCE

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

Table 6-1: Federal Act/Executive Order Compliance

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
<i>N/A — not applicable; C – Compliant</i>		

6.1 Fish and Wildlife Coordination Act

The Corps is required to coordinate with the USFWS and ANHC 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 is pending; no concerns are anticipated.

6.2 Endangered Species Act

The Endangered Species Act requires the determination of possible effects on species or degradation of habitat critical to Federally-listed endangered or threatened species. The USACE has determined that implementation of Alternative 2 would have No Effect on any Federally-listed species that may occur in the Project Area. 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 proposed Master Plan Update 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. SCOPING AND PUBLIC CONCERN

7.1 Introduction

No single agency has complete oversight of stewardship activities on the public lands and waters bordering the MKARNS. 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 MKARNS, 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 practicable, this Master Plan and a proactive approach to partnering would position the MKARNS 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

MKARNS Master Plan revision.

7.2 Scoping

In March of 2020, a global coronavirus pandemic (COVID-19) was declared. This prompted changes in the workforce, including USACE implementing telework schedules across the board to keep employees safe and social distanced. In addition, and due to the evolving Federal, State, and Local policies designed to address the spread of COVID-19, the project delivery team (PDT) determined that no in person agency or public scoping workshops would occur until the threat of the virus subsided. As an alternative, the MKARNS Master Plan Revision website was created to be the primary source of information during this time. Website information was provided through various sources, such as notification postcards, news releases, agency scoping letters, and media outreach, for individuals to visit the project website for information regarding the MKARNS Master Plan update process; to solicit comments for scoping; and to communicate to the public of the reason behind changing the traditional USACE scoping process in response to the global pandemic. As part of the initial phase of the environmental process, an extended public scoping comment period was held between June 15, 2021 and August 27, 2021 to gather agency public comments on the MP revision process and issues that should be examined as part of the environmental analysis. There was an initial extension on the comment period from 30 days to 45 days as a response to the change in the traditional USACE scoping process due to the pandemic. There were two subsequent extensions following the 45-day comment period. The first extension beyond the initial 45-day comment period was due to unforeseen mailing delays with notification materials. The second extension beyond the 45-day comment period was due to website server errors that prevented the online comment form processing any comments for a period of two weeks. News releases were sent out to notify the public of these extensions beyond the 45-day scoping comment period.

Agencies were invited to participate in the scoping process and to provide input on the vision for the MKARNS MP and on issues that should be addressed through the Environmental Assessment. A letter was sent on June 3, 2021 to 48 agencies providing notification of the upcoming agency scoping comment period and links to the project website where more information could be found.

In total, approximately 35 comment submittals (letters, emails, comment cards, or oral comments) from members of the public and 11 comment submittals from agencies were received by the end of the comment period. A full breakdown of comments and analysis is available in the Scoping Report, which may be found in Appendix A of this EA.

7.3 Draft Master Plan/Draft Environmental Assessment

The Draft Master Plan and Draft EA were released to the public on January 16, 2023. Notification of the draft review comment period and public workshops was completed via several forms of media as described in Appendix B, Draft Release Comments Report, to this EA. As part of the draft plans release phase of the environmental process, a 45-day comment period was held from January 16 to March 2, 2023. During this time, the public, resource agencies, and Tribal Nations had the opportunity to review the draft documents and provide comments.

Public workshops were held on January 30, 2023, in Russellville, AR and February 2, 2023, in Pine Bluff, AR. An additional public workshop was scheduled to be held in Little Rock on January 31, 2023, but was canceled due to inclement weather. These workshops gave the public an opportunity to learn about the alternatives and provide input on the Draft Master Plan and Draft EA. A hybrid in-person and online resource agency meeting was also held on January 31, 2023, in Little Rock, AR and over Webex to provide information to agencies, answer questions, and hear feedback.

In total, four comment submittals from members of the public and four comment submittals from resource agencies were received by the end of the draft release period. A full breakdown of comments and analysis are available in the Draft Release Comments Report, which may be found in Appendix B of this EA.

7.4 Final Master Plan/Final Environmental Assessment

The final MKARNS Master Plan was completed in July 2023. No public workshops were held for the final master plan release. The final MKARNS Master Plan was posted on the MKARNS Master Plan revision website once signed by the District Commander.

8. CONCLUSIONS

The Master Plans for the MKARNS were last approved in 1976 and 1977; this was followed by multiple supplements over the last 46 years. During that time, public use patterns have remained similar, but trends, facility and service demands have shifted in the past 46 years due to the need for alternative experiences in recreation and tourism. 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 taxpayers.

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 USACE resource (i.e. Operations for shoreline management) or external resource agency (i.e. Arkansas Dept. of Energy and Environment for water quality) responsible for that specific area. To facilitate this action, the current Master Plan development evaluated three alternatives relative to their potential impacts on the land and water resources of the MKARNS.

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 MKARNS as it currently exists in terms of developable areas and protected areas. Of the 46,163.6 acres of available land along the MKARNS, 64% of this is classified as High and Low density Recreation, with potential future development occurring. While 3% of available acreage is classified as

Environmentally Sensitive Area lands, 6,976.8 acres of land (15%) 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 Alternative 2 (Selected Alternative) and Alternative 3. Alternative 3 includes 13% High Density Recreation lands, while reducing the 46% of Low Density Recreation lands to 11%, with the difference primarily going to the Wildlife Management classification. This action would preserve vegetation, reduce stormwater runoff quantity and velocity, resulting in less 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 Selected Alternative (Alternative 2) shifted the majority of the available acreage toward Wildlife Management (67%), with 11% classified as High Density Recreation, 5% classified as Environmentally Sensitive Areas, and 12% classified as Low Density Recreation. Potential effects from this would be decreased vegetation removal and a reduction in soil erosion due to the reclassification of lands that were previously High and Low Density Recreation, as well as unallocated lands. This posed 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. The Selected Alternative seeks to balance all components of river usage, including the provision for growth and recreation potential, while protecting and preserving terrestrial and aquatic resources.

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