US Army Corps
of Engineers
Little Rock District

Draft Environmental Assessment
Beaver Lake
Proposed Land Acquisition
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BEAVER LAKE
PROPOSED LAND ACQUISITION
ENVIRONMENTAL ASSESSMENT

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1.0 INTRODUCTION

The Flood Control Act of 1954 authorized construction of Beaver Lake for flood control, power, public recreation, and other purposes. The project incorporated a Real Estate Design Memorandum (REDM) which identified all land below a designated mean sea level (msl) as necessary for the operation, maintenance, and control of the reservoir, along with some land above the msl line required for public access areas.

However, some areas below the msl line were not acquired due to the limitations of measuring technology available when the project was constructed. As a result, the U.S. Army Corps of Engineers' ("USACE") ability to manage Beaver Lake is impaired and some privately owned land is inundated during normal flood and conservation pool operations.

USACE initiated a study in May of 2021 to address these issues. Comments on the process scope were solicited from the public and affected agencies. As part of the study, USACE is completing an Environmental Assessment (EA) that evaluates existing conditions at Beaver Lake and potential impacts of proposed alternatives for addressing the lake management and private land inundation issues. This EA is prepared pursuant to the National Environmental Policy Act (NEPA, Public Law 91-190) as amended in 2020, the Council on Environmental Quality (CEQ) regulations (40 CFR, 1500–1508), and USACE regulations, including Engineer Regulation (ER) 200-2-2 (1988).

2.0 PURPOSE AND NEED FOR ACTION

2.1 Purpose and Need

The purpose of the Beaver Lake Proposed Land Acquisition Study is to develop and evaluate alternatives that address the Corps' current inability to manage the lake for authorized purposes.

Construction of Beaver Reservoir was authorized for flood control, hydroelectric power, recreation and other purposes by the Flood Control Act of 1954, approved 3 September 1954 (Public Law 83-780, 60 Stat. 642), as recommended by the Chief of Engineers in the 19 February 1954 report which was submitted as House Document No. 499 (referred to as the project document). The original REDM developed and approved prior to construction identified all lands necessary for the operation, maintenance, and control of the reservoir. The Water Supply Act of 1958 (Public Law 85-500, 72 Stat 297) added water supply as an authorized project purpose.

Per the REDM, the Beaver Reservoir requires fee simple lands up to a guide contour of 1,128' MSL and occasional flowage up to 1,135' MSL. These real property interests allow for the Reservoir to fulfill its congressionally mandated purposes. The original acquisition process used a "blocking" method for the sake of expediency in a period of limited time. resources, and technical abilities. The result is that there are many small parcels of land that were not acquired as required and remain partially or wholly in private ownership. That ownership impedes the fulfillment of project purposes. Some owners of the private property that the Government failed to acquire as required in the REDM have built structures that have reduced needed flood storage and have impeded Recreation and Shoreline Management missions. These trends are on the rise due to growing development pressures at the Reservoir.

This study included public participation in the form of two comment periods and one informational public workshop that were conducted as part of the preparation of the EA.

2.2 Project History

Beaver Lake is a multiple purpose water resource development project initially authorized for flood control, hydropower generation, recreation and other beneficial uses by the Flood Control Act dated 3 September 1954. The inclusion of storage in the lake for municipal and industrial water supply was authorized by the Water Supply Act of 1958. Beaver Lake is a major component of a comprehensive plan for water resource development in the White River Basin of Arkansas and Missouri. The project is located in the scenic Ozark Mountain region of northwestern Arkansas in Benton, Washington, Carroll, and Madison counties (Figure 2.1). The total area contained in the Beaver project, including both land and water surface, consists of 38,138 acres. Of this total, 1,432 acres are in flowage easement, with the remainder in fee-title ownership. The White River drainage area above Beaver Lake is approximately 1,186 square miles. The region is characterized by narrow ridges between deeply cut valleys that are well wooded with deciduous trees and scattered pine and cedar. When the lake is at the top of the conservation pool, the water area is 28,299 surface acres with 490 miles of shoreline within the lands owned in fee. The shoreline is irregular with topography ranging from steep

bluffs to gentle slopes.

Construction of Beaver Dam was initiated in November 1960, and construction of the powerhouse and switchyard began in April 1963. Commercial generation of electricity was initiated in May 1965. The overall project was completed in June 1966. Table 2.1 provides pertinent construction and operations data for the lake. There are 12 public use areas/parks around Beaver Lake. Eleven parks are operated by the USACE, two of which have been reduced to lake access only (Ventris and Blue Springs). One park (Big Clifty) is operated by Carroll County. In addition to 19 launching ramps located in the parks, there are approximately 150 launching ramps/severed roads around the lake that are also used by residents and sportsmen for boat launching. USACE lands around the lake also provide for other popular recreational activities, including hiking, hunting, camping, and picnicking. Additionally, the State of Arkansas owns and operates Hobbs State Park Conservation Area, which covers 12,056 acres, and Devil's Eyebrow Natural Area, which covers 2,503 acres. Both properties are adjacent to USACE lands.

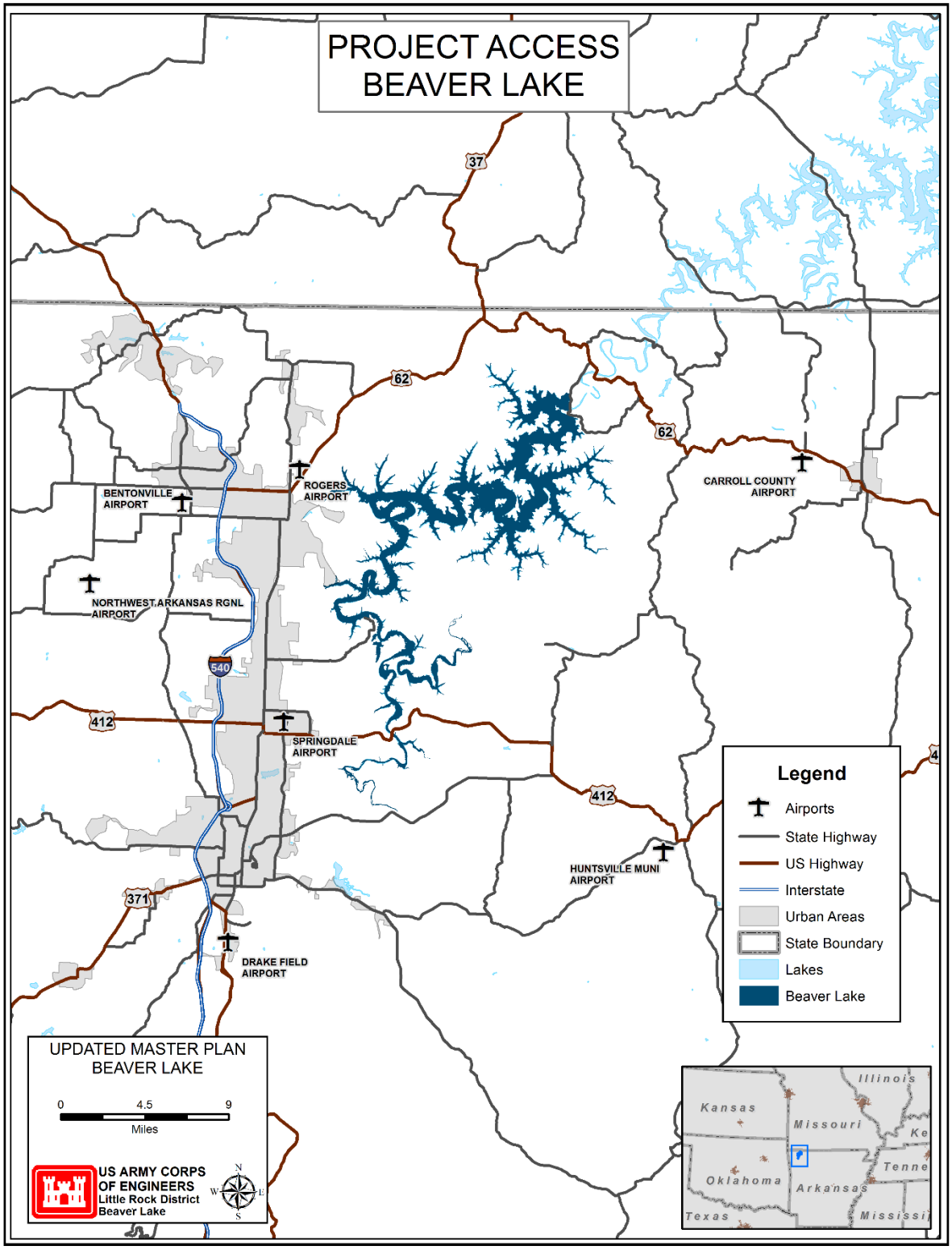

Figure 2.1 Beaver Lake and Surrounding Area

Table 2.1 Pertinent Data of Beaver Dam and Lake

PERTINENT DATA OF THE DAM AND LAKE	
General Information	
Purpose Stream State	FC, P, WS, R, F&W[1] White River Arkansas
Drainage area, square miles	1,186
Average annual rainfall over the drainage area, inches, approximately	45.4
Dam	
Length in feet	2,575
Height, feet above streambed	228
Top of dam elevation, feet above mean sea level	1,142
Generators	
Main units, number	2
Rated capacity each unit, kilowatts	56,000
Lake	
Nominal bottom of power drawdown Elevation, feet above mean sea level	1,050
Area, acres	9,750
Nominal top of conservation pool Elevation, feet above mean sea level	1,120.43
Area, acres	28,299
Length of shoreline, miles	490
Nominal top of flood-control pool Elevation, feet above mean sea level	1,130
Area, acres	31,487
Length of shoreline, miles	547
Five-Year frequency pool	
Elevation, feet above mean sea level (flood pool)	1,130
Elevation, feet above mean sea level (drawdown)	1,050
[1] *FC – flood control, P – power, WS-water supply, R-recreation, F&W-fish and wildlife*	

3.0 PLAN FORMULATION AND EVALUATION OF ALTERNATIVES

Plan formulation and evaluation of alternatives used for this study are conducted in accordance with the USACE Planning Guidance Notebook (Engineer Regulation 1105-2-100) and the USACE Water Supply Handbook, both emanating from the Economic and Environmental Principles and Guidelines for Water and Related Land Resources Planning Act (P.L. 89-80) and Executive Order 11747, which was approved by the U.S. Water Resources Council in 1982, and by the President in 1983. Based on guidance and policy, the USACE has a well-defined six-step process used to identify and respond to problems and opportunities associated with Federal water resources planning objectives, and specific state and local concerns:

1) Identify Problems and Opportunities
2) Inventory and Forecast Conditions
3) Formulate Alternative Plans
4) Evaluate Alternative Plans
5) Compare Alternative Plans
6) Select Recommended Pan

The remainder of this section describes each step of the process as it applies to this study.

3.1 Problems and Opportunities

Water resources projects are planned and implemented to solve problems, meet challenges, and seize opportunities. In the alternative planning setting, a problem can be thought of as an undesirable condition. An opportunity offers a chance for progress or improvement of the situation. The identification of problems and opportunities gives focus to the alternative planning effort and aids in the development of planning objectives. Problems and opportunities can also be viewed as local and regional resource conditions that could be modified in response to concerns expressed by Federal, state, and local government agencies, and the public. This section identifies the problems and opportunities in the study area based on the assessment of existing and expected Future without Project conditions.

The objective of the USACE with respect to Corps Projects (e.g. Beaver Lake) is to maximize the ability to effectively manage those Project functions authorized by Congress, and those mandated by laws and regulations. The Beaver Lake Project has been authorized by Congress for flood control (Flood Risk Management), hydropower, water supply, and recreation purposes. These purposes require coordinated management of the lake.

Problem Statement:

Since construction of the project, the fulfillment of project purposes has been hampered by the inability of the Government to manage the entire shoreline due to privately owned parcels scattered around the lake. For example, privately-owned land at seasonal conservation pool and flood pool are subject to flooding as part of the Government's Flood

Risk Management (FRM) efforts. As a result of their proximity to the lake, these areas are also highly desirable for private development. In many locations, owners have placed fill and constructed retaining walls in these areas. Even small amounts of fill reduces the flood storage capacity of the lake from the designed level needed to decrease flood risk risks both in the lake and downstream. Fee owners who do not have Government purchased flowage easements on their property are entitled to construct on their property, despite the fact that any structure impedes flood storage and some structures, such as high-density residential housing, would come at the expense of human safety.

Recreation measures are limited by private owners who prohibit public access to the shoreline. Confrontations occur between private property owners and members of the public, who are unaware they are trespassing. During high water events accessibility to private boat docks across public land is often times severed, creating a scenario that invites trespassing on private property. Private property owners have also placed cables and ropes to deter trespassers, but when the water levels rise, these cables and ropes create boating hazards. Some owners have attempted to place boat docks in areas the Corps has limited or prohibited boat docks as a means of avoiding overcrowding or limiting negative environmental impacts. Others have constructed private boat ramps that confuse the public and increase the potential that the number of vessels on the lake will exceed the carrying capacity sometime in the future.

The vegetation reduction efforts of private property owners, whether by mowing, trimming or tree removal, increase erosion and sedimentation to the detriment of the Corps' water supply purposes and natural resources management responsibilities. The Corps can do little to prevent the nutrient loading and spikes of phosphorus and nitrogen that come from the runoff of private land. The resulting decreases in water quality manifest in poor taste, which is expensive to filter and treat for drinking water purposes.

In addition, the increased sediment load causes binding (chelation) of dissolved oxygen, resulting in a decrease in oxygen for living organisms. Mussels and other ecologically important (and sensitive) species that aid in water filtration can experience population declines as unnatural sediment loads increase, causing ecological breakdown of aquatic food webs.

In an attempt to counter these negative impacts, over the last three years, the Corps has planted approximately 10,000 trees surrounding Beaver Lake, but these efforts cannot extend to the entire shoreline: They are limited to Government-owned land. These plantings have been supported by our local partnering agencies.

Opportunities:

The USACE has requested funding in the past to pursue the acquisition of the private land parcels in order to maximize the effectiveness and efficiency of managing the Beaver Lake Project for congressionally-authorized purposes. Fiscal year 2022 funding includes funds to begin the process of acquiring identified land parcels needed for management of the Project.

3.2 Planning Objectives and Constraints

An objective is a statement of the intended purposes of the planning process; it is a statement of what an alternative plan should try to achieve.

Planning today exists in a world of scarcity where it is not possible to do everything. Our choices are constrained by a number of factors. Planning is no exception. An essential element of any planning study is the set of constraints confronting the planners. A constraint is basically a restriction that limits the extent of the planning process. Constraints, like objectives, are unique to each planning study.

Planning objectives reflect an expression of public and professional issues or concerns about the use of water and related land resources resulting from the analysis of existing and future conditions in the study area. These planning objectives were used in guiding the development of alternative plans and their evaluation. The planning objective used in the formulation and evaluation of alternative plans was to maximize the ability of the Beaver Lake Project to manage the congressionally-authorized purposes effectively and efficiently. The planning process is subject to the limitations imposed by the following general constraints:

- Conformance to USACE policies, regulations, and Executive Orders for the Project purpose.
- Plans must be consistent with Federal, State, and local laws such as the NEPA, Endangered Species Act (ESA), Fish and Wildlife Coordination Act (FWCA), Clean Water Act (CWA), and the National Historic Preservation Act (NHPA).
- Minimize impacts to culturally significant landmarks and areas.
- This a project that has been in operation for decades with significant development pressures, many encroachments, and more restrictive laws and regulations in place than at the time of construction. This limits methods and means available for use in the present.

The following study-specific constraint was also considered in the development and evaluation of alternatives:

- Public Law 106-53 restricts lowering conservation pool elevation. Public Law 106-53 (August 17, 1999), states ". . . except that at no time shall the bottom of the conservation pool be at an elevation that is less than 1,076 feet, NGVD."

No other specific planning constraints have been identified for this study that would further limit the planning process; and although there are many factors that may ultimately affect the ability to implement a particular alternative, these do not necessarily qualify as planning constraints.

3.3 Plan Formulation and Evaluation Criteria

An alternative plan consists of a system of structural and/or nonstructural measures, strategies, or programs formulated to meet, fully or partially, the identified study planning objectives subject to the planning constraints. A management measure is a feature or an

activity that can be implemented at a specific geographic site to address one or more planning objectives. Management measures are the building blocks of alternative plans and are categorized as structural and nonstructural. An alternative plan is a set of one or more management measures functioning together to address one or more objectives. In this study, the Project Delivery Team (PDT) considered combining measures or using stand-alone measures as alternative plans in the formulation process.

3.4 Inventory of Existing and Future Conditions

The inventory of current and future conditions is located in different chapters of this report and appendices. As part of the Environmental Assessment, Chapters 4 and 5 present current and future environmental conditions under the no-action/future without project (FWOP) condition; and discusses potential environmental impacts for the no-action/FWOP and future with project (FWP) conditions including both alternatives considered for in-depth analysis.

3.5 Identification of Measures

Initially, the study team considered a wide range of potential measures to address the planning problem, including several comments received during the initial public comment period. Table 3.1 shows potential measures considered, and which measures were carried forward as preliminary alternatives, either individually or combined, for further analysis during plan formulation. Several measures were screened out at this stage, as they either would not resolve the issues confronted, or were considered outside the scope of this study.

Table 3.1 Measures Initially Considered

No.	Measure	Structural or non-structural or both	Screened or carried forward
1	Purchase land according to prescribed elevations in Design Memorandum (DM).	Non-structural	Carried forward
2	Purchase Occasional Flowage Easements only.	Non-structural	Carried forward
3	Land Exchange for Higher Elevation Property.	Non-structural	Carried forward
4	Lower flood pool elevation to avoid flooding of private property.	Non-structural	Carried forward
5	Begin evacuating flood pool earlier to avoid flooding private lands.	Non-structural	Carried forward
6	Lower both flood and conservation pools to	Non-structural	Carried forward

	avoid flooding private property.		
7	Purchase from willing sellers only.	Non-structural	Screened (Unable to only flood property that is purchased from willing sellers).
8	Purchase lands from only owners that have expressed a concern about the flooding of their property	Non-structural	Screened (Similar to Measure #7).
9	USACE issue moratorium on development below elevation 1128.	Non-structural	Screened (USACE has no authority to issue any moratoriums if they don't hold interest in the land. Does not resolve the issue of flooding private property).
10	Establish the USACE property line at elevation 1128 (no USACE fee or easements above 1128).	Non-structural	Screened (Does not meet the need of the project and REDM. Does not resolve the issue of flooding non-USACE property above 1128 without just compensation).
11	Provide grant funds to landowners to protect property from flooding.	Non-structural	Screened (No authority to expend federal funds for landowners to maintain/modify private property).
12	Relocate legally-built structures and landscaping above the high-water line to avoid flooding them.	Non-structural	Screened (Does not meet the need of the project and REDM to protect project purposes into the future. However, compensating property owners for legally-built structures is part of Measure 2).
13	COE send cleanup crews to deal with debris that builds up on previously owned private property.	Non-structural	Screened (Outside the scope of study. Debris removal is not the subject of this study: The subject of this study is the achievement of project purposes).
14	Raise Highway 12 Bridge so boats can pass under it during high water.	Structural	Screened (Outside the scope of the study. Increasing boating opportunities is not the subject of this study: The subject of this study is the achievement of project purposes).
15	Build a dam somewhere else in the White River watershed for flood prevention (reduction).	Structural	Screened (Outside the scope of the study. Increasing flood storage in other locations is not the subject of this study: The subject of this study is the achievement of project purposes).

16	Give all the COE property around the lake (including lands to be purchased) to the State of Arkansas	Non-structural	Screened (Outside the scope of the study. Transferring USACE property to another entity would prevent the Beaver Lake Project from achieving the authorized purposes).
17	Since COE wants to move from "blocked-out" surveys to contour elevations, allow landowners to purchase USACE property above elevation 1128.	Non-structural	Screened (Does not meet project purposes – Designation and disposal of excess property does not achieve the project purposes).

3.6 Preliminary Alternatives – Evaluation and Screening of Alternatives to Develop Final Array For Analysis

Several measures from Table 3.1 were determined to have the capacity to meet the study objective either fully or partially. These measures were carried forward as individual alternatives for further screening.

- Alternative 1 - No Action or Future without Project Condition (does not meet the study objective, however it is required by NEPA).
- Alternative 2 - Purchase land according to prescribed elevations in REDM.
- Alternative 3 - Purchase Occasional Flowage Easements only.
- Alternative 4 - Land Exchange for Higher Elevation Property.
- Alternative 5 - Lower flood pool elevation to avoid flooding of private property.
- Alternative 6 - Begin evacuating flood pool earlier to avoid flooding private lands.
- Alternative 7 - Lower both flood and conservation pools to avoid flooding private property.

Screening is an ongoing process of eliminating alternatives based on planning criteria. Criteria derive from a specific planning study, based on the planning objectives, constraints, and problems and opportunities of a study area. The study team gathered information from public comments, Beaver Lake project office staff, and state and Federal resource agencies. The team used this information, along with professional judgment, to perform an initial screening using the following four general criteria: 1) completeness, 2) effectiveness, 3) efficiency, and 4) acceptability:[1]

1) *Completeness*: Completeness is the extent that an alternative provides and accounts for all investments and actions required to ensure the planned output is achieved. These criteria may require that an alternative consider the relationship of the plan to other public and private plans if those plans affect the outcome of the project. Completeness also includes consideration of real estate issues, operations and maintenance (O&M), monitoring, and sponsorship factors. Adaptive management plans formulated to address project uncertainties also have to be considered.

[1] These criteria may not be fully evaluated at the initial stages of plan formulation in regard to evaluation of measures and preliminary alternatives, but are fully evaluated for the final array of alternatives.

2) *Effectiveness:* Effectiveness is defined as the degree to which the plan will achieve the planning objective. The plan must make a significant contribution to the problem or opportunity being addressed.

3) *Efficiency*: The project must be a cost-effective means of addressing the problem or opportunity, and plan outputs cannot be produced more cost-effectively by another institution or agency.

4) *Acceptability*: A plan must be acceptable to Federal, state, and local government in terms of applicable laws, regulation, and public policy.

The study team also used the following criteria to evaluate how each alternative would affect the authorized purposes at Beaver Lake in an attempt to evaluate potential "serious effects".

1) Environmental impacts.
2) Dam safety impacts.
3) Recreational impacts.
4) Flood risk management impacts.
5) Hydropower impacts.
6) Water supply impacts.

After extensive discussion and evaluation, the PDT found among the preliminary alternatives considered, either alone or in combination with one another, that only alternative 2 met the screening criteria, and thus would be carried forward for detailed analysis in this EA. Table 3.2 shows the preliminary alternatives and results of the screening analysis conducted by the PDT. Rationale for screened alternatives is provided below Table 3.2.

Table 3.2 Alternatives Considered to Resolve Flooding of Private Property Without Just Compensation at Beaver Lake

No.	Alternative	Structural or non-structural or both	Screened or carried forward
1	No Action	-	Required by NEPA
2	Purchase land according to prescribed elevations in Design Memorandum (DM).	Non-structural	Carried forward
3	Purchase Occasional Flowage Easements only.	Non-structural	Screened
4	Land Exchange for Higher Elevation Property.	Non-structural	Screened

5	Lower flood pool elevation to avoid flooding of private property.	Non-structural	Screened
6	Begin evacuating flood pool earlier to avoid flooding private lands.	Non-structural	Screened
7	Lower both flood and conservation pools to avoid flooding private property.	Non-structural	Screened

3.6.1 Alternatives screened from further analysis

3.6.1.1 Alternative 3 - Purchase Occasional Flowage Easements only.

The purchase of occasional flowage easements in lieu of Fee does not fully support the multiple missions the Beaver Lake Project Office is charged to manage. There are several instances where landowners have constructed retaining walls and placed fill material within the flood pool elevation of the lake on private lands, within an existing Occasional Flowage Easement. Although consents may be issued in limited circumstances, managing compensatory storage requirements and events such as changes ownership are difficult, often resulting in compliance and communication shortfalls, leading to reductions in storage capacity required for the FRM mission.

Similar negative impacts are occurring to the NRM mission of the Beaver Lake Project. Lack of fee ownership has direct impacts to the water quality of Beaver Lake. Agricultural and residential activities on private lands adjacent to the shoreline often result in the reduction or removal of riparian vegetation that serves as buffers. Occasional flowage easements do not prevent these removals from occurring. A critical role of riparian buffers is to serve as a biological filter that reduces the amount of pollution, sediments, and nutrients, from both point-source and non-point sources, entering the watershed. Increases in nutrients, particularly nitrogen and phosphorus common in agricultural and residential fertilizers, can lead to nutrient loading or spikes that often result in poor water quality and harmful algal blooms that are costly to treat for human use (i.e. drinking water) and are also harmful to biological life.

3.6.1.2 Alternative 4 - Land Exchange for Higher Elevation Property.

Property currently owned by USACE is necessary for Project Operations, thus, no excess exists for trade, nor does USACE have authority to purchase property at higher elevations for trade.

3.6.1.3 Alternative 5 - Lower flood pool elevation to avoid flooding of private property.

Beaver Lake is one of six reservoirs in the White River Basin that are operated as a system to reduce flood frequency and severity of floods. Lowering the flood pool elevation would result in increased risk to life and property downstream as a result of increased occurrences of emergency surcharge operations. There would be limited benefits to upstream

landowners as periodic flooding could still occur on private property.

3.6.1.4 Alternative 6 - Begin evacuating flood pool earlier to avoid flooding private lands.

The rationale for alternative 6 is the same as discussed for alternative 5 above.

3.7.1.5 Alternative 7 - Lower both flood and conservation pools to avoid flooding private property.

Lowering the flood pool elevation would have consequences similar to those discussed in Chapter 3.6.1.3 above. Lowering the conservation pool elevation even a few feet would result in significant adverse financial impacts to hydropower (less water available for hydropower generation), adverse effects to recreation (lower water level would leave beaches and many boat ramps out of water), and significant financial impacts to area Water Districts that draw water from Beaver Lake (would have to modify equipment to continue the ability to draw water). Numerous other impacts would likely result from this alternative.

3.6.2 Alternatives carried forward for detailed analysis.

Alternatives evaluated in this EA are depicted in Table 3.2. The alternatives include Alternative 1 (No Action-Required by NEPA) and Alternative 2 (Purchase Land According to Prescribed Elevations in DM).

In this EA development, each Alternative is compared to the No Action Alternative to evaluate potential positive and negative effects on the natural and human environment. The alternatives considered in detail will be provided for public review after completion of the draft EA. Public comments collected during a public comment period on the draft EA are considered in the development of the final EA. The Final EA will present the Selected Alternative and provide the basis for the agency decision under NEPA.

3.6.2.1 Alternative 1 - No Action / Future without Project Condition (FWOP)

The No Action Alternative serves as a basis for comparison to the anticipated effects of the other action alternatives, and its inclusion in this EA is required by NEPA and CEQ regulations (40 CFR § 1502.14(d)). Under the No Action Alternative, the current operation of Beaver Lake would continue into the future with associated negative impacts to the Congressionally approved missions and the public along with continued takings of private lands. While the No Action Alternative does not meet the purpose of, or need for, the Proposed Action, it serves as a benchmark of existing conditions against which federal actions can be evaluated.

3.6.2.2 Alternative 2 - (Proposed Action) Purchase land according to prescribed elevations in Design Memorandum (REDM)

Alternative 2 involves the purchase of all lands and interests in lands necessary for the operation and maintenance of the Beaver Lake Project. This purchase would occur as described in the Beaver Lake REDM, which includes the purchase of fee title and occasional flowage easements. Details of the REDM can be found in Chapter 2.1 of this EA.

In an effort to correct the failure to acquire adequate lands for the designed operation of Beaver Lake, USACE conducted a Geographic Information System (GIS) analysis which estimates the acquisition of roughly 161 acres of fee is necessary to properly operate the

project. County tax records and cadastral data analysis indicate fee acquisitions would affect an estimated 464 landowners and 596 total tracts. This preliminary analysis revealed flowage easements are not required, however, a final determination would be made upon completion of boundary line surveys. Any survey-identified requirement to acquire flowage would result in acquiring an Occasional Flowage Easement estate to remain consistent with currently owned occasional flowage easements on the project.

While acquisition of all identified land parcels is necessary to address the problem identified in Section 3.1, USACE used the following criteria to identify land tracts required in the first phase of land acquisition, using currently available funding.

- Privately-owned land routinely flooded up to 1128 msl.
- History of complaints from the public regarding shoreline use or public confusion.
- Tract equal to, or larger than, 0.1 acre.
- Staff knowledge/familiarity of low boundary area based on historical interactions with past/current landowners.
- Possible current and future development potential.
- Tracts contiguous to identified priority tracts (i.e. in the same cove).
- Permitted boat docks that become inaccessible and float over private property during flood conditions.
- Private lands in areas surrounded by USACE property classified as MP Environmentally Sensitive Area. Would prevent habitat alterations that could impact sensitive and/or rare species.

Eighteen priority areas, consisting of approximately 26 individual tracts totaling 16 acres were identified for the first phase of potential acquisition. Appendix B includes generalized maps of all identified land parcels and detailed maps of the eighteen priority areas included in phase one. Implementation of this alternative, if selected, would begin immediately. Landowners would be contacted by the USACE Little Rock District Real Estate Division to begin negotiations.

Future acquisition phases would occur as funding becomes available.

4.0 AFFECTED ENVIRONMENT

Beaver Lake is located in the Ozark Highlands of Carroll, Washington, Benton, and Madison Counties, 6 miles west of Eureka Springs, Arkansas. Having 449 miles of shoreline (at conservation pool) and over 28,000 water surface acres, Beaver Lake is the largest reservoir in northwest Arkansas and the first federal impoundment on the White River.

Located adjacent to the fast-growing communities of Fayetteville, Springdale, Bentonville, and Rogers Arkansas and a regional population of over 500,000, the lake provides open spaces and a quality outdoor recreation opportunity. Many arms and coves of the lake offer secluded areas for traditional activities such as fishing, skiing, sailing and scuba diving, but also allow for passive recreation opportunities like photography and nature observation. Limestone bluffs, striking vistas, and heavily wooded shorelines combine to offer a natural setting for all types of outdoor activities. Recreation areas offering developed facilities to support camping, boating, and swimming are located across the Lake. Commercial concessions, such as marinas and resorts, provide services ranging from fuel and supplies to overnight lodging.

4.1 Climate and Climate Change

The climate in the Beaver Lake area is classified as humid subtropical according to the Köppen climate model. A humid subtropical climate is characterized by hot, usually humid summers and mild to cool winters. The Köppen definition of this climate is for the coldest month's mean temperature to be between 26.6 Fahrenheit (°F) (−3 Celsius [°C]) and 64.4° F (18 °C), and the warmest month to be above 71.6° F (22° C). Some climatologists prefer to use 32° F (0° C) as the lower bound for the coldest month's mean temperature.

While technically classified as humid subtropical, the climate in the Beaver Lake area is considered moderate. Average temperatures range from a high of 88° F (31.1° C) and low of 27° F (-2.7° C) in nearby Rogers, Arkansas. Extreme temperatures rarely exceed 96° F (35.6° C) and 13° F (-10.6° C). Late summer is the time of maximum heat and least rainfall. During the winter months, midday temperatures in the basin are relatively warm, around 55º to 60º F. Some short periods of cold weather occur with temperature ranging from 0º to 10º F. On winter nights, temperatures from 40º F to below freezing are common. Highest recorded temperature in Rogers, Arkansas was 114° F (45.6° C) (recorded in July 1954). The lowest temperature recorded was −16° F (−26.7° C), in February 1996.

The relative humidity typically ranges from 41% (comfortable) to 91% (very humid) over the course of the year, rarely dropping below 24% (dry) and reaching as high as 100% (very humid). The air is driest around April 9th, at which time the relative humidity drops below 49% (comfortable) three days out of four; it is most humid around June 3rd, exceeding 87% (very humid) three days out of four.

Dew point is often a better measure of how comfortable a person will find the weather than relative humidity because it more directly relates to whether perspiration will evaporate from the skin, thus cooling the body. Lower dew points feel drier and higher dew points feel more humid. Over the course of a year, the dew point typically varies from 19° F (dry) to

71° F (muggy) and is rarely below 4° F (dry) or above 74° F (very muggy). There are two periods in the year that are most comfortable: The first is between April 18th and June 6th, and the second is between September 3rd and October 23rd.

Average annual rainfall for the Beaver Lake area is 45 inches per year. Precipitation is weakly seasonal, with a bimodal pattern: wet seasons in the spring and fall, and relatively drier summers and winters, but some rain in all months. The spring wet season is more pronounced than fall, with the highest rainfall typically occurring in May. The average annual snowfall for the Beaver area is 12 inches. Snow packs are usually short lived and are not commonly a concern for flooding.

The U.S. Global Change Research Program (USGCRP) looks at potential impacts of climate change globally, nationally, regionally, and by resource (e.g., water resources, ecosystems, human health). Beaver Lake area lies within the Southern Great Plains region of analysis. The Southern Great Plains region has already seen evidence of climate change in the form of rising temperatures that are leading to increased demand for water and energy and impacts on agricultural practices. Over the last few decades, the Southern Great Plains has seen fewer cold days in winter and more hot days in summer, as well as changes to precipitation patterns. The decrease in the cold days has resulted in an overall increase of the frost-free season. Within this region, there has been an increase in average temperatures 1° – 2° F since 1901 (Kloesel et al., 2018). The changing precipitation patterns in the region has led to more frequent extreme droughts, storms, and flood events. If the current rate of greenhouse gas (GHG) emissions continues, the potential increase will be much higher by 2100.

The USACE mission for the Responses to Climate Change Program is “to develop, implement, and assess adjustments or changes in operations and decision environments to enhance resilience or reduce vulnerability of USACE projects, systems, and programs to observed or expected changes in climate.” The effects of climate change and mitigation efforts are evolving, and Beaver Lake and all federally owned property will be managed to comply with laws and executive orders to respond to the growing threat of climate change.

4.2 Topography, Geology, and Soils

The depositional environment of the rocks found in the Arkansas Ozarks is one of a relatively shallow continental shelf, sloping toward deeper water generally toward the south. This shelf emerged many times during the Paleozoic resulting in numerous unconformities throughout the sequence. The Ozark Plateaus region of Arkansas is made up of generally flat-lying Paleozoic age strata divided into three plateau surfaces. The lowest and northern-most plateau is the Salem Plateau. The Springfield Plateau stands above the Salem a few hundred feet and is generally capped by lower Mississippian age limestones and cherts. The southernmost and highest plateau of the Ozarks is the Boston Mountains. All of these plateaus are deeply dissected by numerous streams throughout the area.

Beaver Lake is part of the Springfield Plateau that occupies primarily the western and southwestern flanks of the Ozark Plateau province. The Springfield Plateau in this region

rises to an elevation of approximately 1400 feet and in many areas, forms extensive plains. Hilly areas occur where rivers and their tributaries cut into the plateau surface, most notably in the vicinity of the White River and Beaver Lake. As streams like the Buffalo National River cut through the plateau down to the level of the White River, they sometimes carve spectacular bluffs.

Lower Ordovician, Middle to Upper Devonian and Lower and Upper Mississippian age strata are present around Beaver Lake. Upper Ordovician and Devonian strata crop out around Beaver Lake and its tributaries. The Lower Mississippian Boone Formation comprises the surface rock over the majority of the area and forms the surface of the heavily dissected Springfield Plateau. In addition to the Boone Formation, Cotter and Jefferson City formations (Jefferson City formation has not been successfully differentiated from the Cotter Formation in Arkansas), and the Powel formation, all of Ordovician age are present in the area. Formations in the Devonian strata include the Chattanooga, Clifty and Penters.

The Boone Formation consists of gray, fine- to coarse-grained fossiliferous limestone interbedded with chert. This formation caps the higher hills in the area. Since limestone is easily dissolved by water, cave and solution (karst) features are prominent. The Boone Formation is well known for dissolutional features, such as sinkholes, caves, and enlarged fissures. Surface water may drain directly into channels in limestone, where it can move rapidly and without filtration to the surface as a spring, at a location that is unpredictable without extensive testing, thus water pollution problems are of particular concern in this region. The thickness of the Boone Formation is 300 to 350 feet in most of northern Arkansas, but as much as 390 feet has been reported.

The Cotter Dolomite is composed of dolostone of predominantly two types: a fine-grained, argillaceous, earthy textured, relatively soft, white to buff or gray dolostone called "cotton rock", and a more massive, medium-grained, gray dolostone that weathers to a somewhat hackly surface texture and becomes dark on exposure. The formation contains chert, some minor beds of greenish shale, and occasional thin interbedded sandstone. The thickness is about 340 feet in the vicinity of Cotter, but the interval may range up to 500 feet thick in places.

The Powell Dolomite is generally a fine-grained, light-gray to greenish-gray, limy, argillaceous dolostone with thin beds of shale, sandstone, sandy dolostone, and occasionally chert. The formation’s thickness may be as much as 215 feet, but is often much thinner.

The Chattanooga Shale Formation is typically black, fissile clay shale that weathers into thin flakes. The beds are usually cut by prominent joints creating polygonal blocks upon weathering. The upper part of the formation may be slightly sandy and usually contains abundant pyrite. Thickness ranges from 0 to about 85 feet; normally averaging about 30 feet.

The Clifty Formation is thin, very sandy limestone and sandstone. Maximum thickness of this formation is only four feet, but is usually thinner, averaging 2 feet or less.

The Penters Chert is a fine-grained, fossiliferous, dolomitic, limestone with some chert and siliceous replacement overlain by a massive, dense, mottled gray chert with some patches of fine-grained limestone. The thickest outcrop exposure is about 25 feet; however, at least one report suggests a maximum thickness of about 90 feet.

The strata throughout the region are nearly horizontal. One predominant geological feature of the lake area is a low, persistent, limestone bluff, which occurs just above the Ordovician-Mississippian contact.

The faulting in the Ozarks is generally normal; most faults displaying a displacement down on the southern side, however some observations reveal that a few strike-slip faults may be present. Gentle folds are noted but are generally of very low amplitude. Lineaments and faults characteristic of northwest Arkansas are present around Beaver Lake. The Fayetteville Fault lies beneath Beaver Lake. This fault is the west side of a graben that has down-dropped the Boone Formation to lake level. The Starkey Fault bounds the east side of the graben. Both faults trend approximately N 450E. One section of the Starkey fault trends N 60-700E. The Clantonville Lineament – Monocline is a northeast to southwest trending structural feature that extends from north of Clantonville to Ventris Hollow. The location of this feature was determined from the 1:24,000 three dimensional quadrangle and from structural disparities in the Lower Mississippian rock units. This structural feature could be responsible for the presence of lead-zinc mineralization in an old prospect near Clantonville (north of Beaver Lake). The trend of this lineament to monocline is N 30-400E. Paleokarst features within the top of the Powell Dolomite are present around Beaver Lake and coincident with a lineament in Limekiln Hollow near Garfield, northwest of Beaver Lake. Figure 4.1 depicts geological formations and fault lines located in this region.

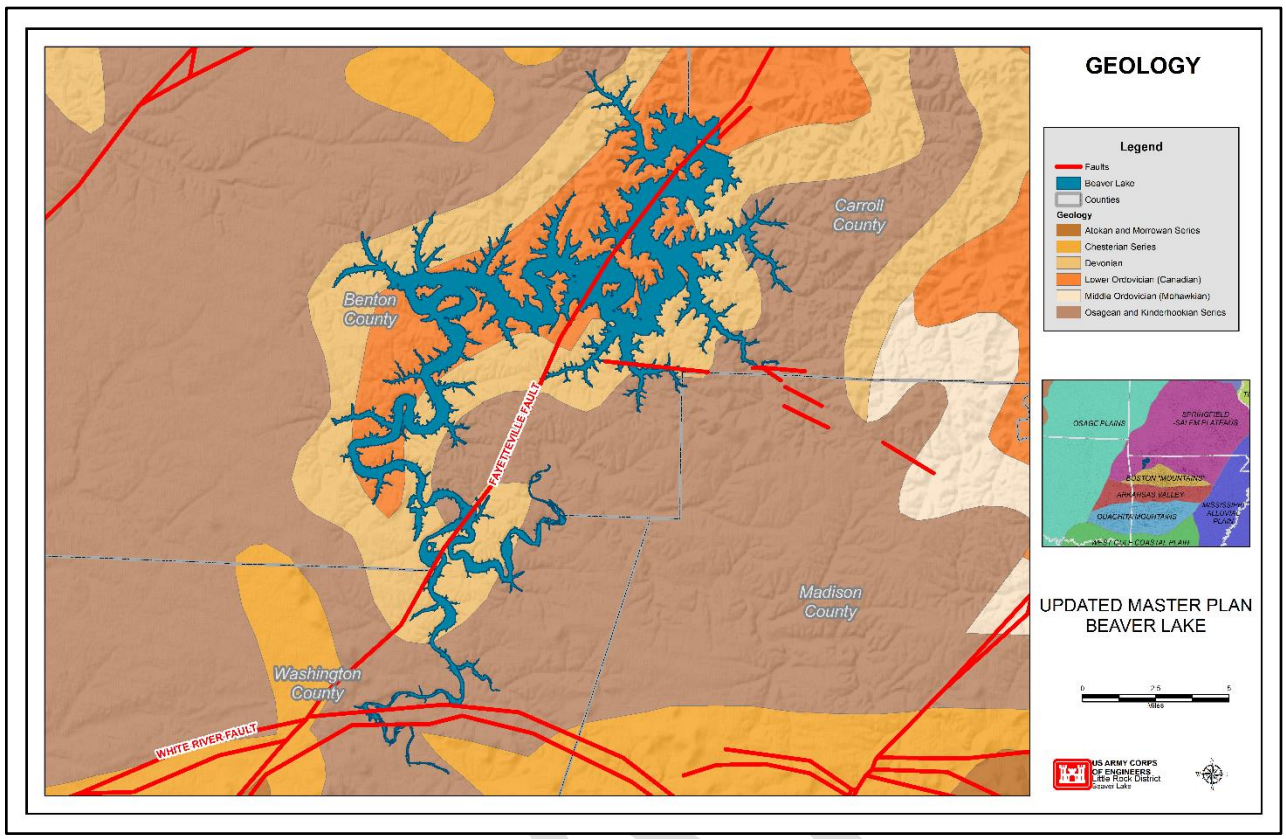

Figure 4.1 Geology of Beaver Lake Watershed

In general, the soils of the Ozark Plateaus are residual and are formed on a broad, domed, upwarp consisting mostly of limestone and dolomite. The main difference in the soils is due to different rocks from which the soils were formed. The main geologic materials are cherty limestone; cherty, very siliceous dolomite; cherty, siliceous dolomite; and alluvium, which are weathered and water transported products of the first three materials. Glade-rock soil occurs where the cherty, very siliceous dolomite is exposed to the soil formation. Dolomite is more resistant to weathering than limestone and siliceous dolomite is even more resistant, so very shallow soil results. In areas where the dolomite is less siliceous, more weathering has taken place; however, the soils produced are not as deep as soils formed by limestone.

The following eight soils associations are found in and around the Beaver project area: Captina-Nixa, Captina-Nixa-Pickwick, Clarksville-Nixa-Baxter, Corydon-Sogn, Enders-Allegheny-Mountainburg, Razort-Captina-Etowah, Linker-Apison-Hector, and Captina-Pembroke.

4.3 Aquatic Environment

4.3.1 Hydrology and Groundwater

In the Interior Highlands of western and northern Arkansas ground-water supplies are more limited than in the Coastal Plain. Much of the Ozark Plateaus region is underlain by carbonate rocks, which are quite soluble in the presence of water. Solution by ground water

has caused many large openings through which water passes so quickly that contaminants from the surface cannot be filtered out. Signs of these openings are caves, sink holes, springs, and lost stream segments. As a consequence, the water in shallow wells may not be suitable for human consumption without treatment.

Three aquifers, which are part of the Ozark Plateaus Aquifer System, are located within northern Arkansas. The Springfield Plateau aquifer is generally under unconfined conditions, with ground water movement occurring through fractures and solution cavities formed by dissolution of carbonate rock. Local discharge is through springs and streams. The Ozark aquifer is generally under confined conditions, especially where overlain by the units of the Ozark Confining Unit (Chattanooga Shale). Most wells in the Springfield Plateau and upper units in the Ozark aquifer yield 5-10 gpm on the average, with yields greater than 25 gpm in rare cases.

The third aquifer, the St. Francois, formed by the Roubidoux Formation and the Gunter Sandstone Member of the Gasconade Formation in northern Arkansas, occurs at greater depth and constitutes the only significant aquifer system in the Ozarks. Both formations are permeable sandstone and carbonate units of Ordovician age. These aquifers serve as the principal source of high-quality water for many communities in northern Arkansas where surface water sources are unavailable. Together these units may yield up to 500 gpm to wells. These formations do not outcrop anywhere in Arkansas but instead outcrop in southern Missouri.

4.3.2 Water Quality

The waters of the Arkansas portion of the White River watershed have all been designated by the Environmental Quality Division of the Arkansas Department of Energy and Environment for fisheries, primary and secondary contact recreation, and domestic, agricultural, and industrial water supplies (ADEE, 2020). Beaver Lake is classified by ADEE as a Type A water body, which includes most larger lakes of several thousand acres in size, in upland forest dominated watersheds, having an average depth of 30 to 60 feet, and having low primary production (i.e., having a low trophic status if in natural [unpolluted] condition). Beaver Lake, like all other lakes of its size in the Ozark region, stratifies chemically and thermally in the late spring with stratification extending into late fall and early winter. During the warmer months, lake waters of the upper layer (the epilimnion) are warmer and contain more dissolved oxygen, while the denser, lower layer waters (the hypolimnion) are colder and contain very little or no dissolved oxygen, thus undesirable for fish habitat.

This undesirable water, when discharged downstream from hydropower generation, may cause some problems in the tailwaters. To combat this problem, the dissolved oxygen content is monitored, and various management measures are implemented to improve the dissolved oxygen concentration in the hydropower releases. A highly productive trout fishery has been established in the Beaver tailwaters by the Arkansas Game and Fish Commission (AGFC) because of the available discharge of cold water from the dam, which is reaerated by turbulence as it flows downstream.

As the stratified epilimnion cools in the late fall and winter, the layers begin to mix (de-stratify) and dissolved oxygen (DO) is more evenly distributed. This condition is more favorable to the fishery of the lake and overall water quality.

The Arkansas Department of Energy and Environment (ADEE) lists the portion of War Eagle Creek within Beaver Lake federal fee boundary as to being on the Arkansas 2020 draft 303d list for aquatic life impairment due to dissolved oxygen issues. The cause of this impairment is from agriculture and other unknown sources. This creek can be found immediately south of Hobbs State Park. The lower half of the fee boundary, from 14028 Frisco Springs Rd to the southernmost extent of the fee boundary is listed as impaired for Escherichia coli (E.coli) and turbidity.

The Clean Water Act requires states to list waters that do not meet Federal water quality standards or have a significant potential not to meet standards as a result of point source dischargers or non- point source run-off. Subsequent to listing on the 303(d) list, the statute requires that the states develop and set the Total Maximum Daily Load (TMDL) for water bodies on the list. A TMDL establishes the maximum amount of a pollutant that can enter a specific water body without violating the water quality standards. Values are normally calculated amounts based on dilution and the assimilative capacity of the water body. TMDLs have not been established by ADEE for Beaver Lake area.

At the time of this publication Arkansas Department of Health (2022) has not published any fish consumption advisory warnings within Beaver Lake nor waters immediately below it.

4.3.3 Fish Species and Habitat

The impoundment of the White River, War Eagle River, and other tributary streams and rivers which form Beaver Lake resulted in changes in the composition of the fish populations. Smallmouth bass was the principal game fish found in the White River and War Eagle River prior to impoundment. Arkansas Game and Fish Commission is the agency primarily responsible for managing the fishery and through their efforts, a variety of fish species are well-established in the lake. Sport fish species currently found include largemouth bass (*Micropterus salmoides*), spotted bass (*Micropterus punctulatus*), smallmouth bass (*Micropterus dolomieu*), white bass (*Morone chrysops*), striped bass (*Morone saxatilis*), hybrid striped bass (*Morone chrysops x saxatilis*), walleye (*Sander vitreus*), flathead catfish (*Pylodictis olivaris*), channel catfish (*Ictalurus punctatus*), white crappie (*Pomoxis annularis*), black crappie (*Pomoxis nigromaculatus*), and various species of sunfish (*Lepomis sp.*). Due to the quality and diversity of the fishery, Beaver Lake serves as a national fishing destination, hosting hundreds of fishing tournaments annually.

Beaver Lake was first impounded in 1966 and much of the standing timber was cut prior to the impoundment. Since impoundment, the few remaining native forests that were submerged provided little structure and forage habitat for fish. Since this limited habitat has degraded over time, AGFC began an artificial habitat improvement project in 1986 with the primary objective to improve fish habitat within Beaver Lake. Since 1987, hundreds of fish habitat structures known as "fish attractors" have been placed in the lake

by AGFC. AGFC continues to fund the maintenance of the attractors each year, adding fresh cover to keep the attractors productive and increasing the habitat.

In 1990, AGFC began a program for the public to bring their discarded Christmas trees to be used as fish attractors to enhance fish habitat. Thousands of these trees have been sunk by USACE and AGFC personnel, and volunteers since the program began.

Walleye, smallmouth bass, striped bass, hybrid white-striped bass, and paddlefish (*Polydon spathula*) have been introduced into Beaver Lake to add diversity to the fishery. These species do not naturally reproduce in the lake (with the possible exception of some minor reproduction by walleye), thus the AGFC have supplemented stocked these species in Beaver Lake for many years. While natural reproduction occurs in white crappie, black crappie, largemouth bass, smallmouth bass, channel catfish, and blue catfish (*Ictalurus furcatus*), AGFC supplements their reproduction by occasional stockings of these species. Historically, there have also been introductions of northern pike (*Esox lucius*), lake trout (*Salvelinus namaycush*), and threadfin shad (*Dorosoma petenense*).

Wilson Lake in the Fayetteville area was used for the supply hatchery for warm water species for the lake until 1986. In 1986, a 30-acre fish nursery pond was constructed by AGFC on the north shore of the Blackburn Creek arm of Beaver Lake for the purpose of rearing game fish for stocking purposes. Since 1986, the fish nursery pond has been used to rear black crappie, largemouth bass, smallmouth bass, and walleye for stocking directly into the lake.

The impoundment of Beaver Lake in 1965 caused environmental changes in the tailwater portion of the White River from Beaver Dam to Table Rock Lake downstream. Hypolimnetic discharge from Beaver Dam created cold-water habitat that was unsuitable for native, warm-water species, such as smallmouth bass. To mitigate for the loss of the warm-water fishery, the AGFC began stocking rainbow trout (*Oncorhynchus mykiss*) into Beaver tailwaters in 1966. Brown trout (*Salmo trutta*) were first stocked in 1985 to increase the diversity of trout species available to anglers. Cutthroat trout (*Oncorhynchus clarkii*) and brook trout (*Salvelinus fontinalis*) were introduced in 1989 and 1994 to further improve the quality of anglers' trout fishing experiences. The Beaver tailwater fishery has gained popularity over the last few decades and is currently among the most popular trout fishing locations in Arkansas.

The Norfork National Fish Hatchery, built and operated by the U.S. Fish and Wildlife Service (USFWS), supplies all trout that are stocked into Beaver tailwater. Intensive stocking of trout is necessary due to a range of environmental factors that limit natural reproduction in the fishery. Currently, rainbow and brown trout are stocked each year; cutthroat trout and brook trout stockings were discontinued in 2002 and 2004, respectively. Biologists from the AGFC are responsible for trout management in the Beaver tailwater. This fishery was the first trout water managed by the AGFC as part of their strategic planning process and an individual management plan for the Beaver tailwater fishery was developed in 2005. The Beaver Tailwater Management Plan can be found on the AGFC website (www.agfc.com).

4.4 Terrestrial Resources

4.4.1 Wildlife

White-tailed deer (*Odocoileus virginianus*), eastern wild turkey (*Meleagris gallopavo silvestris*), and black bear (*Ursus americanus*) are common game animals found and hunted in the Beaver Lake area. The principal small game species found in the open upland areas include bobwhite quail (*Colinus virginianus*), cottontail rabbit (*Sylvilagus floridanus*), and mourning dove (*Zenaida macroura*). Gray (*Sciurus carolinensis*) and fox squirrels (*S. niger*) are common in upland wooded areas. Furbearing animals found in the Beaver Lake area include coyote (*Canis latrans*), red fox (*Vulpes vulpes*), gray fox (*Urocyon cinereoargenteus*), river otter (*Lontra canadensis*), American mink (*Neogale vison*), muskrat (*Ondatra zibethicus*), beaver (*Castor canadensis*), bobcat (*Lynx rufus*), and raccoon (*Procyon lotor*). Habitat management that includes wildlife food plot plantings, mowing, soil disturbance, removal of exotic species and application of prescribed fire provide benefit to these populations.

Since 1966, AGFC has leased lands and waters at Beaver Lake for fish and wildlife management. From the 1970's through the 1990's, food plots were established in various areas for wildlife management, but have not been funded in recent years.

The common goldeneye (*Bucephala clangula*), hooded merganser (*Lophodytes cucullatus*), bufflehead (*Bucephala albeola*), and ring-necked duck (*Aythya collaris*) are a few of the many diving ducks common to Beaver Lake during winter months. Mallards (*Anas platyrhynchos*), gadwall (*Anas strepera*), and other dabbling duck species can also be found around Beaver Lake in the shallower areas. Resident giant Canada geese (*Branta canadensis maxima*) are so numerous in many coves and recreation areas that their presence has become a nuisance.

Ring-billed gulls (*Larus delawarensis*) are seen frequently around the Beaver Lake area. Greater and lesser yellow legs (*Tringa melanoleuca*) and (*T. flavipes*), American white pelican (*Pelecanus erythrorhynchos*), and large flocks of horned grebes (*Podiceps auritus*) are also seen during their peak migration in the spring and fall. Beaver Lake is also one of the few places where visitors can see both the turkey vulture (*Cathartes aura*) and the black vulture (*Coragyps atratus*) at the same time during winter months. Beaver Lake has also become a popular place that visitors come to observe bald eagles (*Haliaeetus leucocephalus*), commonly wintering 150 or more birds, and hosting 5-6 breeding pairs during the nesting period of March to June. The surrounding woodlands and grasslands serve as prime nesting areas for resident and neotropical migratory songbirds.

4.4.2 Vegetation

The area surrounding the lake is mostly forested. Trees and shrubs around the lakeshore include upland oak (*Quercus spp*.) and hickory (*Carya spp.*) species, wild persimmon (*Diospyros virginiana*), honey locust (*Gleditsia triacanthos*), hawthorn (*Crataegus monogyna*), flowering dogwood (*Cornus florida*), redbud (*Cercis canadensis*), coralberry (*Symphoricarpos orbiculatus*), smooth and winged sumac (*Rhus glabra*) and (*R. copallina*), and buttonbush (*Cephalanthus occidentalis*). Frequent periods of inundation keep a thin

strip of government owned lands around the lake in early stages of succession. Eastern red cedar (*Juniperus virginiana*) and short-leafed pine (*Pinus echinata*), the principal evergreens, are dispersed throughout the region and are found in many large, scattered groups. Ground covers consist of greenbrier (*Smilax rotundifolia*), sedges (*Cyperaceae spp.*), and native grasses.

Plant communities also include post oak (*Quercus stellata*) savannas and glades. The post oak savanna ecosystem exhibits an open canopy of low density trees allowing considerable light penetration to the understory. This permits a wide variety of herbaceous species to perpetuate under natural disturbances such as fire. Dolomite/limestone glades, which are characterized by barrens-like communities of prairie type native forbs and grasses, occur on the shallow soil over outcroppings of bedrock.

The largest tract of public land adjoining Beaver Lake is the 12,054 acre Hobbs State Park – Conservation Area (HSP-CA). HSP-CA adjoins Beaver Lake shoreline for approximately 26 miles. The tract serves as the single largest landholding around the lake, as well as in Benton County. Although the title ownership to the tract is under Arkansas Department of Parks and Tourism, HSP-CA is co-managed by three state agencies: Arkansas State Parks (ASP), AGFC and the Arkansas Natural Heritage Commission (ANHC). Arkansas State Parks has developed facilities to include a state-of-the-art Visitor Center (The Nature Center for Northwest Arkansas), 54 miles of multi-use trails (hiking, mountain biking, and equestrian), development of a significant historic site, the only public shooting range in Northwest Arkansas, as well as infrastructure and support amenities (maintenance complex, staff residences, restrooms, etc.).

Devil's Eyebrow Natural Area borders more than five miles of the northernmost shoreline of Beaver Lake. It is more than 2,089 acres in size and very diverse with more than 550 vascular plant species documented, 25 of which are of state conservation concern. The ANHC and AGFC own and manage the land.

The Devil's Eyebrow area is home to black maple (*Acer nigrum*) trees. This is the only known location of this species in Arkansas. Also identified in the area is the rock elm (*Ulmus thomasii*).

4.4.3 Wetlands

Located within the Springfield Plateau of the Ozark Mountains region of northern Arkansas, the area surrounding Beaver Lake is characterized by limestone, dolomite, or chert geology. The many rivers and streams flowing through the region have created a landscape of level highlands dissected by rugged valleys rich in karst features such as caves and sinkholes. Associated with these streams and landscape features are a variety of wetland habitats representative of the five wetland classes occurring within the region. These wetland classes include depressions, flats, fringe, riverine, and slope. It is possible, and perhaps even likely, that all of these classes of wetlands occur in the general area of Beaver Lake. However, those most likely to occur in the area immediately surrounding the lake are fringe (most likely reservoir), riverine (most likely spring runs) and slope wetlands (most likely calcareous slope).

4.4.4 Federal and State Threatened and Endangered Species

There are many species in the Ozarks that are federally listed as threatened or endangered under the Endangered Species Act, or listed as species of concern by the State of Arkansas. While species become imperiled for a variety of reasons, habitat loss is the main contributor to population declines. A federally listed threatened species is one that is likely to become endangered within the foreseeable future. A federally listed endangered species is one in danger of extinction throughout all or a significant portion of its range.

Table 4.1 includes a list of threatened and endangered species identified by the Arkansas Natural Heritage Commission (ANHC 2021) and/or the USFWS that have either been documented as occurring, or have the potential to occur in or near Beaver Lake. No critical habitat for any federally listed species occurs in the immediate area of Beaver Lake. Appendix B to this EA includes the federal list of threatened and endangered species from the USFWS (USFWS 2022A), as the ANHC List of Species of Conservation Concern recorded within a five-mile radius of Beaver Lake.

Table 4.1 Federal and State Threatened and Endangered Species

Common Name	Scientific Name	Federal Status	State Status/Global Rank
MAMMALS			
Gray Bat	*Myotis grisescens*	LE	SE / S2S3/G4
Indiana Bat	*Myotis sodalis*	LE	SE / /S1/G2
Northern long-eared Bat	*Myotis septentrionalis*	LT	SE / S1S2/ G1G2
Ozark Big-eared Bat	*Corynorhinus (=Plecotus) townsendii ingens*	LT	Not listed
Little Brown Bat	*Myotis lucifugus*	-	SE / S1
BIRDS			
Bald Eagle	*Halieetus Leucocephalus*	*Protected under Bald and Golden Eagle Protection Act	S3B,S4N/G5
Eastern Black Rail	*Laterallus jamaicensis ssp. jamaicensis*	LT	Not listed
Piping Plover	*Charadrius melodus*	LT	Not listed
Rufa Red Knot	*Calidris canutus rufa*	LT	Not listed
Whooping Crane	*Grus americana*	Experimental Population, Non-Essential	Not listed
FISHES			
Ozark Cavefish	*Amblyopsis rosae*	LT	SE / S1/G3
CLAMS			
Neosho Mucket	*Lampsilis rafinesqueana*	LE	Not Listed
Rabbitsfoot mussel	*Theliderma cylindrica*	LT	SE/S3/G3G4
Snuffbox Mussel	*Epioblasma triquetra*	LE	Not listed

INSECTS			
Monarch Butterfly	*Danaus plexippus*	C	Not listed
VASCULAR PLANTS			
Missouri Bladderpod	*Physaria filiformis*	LT	S2/G3
Opaque Prairie Sedge	*Carex opaca*	-	SE / S2S3G4
Yellow Coneflower	*Echinacea paradoxa var. paradoxa*	-	ST / S2G3T3
Ovate-leaf Catchfly	*Silene ovata*	-	ST / S2G3
Royal Catchfly	*Silene regia*	-	ST / S2G3

FEDERAL STATUS CODES

LE = Listed Endangered; the U.S. Fish and Wildlife Service has listed this species as endangered under the Endangered Species Act.
LT = Listed Threatened; the U.S. Fish and Wildlife Service has listed this species as threatened under the Endangered Species Act.
C = Candidate Species;

STATE STATUS CODES

INV = Inventory Element; The Arkansas Natural Heritage Commission is currently conducting active inventory work on these elements. Available data suggests these elements are of conservation concern. These elements may include outstanding examples of Natural Communities, colonial bird nesting sites, outstanding scenic and geologic features as well as plants and animals, which, according to current information, may be rare, peripheral, or of an undetermined status in the state. The ANHC is gathering detailed location information on these elements.

GLOBAL RANKS

G3 = Vulnerable globally. At moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.

G4 = Apparently secure globally. Uncommon but not rare; some cause for long-term concern due to declines or other factors.

G5 = Secure globally. Common, widespread and abundant.

T-RANKS= T subranks are given to global ranks when a subspecies, variety, or race is considered at the state level. The subrank is made up of a "T" plus a number or letter (1, 2, 3, 4, 5, H, U, X) with the same ranking rules as a full species.

STATE RANKS

S1 = Critically imperiled in the state due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors making it vulnerable to extirpation.

S2 = Imperiled in the state due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it vulnerable to extirpation.

S3 = Vulnerable in the state due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.

GENERAL RANKING NOTES

Q = A "Q" in the global rank indicates the element's taxonomic classification as a species is a matter of conjecture among scientists.

USFWS lists the gray bat as endangered wherever it is found and can occur (USFWS 2021A). Gray bats are distinguished from other bats by the unicolored fur on their back. In addition, following their molt in July or August, gray bats have dark gray fur which often bleaches to a chestnut brown or russet. The gray bat occupies a limited geographic range in limestone karst areas of the southeastern United States. They are mainly found in Alabama, northern Arkansas, Kentucky, Missouri, and Tennessee. Most gray bats seasonally migrate between winter hibernacula and summer maternity or bachelor colonies. Roosting primarily takes place in caves, during the summer they prefer caves within a mile of rivers and lakes (Animal Diversity Web [ADW], 2020A). Gray bats forage along the forested banks of streams and lakes, where they emerge at dusk and feed on various insect species such as moths, flies, leafhoppers, caddisflies, and beetles from

vegetation and water surfaces (NatureServe, 2020A). Gray bats are endangered largely because of their habit of living in very large numbers in only a few caves. As a result, they are extremely vulnerable to disturbance.

USFWS lists the Indiana bat as endangered wherever it is found (USFWS, 2021B). Indiana bats are quite small, weighing only one-quarter of an ounce (about the weight of three pennies) although in flight they have a wingspan of 9 to 11 inches. Their fur is dark-brown to black. Most Indiana bats seasonally migrate between winter hibernacula and summer maternity or bachelor colonies. Summer roosting primarily takes place in caves, trees, under bridges, and in buildings. During winter they will hibernate in caves and occasionally in an abandoned mine. About 85% of the total population hibernates in nine caves, each of which contains at least 30,000 bats; the remaining 15% of the population have been or currently are distributed among 50+ hibernacula. Based on hibernacula that contain the vast majority of the population, the area of occupancy is very small. Because the total population hibernates in relatively few caves, this is the most limiting portion of the species annual cycle. In contrast, the area occupied in summer is much larger and minimally affected by localized threats (ADW, 2020B). During summer, if the bats roost in trees it will be those that are shedding their bark and that are dead or dying. Preferred roosting tree species include bitternut hickory (*Carya cordiformis*), oaks, elms (*Ulmus sp.*), pines (*Pinus sp.*), American sycamore (*Platanus occidentalis*), and eastern cottonwood (*Populus deltoides*) to roost in. Indiana bats forage along the forested banks of streams, lakes, and floodplains as well as in the open. They emerge at dusk and feed on various insect species such as moths, flies, leafhoppers, caddisflies, and beetles from vegetation and water surfaces (NatureServe, 2020C). The overall range extends west to the western Ozark region in eastern Oklahoma and Iowa, north and east to southern Wisconsin and Michigan, New York, New England, and northern New Jersey, and south to northern Alabama and Arkansas, with accidental or nonregular occurrences outside this range. The species has disappeared from or greatly declined in most of its former range in the northeastern United States.

The USFWS lists the northern long-eared bat (NLEB) as threatened wherever it is found (USFWS, 2021C). the NLEB is a medium-sized bat with a body length of 3 to 3.7 inches but a wingspan of 9 to 10 inches. Their fur color can be medium to dark brown on the back and tawny to pale-brown on the underside. As its name suggests, this bat is distinguished by its long ears, particularly as compared to other bats in its genus, *Myotis*. NLEBs seasonally migrate between winter hibernacula and summer maternity or bachelor colonies. Roosting may take place in tree bark, tree cavities, caves, mines, and barns. NLEBs forage along forested hillsides and ridges near roosting and hibernating caves. They emerge at dusk and feed on various insect species such as moths, flies, leafhoppers, caddisflies, and beetles from vegetation and water surfaces (NatureServe, 2020C).

The Ozark big-eared bat prefers caves in limestone karst formations, in regions dominated by mature hardwood forests of hickory, beech, maple and hemlock trees. Maternity caves, where females bear and raise their young are closer to food sources than are hibernation caves, which are better protected from cold and wind. The bat is now limited to a few isolated populations in Arkansas and Oklahoma.

The little brown bat varies in color from brown, reddish, to golden, although some albino specimens have been observed. The little brown bat is found in abundance throughout the northern United States into Canada. It is present in lesser numbers in southern states and is absent from the southern Great Plains. Little brown bats also live in high-elevation forests in Mexico. Little brown bats are not territorial—they live in colonies numbering in the hundreds of thousands of individuals. Colonies aggregate at nesting sites called roosts. There are several different types of roosts that serve different purposes—day and night roosts provide habitat for bats when they are sleeping or resting. Hibernacula are a type of roost that is occupied in the winter months. Little brown bats choose buildings, caves, trees, rocks, and wood piles as roost sites. They may migrate hundreds of miles to get from their summer habitats to hibernacula.

All five bat species mentioned above have suffered greatly from human disturbance of caves due to exploration and commercialization. Bats enter hibernation with only enough fat reserves to last until spring. Arousing bats while they are hibernating can cause them to use up a lot of energy, which lowers their energy reserves. If a bat runs out of reserves, it may leave the cave too soon and die. In June and July, when flightless young are present, human disturbance can lead to mortality as frightened females drop their young in the panic to flee from the intruder.

The primary threat to the bat species listed above, as well as all other bat species, is the spread of white-nose syndrome (WNS), an often (but not always) lethal condition caused by a fungal pathogen. WNS is an illness that has killed over a million bats since 2006 when dead and dying bats, with the distinctive "white nose," were first observed. "White nose" refers to a ring of white fungus often seen on the faces and wings of affected bats. First observed in a cave in New York in February 2006, WNS has spread from New York caves to caves and mines throughout the Northeast, Southeast and Midwest. It is spreading to the West and Southwest. This rapidly spreading disease is projected to cause massive declines in all three species populations in the future.

The Pigeon Roost Cave is home to the Gray bat, Indiana bat, Northern long-eared bat, and Little brown bat. The USACE works closely with the U.S. Fish and Wildlife Service, AGFC, and ASP to protect the USACE owned cave recharge area and manage the project lands and waters of Beaver Lake to protect the bat habitat. Transient populations of gray, Indiana, Northern long-eared, and Gray bats are documented in other caves located on and near the Beaver Lake area.

While no longer listed as threatened or endangered, the bald eagle (*Halieetus leucocephalus*) is protected by the Bald and Golden Eagle Protection Act, and is a common visitor during the winter months around Beaver Lake. Most winter counts range in the total of 100 to 150 in numbers. In the early 1990's, there were also two golden eagles (*Aquila chrysaetos*) documented on Beaver Lake. In addition, there are currently four to five bald eagle nests located around the lake. Although the bald eagle was delisted by USFWS in 2007 due to recovery of the species, both the bald and golden eagles are still protected in accordance with the Bald and Golden Eagle Protection Act. Beaver Lake was also home for multiple years to the only known leucistic eagle. This attracted ornithologists from across the nation to possibly see this rare bird.

The eastern black rail is one of four subspecies of black rail, and the smallest rail in North America. They are a wetland dependent bird requiring dense emergent cover and extremely shallow water depths over a portion of the wetland-upland interface. Grasslands, wetlands, and marshes have experienced significant loss and conversion in recent history and, although this trend has slowed, losses and alterations continue to occur in eastern rail habitat. Additionally, groundwater declines and water drainage systems/modifications such as channelization, levees, and dams have impacted many wetlands and subsequently wetland-dependent species. Grassland and western habitat also require periodic disturbance, historically through fire. Fire suppression has allowed many types of grasslands to be overgrown with woody species, leading to a loss of grassland habitat. According to the USFWS, the eastern black rail is likely a vagrant in Arkansas, passing through during migration.

Piping plovers are migratory shorebirds that breed in North America in three geographic regions: the Atlantic Coast, Northern Great Plains, and Great Lakes. They are small and stocky, with a light brown upper-body, a white underside and orange legs. Plovers from all three breeding populations winter along coastal beaches and barrier islands from North Carolina to Texas, the eastern coast of Mexico, and on Caribbean islands. They migrate to their nesting grounds in mid-April and depart mid-July to late August. During fall and spring, plovers use rest sites along the migration pathway including shorelines of reservoirs/man-made lakes, industrial ponds/fish farm ponds, rivers, marsh/wetlands, and natural lakes. These stopover sites are highly influenced by local water levels, and tend to consist of locations with muddy/sandy substrates. Plovers do not concentrate in large numbers at inland stopover sites; instead, they stay for just a few days and then move on. They do not use the same stopover sites between years. Migration stopover habitat is not well documented, but migrating piping plovers have been observed in Arkansas. Habitat loss is the main threat to this species, including coastal beaches and migration habitat.

The Rufa red knot is one of six recognized subspecies of red knots. Each recognized subspecies is believed to occupy separate breeding areas in addition to having distinctive morphology (i.e. body size and plumage), migration routes, and annual cycles. The Rufa red knot is a medium-sized (9 to 11 inches) shorebird, with distinctive red breeding plumage on the face, breast, and upper belly. Non-breeding plumage is dusky-gray. The red knot makes one of the longest yearly migrations of any bird (up to 19,000 miles annually) as it travels from its breeding grounds in the Arctic to its wintering grounds in the Southeast U.S., the Northeast Guld of Mexica, northern Brazil, and Tierra del Fuego at the southern tip of South America. According to the USFWS, the red knot can be found in Arkansas during migration, although it is uncommon.

The Whooping Crane is a large white bird, with males approaching 1.5 m tall. Whooping Cranes are a long-lived species. Current estimates suggest a maximum longevity in the wild of at least 30 years. Whooping cranes currently exist in the wild at three locations and in captivity at 12 sites. There is only one self-sustaining wild population that nests in Wood Buffalo National Park and adjacent areas in Canada, and winters in coastal marshes at Aransas National Wildlife Refuge in Texas. Habitat for this species consists of marshes, shallow lakes, lagoons, salt flats, grain and stubble fields, and barrier islands (NatureServe

2020D). While some habitat for this species is present within the Beaver Lake Federal Fee Boundary, there have been no known sightings, therefore it would be considered a rare occurrence.

The Ozark Cavefish is found in only 14 caves in the Springfield Plateau region of the Ozark Highlands in northwest Arkansas, southeast Missouri, and northeast Oklahoma. Beaver Lake is also home to the Ozark cavefish (*Amblyopsis rosae*) which live in two known underground crevices on or near Federal lands surrounding Beaver Lake. USFWS (2022) lists the species as threatened wherever found. It a blind fish that can get up to 2.25 in length, and it has a pinkish white color (USFWS, 2019). Preferred habitat consists of cave streams and springs with clear water over chert or gravel bottoms. It is an invertivore that feeds primarily on plankton, but also eat isopods, amphipods, crayfish, salamander larvae, and bat guano. Primary threats to Ozark cavefish include contaminated groundwater and disturbance to cave ecosystems.

The Neosho mucket (is a medium sized freshwater mussel, reach approximately four inches in length. This species is associated with streams that have shallow riffles and runs and are comprised of gravel substrate with moderate to swift currents. It historically occurred in 16 streams in the Illinois, Neosho, and Verdigris River basins in Arkansas, Kansas, Oklahoma, and Missouri. It is endemic to the Arkansas River system and of the nine extant streams only one population is viable. The Neosho mucket is included in the USFWS species list due to proximity to Beaver Lake, however it is not known to occur in the White River drainage, thus is not expected to occur in the Project Area.

The rabbitsfoot mussel is found in rivers and streams in Alabama, Arkansas, Georgia, Kansas, Kentucky, Illinois, Indiana, Louisiana, Mississippi, Missouri, Ohio, Oklahoma, Pennsylvania, Tennessee, and West Virginia. The USFWS estimates that it has been lost from about 64 percent of its historical range. While 51 of 140 historical populations are still present, only 11 populationsare viable. Most of the existing rabbitsfoot populations are marginal to small and isolated. The majority of stable and reproducing populations left within its historical range occur in Arkansas. Similar to the Neosho mucket, the rabbitsfoot mussel is not known to occur in the White River basin, thus would not occur in the Beaver Lake Project Area.

The snuffbox is a small, triangular freshwater mussel that is found in Alabama, Arkansas, Illinois, Indiana, Kentucky, Michigan, Minnesota, Missouri, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, and Wisconsin. It lives in small to medium-sized creeks in areas with a swift current, although it is also found in Lake Erie and some larger rivers. Most populations are small and geographically isolated from one another, increasing their risk of extinction. In Arkansas, the snuffbox mussel is only known to occur in the Buffalo, Spring, and Strawberry River drainages, thus should not occur in the Beaver Lake Project Area.

Monarch Butterfly (*Danaus plexippus*) is listed as a candidate species wherever it is found (USFWS, 2021D). It is an orange butterfly with black stripes and white dots on its wings, which can span up to five centimeters (NatureServe, 2021A). Its breeding habitat consists primarily of milkweed species (*Asclepias sp*.), which is the only species of plant that their larvae feeds on. While migrating throughout North America, the butterfly is a common

occurrence wherever concentrations of flowering plants and milkweed occur. Monarch butterflies are a common sight around Beaver Lake during fall migrations.

Missouri Bladderpod (*Physaria filiformis*) is a federally-listed threatened species in the mustard family endemic to calcareous glades and barrens in the Interior Highlands of Missouri and Arkansas. Missouri bladderpod is a small annual plant, between 4-8 inches tall, with many slender stems that grow from a cluster of leaves at the base. The stems and leaves are covered in tiny hairs that give the plant a silvery color. Missouri bladderpod blooms from April to May, with clusters of yellow flowers at the top of the stems. Seeds germinate in the fall and overwinter as tiny rosettes, which look like clusters of leaves on the ground. This species was originally found by R Dalton and J. Dow in 1992. Surveys after listing succeeded in finding many more existing populations, bringing the number of known sites with Missouri bladderpod from 9 when originally listed to 70. Many agencies and conservation groups have also bought or protected land with existing populations. The major threat to Missouri bladderpod is the decline of glade and barren habitat due to lack of fire needed to suppress invasive plant species, such as eastern red cedar.

4.5 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 Beaver Project is not protected from the spread of invasive species. Locally the project office works with its partners, AGFC, University of Arkansas Extension Services and United States Department of Agriculture, to help stop the spread of some of the Ozarks most unwanted species. These would include feral hogs, zebra mussels, sericea lespedeza, gypsy moth and the emerald ash borer. Project rangers post signage in all the recreation areas to communicate the dangers of spreading invasive species on project lands and waters. Rangers also place emerald ash borer and gypsy moth traps on project lands to monitor any infestations of these species.

4.6 Archaeological and Historic Resources

4.6.1 Paleontology

Beaver Lake is situated in the Springfield Plateau region of the Ozark Highlands. Geologically, rocks in the Ozark Highlands are dominated by well-lithified sandstones, shales, limestones, and dolostones of Paleozoic age. A thin drape of younger unconsolidated clays, sands, and gravel, termed alluvium, is often found in valley floors

and associated with the streams and rivers.

Lower Ordovician, Middle to Upper Devonian and Lower and Upper Mississippian age strata are present around Beaver Lake. The Ordovician and Devonian strata crop out around Beaver Lake and its tributaries. Primary formations associated with the Lower Ordovician strata include the Cotter and Powell Dolomite. The fossils known from the Cotter and Powell Dolomite are rare, but include gastropods, cephalopods, trilobites and reef-building algae.

Formations associated with the Middle to Upper Devonian include the Chattanooga Shale, Clifty and Penters. Fossils are typically rare to absent in these formations. Brachiopods and conodonts have been collected on a few occasions.

The Upper Mississippian strata consists of the Boone Formation, which is gray, fine- to coarse-grained fossiliferous limestone interbedded with chert. Crinoids are the most common fossil found in the formation, but brachiopods, bryozoa, mollusks, corals, shark material, trilobites, conodonts, and other fossils are known to occur.

4.6.2 Cultural Resources

The following is a brief history of the human occupation of Arkansas and the Beaver Lake area:

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

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

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

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

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

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

Previous Investigations in the Beaver Lake Area

During the past seventy years scientific investigation of archaeological sites in the Beaver Lake area has been carried out in several phases. In 1922 and 1923, Mark R. Harrington of Phillip Academy was the first archeologist to excavate sites on the area that is now Beaver Lake. He excavated 13 bluff shelters. Between 1928 and 1935, the work of Harrington was continued by S.C. Dellinger of the University of Arkansas Museum. Dellinger supervised the excavation of 21 rock shelters. In the early 1960's, a series of surveys were conducted by several archeologists from the University of Arkansas Museum. Today, there are 280 known archeological sites along or immediately adjacent to Beaver Lake. Of these, 271 are identified as prehistoric, seven are historic and two sites have no known cultural affiliation.

Table 4.2 Previously Recorded Resources at Beaver Lake

	Number of Sites
Historic	7
Prehistoric	271
No known cultural affiliation	2
Total	280
National Register Eligibility Status	
Not Evaluated	132
Not Eligible	5
Eligible	1

4.7 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 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.

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 (PM2.5), 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.

The study area is located within the Northwest Arkansas Intrastate Air Quality Control Region (40 CFR §81.140). The area is classified as being in attainment for all NAAQS.

The Current Air Data Air Quality Index Summary Report for the Fayetteville, Rogers, Springdale area show that the area had 269 good days and 95 moderate days of air quality in 2021 (EPA 2021). Situated between the cities of Rogers (west) and Eureka Springs (east), Beaver Lake is east of the Fayetteville area in a relatively rural setting with no nearby heavy emissions producing manufacturing or large mining operations. Air in the region is very clean and smog is virtually unknown, and none of the present purposes of the project contribute to air pollution. Other sources of air quality impairment such as open burning are not a problem. Arkansas state laws restrict open burning, which is allowed in only residential areas and for certain controlled agricultural, forestry, wildlife, and industrial activities. The law does not apply to ceremonial fires and campfires.

4.8 Socioeconomic Resources and Environmental Justice

Beaver Lake is located in Benton, Carroll, and Washington counties in the Ozark Highlands of northwest Arkansas, on the headwaters of the White River. Data from the 2010 and 2020 Census, and the U.S. Bureau of Labor Statistics, were used to summarize socioeconomic conditions in the project area that the proposed action may affect.

4.8.1 Population and Economy

Table 4.3 shows 2020 and 2010 population and rates of change along with 2010 population density for the project area. With the exception of Carroll County, population has grown significantly in counties bordering Beaver Lake. Benton County has grown by 28 percent and Washington County by 21 percent, both of which, exceed national and state level trends. Both Benton and Washington counties comprise a portion of the Fayetteville–Springdale–Rogers Metropolitan Statistical Area (MSA) that is one of the fastest growing regional economies in the nation. Population density is 40 persons per square mile in Carroll County (primarily rural), and 236 and 213 in Washington and Benton counties (more urbanized given their proximity to Fayetteville).

Table 4.3 Population Levels and Trends in the Project Areas (2010 through 2020)

Geopolitical Area	2010 Population	2020 Population	Population percent change (2010-2020)	Population density (Persons per square mile, 2020)
United States	308,745,538	331,449,281	+7%	94
State of Arkansas	2,872,684	3,011,524	+5%	51
Benton County	221,339	284,333	+28%	236
Carroll County	27,446	28,260	+3%	40
Washington	203,065	245,871	+21%	213

Source: U.S. Census Bureau: 2010 and 2020 Census.

Key income indicators (per capita income and median household income) for counties in the project area vary with lower values characteristic of rural counties and higher values for urban counties (Table 4.4). Per capita incomes are on par with national and state averages, but state figures are better gauge given the low cost of living in Arkansas. Benton County is higher than both state and national level estimates while figures in Washington and Carroll counties are lower than national values, but on par or higher than the state figure. Median household incomes follow the same general pattern. The distribution of employment by occupation category tends to follow national and state allotments.

Table 4.4 Existing Employment and Income in the Project Area (2020)

County	Per capita income	Median household income	Total civilian workforce	Management, business, science, and arts	Natural resources, construction, and maintenance	Production and transportation	Sales and office workers	Service
United States	$34,103	$62,843	208,813,047	75,570,019	37,747,405	51,454,565	18,933,732	25,107,326
State of Arkansas	$26,577	$47,597	1,743,672	543,599	300,012	420,251	189,702	290,108
Benton County	$34,442	$66,362	15,628	5,396	1,346	2,557	4,096	2,233
Carroll County	$25,295	$46,110	144,977	36,566	19,060	36,296	28,192	24,863
Washington	$27,790	$50,451	129,961	44,807	22,462	31,932	11,817	18,943

Source: U.S. Census Bureau: 2020 Census

In counties adjacent to Beaver Lake, tourism and recreation is an important part of local economies. Given the scenic and natural beauty of northwest Arkansas, Beaver Lake is a popular recreation venue for both instate and out of state visitors. In 2020, about 3 million people visited Beaver Lake for at least one day.

Accounting for almost one half of reported activities, water sports (swimming, boating, skiing and fishing) are popular at Beaver (Figure 4.2). There are 20 boat launches, and the lake is home for rainbow and brown trout, and other fish including bass, crappie, bream, stripers, and catfish. In addition to fishing and hunting, many other sports and activities await the visitor, picnicking, hiking and sightseeing are also reported recreational opportunities at or near Beaver Lake. To support these activities, Beaver Lake has a variety of recreational facilities (Table 4.5). Paved access roads wind through 11 developed parks with 683 campsites. Other facilities include swimming beaches, hiking trails, boat launching ramps, sanitary dump stations, and picnic shelters. Seven parks contain year-around commercial marinas, which offer grocery items, fuel, boat rental and storage, fishing guides and other supplies and related services.

Recreation at the lake has substantial impact to local economies based on surveys of visitor spending and attendance at USACE projects. Based on 2019 data, 3 million people visited Beaver Lake and spent $101 million at businesses within 30 miles of the lake. Of this amount $53 million stayed in the project area economy in the form of income and supported nearly 1,100 local jobs.

Table 4.5 Recreation Facilities at Beaver Lake Arkansas

Facilities	Number of sites
Recreation sites	28
Picnic sites	174
Camping sites	681
Playgrounds	19
Swimming areas	12
Trails	21
Trail miles	26
Fishing docks	1
Boat ramps	20
Marina slips	1,799

Source: U.S. Army USACE of Engineers, Little Rock District

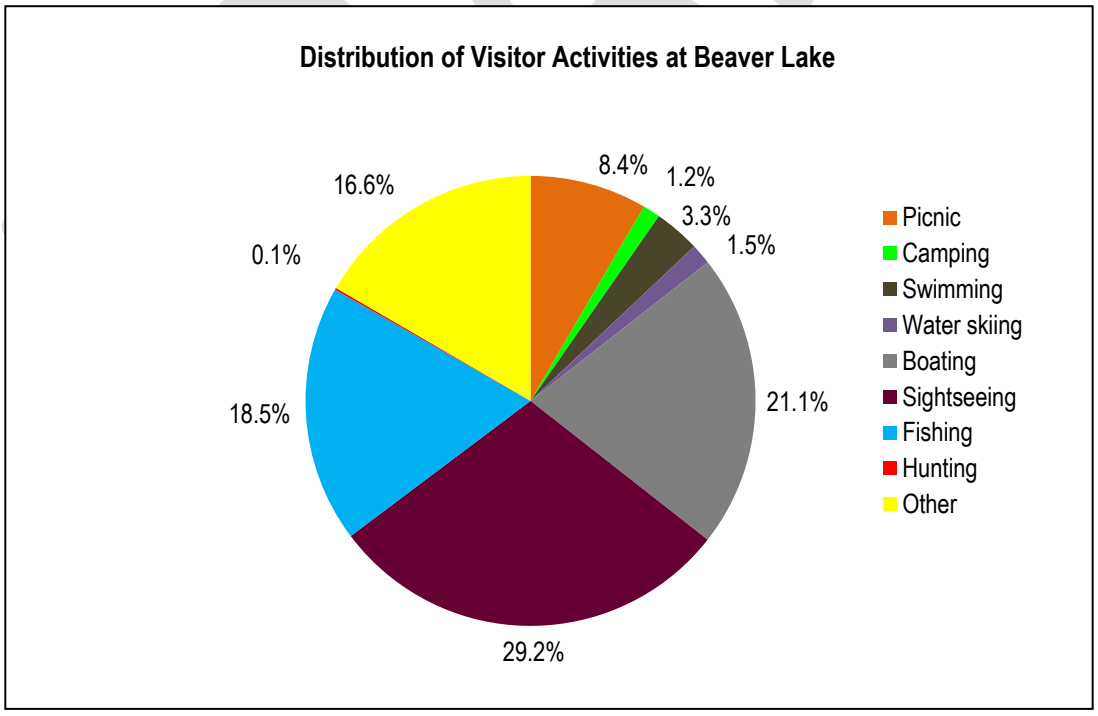

Figure 4.2 Distribution of Visitor Activities at Beaver Lake

4.8.2 Transportation Resources

The primary transportation system at Beaver Lake serves visitors and workers driving to and from recreation and service areas. The road system is maintained by counties and the state, and are high-standard, paved roads. Public access to the park requires a road system, although once visitors reach the park, designated parking areas are available from which miles of trails can be accessed. Nearby residents can access the park via foot or bike. Several U.S., State highways, and county roads access the lake. The primary access roads to the shoreline are U.S. Highway 412 and 62 and State Highways 264, 187, 127 and 12. Several state highways and county roads access the lake (Table 4.5).

Table 4.6 Access Roads to the Beave Lake Shoreline

Gateway Towns	Lake Access Road
Lowell	SH 264
Pilgrims Rest and Blue Springs	SH 95, SH 502 and SH 507
Bethel Heights	SH 264
Rogers and Prairie Creek	SH 12
Avoca	CR 74 and CR 1751
Garfield	CR 99, SH, CR 1717, and CR 1720
Gateway	CR 89
Busch	SH187
Eureka Springs	US 62

Source: U.S. Army USACE of Engineers Little Rock District

4.8.3 Environmental Justice Indicators

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 disproportionally 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 Council on Environmental Quality (CEQ) states that “minority populations should be identified where either: (1) 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 4.6 displays Census data summarizing racial, ethnic and poverty characteristics of areas adjacent to construction sites (loops and compressor stations). The purpose is to analyze whether the demographics of the affected area differ (i.e., Census Tract) in the

context of the broader region (the county as a whole); 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.

Table 4.6 also displays the number of children adjacent to Project areas. The purpose of the data is to assess whether the project disproportionally affects the health or safety risks to children as specified by Executive Order (E.O.) 13045 - *Protection of Children from Environmental Health Risks and Safety Risks* (1997). Overall, it does not appear that the project would disproportionally affect children.

Table 4.7 Racial Composition, Number of Children and Poverty Indictors in Counties Bordering Beaver Lake, Arkansas (2020)

Region	United States	State of Arkansas	Benton County	Carroll County	Washington County
Racial Composition (percent)					
White	60.1%	72.0%	72.6%	78.4%	70.4%
Black or African American, percent	13.4%	15.7%	2.1%	0.8%	3.8%
American Indian and Alaska Native	1.3%	1.0%	1.9%	1.4%	1.6%
Asian	5.9%	1.7%	4.2%	2.0%	2.6%
Native Hawaiian and Other Pacific Islander	0.2%	0.4%	0.7%	1.4%	2.8%
Two or More Races	2.8%	2.2%	2.7%	2.3%	2.9%
Hispanic or Latino	18.5%	7.8%	17.1%	15.2%	17.1%
Percent of population classified as minorities					
Percent of population under 18 years of age	22.30%	23.20%	26.00%	21.40%	24.10%
Poverty Indicator					
Persons in poverty (percent)	11.40%	15.20%	9.10%	14.10%	13.20%

Source: U.S. Census Bureau: 2020 Census

4.9 Recreation Resources

The recreational resource of Beaver Lake Project is considered to be of great importance to this Northwest Arkansas region. The USACE of Engineers has taken advantage of the natural and scenic beauty and constructed a variety of recreational facilities around the lake. Beaver Lake Project offers many recreational activities such as sightseeing, camping, swimming, picnicking, SCUBA diving, boating, water skiing/wakeboarding, canoeing/kayaking, nature study, bird watching, fishing, hunting, and hiking. There are eleven designated recreation areas on Beaver Lake operated by the USACE of Engineers. Carroll County Arkansas has a lease to maintain and operate one park. Seven full-service marinas are owed-operated by commercial concessionaires. Twenty-five boat ramps are licensed to local County or State Government. Seven limited-motel/resorts have facilities on Government property and are owned-operated by lease agreement. The interest in using the project's resources of land and water in and around the parks has been on the

steady increase as the Northwest Arkansas area continues to grow at a fast pace. The population of the area has exceeded 750,000 and is estimated to rapidly exceed 1,000,000 in the next few years with no end in sight. This will only increase the use of existing park areas on Beaver Lake.

In addition to the USACE-owned and managed recreation facilities at Beaver Lake, there are several private businesses surrounding the lake that provide recreational opportunities. One such business mentioned by several commentors during public scoping is War Eagle Caverns. War Eagle Caverns is a popular destination for many visitors seeking a tour of the caverns.

4.10 Health and Safety

Safety of project visitors and project staff are the highest priority in daily project operations. Facilities and recreational areas are routinely evaluated to ensure sites are safe for visitor use. Project staff conducts numerous water safety programs and public announcements to educate children and project visitors about ways to be safe on the lake. Park Rangers provide visitor assistance and work with county law enforcement agencies to ensure public safety. Park Rangers and Arkansas Game and Fish personnel provide water safety and enforcement patrols on the lake as their budgets allow.

4.11 Hazardous, Toxic, and Radioactive Wastes (HTRW)

The definition of Hazardous, Toxic, and Radioactive Wastes (HTRW) according to ER 1165-2-132, page 1, paragraph 4(a) is as follows: “Except for dredged material and sediments beneath navigable waters proposed for dredging, for purposes of this guidance, HTRW includes any material listed as ‘hazardous substance’ under the Comprehensives Environmental Response, Compensation and Liability Act, 42 U.S.C. 9601 et seq (CERCLA). (See 42 U.S.C. 9601(14).) Hazardous substances regulated under CERCLA include ‘hazardous wastes’ under Sec. 3001 of the Resource Conservation and Recovery Act, 42 U.S.C. 6921 et seq; ‘hazardous substances’ identified under Section 311 of the Clean Air Act, 33 U.S.C. 1321, ‘toxic pollutants’ designated under Section 307 of the Clean Water Act, 33 U.S.C. 1317, ‘hazardous air pollutants’ designated under Section 112 of the Clean Air Act 42 U.S.C. 7412; and ‘imminently hazardous chemical substances or mixtures’ on which EPA has taken action under Section 7 of the Toxic Substance Control Act, 15 U.S.C. 2606; these do not include petroleum or natural gas unless already included in the above categories. (See 42 U.S.C. 9601(14).)”

Engineer Regulation (ER) 1165-2-132, HTRW Guidance for Civil Works projects, dated June 26, 1992, provides guidance for consideration of HTRW issues and problems within project boundaries or which may affect/be affected by USACE Civil Works projects. The ER states the USACE policy for addressing HTRW issues and outlines the timing and cost sharing requirements for HTRW encountered during the standard Civil Works project phases. Goals of the ER are to identify the level of detail for HTRW investigation for each phase of a civil works project, promote early detection and response by appropriate responsible parties, determine viable options to avoid HTRW problems, and establish a mechanism for resolution of HTRW issues.

The USACE requires the preparation of an Environmental Condition of Property (ECP) Report prior to the fee acquisition of any property in order to:

- Provide the public with information relative to the environmental condition of the property.
- Assist Federal agencies during the property screening process.
- Provide information to prospective buyers.
- Provide information about completed remedial and corrective actions at the property.
- Assist in determining appropriate responsibilities, asset valuation, and liabilities with other parties to a transaction.

The ECP report presents a summary of readily available information on the environmental conditions of, and concerns relative to, the land, facilities, and real property assets of the subject property. The findings included in the report are based on a record search of available historical environmental investigation reports and site historical documents, a review of aerial photography, stakeholder interviews, and a site reconnaissance visit.

ECP reports have a shelf life of one year, thus for the purposes of this EA, ECPs were only completed for the first phase of proposed land acquisitions as described in Section 3.7.2 (Priority Areas 1, 1A, 2, 3, 4, 5, 6, 8, 9 , 10, 11, 12, 13, 14, 15, 16, and 17). The final ECP documents can be found in Appendix D to this EA.

Should USACE elect to pursue the fee acquisition of private lands as described in Section 3.7.2, this EA will be updated to include ECPs for lands identified in future acquisition phases at that time.

4.12 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 Beaver Lake provide a natural setting that is aesthetically pleasing as well as buffering the lake from development and negative impacts such as erosion and storm water runoff. While many of the private land tracts proposed for acquisition are forested and add to the natural aesthetic quality of the area, some tracts have been cleared to the water's edge. These land tracts are usually vegetated with turf grasses or ornamental shrubs. While pleasing to some, these tracts can detract from the natural aesthetic quality of the Beaver Lake viewshed. Additionally, there are other problems in maintaining the natural aesthetic qualities of the area. Project resource staff is continually investigating trespasses that include activities such as timber cutting and land destruction by unauthorized off road vehicles. In addition, litter and illegal trash dumping both on project lands and project waters are continual problems. Vandalism within recreation areas also occurs. Other concerns that impact aesthetics are demands put upon project resources for uses such as road and utility line corridors.

5.0 ENVIRONMENTAL CONSEQUENCES

The following table summarizes the resources that are likely to be affected by each of the alternatives for an update of the Beaver Lake Proposed Land Acquisition, which includes the No Action alternative. A detailed discussion of the potential impacts of each of the alternatives discussed in Section 3.7 follows the synopsis provided in Table 5.1.

Table 5.1 Resource Impact Summary with Implementation of Alternatives

Resource Category	Alternative 1 No Action	Alternative 2 (Proposed Action) – Purchase Property as per Real Estate Design Memorandum
Climate, Topography, Geology and Soils	Implementation of the No Action Alternative would have no impact on the climate, climate change, GHG emissions, or geology. There could be long-term, minor to moderate adverse impacts to local soils and topography from development or disturbance of the private property.	The implementation of the Proposed Action would have no impact on climate, climate change, GHG emissions, or geology. Minor, beneficial impacts on local soils and topography are anticipated.
Aquatic Environment	Implementation of the No Action Alternative could result in long-term, minor, adverse impacts on local hydrology and groundwater, and minor to moderate adverse impacts to water quality.	Implementation of the Proposed Action would have long-term, minor, beneficial impacts to the local hydrology, groundwater and water quality.
Terrestrial Resources	Implementation of the No Action Alternative would have no impact on terrestrial wildlife resources or wetlands beyond the existing condition.	Implementation of the Proposed Action would have long-term, minor, beneficial impacts to terrestrial wildlife resources.
Threatened & Endangered Species	The implementation of the No Action Alternative would have no impact on any federally-listed threatened and endangered species.	The implementation of the Proposed Action would have long-term, minor positive impacts to threatened and endangered species.
Archaeological & Historic Resources	The implementation of the No Action Alternative has the potential to have long-term, significant, negative impacts on any archeological or historic resources that may occur on the private land	Implementation of the Proposed Action would have long-term benefits to any archaeological or historic resources that might occur on acquired properties.

Resource Category	Alternative 1 No Action	Alternative 2 (Proposed Action) – Purchase Property as per Real Estate Design Memorandum
Socio-economics	Implementation of the No Action Alternative would have no disproportionate impact to minority or low income populations, or children.	Implementation of the Proposed Action would have no disproportionate impact to minority or low income populations, or children.
Recreation Resources	Implementation of No Action Alternative would have long-term, minor to moderate, adverse impacts on public recreation use at Beaver	Implementation of the Proposed Action would have long-term, minor, beneficial impacts to public recreation use of Beaver Lake.
Air Quality	Implementation of the No Action Alternative would have no impacts on air quality.	Implementation of the Proposed Action would result in long-term, minor benefits to air quality.
Health & Safety	The implementation of the No Action Alternative may have long-term, minor, adverse impacts on the health and safety at Beaver Lake.	The implementation of the Proposed Action would have long-term, minor, benefits to the health and safety conditions at Beaver Lake.
Hazardous, Toxic, and Radioactive Wastes	Implementation of Alternative 1 would have the potential for future contamination of the private land parcels from spills or the storage of hazardous materials on the property.	Implementation of the Proposed Action would result in long-term, significant benefits to the terrestrial and aquatic environment at Beaver Lake through the protection of the land parcels by placing them in federal ownership.
Aesthetics	Implementation of the No Action Alternative would have long-term, minor, positive and negative benefits to the aesthetics, depending on an individual's perspective.	Implementation of the Proposed Action would have long-term, minor, positive and negative benefits to the aesthetics, depending on an individual's perspective.

5.1 Climate, Climate Change, and GHG

5.1.1 Alternative 1 – No Action

Implementation of the No Action Alternative would have no change on the climate, nor would it affect climate change. Current activities occurring in the Beaver Lake are expected to continue, thus GHG emissions that exist from the use of motorized equipment (e.g. cars, boats, generators, etc.) within the project area would continue into the future. Emphasis placed on modernizing equipment to reduce emissions in recent years may result in less GHG emissions in the future, providing long-term, minor benefits.

5.1.2 Alternative 2 (Proposed Action) - Purchase land according to prescribed elevations in Design Memorandum (DM)

Implementation of the Proposed Action would have no impact on climate, climate change, GHG emissions (beneficial or adverse) on existing or future climate conditions. Current policy (Executive Orders [EO] 3834 and 13783, and related USACE policy) requires project lands and recreational programs be managed in a way that advances broad national climate change mitigation goals including, but not limited to, climate change resilience and carbon sequestration. These policies would be implemented under this Alternative. Even though there would be an increase of land that would be managed under these policies and programs, the amount purchased in comparison to overall already acquired is small.

5.2 Topography, Geology and Soils

5.2.1 Alternative 1 – No Action

Implementation of the No Action Alternative may have long-term, minor to moderate, adverse impacts on local topography and soils should private landowners modify their property (e.g. re-sloping, installing retaining walls, etc.). Introduction of fill dirt, soil disturbance, and increased erosion of shoreline/stream banks result in increases in sediment load in the water and unnatural increases in rates of sediment deposition in the resource.

5.2.2 Alternative 2 (Proposed Action) - Purchase land according to prescribed elevations in Design Memorandum (DM)

Implementation of the Proposed Action would result in long-term, minor, beneficial benefits to the local topography and soils, as lands purchased by the federal government would remove the potential for the construction of retaining walls, etc., and lands would be allowed to revegetate, thus reducing the erosion potential. There would be no impact to geology.

5.3 Aquatic Environment

5.3.1 Hydrology and Groundwater

5.3.1.1 Alternative 1 – No Action

Implementation of the No Action Alternative could result in long-term, minor, adverse impacts from private landowners altering the topography, which would affect the local hydrology. Any spills of hazardous chemicals stored on private land has the potential to adversely affect groundwater in the karst region.

5.3.1.2 Alternative 2 (Proposed Action) - Purchase land according to prescribed elevations in Design Memorandum (DM)

Implementation of the Proposed Action would have long-term, minor, beneficial impacts to the local hydrology and regional groundwater. The purchase of land parcels would result in a prohibition of the storage of any materials on Federal property, thus removing the risk of spills.

5.3.2 Water Quality

5.3.2.1 Alternative 1 – No Action

Implementation of the No Action Alternative may have long-term, minor to moderate, adverse impacts on water quality, particularly on those tracts that have been cleared to the water edge. Agricultural and residential activities on these private lands contributes to nutrient loading or spikes/increases in nutrients, particularly nitrogen and phosphorus. Both chemicals are extremely high in chicken litter which is a common application to agriculture fields and fertilizers. Nutrient spikes lead to poor water quality and promotes harmful algal blooms that are costly to water treatment processes and harmful to biological life. Decreases in water quality, taste, and odor are expensive in the water treatment process and their biological effects can be toxic. While private lands with good stands of herbaceous and woody vegetation would have no impact on water quality (as the vegetated areas would reduce runoff), the potential exists for future development.

Introduction of fill dirt, soil disturbance, and increased erosion of shoreline/stream banks result in increases in sediment load in the water and unnatural increases in rates of sediment deposition in the resource. Total suspended solids are commonly measured as a means of sediment introduction. Increased sediment load causes binding (chelation) of dissolved oxygen resulting in a decreased in oxygen for living organisms. Mussels and other ecologically important species for water filtration decline as increased, unnatural sediment loads increase causing ecological breakdown of aquatic food webs. Increased sedimentation results in increases of cost related to filtration and treatment of drinking water.

5.3.2.2 Alternative 2 (Proposed Action) - Purchase land according to prescribed elevations in Design Memorandum (DM)

Implementation of the Proposed Action would have long-term, minor, positive impacts to water quality within the project area. The positive impacts would come from land around the lake no longer being mowed or deforested, thus reducing erosion and runoff. The return of forests and grasslands to currently cleared land would filter sediments and other water quality containments that could potentially flow into Beaver Lake. This alternative does not entail dredge or fill of Waters of the United States, thus neither a 404(b)(1) analysis or Section 401 water quality certification are required.

5.3.3 Fish Species and Habitat

5.3.3.1 Alternative 1 – No Action

Implementation of the No Action Alternative would have no impact on fish species and their associated habitat beyond current conditions. The habitat would continue to be managed and used as it is now.

5.3.3.2 Alternative 2 (Proposed Action) - Purchase land according to prescribed elevations in Design Memorandum (DM)

Implementation of the Proposed Action would have long-term, minor, positive impacts to fish species and their associated habitat within the project area. Shoreline vegetation (grasses, shrubs, trees) that may have been cleared by landowners would be allowed to regrow, thus providing spawning and foraging habitat for many fish and other aquatic species. While there would be an increase of fish habitat with this alternative, the amount of land proposed for purchase (~65 acres) is minor in comparison to current USACE-owned property (38,138), thus impacts would be considered negligible to minor.

5.4 Terrestrial Resources

5.4.1 Wildlife

5.4.1.1 Alternative 1 – No Action

The implementation of the No Action Alternative would have no impact on wildlife species and their associated habitat beyond current conditions. The lands would continue to be managed and used as they are now.

5.4.1.2 Alternative 2 (Proposed Action) - Purchase land according to prescribed elevations in Design Memorandum (DM)

The implementation of the Proposed Action would have long-term, minor, positive impacts to wildlife species and their associated habitat within the project area. Shoreline vegetation (grasses, shrubs, trees) that may have been cleared by landowners would revegetate over time, thus providing improved habitat conditions for riparian wildlife species. While there would be an increase of wildlife habitat with this alternative, the amount of land proposed for purchase is minor in comparison to current USACE-owned property, thus impacts would be considered negligible to minor.

5.4.2 Vegetation

5.4.2.1 Alternative 1 – No Action

The implementation of the No Action Alternative would have no impact on vegetation beyond current conditions. It is anticipated that lands would continue to be managed and used as they are now.

5.4.2.2 Alternative 2 (Proposed Action) - Purchase land according to prescribed elevations in Design Memorandum (DM)

The implementation of the Proposed Action would have long-term, minor, positive impacts to vegetation on those land parcels that have been cleared. Allowing shoreline areas to revegetate over time would improve the quantity and diversity of native vegetation. While there would be an increase of vegetation diversity with this alternative, the amount of land proposed for purchase is minor in comparison to current USACE-owned property, thus impacts would be considered minor.

5.4.3 Wetlands

5.4.3.1 Alternative 1 – No Action

The implementation of the No Action Alternative would have no impact on wetlands beyond

current conditions. It is anticipated that the private land parcels under consideration would continue to be managed and used as they are now.

5.4.3.2 Alternative 2 (Proposed Action) - Purchase land according to prescribed elevations in Design Memorandum (DM)

The implementation of the Proposed Action would have minor positive impacts to any wetlands present on the private land parcels, as well as to Beaver Lake. The positive impacts would come from the inability of homeowners to develop the shoreline which would prevent wetland degradation or destruction.

5.4.4 Threatened and Endangered Species

5.4.4.1 Alternative 1 – No Action

The implementation of the No Action Alternative would have no impact on any federally-listed threatened and endangered species. It is anticipated that the private land parcels under consideration would continue to be managed and used as they are now.

5.4.4.2 Alternative 2 (Proposed Action) - Purchase land according to prescribed elevations in Design Memorandum (DM)

The implementation of the Proposed Action may have long-term, minor positive impacts to threatened and endangered species within the project area, particularly those bat species that utilize trees as summer roosting sites. As cleared shoreline areas become revegetated over time, there should be additional roost sites available for bats, as well as perching sites for bald eagles. While there would be an increase of land under government ownership with this alternative, the amount purchased in comparison to overall already owned by USACE is small, thus any benefits would be negligible. This alternative does not entail construction or other ground disturbing activities, as such the USACE has determined that this alternative would have no effect on federally listed species.

5.5 Archaeological and Historic Resources

5.5.1 Alternative 1 – No Action

The implementation of the No Action Alternative has the potential to have long-term, significant, negative impacts on any archeological or historic resources (collectively cultural resources) that may occur on the private land tracts considered for acquisition. These cultural resources could be damaged or destroyed by any earth-disturbing activities.

5.5.2 Alternative 2 (Proposed Action) - Purchase land according to prescribed elevations in Design Memorandum (DM)

Implementation of the Proposed Action would have minor positive impacts on archaeological and historic resources on any fee-acquired lands, because any historic properties brought under federal ownership would be protected in accordance with the National Historic Preservation Act, the Archeological Resources Protection Act and other regulations. . Any ground-disturbing activities on USACE fee-owned 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.

5.6 Socio-Economic Resources

5.6.1 Alternative 1 – No Action

The implementation of the No Action Alternative would have no disproportionate impact to minority or low income populations, or children. It is anticipated that the private land parcels under consideration would continue to be managed and used as they are now. Any future changes in the socio-economic conditions of the Beaver area would be the result of outside influences, and not those created by the USACE.

5.6.2 Alternative 2 (Proposed Action) - Purchase land according to prescribed elevations in Design Memorandum (DM)

Implementation of the Proposed Action would have no disproportionate impact to minority or low income populations, or children. Any future changes in the socio-economic conditions of the Beaver area would be the result of outside influences, and not those created by the USACE.

5.7 Recreation Resources

5.7.1 Alternative 1 – No Action

Implementation of the No Action Alternative would have long-term, minor to moderate, adverse impacts on recreation at Beaver Lake. There have been instances of landowners with shoreline-owned property (or even under water) stretching cables or ropes across coves to keep public boats of the water overlying the private land.

5.7.2 Alternative 2 (Proposed Action) - Purchase land according to prescribed elevations in Design Memorandum (DM)

Implementation of the Proposed Action would result in long-term, minor, beneficial impacts to recreational use at Beaver Lake. Lands purchased would become available for public use, similar to those USACE-owned lands on either side of the newly-acquired property. Private landowners would still have access to this property for recreational use. As cleared areas become revegetated, adjacent landowners would be able to request vegetation modification permits for minor trail construction for access purposes.

As discussed in Section 4.9, several public comments were received regarding War Eagle Caverns during the public scoping phase of this study. The comments expressed concern of the potential closing of the caverns should the USACE pursue the purchase of frequently flooded private lands. The Proposed Action appears, according to USACE digital mapping tools, to NOT impact the boardwalk, concrete walkway, or cave entrance, if land is acquired in fee along the 1,128’ contour. This determination would need to be confirmed by a boundary survey, but this preliminary data suggests these structures will remain on private property. The stairs leading to the water’s edge would be impacted, as they would then be located on public land. The steps would either need to be removed or a real estate interest may be issued by USACE to allow the stairs to remain. The Proposed Action does not appear to restrict patron access to the cave entrance by land using existing facilities.

5.8 Air Quality

5.8.1 Alternative 1 – No Action

Implementation of the No Action Alternative would have no impact on the air quality at Beaver Lake. It is anticipated that the private land parcels under consideration would continue to be managed and used as they are now.

5.8.2 Alternative 2 (Proposed Action) - Purchase land according to prescribed elevations in Design Memorandum (DM)

Implementation of the Proposed Action would result in long-term, minor benefits to air quality in the area as carbon-sequestering vegetation would be allowed to revegetate cleared shorelines. While there would be benefits to air quality with implementation of this alternative, the acreage of lands proposed for purchase is extremely minor in comparison to already USACE-owned and vegetated acres, thus benefits would be considered minor. This alternative does not entail construction activities that would emit greenhouse gases, as such a General Conformity analysis and determination are not required.

5.9 Health & Safety

5.9.1 Alternative 1 – No Action

The implementation of the No Action Alternative may have long-term, minor, adverse impacts on the health and safety at Beaver Lake. As discussed in Section 5.7.1, there have been instances of landowners with shoreline-owned property (or even under water) stretching cables or ropes across coves to keep public boats of the water overlying the private land. These cables and ropes can create safety hazards for boaters.

5.9.2 Alternative 2 (Proposed Action) - Purchase land according to prescribed elevations in Design Memorandum (DM)

The implementation of the Proposed Action would have long-term, minor, benefits to the health and safety conditions at Beaver Lake. With the fee acquisition of frequently flooded private land parcels, landowners would no longer be able to claim ownership of lands under water, thus could not legally restrict access to coves.

5.10 Hazardous, Toxic, and Radioactive Wastes

As discussed in Section 4.11 of this EA, Environmental Condition of Property Reports were completed for the first phase of proposed land acquisitions (Priority Areas 1, 1A, 2, 3, 4, 5, 6, 8, 9 , 10, 11, 12, 13, 14, 15, 16, and 17). All land parcels in phase one received an ECP Category of 1 – an area or parcel of real property where no release, or disposal of hazardous substances or petroleum products or their derivatives has occurred (including no migration of these substances from adjacent properties). The final ECP reports can be found in Appendix D to this EA.

5.10.1 Alternative 1 - No Action

Implementation of Alternative 1 would have the potential for future contamination of the private land parcels from spills or the storage of hazardous materials on the property.

5.10.2 Alternative 2 (Proposed Action) - Purchase land according to prescribed elevations in Design Memorandum (DM)

Implementation of the Proposed Action would result in long-term, significant benefits to the terrestrial and aquatic environment at Beaver Lake through the protection of the land parcels by placing them in federal ownership. While spills of hazardous wastes from adjacent property are always a risk, USACE policy would prevent the storage of any such materials on federal fee owned property.

5.11 Aesthetics

5.11.1 Alternative 1 – No Action

Implementation of the No Action Alternative would have long-term, minor, positive and negative benefits to the aesthetics, depending on an individual's perspective. Those landowners that have cleared their property to the shoreline would continue to enjoy the scenic vista of Beaver Lake. Conversely, some individuals recreating on Beaver Lake enjoy the relative solitude and pristine condition of the shoreline and the ability to see residences and other structures above the shoreline (in those areas where vegetation has been cleared) can detract from their enjoyment.

5.11.2 Alternative 2 (Proposed Action) - Purchase land according to prescribed elevations in Design Memorandum (DM)

Implementation of the Proposed Action would have long-term, minor, positive and negative benefits to the aesthetics, depending on an individual's perspective. The wide panorama of Beaver Lake and the nearby shore conveys a sense of enormity to the lake, and the purchase of these lands would continue to preserve the sense of a relatively pristine shoreline. The natural vegetation along the shoreline would enhance the viewscapes of the people recreating on the lake. Conversely, those landowners that have maintained an open vista on their property to be able to see the lake would likely view the growth of vegetation along the shoreline as an adverse impact to their enjoyment of their property.

6.0 ENVIRONMENTAL COMPLIANCE

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

Table 6.1 Federal Act/Executive Order Compliance

Environmental Compliance Status			
Statute/Executive Order	**Full**	**Partial**	**N/A**
National Environmental Policy Act (considered partial until the FONSI is signed)		X	
Fish and Wildlife Coordination Act		X	
Endangered Species Act	X		
Clean Water Act	X		
Clean Air Act	X		
National Historic Preservation Act	X		
Archeological Resources Protection Act	X		
Comprehensive, Environmental Response, Compensation and Liability Act (CERCLA)	X		
Resource Conservation and Recovery Act	X		
Toxic Substances Control Act	X		
Quiet Communities Act	X		
Farmland Protection Act	X		
*EO 13112 Invasive Species	X		
*EO 11998 Floodplain Management	X		
*EO 11990 Protection of Wetlands	X		
*EO 12898 Environmental Justice in Minority Populations and Low-Income Populations	X		
*EO 13045 Protection of Children	X		
***EO – Executive Order**			

6.1 Fish and Wildlife Coordination Act

The USACE is required to coordinate with the USFWS and AGFC 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 will be completed during the draft release.

6.2 Endangered Species Act

The Endangered Species Act (ESA) requires the determination of possible effects on species or degradation of habitat critical to Federally-listed endangered or threatened species. Implementation of the Proposed Action will not result in any adverse effect to federally protected species. The USACE has determined the Proposed Action will have no effect on federally listed species. Individual requests for use of project lands would be

evaluated to ensure compliance with this Act.

6.3 Environmental Justice

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations* requires Federal agencies to promote "nondiscrimination in Federal programs substantially affecting human health and environment". In response to this directive, Federal Agencies must identify and address a disproportionately high and adverse human health and environmental effects of their programs, policies, and activities on minority and low-income populations. The final step in the environmental justice evaluation process is to evaluate the impact of the project on the population and to ascertain whether target populations are affected more adversely than other residents. Analysis of the data presented in Sections 4.8 and 5.6 determined that implementation of the Proposed Action would have no disproportionate impact on any minority or low income populations, or children.

6.4 Cultural Resource Requirement

Section 106 of the National Historic Preservation Act of 1966 requires the USACE to identify historic properties affected by the Proposed Action and to evaluate the eligibility of those properties for the National Register of Historic Places. Section 110 of the Act requires the USACE 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 the Proposed Action. Individual requests for use of project lands would be evaluated on a case-by-case basis to ensure compliance with this act.

7.0 IRRETRIEVABLE AND IRREVERSIBLE COMMITMENT OF RESOURCES

NEPA requires that Federal agencies identify "any irreversible and irretrievable commitments of resources which would be involved in the Proposed Action should it be implemented" (42 U.S.C. § 4332). An irreversible commitment of resources occurs when the primary or secondary impacts of an action result in the loss of future options for a resource. Usually, this is when the action affects the use of a nonrenewable resource, or it affects a renewable resource that takes a long time to regenerate. An irretrievable commitment of resources is typically associated with the loss of productivity or use of a natural resource (e.g., loss of production or harvest). No irreversible or irretrievable impacts on Federally protected species or their habitat is anticipated from implementing revisions of any alternatives considered in this EA.

8.0 SUMMARY OF COORDINATION, PUBLIC VIEWS, AND COMMENTS

8.1 Participating and Cooperative Agencies

The purpose of this study did not present a need for any participating or cooperating agencies. All relevant state and Federal agencies were contacted during initial scoping to request information and comments. Individual agencies were contacted during development of the EA to gather information necessary for the environmental analysis process. State and Federal agencies were also requested to review the draft EA and provide comment.

8.2 Scoping

In accordance with 40 CFR §§1501.7, 1503, and 1506.6, the USACE initiated public involvement and agency scoping activities to solicit input on the proposed Beaver Lake Land Acquisition, as well as identify appropriate measures, and identify significant issues related to the project. The USACE, Little Rock District, began its public involvement process with a Public Notice to inform the public of the initiation of the study and to seek comments. A 30-day comment period was established from May 11th – June 10th, 2021. Public outreach included the placement of advertisements on the USACE webpage and social media regarding the study and open comment period. Notices were sent to marina and resort owners.

Agencies, community groups, members of the public, and other interested parties submitted 122 letters and e-mails during this period. A summary of those comments can be found in Appendix A to this EA.

9.0 Bibliography

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