CESWT-OD-NR 21 September 2015

MEMORANDUM FOR Commander, Tulsa District

SUBJECT: Robert S. Kerr Lock and Dam and Reservoir Master Plan Revision (September 2015)

1. Enclosed subject Master Plan is submitted for review and approval in accordance with ER 1130-2-550, Change 7 and EP 1130-2-550, Change 5.

2. Point-of-contact in Operations Division is Mr. Steve Nolen, 918.669.7660.

EARL GROVES
Chief, Operations Division

Encl

Approved:_____ Disapproved:_____

Richard A. Pratt
Colonel, U.S. Army
District Commander

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Robert S. Kerr Lock and Dam and Reservoir Master Plan

Arkansas River

Le Flore, Muskogee, and Sequoyah, Haskell Counties, Oklahoma

September 2015

US Army Corps of Engineers®
Tulsa District

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ROBERT S. KERR LOCK AND DAM AND RESERVOIR MASTER PLAN
TABLE OF CONTENTS

CHAPTER 1 - INTRODUCTION 1-1
1.1 PROJECT AUTHORIZATION 1-1
1.2 PROJECT PURPOSE 1-1
1.3 PURPOSE AND SCOPE OF MASTER PLAN 1-1
1.4 DESCRIPTION OF PROJECT AND WATERSHED 1-2
1.5 PRIOR DESIGN MEMORANDA 1-4
1.6 PERTINENT PROJECT INFORMATION 1-7
CHAPTER 2 - PROJECT SETTING AND FACTORS INFLUENCING MANAGEMENT AND DEVELOPMENT 2-1
2.1 DESCRIPTION OF RESERVOIR 2-1
2.2 HYDROLOGY AND GROUNDWATER 2-1
2.3 SEDIMENTATION AND SHORELINE EROSION 2-2
2.4 WATER QUALITY 2-2
2.5 CLIMATE 2-3
2.6 TOPOGRAPHY, GEOLOGY, AND SOILS 2-3
2.7 RESOURCE ANALYSIS 2-4
2.7.1 Fish and Wildlife Resources 2-4
2.7.2 Vegetative Resources 2-5
2.7.3 Federally-listed Threatened and Endangered Species 2-7
2.7.4 Invasive Species 2-10
2.7.5 Ecological Setting 2-12
2.7.6 Wetlands 2-13
2.8 CULTURAL RESOURCES 2-14
2.8.1 Historic and Archaeological Features 2-14
2.8.2 Cultural History Sequence 2-15
2.9 DEMOGRAPHICS 2-22
2.9.1 Population 2-22
2.9.2 Education and Employment 2-25
2.9.3 Households and Income 2-26
2.10 RECREATION FACILITIES, ACTIVITIES, AND NEEDS 2-27
2.10.1 Zones of Influence 2-27

2.10.2 Visitation Profile 2-27
2.10.3 Recreation Analysis 2-28
2.10.4 Recreation Carrying Capacity 2-28
2.11 REAL ESTATE 2-28
2.12 PERTINENT PUBLIC LAWS 2-29
CHAPTER 3 - RESOURCE OBJECTIVES 3-1
3.1 RESOURCE OBJECTIVES 3-1
3.1.1 Navigation Management 3-2
3.1.2 Wildlife and Fisheries Management 3-2
3.1.3 Recreation 3-3
3.1.4 Oklahoma State Comprehensive Recreation Plan 3-3
3.1.5 Project-Wide Resource Objectives 3-4
CHAPTER 4 - LAND ALLOCATION, LAND CLASSIFICATION, WATER SURFACE, AND PROJECT EASEMENT LANDS 4-1
4.1 LAND ALLOCATION 4-1
4.1.1 Operations 4-1
4.1.2 Recreation 4-1
4.1.3 Fish and Wildlife 4-1
4.1.4 Mitigation 4-1
4.2 LAND CLASSIFICATION 4-2
4.2.1 Project Operations 4-2
4.2.2 High Density Recreation 4-2
4.2.3 Mitigation 4-2
4.2.4 Environmentally Sensitive Areas 4-2
4.2.5 Multiple Resource Management Lands 4-2
4.2.6 Water Surface 4-3
4.3 PROJECT EASEMENT LANDS 4-4
4.3.1 Operations Easement 4-4
4.3.2 Flowage Easement 4-4
4.3.3 Conservation Easement 4-4
CHAPTER 5 - RESOURCE PLAN 5-1
5.1 MANAGEMENT BY CLASSIFICATION 5-1
5.1.1 Project Operations 5-1
5.1.2 High Density Recreation 5-1
5.1.3 Environmentally Sensitive Areas 5-3

5.1.4 Multiple Resource Management Lands 5-4
5.1.5 Water Surface 5-5
CHAPTER 6 - SPECIAL TOPICS/ISSUES/CONSIDERATIONS 6-1
6.1 COMPETING INTERESTS ON THE NATURAL RESOURCES 6-1
6.2 PROPERTY OWNERSHIP OF WET BED 6-1
6.3 MINERAL EXPLORATION AND PRODUCTION ACTIVITIES 6-1
6.4 POWERHOUSE AND HYDROPOWER 6-2
CHAPTER 7 - PUBLIC AND AGENCY COORDINATION 7-1
7.1 PUBLIC AND AGENCY COORDINATION 7-1
CHAPTER 8 - SUMMARY OF RECOMMENDATIONS 8-1
8.1 SUMMARY OVERVIEW 8-1
8.2 LAND RECLASSIFICATION PROPOSALS 8-1
CHAPTER 9 - BIBLIOGRAPHY 9-1
APPENDIX A - LAND CLASSIFICATION, MANAGING AGENCIES, RECREATION, AND SEAPLANE RESTRICTION MAPS ..... A
APPENDIX B - NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) DOCUMENTATION ..... B

LIST OF TABLES

Table 1.1 Design Memoranda 1-4
Table 1.2 Water Storage Capacity 1-7
Table 1.3 Land Use Classification by Acres 1-7
Table 2.1 Vegetative Resources 2-6
Table 2.2 Threatened and Endangered Species 2-9
Table 2.3 Invasive Species 2-12
Table 2.4 Wetland Summary 2-13
Table 2.5 2013 Population Estimates and 2065 Projections 2-22
Table 2.6 2013 Percent of Population Estimate by Gender 2-23
Table 2.7 2013 Population Estimate by Age Group 2-24
Table 2.8 2013 Population Estimate by Race/Hispanic Origin 2-25
Table 2.9 2013 Households and Household Size 2-26
Table 2.10 Median and Per Capita Income, 2012 2-27
Table 4.1 Land Classification 4-4
Table 5.1 Recreation Area Managing Agency 5-2
Table 5.2 Management Goal of USACE High Density Recreation Lands 5-2
Table 6.1 Hydropower Data 6-2
Table 7.1 Public and Agency Comments on Master Plan and EA Draft 7-2
Table 8.1 Reclassification Proposals 8-1

CHAPTER 1 - INTRODUCTION

1.1 PROJECT AUTHORIZATION

Robert S. Kerr Lock and Dam and Reservoir was authorized by the Flood Control Act of 17 May 1950 (Public Law 89-72 and 85-624, 79th Congress, Chapter 758, 2d Session) as a modification of the general comprehensive plan for flood control and other purposes approved by the Flood Control Act of 28 June 1938, and the multipurpose plan for the Arkansas River and Tributaries, Arkansas and Oklahoma, approved by the River and Harbor Act of 24 July 1946.

1.2 PROJECT PURPOSE

Robert S. Kerr Lock and Dam and Reservoir (commonly referred to as Robert S. Kerr Reservoir), formerly designated as Short Mountain and later changed in honor of Senator Robert S. Kerr, is a unit in the multipurpose plan for development of the lower Arkansas River Basin for recreation, hydroelectric power, and navigation, as project purposes. Robert S. Kerr Reservoir contributes to navigation on the Arkansas River by sediment control and flow regulation. Hydroelectric power is produced by four Kaplan units with an installed capacity of 27,500 kilowatt (kW) and total capacity of 110,000 kW.

1.3 PURPOSE AND SCOPE OF MASTER PLAN

The *Robert S. Kerr Lock and Dam and Reservoir Master Plan*, originally published as *Design Memorandum 4B*, hereafter referred to as Plan or master plan, is the strategic land use management document that guides the comprehensive management and development for recreation, natural resources, and cultural resources that is efficient and cost-effective throughout the life of the Robert S. Kerr Lock and Dam and Reservoir project. The plan is a vital tool for responsible stewardship and sustainability of the facilities' resources for the benefit of present and future generations. This Plan guides and articulates U.S. Army Corps of Engineers' (USACE) responsibilities pursuant to federal laws to preserve, conserve, restore, maintain, manage, and develop the land, water, and associated resources. The master plan is dynamic and flexible based on changing conditions. This Plan focuses on goals and objectives. Details of design, management and administration, and implementation are addressed in the *Robert S. Kerr Reservoir Operational Management Plan (OMP)*. This Plan does not address the specifics of regional water quality, shoreline management, or water level management. In addition, the operation and maintenance of project operations facilities is not included in this Plan.

This report proposes public use development and conservation necessary to develop and conserve existing project lands to realize the optimal potential of the project. This plan incorporates conservation, enhancement, development, operation, management, and public interest use of all project lands, waters, forests, and other resources throughout the life of the project, and includes plans showing the most desirable and feasible locations and types of facilities needed to meet these goals. Emphasis has been placed on a balanced approach to public access, camping, shoreline use, water based recreation, and conservation. Adequate facilities and land-based requirements are proposed to ensure all desired recreational opportunities are achieved and assure compliance with applicable environmental regulations,

laws and policies. This plan also proposes proper utilization of natural resources and recreational facilities, assuming the continued availability of Congressionally-appropriated funds, while at the same time conserving and protecting all resources held in the public trust.

Implementation of this Plan must recognize and be compatible with the primary project missions of flood risk management and water conservation. Recreational facility development proposed in this plan is dependent on availability of appropriated funds, but may also be achieved through partnerships, donations and volunteer efforts. This plan does not propose the acquisition of additional land.

Additional information regarding environmental impacts to existing conditions as a result of this Plan can be found in the Environmental Assessment for the Robert S. Kerr Lock and Dam and Reservoir in Appendix B.

1.4 DESCRIPTION OF PROJECT AND WATERSHED

Robert S. Kerr Lock and Dam and Reservoir, which controls the runoff from a drainage area of 147,756 square miles, is located in portions of Leflore, Muskogee, Sequoyah and Haskell Counties, Oklahoma. The dam site is located at navigation mile 336.2 on the Arkansas River about 8 miles south of Sallisaw, Oklahoma. The power pool, with a top elevation of 460.0 msl, extends upstream a distance of 32.7 navigation miles, with arms extending up the valleys of several tributaries to form an irregular-shaped lake. The power pool covers a surface area of 43,796 acres, has a shoreline length of 250 miles, and storage capacity of 523,700 acre-feet. The flood control pool is at elevation 460.0 msl. Operation of the project results in a comparatively stable pool at elevation 459.0 msl.

Robert S. Kerr Lock and Dam and Reservoir Lands were purchased under the Original 1962 Land Acquisition Policy which states; the purchasing of fee titles to all land acquired for dam site, construction area, permanent structure area, and reservoir area lying below a block-out purchase line encompassing at the acquisition guideline with minimum distance of 300 feet horizontally from the top of the conservation pool in steep areas; and to the acquisition line on gentle slopes in order to contain the flowage easement. This in effect would protect against wave action, back erosion, induced surcharge, and backwater effects. The acquisition guide contour for fee acquisition is at elevation 463.0 msl, being the estimated elevation to which the reservoir will reach once in every 5 years.

The project includes an area of 56,749 acres acquired in fee, 2,035 acres of flowage easement, and a usable land area of 21,484 acres when the lake is at normal navigation-power pool elevation. The real property-taking line is a blocked perimeter that encompasses the guide-taking line, elevation 463.0 msl (includes freeboard allowance), or the envelope curve of the backwater effects occurring after 50 years of sedimentation, whichever is greater, with a minimum distance of 300 feet horizontally from the static full pool, except where flowage easements were purchased. Neither surface nor minerals were acquired below the normal high water line of the natural river channel. This was generally defined on the ground as the vegetative line on the riverbank. Permanent inundation precludes use by the surface owner; however, sand, gravel, and minerals could possibly be removed subject to operation of the project, including the navigation channel. This area consists of

approximately 6,735 acres in Robert S. Kerr Lock and Dam and Reservoir. Fee simple title was acquired in the area required for lock and dam sites and work areas. In general, the lake area was acquired in fee with subordination of minerals. Approximately 900 acres of coal and/or coal leases along San Bois Creek were not acquired. The coal in this area is from 500 feet to 1,200 feet deep, which necessitates shaft mining. The coal interest was subordinated to the prior rights of the Government to flood, etc. The mineral owner has the right to enter the property and drill from the surface and to construct vent shafts for the release of subsurface gases, subject to prior written approval for entry and location of shafts and necessary equipment.

Under current management proposals, all project land is considered necessary for project purposes. Approximately 2,027 acres of land and water area are licensed to the Oklahoma Department of Wildlife Conservation (ODWC) for wildlife management purposes. Approximately 10,300 acres of land and 10,500 acres of water are managed by US Fish and Wildlife Service (USFWS) for the Sequoyah National Wildlife Refuge. High Density Recreation areas managed by USACE include 1,581 acres and 6,112 acres are managed for Low Density Recreation. Approximately 1,251 acres of the Project Operations lands , which contains the dam, project buildings, port facilities, hydropower plant, controls, dredge disposal areas, and similar facilities, are necessary for the maintenance and operation of the project.

Pool fluctuation was considered in the planning and construction of the public-use facilities which have been developed in accordance with the approved Master Plan for the project. The facilities are designed primarily to serve the visitation demands of the population within a 100-mile radius. Emphasis has been directed toward day-use facilities in order to obtain maximum benefits for the public. Maintenance of the eight USACE-managed public-use areas on the project, the project buildings and grounds, overlook structures, embankment dam, spillway and outlet works structures, and channel is performed by project personnel and/or service contracts. Types of work include resurfacing of roads and parking areas, mowing around project buildings and structures, preventive maintenance, general upkeep, painting, and repairs and replacements caused by fair wear and tear or vandalism on project buildings, structures, and public-use facilities. Other activities include maintenance of project-owned equipment, replacement of riprap on the embankment and outlet channel, cleanup of drift and debris along the 250 miles of shoreline, and construction of erosion control structures and public-use facilities. Daily inspections are made of all public-use areas, and major repairs are scheduled for off-season recreation periods. Contracts are awarded for cleanup and mowing in the public-use areas. Eleven strategically situated public-use areas are located in the lake area and one site provides access below the dam.

The public-use facilities are planned to provide a complete, safe, and healthful recreation experience in a manner that will cause the least possible despoilment of the natural assets of the area. Three of the recreation areas are City Parks managed by the towns of Webbers Fall and Gore. Vian Creek is managed by the USFWS.

1.5 PRIOR DESIGN MEMORANDA

Thirty-one separate Design Memorandums (DM) plus revised DM and supplements to DM were prepared from 1962 through 1967 setting forth design criteria for all aspects of the project including the prime flood risk management facilities, hydroelectric-power facilities, real estate acquisition, road and utility relocations, reservoir clearing, and the master plan for recreation development and land management. Below is a list of prior Design Memoranda for Robert S. Kerr Lock and Dam and Reservoir.

Table 1.1 Design Memoranda

Design Memo	Title	Date Submitted	Date Approved
1	Hydroelectric Power Capacity	Aug 21, 1962	Nov 13, 1962
2	Hydrology	Sep 18, 1962	Jan 17,1963
3	General Design	Dec 31, 1962	May 23, 1963
4A	Preliminary Master Plan	Apr 10, 1963	Jul 24, 1963
4B	Master Plan	Apr 20, 1965	Feb 3, 1966
5-1	Real Estate for Reservoir Area and Public-Use Areas	Jun 27, 1963	Oct 22, 1963
5-2	Real Estate for Portion of Reservoir Area; River Mile 406 to River Mile 424	Sep 18, 1964	Jan 29, 1965
5-3	Real Estate for Relocation of U.S. Highway 59	Nov 16, 1964	May 20, 1965
5-4	Real Estate for Relocation of U.S. Highway 64	Nov 16, 1964	Jan 19, 1965
5-5	Real Estate for Relocation of U.S. Highways 9 and 26	Oct 16, 1964	Feb 15, 1965
5-6	Real Estate for Relocation of Haskell County Roads	Nov 17, 1964	Dec 8, 1964
5-7	Real Estate for Relocation of Sequoyah County Roads	Oct 15, 1964	Nov 13, 1964
5-8	Real Estate for Relocation of Midland Valley Railroad	Jul 6, 1965	Sep 8, 1965

Design Memo	Title	Date Submitted	Date Approved
5-9	Real Estate for Remainder of Reservoir Area	Jul 22, 1965	May 25, 1966
6	Construction of Project Buildings and Left Access Roads	Jun 11, 1963	Jul 24, 1963
7	Construction of Right Embankment and First Stage Cofferdam	Mar 21, 1963	May 22, 1963
8	Construction Materials (Concrete Aggregates)	Sep 21, 1964	Dec 8, 1964
9-1	Preliminary Design Report, Power Plant	Aug 26, 1964	-
9-2	Powerhouse First Stage Construction	-	-
9-3	Completion of Powerhouse	-	-
10	Spillway and Completion of Right Embankment	Dec 31, 1963	Apr 22, 1964
11	Relocation of U.S. Highway 59	Sep 21, 1964	Nov 18, 1965
12	Relocation of Facilities Operated by Cookson Hills Electric Coop., Inc.	Oct 25, 1965	Nov 18, 1965
13	Relocation of U.S. Highway 64	Sep 29, 1964	Jan 8, 1965
14	Navigation Lock	May 20, 1964	Aug 27, 1964
16	Relocation of Haskell County Roads	Oct 9, 1964	Nov 20, 1964
17	Relocation of Oklahoma Highways 9 and 26	Jul 13, 1964	Sep 24, 1964
18	Relocation of Sequoyah County Roads	Aug 21, 1964	Oct 30, 1964
20	Relocation of Midland Valley Railroad Facilities	May 4, 1965	Aug 12, 1965
21	Relocation of Southwestern Bell Telephone Company Facilities	Sep 6, 1966	Sep 28, 1966
22	Relocation of Oklahoma Gas and Electric Company Facilities	Aug 25, 1966	Oct 25, 1966

Design Memo	Title	Date Submitted	Date Approved
23	Relocation of Cross Telephone Company Facilities	Apr 19, 1965	Apr 28, 1965
24	Relocation of K.A.M.O Electric Coop., Inc., Facilities	Jul 20, 1965	Aug 18, 1965
25	Relocation of Southwestern Power Administration Facilities	Mar 12, 1965	Mar 25, 1965
28	Second Stage Cofferdam, Left Embankment and Lock Approach Dikes	Oct 10, 1966	Jan 11, 1967
29	Reservoir Clearing	Oct 31, 1966	Jan 16, 1967
30	Sedimentation Ranges	Sep 30, 1965	Dec 2, 1967
32	Navigation Channel	May 10, 1967	Jul 13, 1967
33	Sans Bois Creek Navigation Channel	-	-

1.6 PERTINENT PROJECT INFORMATION

The following table provides pertinent information regarding existing reservoir storage capacity at Robert S. Kerr Reservoir.

Table 1.2 Water Storage Capacity

Feature	Elevation (feet)	Area (acres)	Capacity (acre-feet)
Top of Dam	483.5	-	-
Top of Overflow Section	468.5	-	-
Top of Power Pool (extends to Webbers Falls Lock and Dam)	460.0	43,796	523,700
Power Pondage	458.0 – 460.0	-	84,700
Weir Crest	417.0	-	-
Top of Normal Lower Pool	412.0	-	-

Note: The drainage area above the dam site is 147,756 square miles with 22,241 square miles not contributing to flows.

The following table shows the acreages by each land classification for Robert S. Kerr Reservoir. A map representing these areas can be found in Appendix A.

Table 1.3 Land Use Classification by Acres

Classification	Acres
Project Operations	1,251
High Density Recreation	1,581
Environmentally Sensitive Areas	39
Multiple Resource Managed Lands: Low Density Recreation	6,112
Multiple Resource Managed Lands: Wildlife Management	14,555
Multiple Resource Managed Lands: Vegetative Management	0
Multiple Resource Managed Lands: Future/Inactive Recreation Areas	0
Water Surface: Restricted	124
Water Surface: Designated No-Wake	40
Water Surface: Fish and Wildlife Sanctuary	0
Water Surface: Open Recreation	41,836
Total Acres	**65,538**

Note: Due to siltation project lands acreage has increased and water surface acreage has decreased over the life of the Reservoir. Acres were calculated through Geographical Information Systems (GIS) and historical data.

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CHAPTER 2 - PROJECT SETTING AND FACTORS INFLUENCING MANAGEMENT AND DEVELOPMENT

2.1 DESCRIPTION OF RESERVOIR

Robert S. Kerr Reservoir is located on the Arkansas River at navigation mile 336.2, about 8 miles south of Sallisaw in LeFlore County, Oklahoma. The purpose is navigation, hydroelectric power, and recreation. Construction began in April 1964, and closure occurred in October 1970. The lock and dam became operational for navigation in December 1970. Power units 1, 2, 3, and 4 were placed on line on October 5, July 27, September 1, and November 2, 1971, respectively. The dam is constructed of rolled earth-filled material. The total length of the structure, including the spillway, powerhouse intake, and navigation lock, is 7,230 feet. The maximum height is 75 feet above the streambed. There is a service road to the right embankment and an access road to the lock in the left embankment. A gated, concrete ogee weir type spillway extends partly across the existing river channel and a portion of the right bank between the power improvements and the navigation lock. The spillway weir has a net length of 900 feet and is surmounted by eighteen 50 by 44 foot-high tainter gates. The gates are separated by seventeen 10-foot piers, which support a 5-foot-wide service roadway bridge. The spillway has a capacity of 1,542,000 cfs at the maximum pool elevation (19.5 feet above the top of the power pool). The lock, located on the left of the spillway, is a single-lift, Ohio River type with culvert and port filling system and has a chamber 110 feet wide by 600 feet long with a normal lift of 48 feet. The powerhouse is an integral-type structure with four 27,500-kW Kaplan-type units having a total capacity of 110,000 kW. The flood of record occurred in May 1943 with an estimated peak discharge at the dam site of 810,000 cfs.

2.2 HYDROLOGY AND GROUNDWATER

Robert S. Kerr Lock and Dam and Reservoir control the runoff from a drainage area of 147,756 square miles. The dam site is located at navigation mile 336.2 on the Arkansas River about 8 miles south of Sallisaw, Oklahoma. The power pool, with a top elevation of 460.0, extends upstream a distance of 32.7 navigation miles, with arms extending up the valleys of several tributaries to form an irregular-shaped lake. The power pool covers a surface area of 43,796 acres, has a shoreline length of 250 miles, and storage capacity of 523,700 acre-feet. The flood control pool is at elevation 460.0 msl. Operation of the project results in a comparatively stable pool at elevation 459.0 msl.

Major aquifers located within Robert S. Kerr Reservoir's fee boundary include the Arkansas River, Roubidoux and Canadian River aquifers. Minor aquifers include the Pennsylvanian, Northeastern Oklahoma Pennsylvanian, and Kiamichi aquifers.

There are four surface water gauges at Robert S. Kerr Reservoir which are monitored by USACE and US Geological Survey. A lake elevation gauge is located lakeside near the dam and a stream gauge is river side at the dam, as well.

2.3 SEDIMENTATION AND SHORELINE EROSION

Typical with a majority of reservoirs, throughout the lifespan siltation accumulates from areas uncontrolled by USACE. Due to the siltation on Robert S. Kerr Reservoir acreages above the normal navigation-power pool elevation have increased and water surface acreage has decreased from the original acquisition of project lands. In response to siltation with the navigation channel dredging helps keep controlled water depth. Dredge disposal sites are located sporadically around the reservoir within and outside of fee owned property.

Areas along the navigation channel subject to erosion due to high flows have been stabilized with rip-rap and are routinely monitored. Rip rap is placed in areas for protection of project facilities only. The navigation channel is also monitored for shoaling and is dredged as needed.

Adjacent landowners may request a permit to rip rap areas where erosion is a threat to their homes. Lake personnel meet with the landowner, assess the scope of work requested, and determine whether the request falls under the nationwide permit. Work which falls under the nationwide permit can be permitted by letter from the lake office. Work which requires a Section 10 or Section 404 Permit must be issued by USACE, Tulsa District.

2.4 WATER QUALITY

Water quality at Robert S. Kerr Reservoir is dependent upon many factors. The location and watershed are two primary factors which contribute to general water quality. Robert S. Kerr Reservoir is typical of many of the reservoirs in Oklahoma and surrounding states that were constructed in the 20th century. As a reservoir ages, water quality declines can be attributed to many factors, individually and collectively. Factors which generally contribute to declining water quality in aging reservoirs include sedimentation, increased human habitation within the vicinity of the lake, changing land management practices within the watershed, increase urbanization and associated urban runoff, and increased reliance on allocated water supply. Adverse impacts to the local economy due to water quality and quantity issues have been an increasing matter of local, state, and regional concern throughout the contiguous United States in recent years.

Industrial and other developments along the navigation system affect fish and wildlife adversely if not planned and managed properly. Coal dust, in addition to silt associated with turbidity that comes from watershed erosion and dredging operation, interferes with photosynthesis and the primary producers (phytoplankton) and thereby reduces the amount of dissolved oxygen available to fish. Siltation also interferes with fish reproduction by smothering egg masses. Siltation further limits primary productivity which provides the basic food supply of all fish.

To maintain and enhance the water quality of Robert S. Kerr Reservoir, project and District personnel will diligently pursue enforcement of State and Federal pollution control laws. Sources of pollution not covered under Federal regulations will be reported by District Office personnel to the Oklahoma Department of Environmental Quality for appropriate action.

2.5 CLIMATE

The climate of Robert S. Kerr Reservoir has relatively short mild winters and long hot summers, thus creating a favorable environment for year-round outdoor recreation. The mean annual temperature is approximately 63 degrees with summer temperatures reaching 100 degrees or higher. Freezing temperatures are recorded approximately 80 days a year. There are about 6 months of frost-free temperatures occurring between April and October. The average rainfall is about 43 inches with an average snowfall of 6 to 8 inches. Early spring and early fall are the major rainfall periods. The growing season averages 212 days with the last spring freeze expected between March 23 and April 1 and the first freeze in the fall between October 24 and November 1. Vegetative-damaging conditions include drought, electrical storms, hailstorms, tornadoes, and snow and ice storms. Snow and ice storms are usually short in duration and cause limited damage. Ice storm conditions are observed on the average of only 5 days per year. Severe thunderstorms and tornadoes are common to the region, occurring mostly in the spring, and sometimes cause considerable damage. Hailstorms, although infrequent, are often very damaging to growing vegetation. Extremes of precipitation, drought, and flood are probably most significant in terms of vegetative growth. Periods of below normal rainfall seem to occur on roughly a 10-year cycle.

The topic of worldwide climate change, including the causes and extent, continues to be studied by the scientific community and world governments. In the United States, two Executive Orders, EO 13514 and EO 13653, as well as the President's Climate Action Plan (CAP) set forth requirements to be met by Federal agencies. These requirements range from preparing general preparedness plans to meeting specific goals to conserve energy and reduce greenhouse gas emissions. USACE has prepared an Adaptation Plan in response to the Executive Orders and CAP. The Adaptation Plan includes the following USACE policy statement:

> "It is the policy of USACE to integrate climate change preparedness and resilience planning and actions in all activities for the purpose of enhancing the resilience of our built and natural water-resource infrastructure and the effectiveness of our military support mission, and to reduce the potential vulnerabilities of that infrastructure and those missions to the effects of climate change and variability."

2.6 TOPOGRAPHY, GEOLOGY, AND SOILS

In general, the topography along the Arkansas River Flood Plain is gentle rolling hills with very narrow fringes of steeper types of little significance to the project. The majority of the uplands soils are low in fertility and rocky. They are best suited for woodlands consisting mostly of oak-dominated forest. The larger portion of the lowland soils consists of rich bottom lands ideal for farming and ranching. About one-third of the Robert S. Kerr Reservoir is comprised of islands.

Approximately 95 percent of the land under this project is considered typical Arkansas River Bottomland. The land is alluvial sandy loam soil and fertile for high crop production. Dougherty-Tiller-Yahola and Yahola-Port-Reinach Soil Associations which make up much of the Arkansas River floodplain occur on the major portions of the lands to

be managed. These lands should be suitable for agricultural developments programmed to combat encroachment of undesirable vegetation.

Soils within the valley are comprised mostly of alluvially deposited sandy and silty loams formed from the decomposition of local sandstones and shales. These soils generally consist of very deep, moderately drained, and rapidly permeable upland soils that formed in sandy Pleistocene sediments.

Further detailed information on all soil types surrounding Robert S. Kerr Reservoir is available on websites maintained by the Natural Resources Conservation Service, U.S. Department of Agriculture.

2.7 RESOURCE ANALYSIS

2.7.1 Fish and Wildlife Resources

Management of fish and wildlife resources at the Robert S. Kerr Reservoir is the responsibility of the ODWC. This agency, together with the USFWS, has responsibilities for the management of all resident and migratory waterfowl. The function of USACE on matters pertaining to fish and wildlife is one of cooperation with the agencies charged with the management of these resources. The 10,300-acre Sequoyah National Wildlife Refuge is administered under a cooperative agreement with USACE which was signed 11 December 1970 under the US Wildlife Coordination Act. This national wildlife refuge on Robert S. Kerr Reservoir makes possible local waterfowl hunting well in excess of that lost due to the construction and operation of the project. Three areas on the refuge totaling 9,760 acres (47 percent of the refuge) are open for public hunting. The majority of the refuge is open for fishing year-round. Exceptions include the western one-half of the refuge along the Arkansas and Canadian Rivers and area "D," located southeast of the refuge headquarters. The closed areas are primarily designed to provide resting and roosting areas for waterfowl. Also, about 1,000 acres of cropland are planted to hold birds in the area to improve hunting or viewing opportunities in the refuge and surrounding area. Federal lands and waters in the project area are open to free public use for hunting and fishing, except for sections reserved for safety, efficient operation of the project, protection of public property, or fish and wildlife management. An additional 70 acres of land near Applegate Cove public-use area is set aside for the "Acres for Wildlife" program in cooperation with the ODWC.

Lands classified for the management of habitat for fish and wildlife habitat are for propagation of such species. Most project lands in this classification are continuously available for passive recreation activities. At the Robert S. Kerr Reservoir these lands are divided into two categories: (l) lands that are intensively managed by the ODWC; and (2) lands that are intensively managed by the USFWS as the Sequoyah National Wildlife Refuge. There are seasonal restrictions on certain recreational uses of the lands and water within the refuge.

The refuge was designed to replace the wildlife habitat which was lost as a result of development of the project. In addition to the National Wildlife Refuge, the ODWC has been granted a long term license by the USACE on 2,027 acres of project lands for wildlife

management purposes and public hunting. Management of these lands will be similar to the management of the refuge land.

The primary management practice within the Sequoyah National Wildlife Refuge is the establishment of large food plots within the refuge to attract large concentrations of migrating and wintering waterfowl. The principal crops which are grown on these plots are corn, grain sorghums, wheat, soybeans, millet, and buckwheat. Another highly successful management practice within the refuge is the construction and maintenance of large, controlled water level marshes. These marshes can be drained during the growing season; planted to crops; and then reflooded in the fall. Due to the nonfluctuating water level of the navigation project, the crops on the refuge produce a good yield every year. In the past few years, upwards to a half million ducks and geese have been estimated to have visited the area annually. All of the lands on the management area are not closed to hunting. Some areas, particularly the Dirty Creek arm and the upper end of the reservoir, are open to public hunting. Areas which are closed for hunting are properly posted. The ODWC employs many of the same management techniques as the USFWS employs in the management of the State's licensed area. Food plots will be established and planted in small grain crops. At the present, controlled water level marshes are not proposed for this area. Other management practices for the area include fencing and posting of the area to prevent unauthorized livestock grazing and to prevent hunters from trespassing on private property. All of the department lands are open to public hunting.

2.7.2 Vegetative Resources

The area's flora represents a transition zone between the hardwood forests of Northern Oklahoma and the predominately pine forests of Southeastern Oklahoma. The vegetation is a mixture of native grasses and improved pasture interspersed with native oak-hickory woodlands.

The vegetative resources of the Robert S. Kerr Reservoir were classified using information derived from FY2014 Project Site Vegetative Resource Records reported in Operations and Maintenance Business Information Link (OMBIL). These data are displayed in Table 2.1.

Table 2.1 Vegetative Resources

Division	Order	Class	Sub-Class	Acreage
Developed/Other Landcover	Agricultural	Crop	Warm Season	4,141
Developed/Other Landcover	Agricultural	Improved/Introduced Pasture	Warm Season	4,120
Developed/Other Landcover	Urban	Residential/Industrial	Non-Vegetated	132
Developed/Other Landcover	Water	Lake Reservoir	Non-Vegetated	2,963
Developed/Other Landcover	Water	Pond	Non-Vegetated	2,963
Developed/Other Landcover	Water	Ravine	Non-Vegetated	753
Forest	Mainly Evergreen Forest	Evergreen Forest With Rounded Crowns	Short Pine Forest	92
Forest	Mainly Evergreen Forest	Evergreen Forest With Rounded Crowns	Shortleaf Pine Oak Forest	399
Forest	Mainly Deciduous Forest	Cold Deciduous Broad-Leaved Forest With Evergreen Needle-Leaved Trees	Oak-Hickory And Pine Forest	89
Forest	Mainly Deciduous Forest	Cold Deciduous Broad-Leaved Forest With Evergreen Needle-Leaved Trees	Oak Pine Forest	730
Forest	Mainly Deciduous Forest	Cold Deciduous Broad-Leaved Forest With Evergreen Needle-Leaved Trees	Oak Cedar Forests	568
Forest	Mainly Deciduous Forest	Cold Deciduous Forest Without Evergreen Needle-Leaved Trees	Eastern Crosstimbers	1,518
Forest	Mainly Deciduous Forest	Cold Deciduous Forest Without Evergreen Needle-Leaved Trees	White Oak-Hickory Forest	2,467
Forest	Mainly Deciduous Forest	Cold-Deciduous Alluvial Forest	Eastern Bottomland Forest	1,046
Forest	Mainly Deciduous Forest	Cold-Deciduous Alluvial Forest	East Central Bottomland Forest	1,464
Herbaceous	Tall Grassland Grasses Or Graminoid Forbes Over 1m Tall	Woody Layer Broad-Leaved Deciduous	Tallgrass Oak Savanna	3,092
Herbaceous	Tall Grassland Grasses Or Graminoid Forbes Over 1m Tall	Tall Grassland Consisting Mainly Of Bunches Of Grasses	Tall Grass Prairie	1,316
Woodland	Mainly Evergreen Woodland	Evergreen Needle-Leaved Woodland With Rounded Crowns	Pine Oak Woodland	116
Woodland	Mainly Evergreen Woodland	Evergreen Needle-Leaved Woodland	Oak-Pine Woodland	104
Woodland	Mainly Evergreen Woodland	Evergreen Needle-Leaved Woodland	Other	1,932
Total Vegetative				**30,005**

2.7.3 Federally-listed Threatened and Endangered Species

Considerations for federally-listed threatened and endangered species at Robert S. Kerr Reservoir are in accordance with Tulsa District's current Biological Opinion (BO) issued by the USFWS. Past and potential future actions include such measures as construction and management of nesting habitat for the endangered the Interior Least Tern (ILT) (*Sterna antillarum*) and the American Burying Beetle (ABB) (*Nicrophorus americanus*). Should federally-listed species change in the future (e.g., delisting of the ILT or other species or listing of new species) associated requirements will be reflected in a revised BO from the USFWS. Natural resources needs and management for listed species at Robert S. Kerr Reservoir will change accordingly.

Section 7(a)(2) of the Endangered Species Act requires federal agencies to ensure that any action authorized, funded, or carried out by such agency is not likely to: 1) jeopardize the continued existence of any endangered or threatened species, or 2) result in the destruction or adverse modification of critical habitat. The term, "jeopardize the continued existence of", means to reduce appreciably the likelihood of both the survival and recovery of listed species in the wild by reducing the species' reproduction, numbers, or distribution. Jeopardy opinions must present reasonable evidence that the project will jeopardize the continued existence of the listed species or result in destruction or adverse modification of critical habitat.

The ILT is a federally-listed endangered bird that nests on sand bars along the Arkansas River in Oklahoma and Arkansas. Preferred nesting habitat for the ILT is bare sand substrate located a considerable distance from trees or other potential roosting spots for avian predators. In accordance with a BO issued by the USFWS, the Tulsa District is required to construct and maintain a given quantity of suitable nesting habitat for the ILT at varying civil works projects. Navigation pools such as Robert S. Kerr Reservoir provide the opportunity for establishing excellent habitat owing to minimal water level fluctuations and expanses of open water which minimize predation. In the spring of 2006, an ILT nesting island was created at river mile 348.5 in Robert S. Kerr Reservoir's pool using beneficial in-water disposal of dredge materials. This island, approximately 15-acres in size, has been maintained by occasional capping with additional sand and rock, vegetation control, and rock protection at its upstream end. Signs prohibiting human disturbance are posted on the island every nesting season (late May through early September), and ILT nesting success is monitored by Tulsa District biologists. The island has been highly successful in term of ILT reproduction and continues to assist with recovery of the species.

Similar habitat was improved in 2009 at river mile 354 in Robert S. Kerr Reservoir's pool by capping an existing island with sand and clearing of vegetation. Though less successful than the other nesting site in reservoir's pool, this approximate 3 acre site does provide suitable habitat for nesting terns and is continually maintained and monitored for ILT nesting success by the Tulsa District.

The ABB can be found at Robert S. Kerr Reservoir. It was proposed for federal listing in October 1988 (53 FR 39617) and designated as an endangered species on July 13, 1989 (54 FR 29652) and retains this status. The ABB is an annual species and typically

reproduces once in its lifetime. It competes with other invertebrate species as well as vertebrate species, for carrion. Although ABBs are considered feeding habitat generalists, they are believed to be more selective regarding breeding habitat. Direct adverse impacts to ABBs during their inactive and active periods may occur as a result of impacts from clearing vegetation; soil compaction due to heavy equipment operation; fuel and chemical contamination of the soil; grading; soil excavation and filling; and re-vegetation and reseeding of disturbed areas. During construction of dredge disposal pits and access roads, soil is excavated and vegetation is cleared. Excavating soils, clearing vegetation, and constructing access roads involve displacement of soils that could uncover ABBs. Uncovered ABBs could be exposed to predation, adverse environmental conditions, or crushed by equipment. If construction occurs during the active season, ABB broods could be displaced during soil excavation, adults could be separated from larvae/eggs, and/or both could be crushed by equipment.

For future actions where incidental take may occur, USACE will comply with the BO to conduct presence/absence surveys. These surveys must be performed during the ABB active season and are valid until the beginning of the active season in the following year. Also, if soil disturbance has not commenced by the beginning of the active season in the following year, another survey will be conducted.

- Project footprint will be minimized to the greatest extent practicable.
- Equipment will utilize existing roads and all equipment will use the same path to minimize disturbance.
- Habitat will not be altered until necessary for the project. Construction equipment access points to dredge disposal sites will be minimized to the greatest extent practicable.
- Project sites will be canvassed and any carcasses that may be present will be removed. Searches for carcasses must be initiated at least two weeks prior to project-related soil disturbance and conducted once a week until soil disturbance begins.
- The minimum amount of lighting necessary to meet the objectives of the project will be used. If night time work is required, lighting will be down shielded.
- Vegetation will be established in areas not permanently impacted that were disturbed during project construction as soon as possible following construction. This will be accomplished with an appropriate mix of plant species native to the project site. Plants listed as invasive by the U.S. Department of Agriculture or the state of Oklahoma should be avoided.
- At least an area equal to the suitable habitat impacted by the project actions (impacts of existing flood pools excluded) will be replaced through improved management or restoration of habitat suitable for ABBs. USACE will prepare an ABB habitat plan outlining proposed habitat improvements and the improved or restored habitat must be in a location approved by the Service. Management and monitoring of these improved habitat areas must be incorporated to maintain these areas and such actions will be included in an annual report to the Service.

If a survey for a project site is positive for the ABB the following best management practices would be implemented:

Other threatened and endangered species having potential habitat at Robert S. Kerr Reservoir fee lands, as identified by the USFWS, can be found in Table 2.2.

Table 2.2 Threatened and Endangered Species

	Status	**FED/State List**	**Has Critical Habitat**	**Biological Opinion Issued**	**Final Recovery Requirements**	**Recovery Actions Designated**
Birds						
Piping Plover *Charadrius melodus*	Threatened	FED	No	Yes	No	No
Least Tern *Sternula antillarum*	Endangered	FED	No	Yes	No	No
Red Knot *Calidris canutus*	Threatened	FED	No	No	No	No
Clams						
Scale shell *Leptodea leptodon*	Endangered	FED	No	Yes	No	No
Winged Mapleleaf *Quadrula fragosa*	Endangered	FED	No	Yes	No	No
Flowering Plants						
Harperella *Ptilimnium nodosum*	Endangered	FED	No	Yes	No	No
Insects						
American Burying Beetle *Nicrophorus americanus*	Endangered	FED	No	Yes	No	No
Mammals						
Gray Bat *Myotis grisescens*	Endangered	FED	No	Yes	No	No

	Status	FED/State List	Has Critical Habitat	Biological Opinion Issued	Final Recovery Requirements	Recovery Actions Designated
Indiana Bat *Myotis sodalist*	Endangered	FED	No	Yes	No	No
Northern Long-eared Bat *Myotis septentrionalis*	Threatened	FED	No	Yes	No	No
Ozark Big Eared Bat *Corynorhinus townsendii ingens*	Endangered	FED	No	Yes	No	No

2.7.4 Invasive Species

The Arkansas River basin has been identified as a major pathway for the introduction of aquatic nuisance species. The following vegetative species are considered of special concern in Oklahoma: alligator weed (*Alternanthera philoxeroides*), Eurasian watermilfoil (*Myriophyllum spicatum*), hydrilla (*Hydrilla verticillata*), purple loosestrife (*Lythrum salicaria*), salvinia (*Salvinia molesta*), and water hyacinth (*Eichhornia crassipes*). Due to its proximity to the McClellan Kerr Arkansas River Navigation System, Robert S. Kerr Reservoir is particularly vulnerable to the transport by boaters of these invasive plants as well as some invasive animal species. Salvinia and water hyacinth have been documented to occur in Robert S. Kerr Reservoir, but are not yet at population levels that allow them to have widespread impacts in the lake. Salvinia refers to a genus of perennial, aquatic ferns from South America that are common in water gardens and aquarium industries. In Oklahoma giant salvinia has established in ponds, lakes and slow moving streams. It prefers nutrient rich waters and forms extensive mats that can completely cover water surfaces resulting in the degradation of natural habitats by shading natural plants, reducing available dissolved oxygen and creating large amounts of decaying plant material. Giant salvinia can clog water intakes which interfere with irrigation, water supply, and electrical generation. Human transport aids in the spread of this species, with plants adhering to anything entering infested waters including boats, trailers, vehicular wheels, intakes, and gear. Water hyacinth is common in Gulf Coast states and its presence has caused massive problems with navigation, water based recreation, canal systems, pumping stations, and water intakes. While the risk of establishment in Oklahoma is low due to cold winter air temperatures, its continued popularity in water gardens poses a threat that it could adapt to colder temperatures or become established in thermal refugia. In addition to aquatic invasive plants, Oklahoma has a total of 22 invasive plant species on the Oklahoma Invasive Plant Council problem list. Invasive terrestrial plants known to occur on Robert S. Kerr Reservoir lands include Japanese honeysuckle (*Lonicera japanica*), Chinese lespedeza (*Lespedeza cuneata*), Japanese climbing

fern (*Lygodium japonicum*), kudzu (*Puearia lobata*), and autumn olive (*Elaeagnus umbellata*).

The zebra mussel (*Dreissena polymorpha*) is an invasive, fresh water invertebrate that has a high filtration rate, high reproductive rate, strong byssal threads for substrate attachment, and limited number of natural predators. Due to these characteristics, zebra mussels are able to populate an aquatic ecosystem relatively quickly and out-compete native mussel populations. Economic impacts caused by the invasive species include fouling water intake pipes, cooling systems, filtration systems, and fouling boat engine cooling systems. Zebra mussels fouling filtration systems associated with fire suppression at facilities using raw water can impede effectiveness of the system, increasing the potential of damage to the facility and danger human welfare. When a zebra mussel "die-off" occurs, thousands of shells can wash up on the shoreline and/or beach area; the sharp edges of the mussels' shells could potentially cause human harm and subsequent public beach closure for public safety.

Zebra mussels were introduced to North America via trans-Atlantic barges to the commercial waterways of the United States from Europe in the 1980's. Once established, the spread of zebra mussels to inland waters has occurred via navigation system traffic, overland transportation of private boats from an infested water body to an uninfected water body, and natural downstream flows that carry the free floating larva form of the species. Within the Tulsa District, zebra mussels were first confirmed in Oklahoma in the McClellan-Kerr Arkansas River Navigation System (MKARNS) in January 1993 inside Locks 14 (W.D. Mayo), 15 (Robert S. Kerr), and 16 (Webbers Falls). The invasive species were subsequently found in the Verdigris River of the MKARNS at lock 17 (Chouteau) in June 1993 and at lock 18 (Newt Graham) January 1994. In conjunction with zebra mussel infestation at the locks along the MKARNS, the species were also observed to be in the powerhouses associated with Robert S. Kerr Reservoir and Webbers Falls. Upon confirmation of zebra mussel establishment, monitoring efforts at locks and dams along the MKARNS were conducted by USACE biologists and Northeastern State University research faculty at boat ramps that provide access to the reservoirs along the MKARNS. Signs were posted to educate the public concerning the presence of invasive species and assist in the prevention of spreading the species to other water bodies. Zebra mussels continue to populate the navigation system and populations are monitored via routine maintenance activities associated with the facilities along the MKARNS. In 2012, USACE facilities at Robert S. Kerr Reservoir noted an increase in manual maintenance to the powerhouse cooling systems during the summer months, when zebra mussel activity is greatest.

Table 2.3 lists additional important invasive species that occur on Robert S. Kerr Reservoir fee lands. Data were retrieved from the FY2014 Project Site Invasive Species Records reported in OMBIL.

Table 2.3 Invasive Species

Species Group	Species Common Name	Type of Occurrence	Acreage Impacted	Percent Acreage Impacted
Aquatic and Wetlands Animals	Zebra Mussel	Major	41,239	72.68%
Aquatic and Wetlands Plants	Alligator Weed	Minor	100	0.18%
Aquatic and Wetlands Plants	Eurasin Water-milfoil	Moderate	1,000	1.76%
Terrestrial Animals	European Starling	Minor	1,000	1.76%
Terrestrial Animals	Wild Boar	Minor	540	0.95%
Terrestrial Plants	Common Dandelion	Minor	600	1.06%
Terrestrial Plants	Japanese Honeysuckle	Minor	250	0.44%
Total Impacted Acres			**44,729**	

Note: The remaining 21.17% of Robert S. Kerr Reservoir does not show impacts by invasive species

2.7.5 Ecological Setting

Robert S. Kerr Reservoir is located within the Arkansas Valley. The Arkansas Valley is a transition area that separates the Ozark Highlands and the Ouachita Mountains. This transitional region exhibits a break in geological formation as well as vegetation community composition. Robert S. Kerr Reservoir occupies portions of two ecoregions: the areas located immediately adjacent to the dam, immediately below the dam and the far northern reaches of the reservoir are affiliated with the Arkansas River Floodplain ecoregion. The main body of the reservoir, all reaches south of the confluence with the Canadian River, and reaches east of the main body are associated with the Arkansas Valley Plains ecoregion.

The Arkansas River Floodplain ecoregion encompasses level to gently rolling plains and low terraces along the Arkansas River. Features such as natural levees, meander scars, oxbow lakes, point bars, swales, and backswamps are common to this region. The Arkansas River substrate is comprised of a mud and sand mixture.

The Arkansas Valley Plains ecoregion exhibits rolling plains interrupted by scattered hills, and ridges in the structural Arkoma Basin. Streams in this region are known to have long, wide, deep pools that are occasionally interrupted by short, high gradient riffles. Stream substrates are mostly gravel with occasional cobbles. During prolonged droughts and most summers, streams typically have little or no flow. During drought periods most streams in this region commonly maintain pools that are known to be approximately 0.4 miles long and up to 10 feet deep.

This region encompasses a wide variety of natural vegetation that includes cross timber oak/hickory, hickory/shortleaf pine forest, bottomland hardwood forest, and tall grass prairie. Hickory/shortleaf pine savannas occupy ridgetops of this region that transition into rugged areas of dry forests. These dry forest areas are dominated by cross timbers containing blackjack oaks, post oak, scattered hickory species, and are underlain with tall grass species such as big bluestem, little bluestem, switchgrass, and Indian grass. The dry forests transition into a broad valley that encompasses tall grass prairies dominated by bluestems and a wide variety of wildflowers. The tall grass valley transitions into floodplains of streams and rivers that are comprised of mixed deciduous forests dominated by species such as pecan, oak, maple, birch, sycamore, cottonwood, elms, and willow, vines such as grape, poison ivy, and green briar that are underlain by a variety of grasses and other herbaceous species.

2.7.6 Wetlands

Table 2.4 lists the acreages of various types of wetlands present at Robert S. Kerr Reservoir. Data was retrieved from the FY2014 Project Records reported in OMBIL.

Table 2.4 Wetland Summary

Wetland Class	Subtotals	Total Acres
Freshwater		6,124.69
Emergent Wetland	2,391.28	
Forested/Shrub Wetland	3,517.28	
Pond	216.13	
Lake		41,239.51
Riverine		541.09
Other		0.64
Total		**47,905.93**

2.8 CULTURAL RESOURCES

A cultural resource inventory survey was conducted along the McClellan-Kerr Arkansas River Navigation System of Oklahoma, in 1976-1977. Fifty-four prehistoric and historic archaeological sites were discovered and recorded during this survey. One hundred thirteen previously recorded sites are located or may be located within the Federal boundary. Precise locations, cultural-historical affiliations, site function (when possible), and relative value of each site to the history and pre-history of the study area are recorded as a result of the survey. Thirty-four sites are listed in or have been nominated to be included in the National Register of Historical Places.

The ethnographic identities of the Arkansas Valley prior to intensive European contact are still uncertain. The earliest European visitors to Eastern Oklahoma found Wichita groups living on the South Canadian River. By the time Europeans began intensely exploiting northeastern Oklahoma, it is believed that a number of different groups used eastern Oklahoma as a foraging territory. Presumably this continued until 1820 when the territory was parceled out between the Five Civilized Tribes.

It is assumed that these foragers exploited eastern Oklahoma mainly for furs to be traded to white traders in return for European trade goods, such as guns, knives and glass beads.

Specific instructions for the identification and administration of cultural resources are contained in ER-1130-2-438. This regulation provides guidance to field operating agencies of the Corps of Engineers for the identification, preservation and mitigation of losses of cultural resources associated with federal resource development projects. Results of annual inspections of these sites, conducted by Robert S. Kerr Reservoir personnel, are sent to the Tulsa District Office.

Prior to any construction, a Cultural Resources survey will be performed. The findings will be documented on a Cultural Resource Survey and Site Update Form, which will be prepared and forwarded to the Tulsa District Office. If, during any construction activity, archeological relics are uncovered, work will cease, District archaeologists will be notified immediately. The archaeologist will assess the site and advise lake personnel whether construction can resume.

2.8.1 Historic and Archaeological Features

History

Cultural resources preservation and management is an equal and integral part of all resource management at Civil Works operating projects. The term “cultural resources” is a broad term meant to include anything that is of cultural significance to humans and that has some historical value, and generally includes, but is not limited to, the following categories of resources: archaeological sites (historic and prehistoric), historic standing structures, traditional cultural properties, and sacred sites. There are approximately 140 known archaeological sites located on Project lands associated with the Robert S. Kerr Reservoir.

Many archaeological sites have high sensitivity because of past recoveries of human remains and associated funerary objects.

Numerous cultural resources laws establish the importance of cultural resources to our Nation's heritage. With the passage of these laws, the historical intent of Congress has been to ensure that the Federal government protects cultural resources. Stewardship of cultural resources on USACE Civil Works water resources projects is an important part of the overall Federal responsibility.

Archaeology

Many cultural resources investigations have been conducted on USACE land at Robert S. Kerr Reservoir. Investigations prior to impoundment of the reservoir included archaeological survey and excavation of significant sites. A large number of additional investigations have been carried out at the Reservoir in the years since impoundment. In the larger regional area there are hundreds of archaeological sites and historic standing structures on record with the Oklahoma State Historic Preservation Office (SHPO) and Oklahoma Archeological Survey (OAS).

2.8.2 Cultural History Sequence

Seven broad cultural divisions are applicable to a discussion of the cultural history of the Robert S. Kerr Reservoir region: Paleoindian, Archaic, Woodland – Fourche Maline Phase, Woodland/Late Prehistoric Transition – Evans Phase, Late Prehistoric, Protohistoric, and Historic.

The following regional chronology is adopted in this Master Plan:

- Paleoindian 12,000 to 8500 Before Present (BP)
- Archaic 8500 to 2000 BP
- Woodland 2000 to 1200 BP (AD 1 to 800)
- Caddoan/Missisippian AD 800 to 1500
- Protohistoric (Contact) AD 1500 to 1825
- Historic AD 1825 to present

To aid in comparing divergent cultures and sequences in eastern Oklahoma, the following general adaptation types are used to characterize prehistoric cultural traditions.

Paleoindian

The Paleoindian Period is the earliest well substantiated archaeological period in the region. Signature stone tools are unnotched projectile points of fluted or lanceolate types, often found in contexts where mammoth or bison remains also occur. The distinctive projectile point styles of this period exhibit fluting (Clovis and Folsom), though later types (Plainview and Dalton) do not exhibit fluting but maintain a high level of technological sophistication.

During this period, small bands of hunters and gatherers relied largely on the hunting of megafauna such as mammoth and bison; however, several sites have exhibited evidence of reliance on a wide variety of plant and animal species. Remains of smaller mammals such as deer, squirrel, raccoon, and turkey, as well as riverine resources (turtles and fish), hickory nuts, and acorns have been identified at archaeological sites in the region of the Ozark Mountains during the Late Paleoindian Period. Structural remains of the Paleoindian Period are poorly understood, due to high residential mobility and the use of perishable construction materials.

Paleoindian sites have been identified in the general project region, but they are few in number.

Archaic

With the loss of the megafauna, a larger variety of floral and faunal resources were utilized during the Archaic Period. An increase in seasonal variability of resources and increasing populations resulted in changing settlement and subsistence patterns. Repeated occupation of sites, often on a seasonal basis, and features such as rock-lined hearths, roasting pits, and grinding tools reflect intensive plant processing and the cyclical exploitation of resources. Increasing diversity of stone tools through time reflects the increasing variability of resources and diversity of activities taking place at habitation sites. Projectile points from the Archaic Period are stylistically quite different (typically notched and stemmed) from those of the Paleoindian Period. The Archaic Period is traditionally divided into Early, Middle, and Late periods, the overall extent of which was approximately 8,500 BP to 2,000 BP.

At Robert S. Kerr Reservoir, sites definitively dating to the Archaic Period are numerous and often multicomponent. Several sites with Archaic components were excavated prior to reservoir impoundment. The most commonly identified archaeological phase dating to the Archaic Period at Robert S. Kerr Reservoir is the Late Archaic Wister Phase.

Woodland

The Woodland Period in Eastern Oklahoma was a time of continuity marked by incorporation of new technologies and intensification of resources. The appearance in the archaeological record of small corner notched projectile points indicates that the bow and arrow was in use. The presence of ceramic shreds indicates that ceramic use in the form of pottery for storage and cooking had become widespread. Archaeological assemblages from this period indicate people were living in semi-permanent villages and dispersed communities, using settlement strategies such as seasonal mobility, targeted long distance resource procurement by portions of the community or household, and intensification of wild and domestic plants to meet their needs. Small game and aquatic resources remained essential in subsistence. Increased residential stability and concomitant intensification of resources led to social changes evident in diversification of stylistic traits and more elaborate burial rituals. Projectile points from this period include, in addition to the small corner notched points, large contracting stem points and large corner-notched projectile points in a variety of styles, indicating continued use of the atlatl and darts, as well as spears likely employed for symbolic political or religious effect.

In southeastern Oklahoma, the principle Woodland manifestation is known as the Fourche Maline Phase. Fourche Maline components are found in the upper levels of Wister Phase midden sites, suggesting continuity from the Wister Phase through the Fourche Maline Phase. Rather than an abrupt change in lifeways from the Archaic to the Woodland, the archaeological record indicates continuity even as populations in the area adopted new technologies and intensified resource use, which in turn drove increasing residential stability, community identity, and possibly territoriality. The Fourche Maline phase material culture tradition continues into the Mississippian influenced Caddoan culture of the Late Prehistoric Period. For this reason, some refer to the Woodland Fourche Maline phase as "Pre-Caddoan". The number of sites in the Robert S. Kerr Reservoir area attributed to the Fourche Maline phase has grown substantially as the Arkansas Valley Fourche Maline Phase has been better defined.

In northeastern Oklahoma, the principle Woodland manifestation is known as the Cooper Focus, which shares many material culture traits and settlement patterns with the Fourche Maline, and symbols and styles with Hopewellian groups to the north and east. The ceramics of the Cooper Focus are very similar to the Fourche Maline in paste and temper, but they are distinct in form and decoration. The decorations used in Cooper Focus sites include motifs that mirror those of Hopewellian groups to the east.

Sites associated with both predominant Woodland archaeological cultures are found at Robert S. Kerr Reservoir. Cultivation of plants began during this period and is often referred to as "insipient agriculture".

Caddoan/Mississippian

Ranked societies and new forms of social integration emerged during the Caddoan/Mississippian period. The Caddoan and Mississippian traditions are known locally as the Northern Caddoan, Arkansas Valley Caddoan, or Ankansas River Caddoan subarea. Settlement patterns consisted of communities of dispersed farmsteads, hamlets, and small villages, often associated with nearby mound centers. Villages were often situated in lowland terraces of waterways where agriculture was viable. House structures were pole framed with waddle and daub, and subsistence was more focused on agriculture, supplemented by hunting and gathering. Agricultural tools are present in artifact assemblages, along with small triangular side and corner notched arrowpoints for hunting and warfare. Social hierarchy is evident in differential treatment of the dead. Both local and regional mound centers were constructed during this time. Some mounds contain primary or secondary burials, but others represent mounds on which a structure was located. Mounds such as these had a very specific role in the ceremonial lives of the region's inhabitants.

Pottery types are distinctive to the period, and are greatly increased in variability in form and function. Pottery was well made. Personal items such as earspools, pipes, gorgets, hairpins, and beads, as well as exotic artifacts such as copper plated pins, conch shells, galena crystals, and exotic ceramics and stone provide evidence for complex cultural traditions, rank, and widespread trade and interaction.

The Caddoan/Mississippian time period is broken down into three temporally sequential phases: the Harlan Phase, the Spiro Phase, and the Fort Coffee Phase.

Material and social changes of this period began in the Harlan Phase. This phase saw the rise of mound centers such as those at the type site for this phase- the Harlan site at Robert S. Kerr Reservoir. Elements of local Fourche Maline culture remained the same, suggesting that interaction with Mississippian groups to the east resulted in adoption of Mississippian material, social, and ceremonial traits by local populations.

The Spiro Phase is considered to be the height of Caddoan long distance exchange and trade, mortuary and other ceremonialism, and inequality in social ranking. The type site for this phase is the Spiro Mound site located in LeFlore County.

The final phase of this time period, the Ft. Coffee Phase, is characterized by a decline in ceremonialism and long distance trade along with less evident social inequality. Trade with Plains groups appears to have been more common than trade with eastern groups during this time. Subsistence appears to have become focused on agriculture and bison hunting, though small game continued to be hunted. Greater social integration is evident in the similarity of lifeways and material culture among sites of this time period, despite lack of ceremonial construction.

Protohistoric (Contact)

The period from A.D. 1500-1825 is referred to as the Protohistoric (or Contact) Period. During this time non-native explorers, trappers, and traders visited the region, and land claims by first the Spanish, and then the French brought great change. Protohistoric sites in Oklahoma appear to be directly related to an earlier manifestation of similar village sites located further north in Kansas, including the Great Bend Aspect with sites in central, south-central, and southeast Kansas. Great Bend manifestations represent the villages encountered by Francisco Coronado in 1541. People lived in large, circular grass houses, grew crops, and hunted bison and small game. The archaeological record documents significant long distance trade with the southwest. Items such as painted and glazed pottery, turquoise beads and pendants, and shell beads distinctive to the Southwest Pueblo cultures as well as bois d'arc and pottery from Caddo settlements in northeastern Texas attest to the extent of the trade networks in place. This way of life continued into the eighteenth century.

In 1682, Robert Cavelier, Sieur de la Salle, claimed the territory drained by the Mississippi as part of the French Empire in North America. By 1700, French traders were established in Oklahoma and had developed trading relationships with Wichita groups in the Arkansas Valley and the Osage to the east. Diseases swept through the region during this time period, dramatically reducing local populations. This, combined with increased intergroup violence, resulted in the coalescence of communities into large villages, often with defensive fortifications. Competition between rivals intensified through time as the fur trade brought significant and lasting changes to the economic systems of Villages. These economic systems in turn brought changes in social structure, including gender roles. During this time the Caddo were in the process of emigrating toward the Red River, largely due to the constant raiding by the Osage from the north. Many place names in the area of the

Reservoir are indicative of the former French presence, including San Bois Creek and LeFlore County.

The Wichita and Affiliated Tribes were historically known as the Wichitas, Wacos, Taovayas, Tawakonis, and Kichais. Protohistoric Wichita sites from the early 1700's have been identified in Kay County, north-central Oklahoma, including the Bryson Paddock (34KA5) and Deer Creek Sites (34KA3), and in south-central Oklahoma at the Longest site (34JF1). These Protohistoric Wichita sites, dating from the early 1700's, provide evidence of the extent of French influence on the central and southern Plains, as artifact assemblages from these sites contain metal musket parts from French firearms, glass trade beads, copper kettle pieces, and European gunflints. Villagers did not dramatically change material culture in spite of this influx of European goods. Rather, they incorporated French goods into existing material culture frameworks. Guns were used until no longer viable, and then were hammered into hoes similar in shape to bison scapula hoes (which had seen long use on the Plains). Copper kettles were hammered flat and used to create tinklers- copper cones sewn to clothing- and other items of personal adornment. The Osage had villages to the east of the protohistoric Wichita Villages, and they often fought the Wichita over access to trade goods.

The Caddo, Wichita, Osage, and Quapaw, hunted in the Arkansas Valley. Territorial claims shifted between France and Spain during the rest of the eighteenth century; however, France controlled the land until it was acquired by the United States in the 1803 Louisiana Purchase.

After the Louisiana Purchase in 1803, military and political expeditions in the R.S. Kerr Reservoir area included those by James B. Wilkinson (1806), Stephen H. Long (1821), Thomas James (1821), and Jacob Fowler (1821).

Historic

Congress created Arkansas Territory on March 2, 1819, and this territory included present-day Oklahoma. Between 1820 and 1907, Oklahoma was designated as Indian Territory on maps of the United States, and, during this time period, it was an Indian resettlement zone for tribes from various parts of the country.

In May 1830, Congress passed the Indian Removal Act, which resulted in lasting consequences for all native groups in the United States. By 1838, most of Indian Territory was assigned to five Indian nations from the eastern United States. These included the Cherokee, Choctaw, Chickasaw, Creek, and Seminole nations.

Land south of the Arkansas and Canadian Rivers in Oklahoma was ceded by the United States to the Choctaws residing in Arkansas Territory in 1825. In 1816, Osage hunting territory north of the Arkansas River was transferred to their rivals, the Cherokee residing in Arkansas during the late 1700's and early 1800's. In 1828, the Cherokee ceded all their Arkansas land for a tract of land that later became the Cherokee Nation and the Cherokee Outlet. This treaty required that all Cherokees (including those residing in the Southeast) move to the land in Indian Territory. The Arkansas River was established as the territorial boundary between the Cherokee and the Choctaw.

The Creek Nation ceded their lands to the United States and migrated to Indian Territory in 1827, and moved to lands west of the confluence of the Arkansas and Canadian rivers. The Chickasaw moved to an area west of the Choctaw settlements by 1840. After war to resist relocation in the 1830s, most of the Seminoles moved west by 1842.

Fort Gibson was established by Col. Matthew Arbuckle, commander of the Seventh Infantry, in 1824. The Fort was the furthest west U.S. Army post, built to protect the southwestern border of the nation and to maintain peace, primarily between the Osage and Cherokee. Originally known as Cantonment Gibson, it was renamed in 1832. It was the first military post in what would become Oklahoma. The Fort was involved in removal of eastern tribes to Indian Territory and was occupied through most of the Indian Removal period. The War Department abandoned the post 1857, as the area was peaceful and the Cherokee complained about the liquor and brothels at Fort Gibson and asked Congress to remove the post. The property and structures were deeded to the Cherokee who established the village of Kee-too-wah on the site. The post was returned to military use during the Civil War when Union forces responded to invasion of Indian Territory. In April of 1863 The Union Indian Brigade, under the leadership of Col. William A. Phillips, occupied the post from April of 1863, and the Army maintained presence at the Fort through the Reconstruction and Indian Wars periods. The Fort was abandoned by the Army in 1890.

The Civil War in Indian Territory resulted in increased factionalism among the tribes, sentiments that had already formed in pre-Removal times. While some fought for the Confederacy, others were left vulnerable to threats from the Confederacy and Plains tribes after the Union removed its troops from Indian Territory.

Two important battles occurred near R.S. Kerr Reservoir: one near the town of Webbers Falls in 1863, and one at Pheasant Bluff near Tamaha in 1864. The Pheasant Bluff battlefield may be inundated by the reservoir. On June 15, 1864, Brigadier General Stand Watie led Confederate forces to capture and sink the Union steamboat J.R. Williams on the Arkansas River. This was considered the most inland Naval battle of the Civil War. The troops included Choctaws, Chickasaws, Creeks, and Seminoles.

The Civil War resulted in huge losses for the tribes and resulted in new treaties with the Cherokee, Choctaw, Chickasaw, Creek, and Seminole. These treaties required tribes to give up land due to their association with the Confederacy. This opened their land to railroads and adoption of their slaves as full citizens (Freedmen). The railroads brought a large increase in immigration from the east. The Missouri, Kansas, and Texas Railway Company began building in Indian Territory in 1870, crossing both the Cherokee and Choctaw nations. The rail lines provided access to minerals and timber in Indian Country. Coal was also discovered in the Choctaw and Cherokee Nations, and this brought experienced miners from Europe.

The Dawes Allotment Act of 1887 required members of the tribes to accept an allotment of individual land in place of tribal ownership of land. All five Nations had signed allotment agreements by 1902. The state of Oklahoma was admitted into the Union in 1907.

At Robert S. Kerr Reservoir, several sites have been defined as dating to the Historic Period; however, most of these date from the late nineteenth to the early twentieth century. A few sites have been attributed to early Cherokee or Choctaw farmsteads. Several small historic cemeteries are located at R.S. Kerr Reservoir, with most dating to the time period between the late nineteenth to the early twentieth centuries.

Several small towns and communities near R.S. Kerr Reservoir are Webbers Falls, Keota, Cowlington, and Tamaha. These settlements have a common history of flourishing until the onset of the Great Depression.

Webbers Falls was established as a trading post in 1828 by Walter Webber, a Cherokee who brought supplies up the Arkansas River.

Keota was founded in 1904 by the Midland Valley Railroad, but its role of supporting local cotton growers and shipping their products diminished greatly during the Great Depression.

Cowlington (previously known as Short Mountain) was established in 1884 and named after two European-American settlers, Coke and Fowler Cowling.

Tamaha (Haskell County) was one of the earliest port towns and trading centers in the Choctaw Nation (ca. 1831) and from 1836 to 1912 was a ferry crossing on the Arkansas River. It was known as Pleasant Bluff prior to establishment of a post office on April 17, 1884. The Tamaha Jail is the oldest jail in Oklahoma, and still stands near Robert S. Kerr Reservoir in Tamaha. The jail was constructed in 1886 and listed on the National Register of Historic Places. The last steamboat to come to Tamaha Landing was in 1912.

In nearby Sallisaw, Oklahoma is the one room log cabin built by Seqhoyah in 1829. The site is listed on the National Register of Historic Places and is a National Historic Landmark.

A historical marker in Keota, Oklahoma, commemorates Reverend Peter Folsom. He was instrumental in establishing the First Choctaw Baptist Church.

2.9 DEMOGRAPHICS

2.9.1 Population

The total population for the zone of interest is 510,458, as shown in Table 2.5. Almost 25% of the population is in Sebastian County, 14% in Muskogee County, 12% in Crawford County, 10% in Le Flore County and 9% in Cherokee County. Each of the remaining counties makes up less than 9% each of the total population. The population in the zone of interest makes up approximately 13% of the total population of Oklahoma and 17% of Arkansas. From 2013 to 2065, the population in the zone of interest is expected to increase to 675,980, an annual growth rate of 0.6% per year. By comparison, the population of Oklahoma is projected to increase at an annual rate of 0.7% per year and Arkansas 0.8% per year. The distribution of the population among gender is approximately 49% male and 51% female in most geographical areas with the male/female ratio reversed in Latimer, Le Flore, and Pittsburgh Counties as shown in Table 2.6.

Table 2.5 2013 Population Estimates and 2065 Projections

Geographical Area	2013 Population Estimate	2065 Projection
Oklahoma	3,785,742	5,280,026
Arkansas	2,933,369	4,437,622
Adair County, OK	22,427	32,391
Cherokee County, OK	47,488	79,980
Haskell County, OK	12,849	16,060
Latimer County, OK	11,034	14,321
Le Flore County, OK	50,062	74,963
McIntosh County, OK	20,358	30,026
Muskogee County, OK	70,657	85,457
Pittsburgh County, OK	45,417	56,668
Sequoyah County, OK	41,834	67,920
Crawford County, AR	61,796	50,818
Sebastian County, AR	126,536	167,376
Zone of Interest Total	**510,458**	**675,980**

Source: U.S. Bureau of the Census, American Fact Finder (2013 Estimate); Oklahoma State Data Center (2065 Projections, OK), UALR Institute for Economic Advancement (2065 Projections for AR)

Table 2.6 2013 Percent of Population Estimate by Gender

Geographical Area	Male%	Female%
Oklahoma	49.5	50.5
Arkansas	49.1	50.9
Adair County, OK	49.1	50.1
Cherokee County, OK	49.1	50.9
Haskell County, OK	49.3	50.7
Latimer County, OK	50.6	49.4
Le Flore County, OK	50.3	49.4
McIntosh County, OK	49.3	50.7
Muskogee County, OK	48.9	51.1
Pittsburgh County, OK	50.9	49.1
Sequoyah County, OK	49.4	50.6
Crawford County, AR	49.0	51.0
Sebastian County, AR	49.0	51.0
Zone of Interest Total	**49.4**	**50.6**

Source: U.S. Bureau of the Census, American Fact Finder (2013 Estimate)

Table 2.7 shows the population by age group. The distribution by age group is similar among the counties, zone of interest and the state overall. The largest age group is the 45 to 54, with 14% of the total population for each geographic area. Approximately 12% of the total population for each area is between 25 and 34 years of age as well as the 35 to 44 age group. Haskell and McIntosh Counties have slightly older populations with 11% and 13% of their populations between 65-74, respectively, while the other counties have less than 10% of their populations in this age group.

Table 2.7 2013 Population Estimate by Age Group

	Age Group												
Area	**<5**	**5 to 9**	**10 to 14**	**15 to 19**	**20 to 24**	**25 to 34**	**35 to 44**	**45 to 54**	**55 to 59**	**60 to 64**	**65 to 74**	**75 to 84**	**85 and over**
Oklahoma	264,159	262,213	256,923	260,843	277,306	512,819	464,680	513,248	243,245	208,692	292,159	165,856	63,599
Arkansas	195,357	200,246	196,350	201,018	203,844	379,638	366,541	399,904	188,978	169,771	243,527	136,433	51,762
Adair County, OK	1,540	1,701	1,840	1,690	1,314	2,700	2,874	3,090	1,392	1,283	1,805	957	241
Cherokee County, OK	3,240	3,134	3,028	3,983	4,782	5,751	5,272	6,007	3,027	2,637	3,927	1,968	732
Haskell County, OK	840	970	839	851	734	1,440	1,477	1,654	703	959	1,358	694	330
Latimer County, OK	701	735	741	927	679	1,240	1,201	1,470	755	636	1,065	587	297
Le Flore County, OK	3,177	3,421	3,557	3,394	3,085	6,128	6,095	6,882	3,348	3,137	4,602	2,447	789
McIntosh County, OK	1,079	975	1,422	1,240	936	1,908	2,140	2,894	1,537	1,542	2,673	1,546	466
Muskogee County, OK	4,985	4,573	5,039	4,716	4,699	8,938	8,563	9,687	4,406	4,494	5,797	3,389	1,371
Pittsburgh County, OK	2,800	2,883	2,671	2,734	2,559	5,820	5,483	6,438	3,216	2,819	4,461	2,516	1,017
Sequoyah County, OK	2,548	2,844	3,212	2,900	2,332	4,777	5,457	6,011	2,829	2,409	3,883	1,958	674
Crawford County, AR	4,077	4,667	4,495	4,146	3,885	7,325	8,184	8,880	3,953	3,684	5,167	2,598	735
Sebastian County, AR	8,980	9,248	8,291	8,494	8,829	16,648	16,146	17,811	8,408	6,871	9,349	5,675	1,786
Zone of Interest Total	**33,967**	**35,151**	**35,135**	**35,075**	**33,834**	**62,675**	**62,892**	**70,824**	**33,574**	**30,471**	**44,087**	**24,335**	**8,438**

Source: U.S. Bureau of the Census, American Fact Finder (2013 Estimate)

Population by race and Hispanic Origin is displayed in Table 2.8. For the zone of interest, 68% of the population is White, 10% American Indian or Native Alaskan, 9% two or more races, 7% Hispanic, and 4% Black. The remainder of the races makes up less than 2% each. By comparison, for the Oklahoma, 68% of the population is White, 9% Hispanic, 7% each for Black, American Indian/Native Alaskan, and two or more races, 2% Asian, with the remaining less than 1% each and for Arkansas, 74% is White, 15% Black, 7% Hispanic, 2% Two or more races, and 1% or less for each of the other groups.

Table 2.8 2013 Population Estimate by Race/Hispanic Origin

Area	White	Black	American Indian and Alaska Native alone	Asian alone	Native Hawaiian and Other Pacific Islander alone	Some other race alone	Two or more races	Hispanic or Latino
Oklahoma	2,582,335	269,717	255,929	66,720	4,208	2,854	258,840	345,139
Arkansas	2,176,057	452,099	16,382	37,460	5,653	2,652	50,802	192,264
Adair County, OK	9,453	80	8,102	144	3	13	3,383	1,249
Cherokee County, OK	23,699	547	13,304	304	59	51	6,489	3,035
Haskell County, OK	9,358	101	1,747	43	4	0	1,142	454
Latimer County, OK	7,573	100	1,385	26	0	0	1,623	327
Le Flore County, OK	36,489	1,091	4,483	300	27	10	4,253	3,409
McIntosh County, OK	14,069	694	2,914	76	0	0	2,164	441
Muskogee County, OK	40,984	7,766	9,610	411	11	23	8,050	3,802
Pittsburgh County, OK	32,403	1,528	4,106	204	10	17	5,257	1,892
Sequoyah County, OK	27,200	787	4,965	257	0	6	7,133	1,486
Crawford County, AR	53,364	811	842	935	0	29	1,920	3,895
Sebastian County, AR	91,557	7,153	1,238	5,416	115	63	5,041	15,953
Zone of Interest Total	**346,149**	**20,658**	**52,696**	**8,116**	**229**	**212**	**46,455**	**35,943**

Source: U.S. Bureau of the Census, American Fact Finder (2013 Estimate)

2.9.2 Education and Employment

In the zone of interest, for 35% of the population 25 years old and older, the highest level of education attained is a high school diploma or equivalent. Twenty-three percent have some college, but no degree, 11% have a Bachelor's degree, 11% 9-12 years but with no diploma, 8% have an Associate degree, 5% have a graduate or professional degree, and 6% have less than nine years of education. For Oklahoma, 32% have a high school diploma or equivalent, 24% have some college, but no degree, 16% have a Bachelor's degree, 9% 9-12 years of school but no diploma, 8% have a graduate or professional degree, 7% have an Associate degree, and 5% less than nine years of schooling. For Arkansas, 35% are high school graduates, 22% have some college but no degree, 13% have a bachelor's degree, 10% have competed 9th to 12th grade but have no diploma, 7% have a graduate or professional degree, 6% have less than a 9th grade education, and 6% have an Associate's degree.

Employment by sector is presented in Table 2.10. In the zone of interest, approximately 24% of the workforce is employed in the Educational Services, Health Care and Social Assistance Sector, followed by 15% in Manufacturing, 12% in Retail Trade, 8% Arts, Entertainment, Recreation and Accommodation, 7% in Construction. Similarly, the largest employment sector for Oklahoma and Arkansas was also Educational Services, Health Care and Social Assistance, with 23% and 24%, respectively, of the total employment. While manufacturing has importance in both the zone of interest and state, it is evident that the economies are driven by service sector employment.

The unemployment rate is slightly higher in the zone of interest, at 6.0%, than the Oklahoma, 4.5%, but comparable to Arkansas, 6.1%. The difference is driven by a significantly higher unemployment rate in Latimer County (8.1%), Sequoya County (7.5 %) McIntosh County (7.3%), and Le Flore County (7.2%).

2.9.3 Households and Income

There are approximately 194,000 households in the zone of interest with an average household size of 2.63 persons. For Oklahoma, there are 1.4 million households and in Arkansas, 1.1 million, with an average size of households at 2.55 for Oklahoma and 2.53 for Arkansas, as shown in Table 2.9.

Table 2.9 2013 Households and Household Size

Area	Total Number of Households	Average household size
Oklahoma	1,444,081	2.55
Arkansas	1,129,723	2.53
Adair County, OK	8,046	2.76
Cherokee County, OK	16,875	2.68
Haskell County, OK	4,713	2.70
Latimer County, OK	4,160	2.53
Le Flore County, OK	18,412	2.63
McIntosh County, OK	8,092	2.48
Muskogee County, OK	26,802	2.51
Pittsburgh County, OK	18,456	2.32
Sequoyah County, OK	15,624	2.65
Crawford County, AR	23,368	2.62
Sebastian County, AR	49,294	2.53
Zone of Interest Total	**193,842**	**2.63**

Source: U.S. Bureau of the Census, American Fact Finder (2013 Estimate)

As shown in Table 2.10, the zone of interest is slightly poorer that the state overall. In the counties in zone of interest, the median household income is almost $36,000, compared to the state median household income of $45,000 in Oklahoma and $41,000 in Arkansas; the exceptions being Latimer, Pittsburgh, and Sebastian Counties, whose medial household incomes are $40,000 or greater. Similarly, the zone of interest has a lower per capita income

($20,204) compared to the Oklahoma ($24,208) and Arkansas ($22,170). Within the zone of interest, Sebastian County has the highest per capita income ($23,222) followed by Latimer County ($22,603) and Pittsburgh County ($21,966).

Table 2.10 Median and Per Capita Income, 2012

Geography	Median Household Income	Per Capita Income
Oklahoma	45,339	24,208
Arkansas	40,768	22,170
Adair County, OK	32,556	15,116
Cherokee County, OK	37,260	18,582
Haskell County, OK	35,334	18,896
Latimer County, OK	40,970	22,603
Le Flore County, OK	36,542	18,141
McIntosh County, OK	36,096	19,100
Muskogee County, OK	38,502	19,868
Pittsburgh County, OK	41,252	21,966
Sequoyah County, OK	35,742	18,131
Crawford County, AR	39,479	19,477
Sebastian County, AR	40,471	23,222
Zone of Interest Total		**20,203**

Source: U.S. Bureau of the Census, American Fact Finder (2013 Estimate)

The number of persons whose income was below the poverty level was considerably greater in the zone of interest (21%) as compared to Oklahoma (17%) and Arkansas (19%). Most of the counties in the zone of interest showed between 20% and 26% of all persons having incomes below the poverty level, with Haskell, Latimer and Pittsburgh Counties having less than 20% of their populations below the poverty level.

2.10 RECREATION FACILITIES, ACTIVITIES, AND NEEDS

2.10.1 Zones of Influence

The primary area of economic influence encompasses portions Sequoyah, Cherokee, Muskogee, McIntosh, Haskell, and Le Flore Counties with additional economic influence from within a 100 mile radius of the lake. This six-county region has been utilized as the basis in summarizing the population characteristics of Robert S. Kerr Reservoir.

2.10.2 Visitation Profile

The majority of visitors to Robert S. Kerr Reservoir come from within a 100 mile radius of the lake area. Robert S. Kerr Reservoir visitors are a diverse group ranging from campers who utilize the campgrounds around the lake, full time and part time residents of the private housing developments that border the lake, hunters who utilize the Wildlife Management Areas around the lake, day users who picnic in the city, state and federally operated parks, marina customers and many other user groups. The peak visitation months on Robert S. Kerr Reservoir are April through September. July is the highest visitation

month and accounts for 17 to 21 percent of the annual total. Approximately 83 percent of visits to recreation areas occur in USACE managed recreation areas. Dispersed recreation visits exceed those that occur in recreation areas.

2.10.3 Recreation Analysis

Recreational use at Robert S. Kerr Reservoir continues to evolve. While visitation in recreational areas remains strong, facilities installed in outgranted areas indicate that there is demand for recreational opportunities not offered in traditional USACE managed parks.

2.10.4 Recreation Carrying Capacity

The recreation carrying capacity of a lake is the amount of development, use, and activity any lake and associated recreational lands can sustain without being permanently adversely impacted. No recreation carrying capacity studies have been conducted at Robert S. Kerr Reservoir Project. Presently, lake staff manage recreation areas using historic visitation data combined with best professional judgment to address recreation areas considered to be overcrowded, overused, underused, or well balanced. Lake staff will continue to identify possible causes and effects of overcrowding and overuse and apply appropriate best management practices including: site management, regulating visitor behavior, and modifying visitor behavior.

2.11 REAL ESTATE

Robert S. Kerr Reservoir Lands were purchased under the Original 1962 Land Acquisition Policy. The policy states the purchasing of fee titles to all land acquired for dam site, construction area, permanent structure area, and reservoir area lying below a block-out purchase line encompassing at the acquisition guideline with minimum distance of 300 feet horizontally from the top of the conservation pool in steep areas and the acquisition line on gentle slopes in order to contain the flowage easement. The effect would protect against wave action, back erosion, induced surcharge, and backwater effects. The acquisition guide contour for fee acquisition is at elevation 463.0, being the estimated elevation to which the reservoir will reach once in every 5 years.

The project includes an area of 56,749 acres acquired in fee, 2,074 acres of flowage easement, and a usable land area of 21,484 acres when the lake is at normal navigation-power pool elevation. Also acquired were 6,735 acres by navigational servitude. Total project lands at Robert S. Kerr Reservoir equal 63,443 acres. The real property-taking line is a blocked perimeter that encompasses the guide-taking line, elevation 463.0 (includes freeboard allowance), or the envelope curve of the backwater effects occurring after 50 years of sedimentation, whichever is greater, with a minimum distance of 300 feet horizontally from the static full pool, except where flowage easements were purchased. Neither surface nor minerals were acquired below the normal high water line of the natural river channel. This was generally defined on the ground as the vegetative line on the riverbank. Permanent inundation precludes use by the surface owner; however, sand, gravel, and minerals could possibly be removed subject to operation of the project, including the navigation channel. This area consists of approximately 6,735 acres in Robert S. Kerr Lock and Dam and Reservoir. Fee simple title was acquired in the area required for lock and dam sites and work areas. In general, the lake area was acquired in fee with subordination of minerals.

Approximately 900 acres of coal and/or coal leases along San Bois Creek were not acquired. The coal in this area is from 500 feet to 1,200 feet deep, which necessitates shaft mining. The coal interest was subordinated to the prior rights of the Government to flood, etc. The mineral owner has the right to enter the property and drill from the surface and to construct vent shafts for the release of subsurface gases, subject to prior written approval for entry and location of shafts and necessary equipment.

Government Property is monitored by Eufaula Lake personnel to identify and correct instances of unauthorized use. When permanent encroachments are discovered, Tulsa District Real Estate Division will be notified after the project exhausts all efforts to resolve it in the field. In cases involving permanent structures, encroachments will be considered individually and the method of resolution will be determined on a case by case basis by Real Estate, with recommendations from Operations Division, Office of Counsel, and lake personnel. Disposal of Government owned land to resolve permanent encroachments may be considered.

Forest products generated through clearing, flood damage and salvage operations, or incidental to implementation of the approved Forest Management Plan, and not required for USACE use, will be sold. Disposal procedure for standing timber is a real estate function and all proposed sales will incorporate a disposal plan. Generally, the plan will indicate extent, volume, and justification for such sales, and will be accomplished through the Real Estate Division, Tulsa District.

2.12 PERTINENT PUBLIC LAWS

The following public laws are applicable to Robert S. Kerr Reservoir. Additional information on Federal Statutes applicable to Robert S. Kerr Reservoir can be found in the Environmental Assessment for the Robert S. Kerr Lock and Dam and Reservoir Master Plan in the Appendix B of this Plan.

- Public Law 59-209, Antiquities Act of 1906. - The first Federal law established to protect what are now known as "cultural resources" on public lands. It provides a permit procedure for investigating "antiquities" and consists of two parts: An act for the Preservation of American Antiquities, and Uniform Rules and Regulations.

- Public Law 74-292, Historic Sites Act of 1935. - Declares it to be a national policy to preserve for (in contrast to protecting from) the public, historic (including prehistoric) sites, buildings, and objects of national significance. This act provides both authorization and a directive for the Secretary of the Interior, through the National Park Service, to assume a position of national leadership in the area of protecting, recovering, and interpreting national archeological historic resources. It also establishes an "Advisory Board on National Parks; Historic Sites, Buildings, and Monuments, a committee of eleven experts appointed by the Secretary to recommend policies to the Department of the Interior".

- Public Law 75-761, Flood Control Act of 1938. - This act authorizes the construction, repair, and preservation of certain public works on rivers and harbors for navigation, flood control, and for other purposes.

- Title 16 U.S. Code §§ 668-668a-d, 54 Stat. 250, Bald Eagle Protection Act of 1940, as amended. This Act prohibits anyone, without a permit issued by the Secretary of the Interior, from taking bald eagles, including their parts, nests, or eggs. The Act provides criminal penalties for persons who take, possess, sell, purchase, barter, offer to sell, transport, export or import, at any time or any manner, any bald eagle [or any golden eagle], alive or dead, or any part, nest, or egg thereof. The Act defines "take" as pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb.

- Public Law 78-534, Flood Control Act of 1944. - Section 4 of the act as last amended in 1962 by Section 207 of Public Law 87-874 authorizes USACE to construct, maintain, and operate public parks and recreational facilities in reservoir areas and to grant leases and licenses for lands, including facilities, preferably to Federal, State or local governmental agencies. This act also authorized the creation of the Southwestern Power Administration, then within the Department of the Interior and currently within the Department of Energy, as the agency responsible for marketing and delivering the power generated at Federal reservoir projects.

- Public Law 79-525, River and Harbor Act of 1946. - This act authorizes the construction, repair, and preservation of certain public works on rivers and harbors for navigation, flood control, and for other purposes.

- Public Law 83-780, Flood Control Act of 1954. - This act authorizes the construction, maintenance, and operation of public park and recreational facilities in reservoir areas under the control of the Department of the Army and authorizes the Secretary of the Army to grant leases of lands in reservoir areas deemed to be in the public interest.

- Public Law 85-624, Fish and Wildlife Coordination Act 1958. - This act as amended in 1965 sets down the general policy that fish and wildlife conservation shall receive equal consideration with other project purposes and be coordinated with other features of water resource development programs. Opportunities for improving fish and wildlife resources and adverse effects on these resources shall be examined along with other purposes which might be served by water resources development.

- Public Law 86-523, Reservoir Salvage Act of 1960, as amended. This Act provides for (1) the preservation of historical and archeological data that might otherwise be lost or destroyed as the result of flooding or any alteration of the terrain caused as a result of any Federal reservoir construction projects; (2) coordination with the Secretary of the Interior whenever activities may cause loss of scientific, prehistoric, or archeological data; and (3) expenditure of funds for recovery, protection, and data preservation. This Act was amended by Public Law 93-291.

- Public Law 86-717, Forest Conservation. - This act provides for the protection of forest cover for reservoir areas under this jurisdiction of the Secretary of the Army and the Chief of Engineers.

- Public Law 87-88, Federal Water Pollution Control Act Amendments of 1961, as amended. Section 2(b)(1) of this Act gives USACE responsibility for water quality management of USACE reservoirs. This law was amended by the Federal Water Pollution Control Act Amendment of 1972, Public Law 92-500.

- Public Law 87-874, Rivers and Harbors Act of 1962. - This act authorizes the construction, repair, and preservation of certain public works on rivers and harbors for navigation, flood control, and for other purposes.

- Public Law 88-578, Land and Water Conservation Fund Act of 1965. - This act established a fund from which Congress can make –appropriations for outdoor recreation. Section 2(2) makes entrance and user fees at reservoirs possible by deleting the words "without charge" from Section 4 of the 1944 Flood Control Act as amended.

- Public Law 89-72, Federal Water Project Recreation Act of 1965. - This act requires that not less than one-half the separable costs of· developing recreational facilities and all operation and maintenance costs at Federal reservoir projects shall be borne by a non-Federal public body. An OCE/OMB implementation policy made these provisions applicable to projects completed prior to 1965.

- Public Law 89-90, Water Resources Planning Act (1965). - This act established the Water Resources Council and gives it the responsibility to encourage the development, conservation, and use of the Nation's water and related land resources on a coordinated and comprehensive basis.

- Public Law 89-272, Solid Waste Disposal Act, as amended by PL 94-580, dated October 21, 1976. - This act authorized a research and development program with respect to solid-waste disposal. It proposes (1) to initiate and accelerate a national research and development program for new and improved methods of proper and economic solid-waste disposal, including studies directed toward the conservation of national resources by reducing the amount of waste and unsalvageable materials and by recovery and utilization of potential resources in solid waste; and (2) to provide technical and financial assistance to State and local governments and interstate agencies in the planning, development, and conduct of solid-waste disposal programs (3) Enacted the Resource Conservation and Recovery Act (RCRA) which addresses solid (Subtitle D) and hazardous (Subtitle C) waste management activities.

- Public Law 89-665, Historic Preservation Act of 1966. - This act provides for: (1) an expanded National Register of significant sites and objects; (2) matching grants to states undertaking historic and archeological resource inventories; and (3) a program of grants-in aid to the National Trust for Historic Preservation; and (4) the establishment of an Advisory Council on Historic Preservation. Section 106 requires that the President's Advisory Council on Historic Preservation have an opportunity to comment on any undertaking which adversely affects properties listed, nominated, or considered important enough to be included on the National Register of Historic Places.

- Public Law 90-483, River and Harbor and Flood Control Act of 1968, Mitigation of Shore Damages. - Section 210 restricted collection of entrance fee at USACE lakes and reservoirs to users of highly developed facilities requiring continuous presence of personnel.

- Public Law 91-190, National Environmental Policy Act of 1969 (NEPA). - NEPA declared it a national policy to encourage productive and enjoyable harmony between man and his environment, and for other purposes. Specifically, it declared a "continuing policy of the Federal Government... to use all practicable means and measures...to foster and promote the general welfare, to create conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans." Section 102 authorized and directed that, to the fullest extent possible, the policies, regulations and public law of the United States shall be interpreted and administered in accordance with the policies of the Act.

- Public Law 91-611, River and Harbor and Flood Control Act of 1970. - Section 234 provides that persons designated by the Chief of Engineers shall have authority to issue a citation for violations of regulations and rules of the Secretary of the Army, published in the Code of Federal Regulations.

- Public Law 92-347, Golden Eagle Passbook and Special Recreation User Fees. - This act revises Public Law 88-578, the Public Land and Water Conservation Act of 1965, to require Federal agencies to collect special recreation user fees for the use of specialized sites developed at Federal expense and to prohibit the Corps of Engineers from collecting entrance fees to projects.

- Public Law 92-500, Federal Water Pollution Control Act Amendments of 1972. - The Federal Water Pollution Control Act of 1948 (PL 845, 80th Congress), as amended in 1956, 1961, 1965 and 1970 (PL 91- 224), established the basic tenet of uniform State standards for water quality. Public Law 92-500 strongly affirms the Federal interest in this area. "The objective of this act is to restore and maintain the chemical, physical and biological integrity of the Nation's waters."

- Public Law 92-516, Federal Environmental Pesticide Control Act of 1972. - This act completely revises the Federal Insecticide, Fungicide and Rodenticide Act. It provides for complete regulation of pesticides to include regulation, restrictions on use, actions within a single State, and strengthened enforcement.

- Public Law 93-81, Collection of Fees for Use of Certain Outdoor Recreation Facilities. - This act amends Section 4 of the Land and Water Conservation Act of 1965, as amended to require each Federal agency to collect special recreation use fees for the use of sites, facilities, equipment, or services furnished at Federal expense.

- Public Law 93-205, Conservation, Protection, and Propagation of Endangered Species Act of 1973, as amended. This law repeals the Endangered Species Conservation Act of 1969. It also directs all Federal departments/agencies to carry out programs to conserve endangered and threatened species of fish, wildlife, and plants and to preserve the habitat of these species in consultation with the Secretary of the Interior. This Act establishes a procedure for coordination, assessment, and consultation. This Act was amended by Public Law 96-159.

- Public Law 93-251, Water Resources Development Act of 1974. - Section 107 of this law establishes a broad Federal policy which makes it possible to participate with local governmental entities in the costs of sewage treatment plan installations.

- Public Law 93-291, Archeological Conservation Act of 1974. - The Secretary of the Interior shall coordinate all Federal survey and recovery activities authorized under this expansion of the 1960 act. The Federal Construction agency may transfer up to one percent of project funds to the Secretary with such transferred funds considered nonreimbursable project costs.

- Public Law 93-303, Recreation Use Fees. - This act amends Section 4 of the Land and Water Conservation Act of 1965, as amended, to establish less restricted criteria under which Federal agencies may charge fees for the use of campgrounds developed and operated at Federal areas under their control.

- Public Law 93-523, Safe Drinking Water Act. - The act assures that water supply systems serving the public meet minimum national standards for protection of public health. The act (1) authorizes the Environmental Protection Agency to establish Federal standards for protection from all harmful contaminants, which standards would be applicable to all public water systems, and (2) establishes a joint Federal-State system for assuring compliance with these standards and for protecting underground sources of drinking water.

- Public Law 94-422, Amendment of the Land and Water Conservation Fund Act of 1965. - Expands the role of the Advisory Council. Title 2 - Section 102a amends Section 106 of the Historical Preservation Act of 1966 to say that the Council can comment on activities which will have an adverse effect on sites either included in or eligible for inclusion in the National Register of Historic Places.

- Public Law 95-217, Clean Water Act of 1977, as amended. This Act amends the Federal Water Pollution Control Act of 1970 and extends the appropriations authorization. The Clean Water Act is a comprehensive Federal water pollution control program that has as its primary goal the reduction and control of the discharge of pollutants into the nation's navigable waters. The Clean Water Act of 1977 has been amended by the Water Quality Act of 1987, Public Law 100-4.

- Public Law 95-341, American Indian Religious Freedom Act of 1978. The Act protects the rights of Native Americans to exercise their traditional religions by ensuring access to sites, use and possession of sacred objections, and the freedom to worship through ceremonials and traditional rites.

- Public Law 95-632, Endangered Species Act Amendments of 1978. This law amends the Endangered Species Act Amendments of 1973. Section 7 directs agencies to conduct a biological assessment to identify threatened or endangered species that may be present in the area of any proposed project. This assessment is conducted as part of a Federal agency's compliance with the requirements of Section 102 of NEPA.

- Public Law 96-95, Archeological Resources Protection Act of 1979. This Act protects archeological resources and sites that are on public and tribal lands, and fosters increased cooperation and exchange of information between governmental authorities, the professional archeological community, and private individuals. It also establishes requirements for issuance of permits by the Federal land managers to excavate or remove any archeological resource located on public or Indian lands.

- Public Law 96-510, Comprehensive Environmental Response, Compensation, and Liability Act of 1980, amended by the Superfund Amendments and Re-authorization Act on October 17, 1986. This Act's purpose is to identify sites where hazardous materials threaten the environment and or public health as a result of leakage, spillage, or general mismanagement, and then to identify the responsible party.

- Public Law 98-63, Supplemental Appropriations Act of 1983. This Act authorized the Corps of Engineers Volunteer Program. The United States Army Chief of Engineers may accept the services of volunteers and provide for their incidental expenses to carry out any activity of the Army Corps of Engineers, except policymaking or law or regulatory enforcement.

- Public Law 99-662, The Water resources Development Act 1986. - Provides for the conservation and development of water and related resources and the improvement and rehabilitation of the Nation's water resources infrastructure.

- Public Law 110-114, Water Resources Development Act of 2007, Section 3134. - This act requires lakes within the State of Oklahoma under Corps of Engineers jurisdiction and research methods for demonstration projects to benefit and enhance recreation. However, no funding has been appropriated and section 3134 expires in 2017.

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CHAPTER 3 - RESOURCE OBJECTIVES

3.1 RESOURCE OBJECTIVES

Resource considerations at Robert S. Kerr Reservoir exist primarily due to user demands on the project. Multiple user types have interests in the project lands, recreation facilities, and waters, and such demands regularly create conflicts. USACE is also obligated to manage these resources for the overall interest of the public and not just for a select group of individuals. It is the responsibility of the project and the agency to attempt to provide an environmentally sound balance of these demands. Impacts on the environment will be assessed during the decision making process prior to any change to management plans or strategies. The following goals are the priorities for consideration when determining management objectives and development activities.

- To increase the value of all project lands and waters for recreation, fisheries, and wildlife.
- Manage the existing natural resources and recreation facilities in compliance with all pertinent laws, regulations and policies.
- Develop and manage the area for maximum enjoyment of the recreating public.
- Protect and preserve the existing native wildlife species and improve wildlife habitat for now and in the future.
- To protect and preserve the existing Government property from erosion and overuse through natural resource management.
- To inform the public, through programs and personal contacts, about the project and resource management purposes and objectives.
- Integrate fish and wildlife management practices with other natural resource management practices while working closely with state and local natural resource agencies.
- Identify safety hazards or unsafe conditions; correct infractions and implement safety standards in accordance with EM 385-1-1.
- Encourage non-consumptive use of project lands.

Implementation of these goals is based upon time, manpower, and budget. The objectives provided in this chapter are established to provide high levels of stewardship to USACE managed lands and resources while still providing a high level of public service. These objectives will be pursued through the use of a variety of mechanisms such as: assistance from volunteer efforts, hired labor, contract labor, permit conditions, remediation, and special lease conditions. It is the intention of Robert S. Kerr Reservoir staff to provide a realistic approach to the management of all resources.

The Natural resource elements within the identified objectives come in several different categories of work at Robert S. Kerr Reservoir. They can be broken into fisheries,

game, and non-game. Management objectives for these categories are dependent on the individual resource, location, and lead agency.

3.1.1 Navigation Management. The Robert S. Kerr Reservoir navigation management program is one of the primary work burdens for the staff. The objectives for this program are maintenance of navigation structures and the navigation channel and the management of navigational traffic without increased environmental degradation while providing recreational opportunities. USACE manages some of the navigational program through a partnership with the US Coast Guard. The USCG is the lead agency for maintaining navigational markers and therefore maintains the channel markers as well as other various buoys within the lake.

3.1.2 Wildlife and Fisheries Management. Wildlife and fisheries are managed cooperatively between ODWC, USFWS and USACE. USACE currently licenses 2,027 acres of land to ODWC and 10,300 acres of land to the USFWS. This ODWC licensed land comprises the Robert S. Kerr Reservoir Wildlife Management Area. ODWC's primary objective in these areas is to manage game species with the understanding those actions benefit both game and non-game species. These areas will continue being managed by this agency under their license. The land licensed to the USFWS was for the creation of Sequoyah National Wildlife Refuge. The primary purpose of this refuge is to manage the natural resources for the enhancement of migrating waterfowl.

ODWC is also the primary agency responsible for performing fisheries management. ODWC objectives for fisheries are to continue to monitor current populations, ensure the populations are healthy and stable, and reduce the number of spotted bass in the reservoir. ODWC does annual sampling and data analysis to assure fisheries populations stay within an acceptable range. They also make adjustments in creel and size limits as necessary to keep existing populations healthy. ODWC can also supplement fish populations with their hatchery program.

USACE is not directly involved with management within the ODWC or USFWS areas of responsibility. However, USACE has determined that both agencies objectives compliment our goals for fish and wildlife management and should remain as the primary objectives for these locations. Another USACE objective for these licensed areas of responsibility will be to continue providing support when resources are available. USACE often provides support with assistance in the placement of fish structures, archeological reviews for proposals involving soil disturbance, and assistance with Geographic Information Systems (GIS) mapping.

In addition to these licensed areas, USACE has several additional management units established for the purpose of wildlife management. The objectives for these lands are to preserve the existing native wildlife species and improve their habitat. The management plans written within this objective will be centered on both game and non-game species and can be found in the OMP.

3.1.3 Recreation. Recreation falls within two categories and can be identified as either land or water based recreation. Management objectives for each type vary depending on the location and the intensity of use. General objectives are provided in this master plan as to the work necessary to meet the public's needs for land and/or water based recreation.

Land-based recreation includes opportunities, activities, areas and facilities that typically occur on, or adjacent to, USACE land and water, such as camping, hiking, hunting, picnicking, wildlife/bird viewing, sightseeing, etc. Land-based recreation areas include campgrounds, day-use areas, overlooks, bathrooms, roads, boat ramps, courtesy docks, and wildlife management areas. Facility types typically found within these recreation areas include campsites, picnic sites, hunting areas, and trails. These recreation areas are managed by several entities: USACE, State of Oklahoma, USFWS, county and city governments, and private/commercial concessionaires. Land-based recreation objective will be to continue providing service and rehabilitate existing parks to a "Justified Level of Service".

Water-based outdoor recreation includes opportunities, activities, areas and facilities that occur on water managed by USACE. These activities include; fishing, boating, swimming, scuba diving, operating seaplanes, kayaking, etc. Unlike land-based recreation the majority of water-based recreation is managed by USACE with some assistance from the Oklahoma Highway Patrol, Marine Enforcement Division. The objective of this program is to ensure public safety while providing recreational opportunities on the water. This program will involve looking at recreation carrying capacity vs. current use patterns, zoning requirements for no-wake or restricted areas, and areas to remain open for public recreation. USACE will keep in close coordination with the Oklahoma Lake Patrol in determining use patterns within the water portions of the project and promote water safety.

3.1.4 Oklahoma State Comprehensive Recreation Plan. The 2012 Oklahoma State Comprehensive Recreation Plan (SCORP) includes 14 recommendations addressing outdoor recreation concerns and issues. The SCORP indicates 1) there is an increased awareness regarding water quality and water quantity issues throughout the state, 2) the public is primarily concerned with maintaining access to public lands while providing a wide variety of recreation opportunities, 3) Oklahomans under-value public recreation, and 4) Oklahoma lacks trails or a plan for trails to link communities or populations to outdoor recreation resources.

One of the unique challenges identified in the SCORP is the change in demographics that all outdoor recreation providers will see an increase in resource user groups that have historically represented ethnic and racial minorities. These groups have differences in preferences for space, facilities, and amenities. The SCORP also demonstrated that low-income and rural constituents often face unique challenges in accessing outdoor recreation resources and that Oklahomans do not fully comprehend the costs associated with recreation services and facilities provided by the public sector. Further depletion of the available outdoor recreation resource base would increase the negative impacts on these population groups. Maintaining what is currently held in the public sector and purposefully managing some of these spaces for undeveloped outdoor recreation use would address the needs of these minority user groups.

3.1.5 Project-Wide Resource Objectives. The purpose of the USACE Master Plan is to establish the guidelines for sustainable stewardship of natural and recreational resources managed directly and indirectly on USACE fee lands. The project-wide resource management objectives involve the long-term development and management goals of project resources to guide proposed future actions for the public benefit, consistent with resource capabilities within the framework of the USACE Environmental Operation Principles.

Resource objectives are attainable goals for development, conservation, and management of natural, cultural, and manmade resources at a project. They are guidelines for obtaining maximum public benefits while minimizing adverse impacts to the environment and are developed in accordance with: 1) authorized project purposes, 2) applicable laws and regulations, 3) resource capabilities and suitability, 4) regional needs, 5) other governmental plans and programs, and 6) expressed public desires.

The project-wide resource objectives for Robert S. Kerr Reservoir, not in priority order, are listed below:

- To give priority to the preservation and improvement of wild land values in public use planning, design, development, and management activities.
- To preserve and protect important paleontological, archeological, ecological, and esthetic resources.
- To manage habitat for threatened and endangered species and to support a diversity of fish and wildlife, and recreation use.
- To prevent the introduction of invasive species and aquatic nuisance species (ANS), detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner, monitor invasive species and ANS populations accurately and reliably, and provide for restoration of native species and habitat conditions in ecosystems that have been invaded.
- To manage and develop project lands to accommodate periodic fluctuations in lake elevations with minimal impacts.
- To develop and manage project resources to support types and levels of recreation activities indicated by visitor demand and consistent with carrying capacities and aesthetic, cultural, and ecological values.
- To manage identified recreational lands in ways that enhance benefits to wildlife.
- To provide access by Tribal members to any cultural resources, sacred sites, or other Traditional Cultural Properties.
- To preserve and protect cultural resources sites in compliance with existing federal statutes and regulations.
- To expand public outreach and education about the history of the area, project resources, and the USACE's role in developing and managing these resources.
- To foster stewardship by minimizing encroachments and other non-allowed uses.

- To develop and manage lands in cooperation and coordination with other management agencies and appropriate entities in the private sector.
- To maintain and manage project lands and waters to support regional management programs.
- Manage project lands and recreational programs to advance broad national climate change mitigation goals, including but not limited to climate change resilience and carbon sequestration, as set forth in Executive Order 13653, Executive Order 13693 and related Corps policy.

Execution of resource objectives at a large multi-purpose project such as Robert S. Kerr Reservoir is difficult. It is a delicate balance between items that often compete for funds, time, and other resources. Priority will be given to those items required by law with an attempt to provide continued public use of Government land. Public access will still be a priority to service all ethnic and economic groups. Access will be in the form of offering hunting, fishing, camping, bird watching, boating, and other various lake related recreational opportunity locations.

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CHAPTER 4 - LAND ALLOCATION, LAND CLASSIFICATION, WATER SURFACE, AND PROJECT EASEMENT LANDS

4.1 LAND ALLOCATION

Land allocation categories identify the congressionally authorized purpose for which project lands were acquired, whether by fee simple purchase or through other means as described below. The four categories of land allocation potentially applicable to project lands include:

- Operations
- Recreation
- Fish and Wildlife
- Mitigation

Approximately 56,749 acres were acquired in fee for the creation of Robert S. Kerr Reservoir (easement lands acquired are covered in section 4.3). An additional 6,735 acres, over which the Federal government had long-standing rights of navigational servitude, were added to project lands. Of the acres acquired, 21,484 acres were above the normal elevation of the navigation-power pool of 460 msl. All project lands are needed to carry out project purposes and are allocated as described in the following paragraphs.

4.1.1 Operations. These lands, totaling 6,427 acres, were acquired specifically to meet the requirements of the congressionally authorized purpose of constructing and operating the project for flood control, hydroelectric power generation, and navigation.

4.1.2 Recreation. A total of approximately 2,941 acres were acquired specifically for the congressionally authorized purpose of recreation development.

4.1.3 Fish and Wildlife. A total of approximately 22,827 acres of land and water were purchased specifically for the congressionally authorized purpose of managing or protecting fish and wildlife. Of this total, 2,027 acres of land and water areas are licensed to the ODWC for wildlife management purposes. The remaining 20,800 acres of land and water areas are managed by the USFWS for the Sequoyah National Wildlife Refuge.

4.1.4 Mitigation. This category includes lands purchased for the specific intention of offsetting losses associated with the creation of the project. There were no lands congressionally authorized for the purpose of mitigation.

4.2 LAND CLASSIFICATION

Land Classification indicates the primary use for which project lands are managed. There are six categories of classification identified as: Project Operations, High Density Recreation, Mitigation, Environmentally Sensitive Areas, Multiple Resource Management Lands, and Water Surface. Maps showing the various land classification can be found in the maps section.

4.2.1 Project Operations. This category includes the lands managed for the lock, dam, spillway, hydropower plant, project office, ports and maintenance yards. It likewise includes areas identified for current or future dredge disposal facilities. There are 1,251 acres of Project Operations lands specifically managed for these features.

4.2.2 High Density Recreation. These are lands developed for intensive recreational activities for the visiting public including day use areas, campgrounds, and concession areas. There are 1,581 acres of land classified for high density recreation.

4.2.3 Mitigation. This classification is only used for the lands allocated for mitigation for the purpose of offsetting losses associated with the development of the project. There are no lands classified as mitigation since this land allocation was not included in congressional authorization language for Robert S. Kerr Reservoir.

4.2.4 Environmentally Sensitive Areas. These are areas where scientific, ecological, cultural, and aesthetic features have been identified. This designation limits and can prohibit any further development within the area. There are 18 acres classified for environmentally sensitive areas to manage and protect interior least tern nesting habitat in accordance with a Biological Opinion issued by the USFWS. The Kerr-McGee Corporation site located along the Illinois River near the confluence of the Arkansas River once used 21 acres of fee property as industrial use for the production of uranium. This area is now classified as environmentally sensitive due to nuclear material site contamination. Contamination site is monitored by Sequoyah Fuels Corporation under the regulatory authority of the U.S. Nuclear Regulatory Commission. In total there are 39 acres classified as environmentally sensitive areas.

4.2.5 Multiple Resource Management Lands. This classification is divided into four sub-classification identified as: Low Density Recreation, Wildlife Management, Vegetative Management, and Future/Inactive Recreation Areas. A given tract of land may be classified using one or more of these sub-classification. There are 20,667 acres of lands that are under this classification. The following identifies the amount contained in each sub-classification of this classification.

- Low Density Recreation. These are lands with minimal development or infrastructure that support passive public recreational use (e.g., fishing, hunting, wildlife viewing, shoreline use, hiking, etc.). They were lands purchased for recreation and classified for low density recreation. The intention of these

classified lands is to assure available lands for low density recreation between areas classified as recreation intensive use and wildlife management. There are 6,112 acres under this classification at Robert S. Kerr Reservoir.

- Wildlife Management. These are lands designated for the stewardship of fish and wildlife resources. There are 14,555 acres of land under this classification at Robert S. Kerr Reservoir between USACE, ODWC, and USFWS.

- Vegetative Management. These are lands designated for stewardship of forest, prairie, and other native vegetative cover. There are no acreages under this classification at Robert S. Reservoir.

- Future or Inactive Recreation. These are lands with site characteristics compatible with potential future recreation development or recreation areas that are closed or open but no longer maintained. These areas will be managed as multiple resource land until an opportunity to develop or reopen these areas. There are no acres under this classification at Robert S. Kerr Reservoir.

4.2.6 Water Surface. The project does have a surface water management program for project operations, navigation, and public safety. The navigation channel buoys are managed by US Coast Guard. Buoys not navigation related are managed by USACE with close coordination with the Oklahoma Department of Public Safety.

- Restricted. These are water areas restricted for project operations, safety, and security purposes. The area around the dam and hydropower intakes has been identified for no boat entry which covers an area of approximately twenty acres. There are two buoyed swim beaches at the Damsite and Cowlington Point totaling four acres managed by USACE which do not allow boat access. A 100-acre cove where USACE marine fleet and U.S. Coast Guard (USCG) are located is also restricted. In total there are 124 acres of restricted surface water.

- Designated No-Wake. Applegate Cove Marina has approximately twenty-one acres of no-wake areas surrounding the boat slips and boat launch. There are nineteen boat ramps at Robert S. Kerr Reservoir and a number of them have no-wake buoys for the safety of launching and loading boats. In total that are 40 acres of surface water designated as no-wake.

- Fish and Wildlife Sanctuary. These areas are managed with annual or seasonal restrictions to protect fish and wildlife species during periods of migration, resting, feeding, nesting, and/or spawning. Robert S. Kerr Reservoir does not have surface water designated for this purpose.

- Open Recreation. The remainder of the lake is open to recreational use. There is no specific zoning for these areas, but there is a buoy system in place to help aid in public safety. These buoys mark hazards, no wake areas, boat restriction, and navigational direction.

Table 4.1 provides a summary of land classifications at Robert S. Kerr Reservoir. A map representing these areas can be found in Appendix A.

Table 4.1 Land Classification

Classification	Acres
Project Operations	1,251
High Density Recreation	1,581
Environmental Sensitive Areas	39
Multiple Resource Managed Lands: Low Density Recreation	6,112
Multiple Resource Managed Lands: Wildlife Management	14,555
Multiple Resource Managed Lands: Vegetative Management	0
Multiple Resource Managed Lands: Future/Inactive Recreation Areas	0
Water Surface: Restricted	124
Water Surface: Designated No-Wake	40
Water Surface: Fish and Wildlife Sanctuary	0
Water Surface: Open Recreation	41,836
Total Acres	**65,538**

Note: Due to siltation project lands acreage has increased and water surface acreage has decreased over the life of the Reservoir. Acreages have been calculated by GIS and historical data.

4.3 PROJECT EASEMENT LANDS

These are lands on which easement interests were acquired. Fee title was not acquired on these lands but the easement interests convey to the Federal government certain rights to use and or restrict the use of the land for specific purposes. Easement lands are typically classified as Operations Easement, Flowage Easement, and/or Conservation Easement. There are 2,074 acres of easement lands at Robert S. Kerr Reservoir.

4.3.1 Operations Easement. These are easements the Corps of Engineers purchased for the purpose of project operations. There are no acres of operations easement at Robert S. Kerr Reservoir.

4.3.2 Flowage Easement. These are easements purchased by the Corps of Engineers giving the right to temporarily flood private land during flood risk management operations. There are 2,074 acres of flowage easement lands located at Robert S. Kerr Reservoir.

4.3.3 Conservation Easement. These are easements purchased by the Corps of Engineers for the purpose of protecting wildlife, fisheries, recreation, vegetation, archeological, threatened and endangered species, or other environmental benefits. There are no conservation easements at Robert S. Kerr Reservoir.

CHAPTER 5 - RESOURCE PLAN

5.1 MANAGEMENT BY CLASSIFICATION

This chapter describes the management plans for each area of classification within the Master Plan. The classifications which exist at Robert S. Kerr Reservoir are; Project Operations, High Density Recreation, Low Density Recreation, Wildlife Management, and Environmentally Sensitive. The management plans identified are in broad terms of how these project lands will be managed. A more descriptive plan for managing these lands can be found in the Robert S. Kerr Reservoir OMP.

5.1.1 Project Operations. This land is classified for security reasons pertaining to project operations. This is land associated with the dam, hydropower, and navigation related facilities. There are 1,281 acres of lands under this classification which are managed by the USACE. The management plan for this area is to continue providing physical security necessary to ensure continued operations of the dam, hydropower plant, lock, ports, dredge disposal pits and other navigational related facilities. This means that public access must be restricted in hazardous locations, near the dam and spillway, lock, marine fleet dock, and within the hydropower plant. The goal for these classified lands is to continue operating as done historically in order to ensure project operations.

5.1.2 High Density Recreation. There are numerous areas around Robert S. Kerr Reservoir that are designated as high density recreation in previous master plans. Description of high density recreation is provided in two separate areas. First are areas classified for high density recreation but leased to another agency/entity for management and operation. Second are high density recreation areas which USACE still manages and operates.

There are several areas currently classified as high density recreation which are leased to other organizations for operation and management. These areas include the lands and waters leased to two state parks and recreation facilities. USACE does not provide any maintenance within any of these locations but there are times when support is provided to the managing agency. USACE has to provide review of requests and make sure they are in accordance with applicable laws and regulations for the proposed activity within an area zoned high density recreation. The areas currently leased to other agencies and individuals can be found in Table 5.1. The goal for these areas is to work with USACE partners to assure recreation areas are being managed in accordance with resource objectives identified in Chapter 3.

Table 5.1 Recreation Area Managing Agency

Park	Number of Acres	Land Allocated to Recreation	Managing Agency
Applegate Cove Marina	269	Yes	Applegate Cove Marina
Sallisaw Creek	1,050	Yes	Transferred to BIA
Vian Creek	88	Yes	USFWS
Gore Landing North	70	Yes	City of Gore
Summer's Ferry	4	Yes	City of Gore
Webbers Falls City Park	18	Yes	Town of Webber Falls

A map showing managing agencies and their locations can be found in the maps section (RSKERR15MP-OM-01).

USACE still operates and manages numerous areas designated as high density recreation. These areas vary from locations that were classified recreation areas that were developed but have since been turned into access points and locations where developed recreational areas are still managed and maintained for high density use. Table 5.2 shows the areas currently managed by USACE. Maps showing existing parks and facilities managed by USACE can be found in Appendix A.

Table 5.2 Management Goal of USACE High Density Recreation Lands

Park	Number of Acres	Land Allocated to Recreation	Management Goal
Fisherman's Landing	67	Yes	Maintained Facility
Applegate Cove	310	Yes	Maintained Facility
Little Sans Bois Creek	164	Yes	Access Point
Keota Landing	116	Yes	Access Point
Cowlington Point	405	Yes	Maintained Facility
Short Mountain Cove	362	Yes	Maintained Facility
Overlook	1	Yes	Closed
Visitor Center	NA	Yes	Access Point
Tamaha Landing	11	No	Access Point

The areas identified as Access Point under the management goal are locations that were constructed in the early years of the lake's development. These locations were projected to have need for recreational facilities based on projected use. Time revealed that recreational use did not develop for these locations and/or funding to provide services was insufficient. Therefore, over a several year period USACE opted to change some maintained facilities into Access Points. This allowed these areas to stay open for public use but services such as park cleaning, refuse collection, and mowing were no longer provided. Also, any maintenance needs such as improvements or betterments were ceased. The only maintenance performed is the minimal amount necessary to allow safe use of the facilities. Management goal for these areas is to keep them open for public use while meeting the resource objectives identified in Chapter 3.

The areas shown as maintained facilities under the management goals are parks that were constructed and managed for high density use. These areas still provide services such as water, electric, mowing, refuse collection, cleaning, and maintenance/improvements. The plan is to provide a justified level of service by updating camp sites to accommodate larger camping units with 50-amp electrical service, restrooms to a sufficient standard to service the public, and water available for camper hook-up while at a campsite. With minor exceptions, all operations and maintenance activities are performed by USACE employees, contractors, volunteers, and other various methods. The ultimate goal of this program is to ensure the safety of visitors and to provide a wide range of opportunities for outdoor recreational enjoyment while concurrently meeting the resource objectives in Chapter 3. Users and their activities vary greatly at Robert S. Kerr Reservoir and satisfying these demands will be a constant challenge. Routine visitor use surveys will be conducted to identify user desires and preferences. To the extent practicable, future management strategies will shift to accommodate the demands indicated in these visitor use surveys.

5.1.3 Environmentally Sensitive Areas. These are areas where scientific, ecological, cultural, and aesthetic features have been identified. Designation of these lands is not limited to just lands that are otherwise protected by laws such as the Endangered Species Act, the National Historic Preservation Act (NHPA), or applicable State statues. These areas must be considered by management to ensure they are not adversely impacted. Typically, limited or no development of public use is allowed on these lands. No agricultural or grazing uses are permitted on these lands unless necessary for a specific resource management benefit, such as prairie restoration. There are three areas at Robert S. Kerr Reservoir that fit this description. The first was established in the spring of 2006, a least tern nesting island was created at river mile 348.5 on Robert S. Kerr Reservoir using beneficial in-water disposal of dredge materials. This island, approximately 15 acres in size, has been maintained by occasional capping with additional sand and rock, vegetation control, and rock protection at its upstream end. Signs prohibiting human disturbance are posted on the island every nesting season (late May through early September) and ILT nesting success is monitored by Tulsa District biologists. The island has been highly successful in term of ILT reproduction and continues to assist with recovery of the species. Similar habitat was improved in 2009 at river mile 354 in Robert S. Kerr Reservoir's pool by capping an existing island with sand and clearing of vegetation. Though less successful than the other nesting site in reservoir pool, this approximate 3 acre site does provide suitable habitat for nesting terns and is continually maintained and monitored for ILT nesting success by the Tulsa District. The third Environmentally Sensitive Area is the Kerr-McGee Corporation site located along the Illinois River near the confluence of the Arkansas River which once used 21 acres of fee property as Industrial Use for the production of uranium. This area is now classified as environmentally sensitive due to nuclear material site contamination. Contamination site is monitored by Sequoyah Fuels Corporation under the regulatory authority of the U.S. Nuclear Regulatory Commission. In total there are 39 acres classified as environmentally sensitive areas.

There is an abundance of cultural resources located around and within Robert S. Kerr Reservoir located in various land classifications. Special consideration should be given to any activity that may have a negative impact on cultural resources. Therefore, a thorough

review of all actions that have soil disturbance must be conducted and reviewed by the District Archeologist. Any action found to have negative impact must be coordinated with the appropriate state or tribal entity before authorization of work is granted.

5.1.4 Multiple Resource Management Lands. These are areas where predominant use is low density recreation, wildlife management, vegetative management, or future/inactive recreation areas. However, there are other compatible uses which may occur on these lands without impacting the predominant use. These lands can be divided into four sub-categories for the purposes of this master plan. These categories are; Low Density Recreation, Wildlife Management, Vegetative Management, and Future/Inactive Recreation Areas. The following is a description of each sub-categories resource objectives, acreages, and description of use.

- Low Density Recreation. These are lands with minimal development or infrastructure that support passive public use. There are 6,112 acres zoned Low Density Recreation.

  Low Density Recreation lands are areas where USACE has determined that limited recreation that generates light impacts can occur. These activities typically involve hiking, hunting, fishing and bird watching on fee owned land. The objectives for this land classification are continued recreation of a low impact and assure no degradation of the natural resources occurs within the zoning.

- Wildlife Management. These are lands designated for the management of wildlife resources. Wildlife management is conducted by USACE and the State of Oklahoma. These areas are primarily located in the northwestern portion of Robert S. Kerr Reservoir. ODWC's primary strategy in these areas is to manage game species with the understanding those actions benefit both game and non-game species. The USFWS primary strategy is to manage for migratory waterfowl and various other game and non-game species. The resource plan for both of these agencies coincides with the objectives USACE desires to see on land classified as wildlife management. Therefore the plan for these areas is to continue allowing ODWC and USFWS to implement their management plan.

  A special note about USACE involvement within ODWC and USFWS licensed land is USACE is not directly involved with the work effort within these areas. However, USACE often provides support to both agencies when time and resources are available. Support often comes in assistance with creation of habitat, archeological reviews, identifying boundary line, and assistance with GIS mapping. USACE will continue to let ODWC and USFWS be the lead agency when it comes to management of wildlife at these locations.

  In addition to the ODWC and USFWS licensed areas, USACE has property that is directly managed within several units for the purpose of wildlife management. These areas are managed with the intentions of providing public hunting opportunities for both big and small game. A level one environmental

inventory has been conducted for Robert S. Kerr Reservoir, which is a GIS based measurement of existing wetlands, soils, and vegetative types. The next step is to perform a level two environmental inventory to continue cataloging existing natural resources. This survey is more labor intensive and requires actual field surveillance by staff to identify resources that need to be cataloged. These inventories will identify sensitive natural resources and their location as well as help develop management plans to enhance these natural resources. The management plans will include common wildlife management practices such as: planting of food plots, fencing, cattle grazing for vegetation control, and the use of special restrictions to manage wildlife populations.

Non-game wildlife is something that is also managed by USACE. The species of focus within this area of consideration are animals listed as a threatened or endangered species under the Endangered Species Act. These species (Table 2.2) will continue to receive attention to assure they are managed in accordance to their habitat needs. Any work conducted on this project will be in accordance to the Endangered Species Act, associated BO, and will be appropriately coordinated with the USFWS. Other non-game programs such as song bird nest box construction and installation of bat boxes are often performed on an intermittent basis. The plan is to continue providing effort to these initiatives in order to provide some form of management for non-game species.

The goal for the areas licensed to ODWC and USFWS is to continue working with USACE partners to assure wildlife management is being conducted so that it benefits both game and non-game species. Those lands managed directly by USACE will continue being managed in a fashion to enhance existing environment and benefit both game and non-game wildlife. A priority will be given to accomplishing the objectives identified in Chapter 3.

5.1.5 Water Surface. This is in reference to water surface management needs which the project utilizes to ensure project operations. There are three types of water surface zoning utilized at Robert S. Kerr Reservoir. First would be an area that is prohibited for boat traffic. This area is located around the dam and is delineated with buoy lines. There are prohibited entry locations on both the upstream and downstream side of the dam in accordance with ER 1130-2-520. The second is operating seaplanes by restricting takeoff and landing within 1000 feet of dam structure, bridges, recreation areas, and in the National Wildlife Refuge. A map of authorized seaplane activities can be found in the maps section (RSKERR15MP –OP-01). The purpose of these two restrictions is to limit public access to ensure the security of structures and public safety. The third is where United States Coast Guard and USACE have a marine fleeting area. This is inside a small cove to the north of Applegate Cove Park which no unauthorized vessels are allowed to enter. This area is marked with buoys showing the area as prohibited entry.

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CHAPTER 6 - SPECIAL TOPICS/ISSUES/CONSIDERATIONS

6.1 COMPETING INTERESTS ON THE NATURAL RESOURCES

Robert S. Kerr Reservoir is a medium sized multi-purpose project with numerous authorized purposes. The authorized purposes have municipal and industrial users which have developed over time and are reliant on their provided benefits. These benefits are critical to the local and regional economies and are of great interest to the public. As a result competing interests for the utilization of federal lands, impacts and the way natural resources are managed can be influenced. It is a challenge to balance these interests so the customer can benefit while ensuring their adverse impacts are minimized per USACE environmental stewardship mission. The intention of this document is to outline a plan, which when executed, provides customer service and appropriate natural resource management.

6.2 PROPERTY OWNERSHIP OF WET BED

Pursuant to the decision of the U.S. Supreme Court in Choctaw Nation v. Oklahoma, 397 U.S. 620 (1970) and subsequent order of the U.S. District Court for the Eastern District of Oklahoma, the south portion of the Arkansas River bed from the Canadian Fork to the Arkansas-Oklahoma border belongs in fee simple to the Choctaw Nation, having an undivided 3/4 interest, and the Chickasaw Nation, having an undivided 1/4 interest,; the thread of the main channel of the river is the dividing line of the river bed; and the Cherokee Nation has the north portion of the Arkansas River bed from the Canadian Fork to the Arkansas-Oklahoma border in fee simple. It was also determined that the portion of the bed of the Arkansas River from the confluence of the mouth of the Grand River to the confluence of the Canadian River is owned in fee simple by the Cherokee Nation.

This multi-government property ownership requires that individuals seeking permissions for activities within portions of the reservoir contact more than one agency. Thorough research on who owns the property, and receiving appropriate authorizations from all agencies, is a requirement prior to work being conducted.

6.3 MINERAL EXPLORATION AND PRODUCTION ACTIVITIES

Effective control of mineral extraction activities, particularly when USACE does not own the necessary estates in real property to control development within close proximity of dams and other structures, requires close coordination among district offices, especially Operations, Real Estate, Engineering-Construction and Counsel. Operations personnel are often the first USACE employees to become aware of new or proposed mineral extraction activities in close proximity to USACE projects. Mineral extraction activities can include exploration operations, mining operations, drilling operations, production operations, reworking operations (including hydraulic fracturing), and high pressure pipeline operations. Real Estate personnel must investigate the location of the activities and determine the federal real property interests in the location. Engineering-Construction personnel must evaluate any new or proposed activities in order to make a determination whether said activity is compatible with the structural integrity of the dam and other major structures. Counsel must review applicable laws and ordnances that may affect the site of the activities and advise as to what legal actions can be taken to prevent harm to USACE structures and put appropriate authorities on notice of the potential danger.

6.4 POWERHOUSE AND HYDROPOWER

The powerhouse is an integral-type structure with four 27,500-kW Kaplan-type units having a total capacity of 110,000 kW. Information presented below was found in Robert S. Kerr Reservoir's Operations Management Plan.

Table 6.1 Hydropower Data

Required Flow for Prime Power, average cfs [(1)]	4,650
Average Net Power Heads, feet	
Four Units Operating	45.0
Critical Hydroyear [(1)]	40.5
Continuous Power, kW [(1)]	13,640
Installed Capacity, kW	110,000
Annual Prime Energy Output, kWh	119,500,000
Average Annual Potential Energy, kWh [(2)]	459,000,000

(1) Based on 1956 critical hydroyear.
(2) Crediting 15% overload capacity.

CHAPTER 7 - PUBLIC AND AGENCY COORDINATION

7.1 PUBLIC AND AGENCY COORDINATION

The USACE began planning to revise the Robert S. Kerr Reservoir Project Master Plan in the fall of 2014. The objectives for the Master Plan revision were 1) update land classifications to reflect changes in USACE land management policies since 1963 and 2) to update the Project Master Plan to reflect new agency requirements for Master Plan documents in accordance with ER 1130-2-550, Change 7, January 30, 2013 and EP 1130-2-550, Change 5, January 30, 2013.

The first action was a scheduled public scoping meeting providing an avenue for public and agency stakeholders to ask questions and provide comments. This public scoping meeting was held on November 13, 2014 at Carl Albert College Student Center in Sallisaw, Oklahoma. The Tulsa District placed commercial advertisements on the USACE webpage, social media, and ads published in several local papers (*Sequoyah Times*) on multiple dates during the two weeks prior to the public scoping meeting.

USACE employees hosted the workshop, which was conducted in an open format. Participants were asked to sign-in at a table where staff provided the participants with information regarding the structure of the scoping meeting, comment forms, and postage paid envelopes to return comment forms. After signing in, participants were directed to an area where topic-specific information tables were set up. Large-scale boards were displayed at each table to convey information about the following topics:

- Public Involvement Process
- Project Overview
- Overview of the National Environmental Policy Act process
- Master Plan and current land classifications
- How to Submit Comments

At each of the information tables and throughout the meeting room, USACE representatives were available to answer questions and receive written comments. Interested persons had the opportunity to comment about the project using a variety of methods, including the following:

- Filling out a comment form at the open house
- Taking a comment form home to be returned in a pre-stamped envelope
- Submitting a comment using electronic mail
- Submitting a comment and mailing it in on letterhead or choice of paper

Three (3) comments were received following the November 13, 2014 public scoping meeting for interest groups, partner agencies, other government agencies, and businesses. In total, four (4) individuals, not including USACE personnel, attended this public scoping meeting.

One of the comments was from a private adjacent landowner requesting shoreline management activity permissions. The comments did not propose a change to the Robert S. Kerr Reservoir Master Plan. The other two comments were from partnering government agencies and did recommend changes in land allocations.

On June 12, 2015 the Tulsa District and Regional Planning and Environmental Center (RPEC) released the revised draft of Robert S. Kerr Lock and Dam and Reservoir Master Plan for public and agency review. This review was open for comment until July 15, 2015 providing an opportunity for the public and agencies to comment on the Draft Master Plan, Environmental Assessment (EA) and Finding of No Significant Impact Statement (FONSI). One agency's comments were received during the review period and summarized in Table 7.1 below. Once public, agency and PDT comments to the draft are addressed the Master Plan and all appendices are prepared for final approval. The District Engineer has the approval authority to sign the FONSI and at that time the revised Robert S. Kerr Lock and Dam and Reservoir Master Plan is implemented.

Table 7.1 Public and Agency Comments on Master Plan and EA Draft

	Comment	**Response**
Draft Comment 1	Requested any revisions made to the Master Plan not negatively impact current hydroelectric power operation at Robert S. Kerr Reservoir	Hydroelectric power is one of the original Congressionally authorized purposes of the project and continues to be the primary purpose of the reservoir and mission of USACE.
Draft Comment 2	Suggested additional information to the Flood Control Act of 1944 mentioned in the Public Laws section of Chapter 2.	Flood Control Act of 1944 also authorized the creation of the Southwestern Power Administration, then within the Department of the Interior and currently within the Department of Energy, as the agency responsible for marketing and delivering the power generated at Federal reservoir projects.
Draft Comment 3	Requested considerations of upcoming rehabilitation of the Robert S. Kerr hydroelectric units	When designating lands for Project Operations a sufficient buffer around the current powerhouse and switchyard was included as Project Operations land to allow for upcoming rehabilitation project work.

CHAPTER 8 - SUMMARY OF RECOMMENDATIONS

8.1 SUMMARY OVERVIEW

The following are the recommended course of action necessary to manage Robert S. Kerr Reservoir's current and future issues. The belief is actions taken today can ensure the future health and longevity of Robert S. Kerr Reservoir Lake while still allowing continued use and development. The factors considered cover a broad spectrum of public use, environmental, socioeconomic, and workload. The final Master Plan for Robert S. Kerr Reservoir will continue to provide for and enhance recreational opportunities for the public, improve the environmental quality, and create a management philosophy more conducive to existing staff levels at the Robert S. Kerr Reservoir Project.

8.2 LAND RECLASSIFICATION PROPOSALS

A public notice was developed as part of the initial process for revising the Robert S. Kerr Lock and Dam and Reservoir Master Plan. The public notice requested the public to provide proposals for the revision of the Master Plan. During this process there were three (3) proposals received. Additional reclassification proposals assessed during this process were formulated by Robert S. Kerr Reservoir Project staff, the Regional Planning and Environmental Center (RPEC) staff, and Tulsa District Office staff assigned to the Project Delivery Team (PDT). Reclassification proposals are presented in Table 8.1.

Table 8.1 Reclassification Proposals

Proposal	Description	Response
Reclassification Proposal 1	Permission to mow from private property to shoreline.	No – This activity is a Shoreline Management activity which does not propose a change in land classification. Furthermore, this activity does not meet management, policy, goals and objectives of Robert S. Kerr Reservoir.
Reclassification Proposal 2	Permission to improve shoreline to prevent erosion.	No – This activity is a Shoreline Management activity which does not propose a change in land classification. Furthermore, this activity does not meet management, policy, goals and objectives of Robert S. Kerr Reservoir.
Reclassification Proposal 3	Expand refuge boundaries to help meet Sequoyah NWR waterfowl conservation objectives.	No – Remaining property is required for project purposes.

Proposal	Description	Response
Reclassification Proposal 4	Reclassify Vian Creek Public Use Area from High Intensive Recreational Use to USFWS Management.	No – USACE will continue to manage this area as High Density Recreation as demand from visiting public is still high.
Reclassification Proposal 5	Evaluate variance in water level management of Robert S. Kerr Reservoir and other managed river and lake levels in the entire McClellan-Kerr Navigation System for occasional replication of historic seasonal flood and drought events to stimulate germination of seasonal herbaceous plants, provide nesting areas for the Endangered Interior least tern, and stimulate natural alluvial incision and deposition processes.	No – Maintaining a stable pool level is required for navigation traffic and hydropower functions.
Reclassification Proposal 6	Reclassify 69 acres of the western area of Cowlington Point to Low Density Recreation.	Yes – This area has never been developed for High Density Recreation and current primary use is hunting. This area will be continued to be utilized as Low Density Recreation.
Reclassification Proposal 7	Classify 18 acres of least tern managed habitat to Environmentally Sensitive Areas.	Yes – Least Tern is a federally threatened species. This habitat has been created from dredge material for the purpose of Least Tern habitat.
Reclassification Proposal 8	Reclassify the 539 acres of Restricted areas along bridges crossing public property to Project Operations.	Yes – This is consistent with how land use is managed.
Reclassification Proposal 9	Remove 1,050 acres Sallisaw Creek recreation area from federally managed property.	Yes – Sallisaw Creek recreation area has been transferred to the Bureau of Indian Affairs with the intent to dispose to the Cherokee Nation.

Proposal	Description	Response
Reclassification Proposal 10	Reclassify all 160 acre lands classified as Industrial Use to Project Operations.	Yes – Current MP guidance does not contain an Industrial classification. Project Operations is the best fit for the use of these lands and will ensure continued industrial type use.
Reclassification Proposal 11	Reclassify the 18 acre Recreation – Intensive Use area south of the dam lakeside known as Fisherman's Landing to Project Operations.	Yes – This is consistent with how land use is managed. Project Operations is the best fit for the use of these lands for public safety and project security as this is near the dam and lock.
Reclassification Proposal 12	Reclassify 544 acres of Multipurpose areas to Project Operations where dredge disposal sites have been selected.	Yes – This is consistent with how land use is managed. Project Operations best fits for the use of these lands as these sites will continually used as dredge disposal sites in the future.
Reclassification Proposal 13	Reclassify the 6,006 acres of Multipurpose areas to Recreation – Low Density Use where dredge disposal sites have not been selected.	Yes – This is consistent with how land use is managed. Low Density Recreation Use best fits the use of these lands.
Reclassification Proposal 14	Reclassify the 48 acres of Quasi-Public areas to Low Density Recreation.	Yes – The classification of Quasi-Public lands is no longer a land classification under EP 1130-2-550. Low Density Recreation is more appropriate for this area, with the exception of the dredge disposal sites.
Reclassification Proposal 15	Reclassify the 2 acres of Project Operations on the eastern end riverside's Fisherman's Landing to High Density Recreation.	Yes – This is the location of a previous highway. Normal business practice classified these areas as Project Operations, yet the highway has been relocated. The area is not being used as an extension of Fisherman's Landing.
Reclassification Proposal 16	Reclassify the 21 acres of Kerr-McGee Corporation's industrial area to Environmentally Sensitive Area.	Yes – The Kerr-McGee Corporation site, once an area for uranium production, should be changed to an Environmentally Sensitive Area due to site contamination.

Proposal	Description	Response
Reclassification Proposal 17	Reclassify 11 acres of Multipurpose areas upstream of the Consolidated Grain and Barge's port and facility to Project Operations.	Yes – The area upstream from this site is an extension of the existing port facility and across the river is used as a fleeting area for the port facility.
Reclassification Proposal 18	Classify 124 surface water acres to Restricted.	Yes – Water Surface needs to be restricted near dam, lock, hydropower intakes, and USCG area for public safety and project security.
Reclassification Proposal 19	Classify approximately 40 water surface acres to No-Wake designation.	Yes – Water Surface needs to be designated No-Wake near boat ramps and marinas for public safety.
Reclassification Proposal 20	Classify remaining 41,836 water surface acres not classified as Restricted or Designated No-Wake as Open Recreation	Yes – previous water surface did not meet current EP 1130-2-550 and ER 1130-2-550. The classification of water surface complies with Master Plan guidelines.

CHAPTER 9 - BIBLIOGRAPHY

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APPENDIX A - LAND CLASSIFICATION, MANAGING AGENCIES, RECREATION, AND SEAPLANE RESTRICTION MAPS

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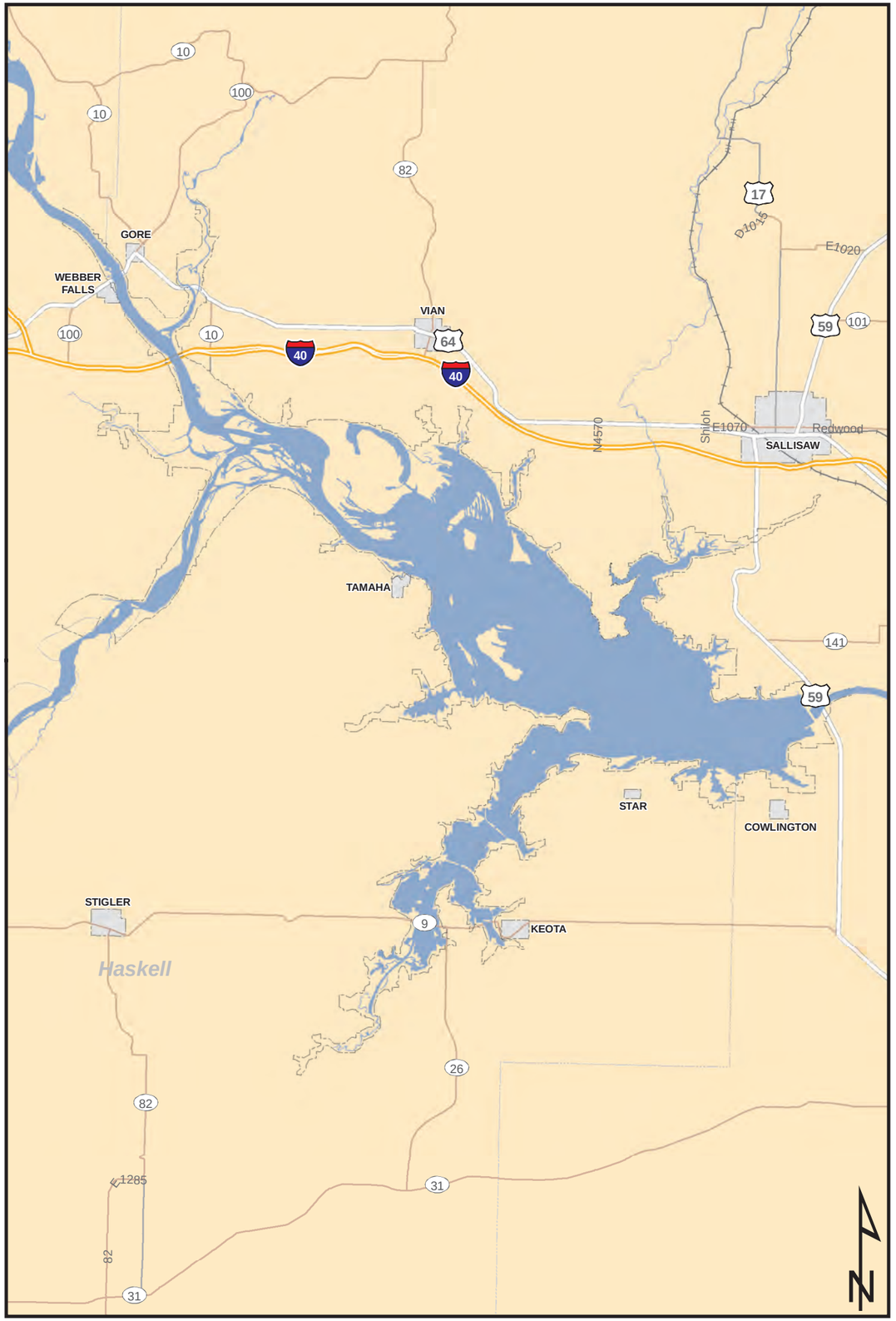

INDEX TO MASTER PLAN MAPS

GENERAL

MAP NO.	TITLE
RSKERR15MP-OI-00	PROJECT LOCATION & INDEX TO MAPS
RSKERR15MP-OM-01	AGENCY LAND MANAGEMENT
RSKERR15MP-OP-01	SEAPLANE GUIDE

LAND CLASSIFICATION

MAP NO.	TITLE
RSKERR15MP-OC-00	LAND CLASSIFICATION (SHEET 00)
RSKERR15MP-OC-01	LAND CLASSIFICATION (SHEET 01)
RSKERR15MP-OC-02	LAND CLASSIFICATION (SHEET 02)
RSKERR15MP-OC-03	LAND CLASSIFICATION (SHEET 03)
RSKERR15MP-OC-04	LAND CLASSIFICATION (SHEET 04)
RSKERR15MP-OC-05	LAND CLASSIFICATION (SHEET 05)
RSKERR15MP-OC-06	LAND CLASSIFICATION (SHEET 06)
RSKERR15MP-OC-07	LAND CLASSIFICATION (SHEET 07)
RSKERR15MP-OC-08	LAND CLASSIFICATION (SHEET 08)
RSKERR15MP-OC-09	LAND CLASSIFICATION (SHEET 09)
RSKERR15MP-OC-10	LAND CLASSIFICATION (SHEET 10)
RSKERR15MP-OC-11	LAND CLASSIFICATION (SHEET 11)
RSKERR15MP-OC-12	LAND CLASSIFICATION (SHEET 12)
RSKERR15MP-OC-13	LAND CLASSIFICATION (SHEET 13)
RSKERR15MP-OC-14	LAND CLASSIFICATION (SHEET 14)
RSKERR15MP-OC-15	LAND CLASSIFICATION (SHEET 15)
RSKERR15MP-OC-16	LAND CLASSIFICATION (SHEET 16)
RSKERR15MP-OC-17	LAND CLASSIFICATION (SHEET 17)

RECREATIONAL AREAS

MAP NO.	TITLE
RSKERR15MP-OR-01	GORE LANDING
RSKERR15MP-OR-02	VIAN CREEK
RSKERR15MP-OR-03	LITTLE SANSBOIS CREEK
RSKERR15MP-OR-04	KEOTA LANDING
RSKERR15MP-OR-05	COWLINGTON POINT
RSKERR15MP-OR-06	SHORT MT. COVE
RSKERR15MP-OR-07	FISHERMAN'S LANDING
RSKERR15MP-OR-08	APPLEGATE COVE

FEE BOUNDARY

WATER SURFACE

THIS PRODUCT IS REPRODUCED FROM GEOSPATIAL INFORMATION PREPARED BY THE U.S. ARMY CORPS OF ENGINEERS. GIS DATA AND PRODUCT ACCURACY MAY VARY. THEY MAY BE DEVELOPED FROM SOURCES OF DIFFERING ACCURACY. ACCURATE ONLY FOR CERTAIN SCALES. BASED ON MODELING OR INTERPRETATION, INCOMPLETE WHILE BEING CREATED OR REVISED. USING GIS PRODUCTS FOR PURPOSES OTHER THAN THOSE FOR WHICH THEY WERE CREATED MAY YIELD INACCURATE OR MISLEADING RESULTS.

U.S. ARMY CORPS OF ENGINEERS

TULSA DISTRICT

ROBERT S. KERR LOCK AND DAM AND RESERVOIR — ARKANSAS RIVER, OKLAHOMA

ROBERT S. KERR RESERVOIR

ROBERT S. KERR MASTER PLAN

PROJECT LOCATION AND INDEX

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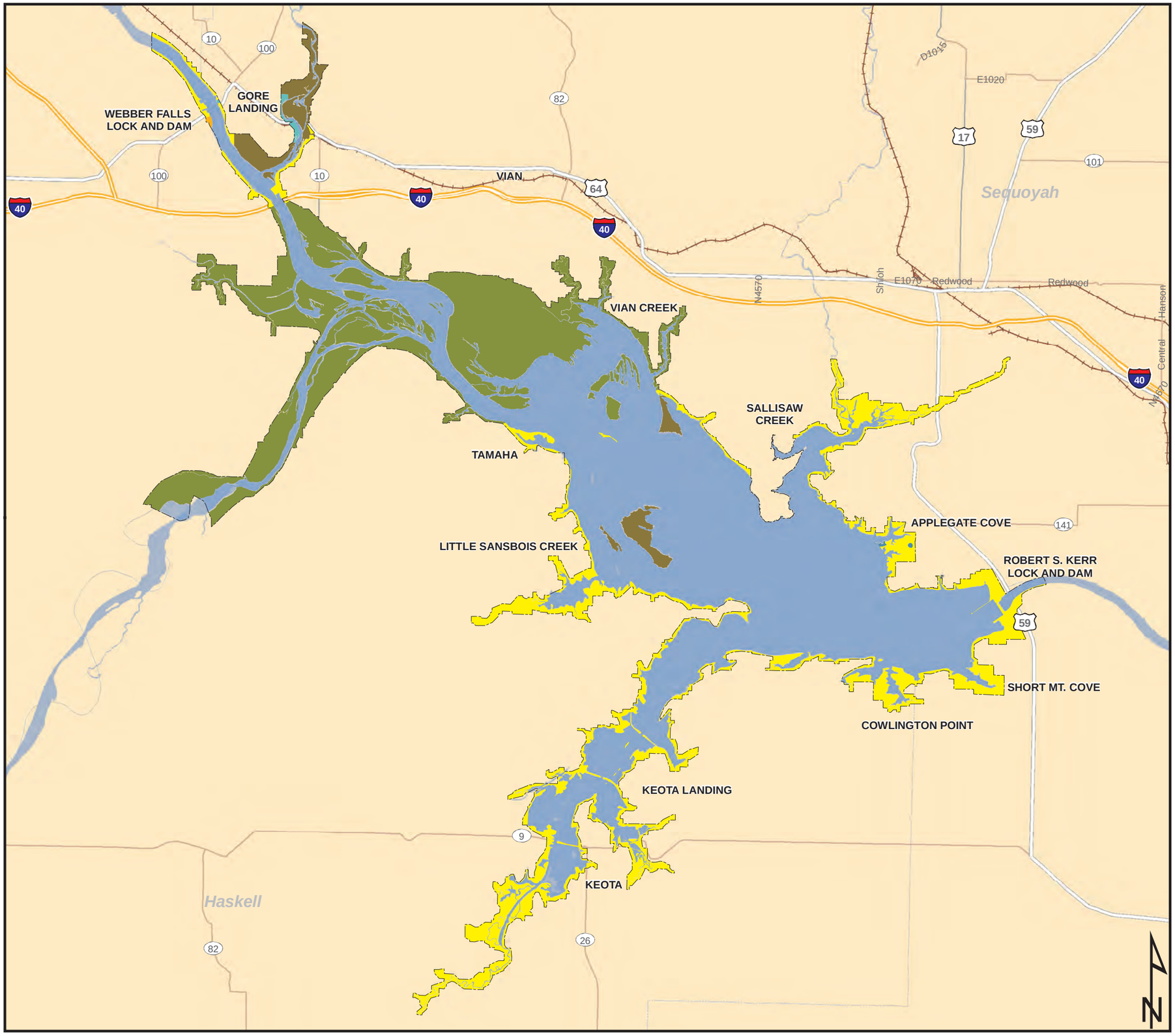
DATE:	MAP NO.
AUGUST 2015	RSKERR15MP-OI-00



- FEE BOUNDARY
- CITY OF GORE
- CITY OF WEBBER FALLS
- OKLAHOMA DEPT. OF WILDLIFE CONSERVATION
- U.S. FISH AND WILDLIFE SERVICE
- U.S. COAST GUARD
- U.S. ARMY CORPS OF ENGINEERS
- WATER SURFACE

U.S. ARMY CORPS OF ENGINEERS

TULSA DISTRICT

ROBERT S. KERR LOCK AND DAM AND RESERVOIR — ARKANSAS RIVER, OKLAHOMA

ROBERT S. KERR RESERVOIR

ROBERT S. KERR MASTER PLAN

AGENCY LAND MANAGEMENT

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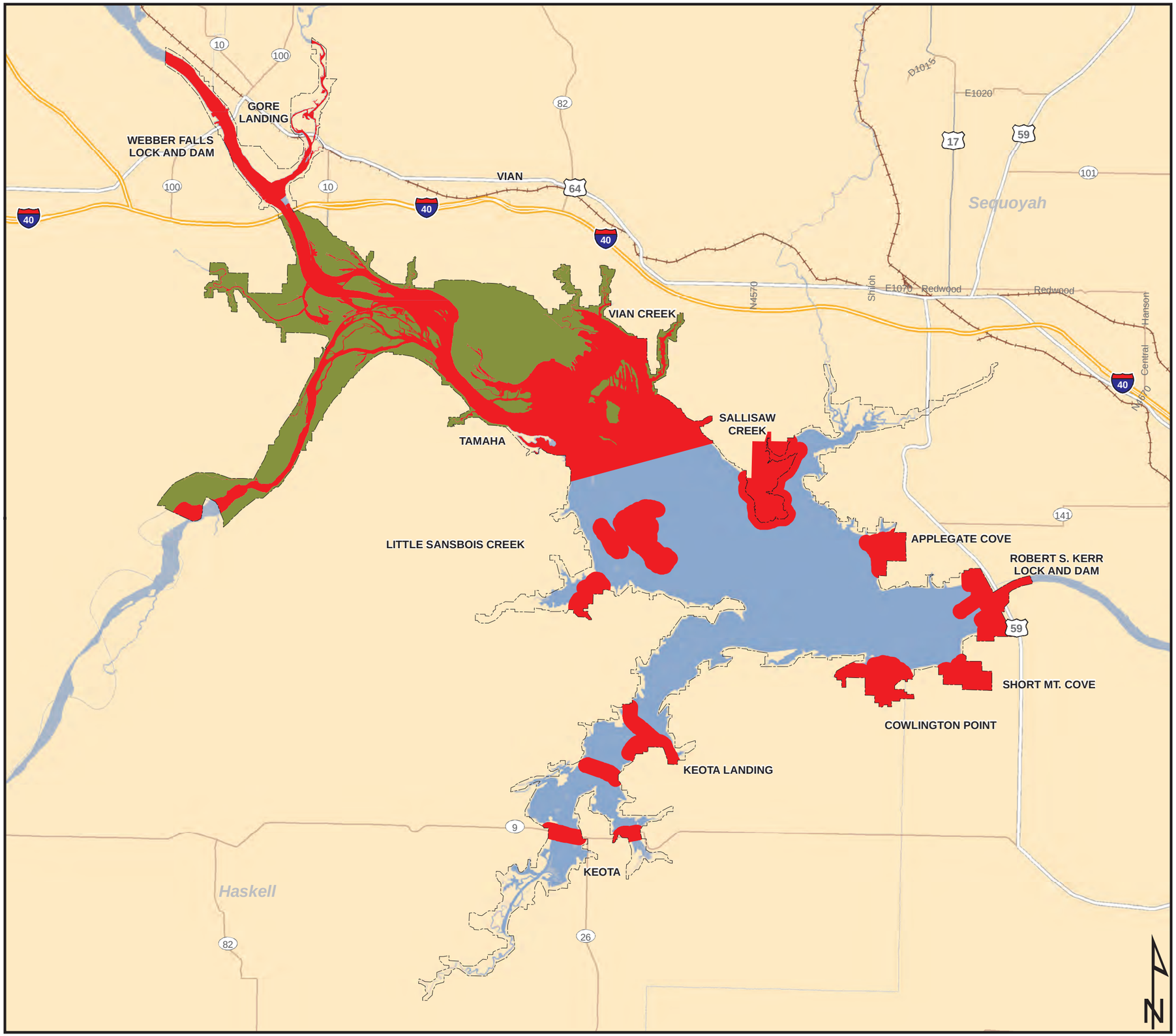
AUGUST 2015	RSKERR15MP-OM-01



FEE BOUNDARY

NATIONAL WILDLIFE REFUGE

RESTRICTED AREAS

WATER SURFACE

TAKE OFF AND LANDING PROHIBITED WITHIN 1000 FEET OF DAM STRUCTURES, BRIDGES, RECREATIONAL AREAS, AND IN NATIONAL WILDLIFE REFUGE

OPERATION OF SEA PLANE AT CORPS PROJECTS IS AT THE RISK OF THE PLANE'S OWNER, OPERATOR, AND / OR PASSENGERS

U.S. ARMY CORPS OF ENGINEERS

TULSA DISTRICT

ROBERT S. KERR LOCK AND DAM AND RESERVOIR — ARKANSAS RIVER, OKLAHOMA

ROBERT S. KERR RESERVOIR

ROBERT S. KERR MASTER PLAN

SEA PLANE GUIDE

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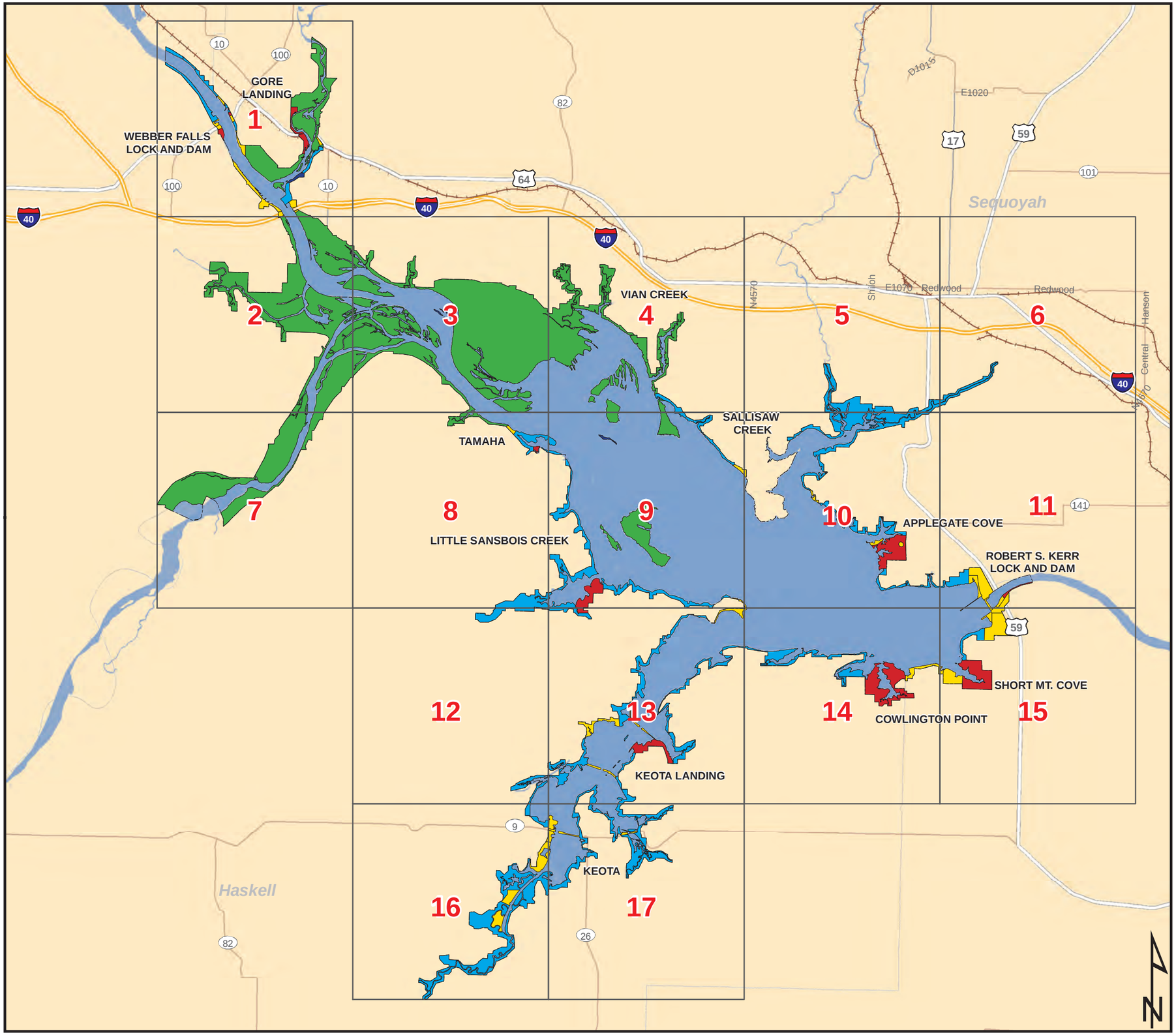
AUGUST 2015	RSKERR15MP-OP-01



FEE BOUNDARY

INDEX GRID

WATER SURFACE

LAND CLASSIFICATION

PROJECT OPERATIONS

HIGH DENSITY RECREATION

LOW DENSITY RECREATION

WILDLIFE MANAGEMENT

ENVIRONMENTALLY SENSITIVE

U.S. ARMY CORPS OF ENGINEERS

TULSA DISTRICT

ROBERT S. KERR LOCK AND DAM AND RESERVOIR — ARKANSAS RIVER, OKLAHOMA

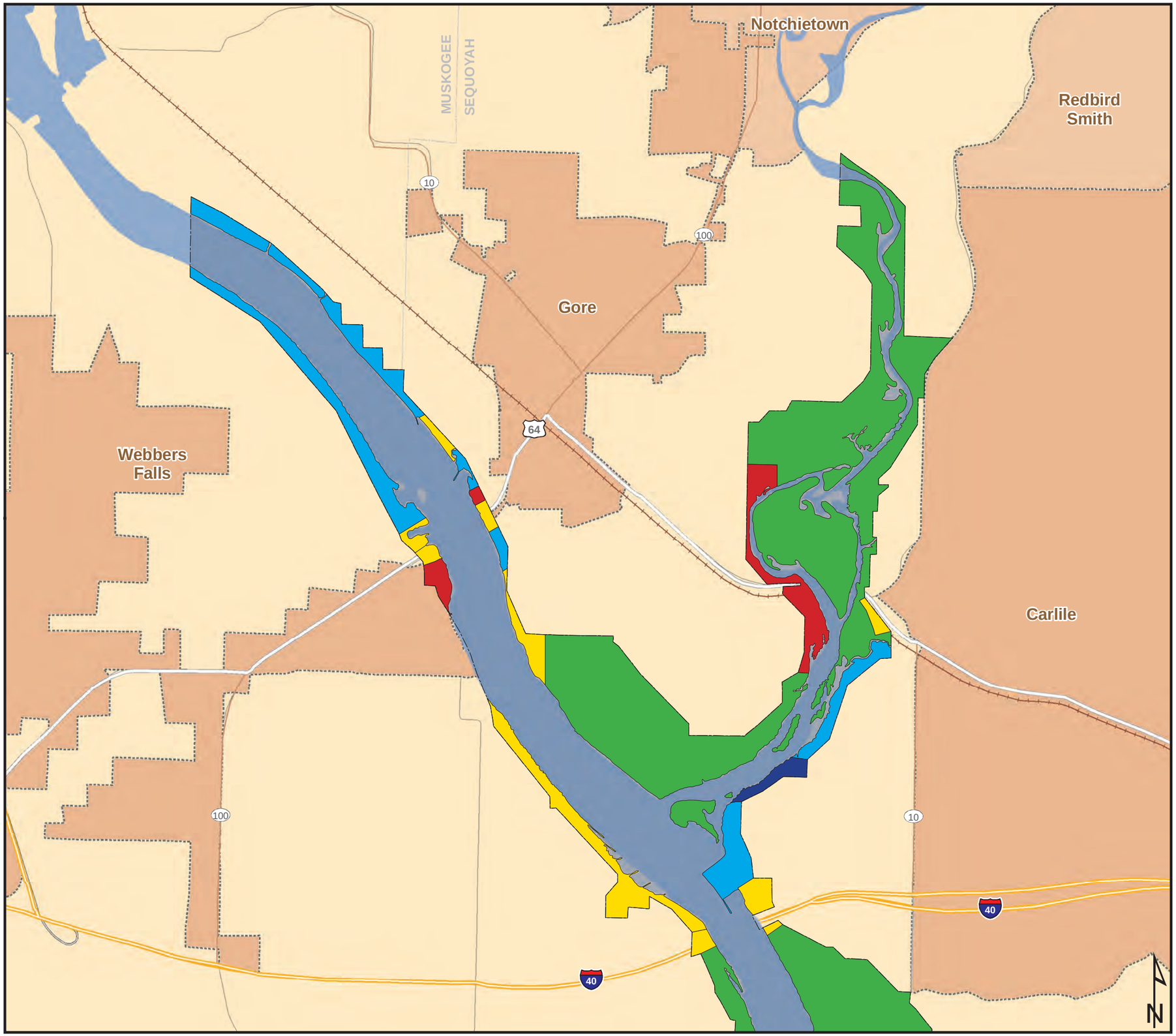
ROBERT S. KERR RESERVOIR

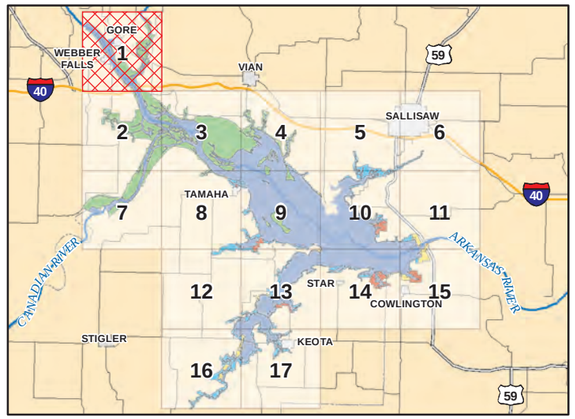
ROBERT S. KERR MASTER PLAN

LAND CLASSIFICATION INDEX (SHEET 00)

1 0 1 2 3 MILES

DATE:	MAP NO.
AUGUST 2015	RSKERR15MP-OC-00





FEE BOUNDARY

WATER SURFACE

LAND CLASSIFICATION

PROJECT OPERATIONS

HIGH DENSITY RECREATION

LOW DENSITY RECREATION

WILDLIFE MANAGEMENT

ENVIRONMENTALLY SENSITIVE

U.S. ARMY CORPS OF ENGINEERS

TULSA DISTRICT

ROBERT S. KERR LOCK AND DAM AND RESERVOIR — ARKANSAS RIVER, OKLAHOMA

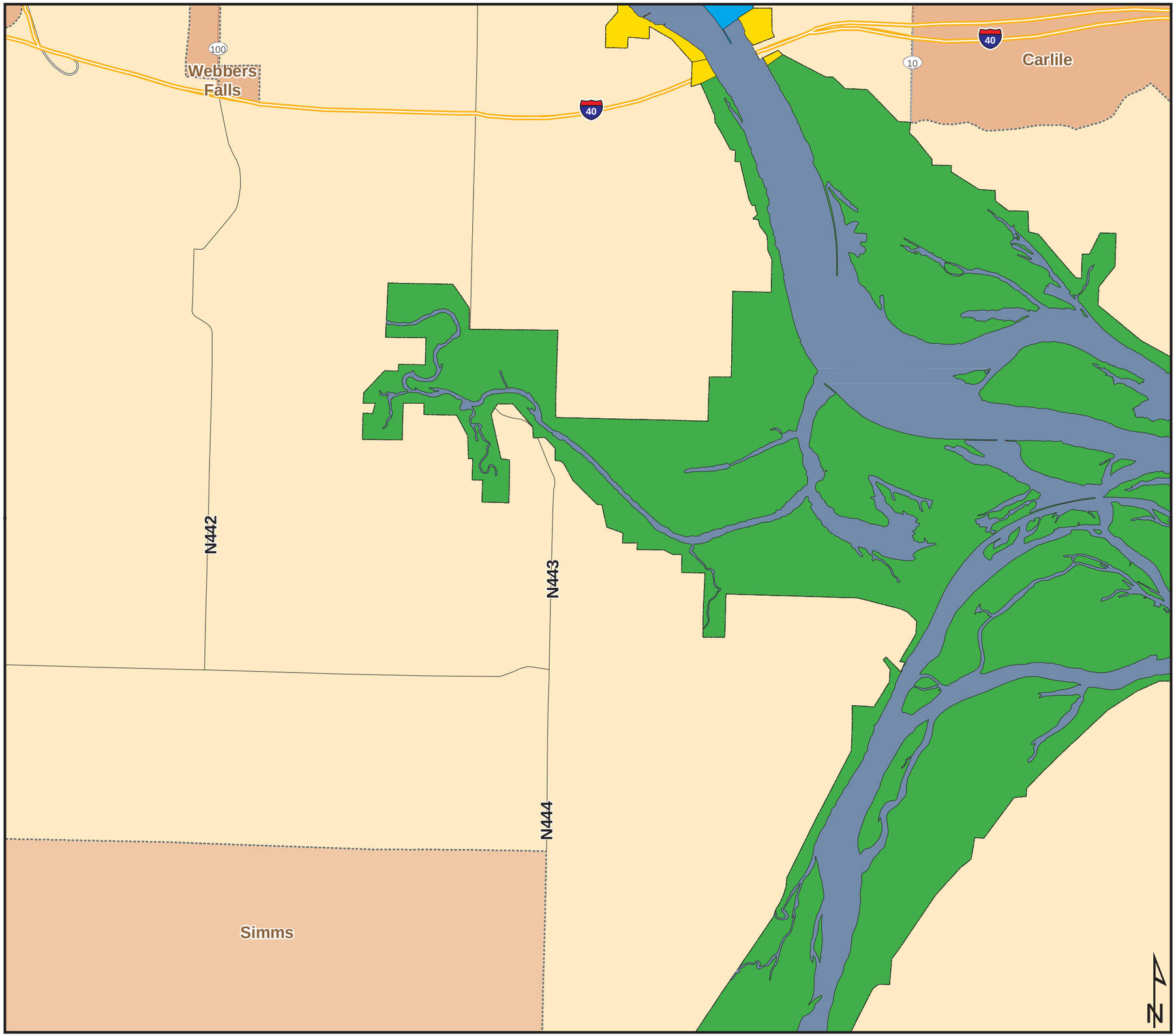
ROBERT S. KERR RESERVOIR

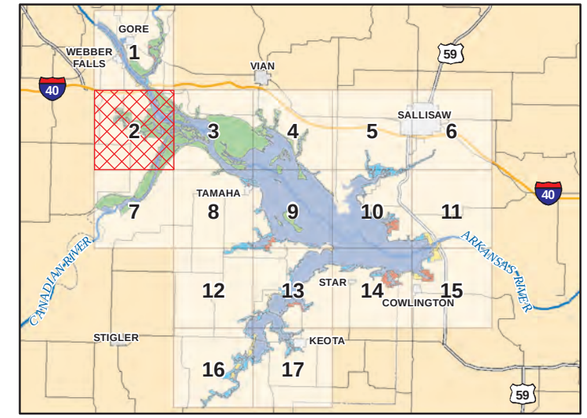
ROBERT S. KERR MASTER PLAN

LAND CLASSIFICATION (SHEET 01)

2,000 0 2,000 4,000 6,000 FEET

DATE:	MAP NO.
AUGUST 2015	RSKERR15MP-OC-01





FEE BOUNDARY

WATER SURFACE

LAND CLASSIFICATION

PROJECT OPERATIONS

HIGH DENSITY RECREATION

LOW DENSITY RECREATION

WILDLIFE MANAGEMENT

ENVIRONMENTALLY SENSITIVE

U.S. ARMY CORPS OF ENGINEERS

TULSA DISTRICT

ROBERT S. KERR LOCK AND DAM AND RESERVOIR — ARKANSAS RIVER, OKLAHOMA

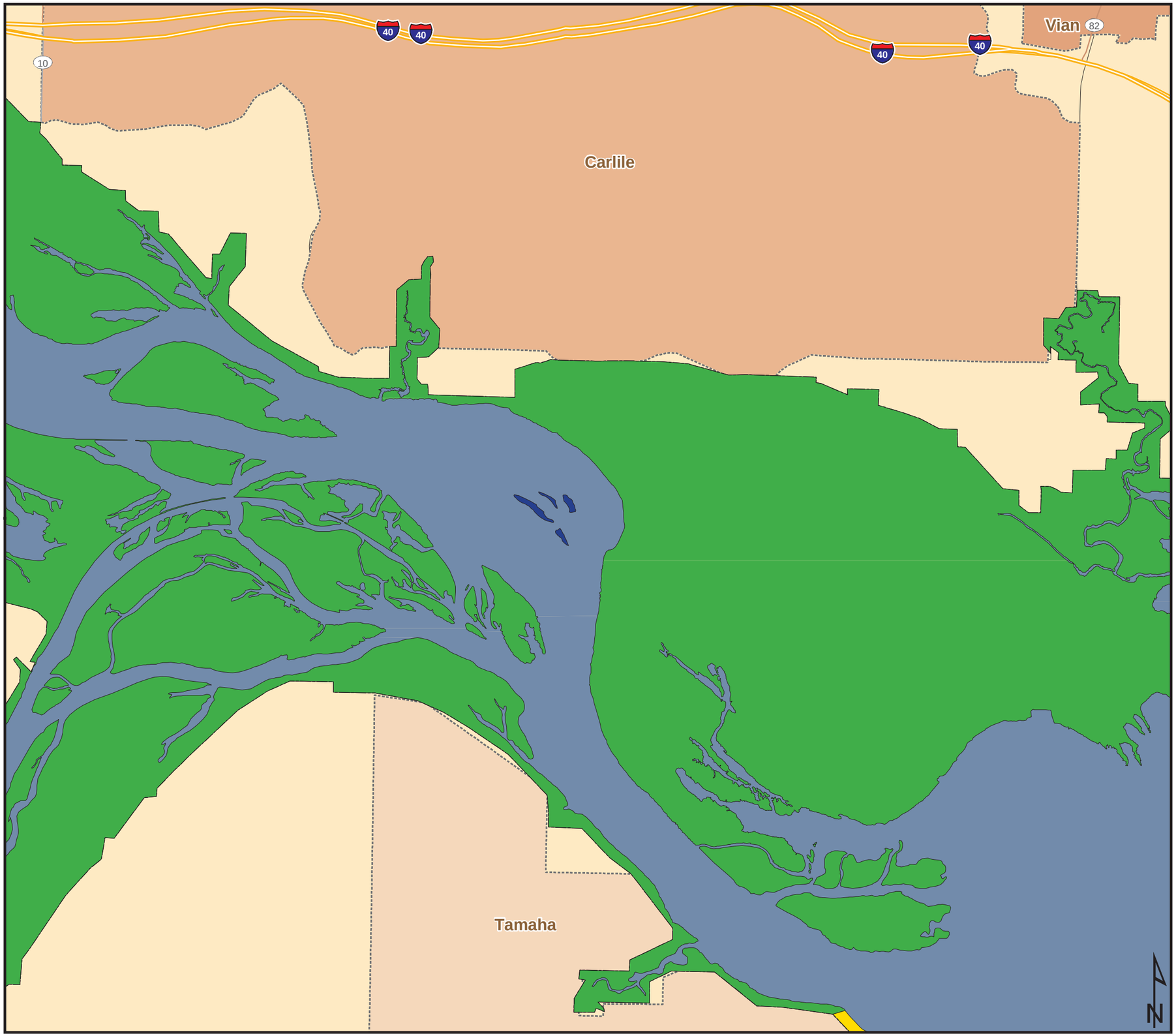
ROBERT S. KERR RESERVOIR

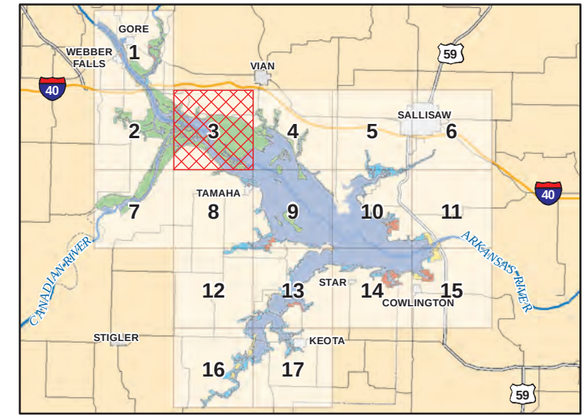
ROBERT S. KERR MASTER PLAN

LAND CLASSIFICATION (SHEET 02)

2,000 0 2,000 4,000 6,000 FEET

DATE:	MAP NO.
AUGUST 2015	RSKERR15MP-OC-02





FEE BOUNDARY

WATER SURFACE

LAND CLASSIFICATION

PROJECT OPERATIONS

HIGH DENSITY RECREATION

LOW DENSITY RECREATION

WILDLIFE MANAGEMENT

ENVIRONMENTALLY SENSITIVE

U.S. ARMY CORPS OF ENGINEERS

TULSA DISTRICT

ROBERT S. KERR LOCK AND DAM AND RESERVOIR — ARKANSAS RIVER, OKLAHOMA

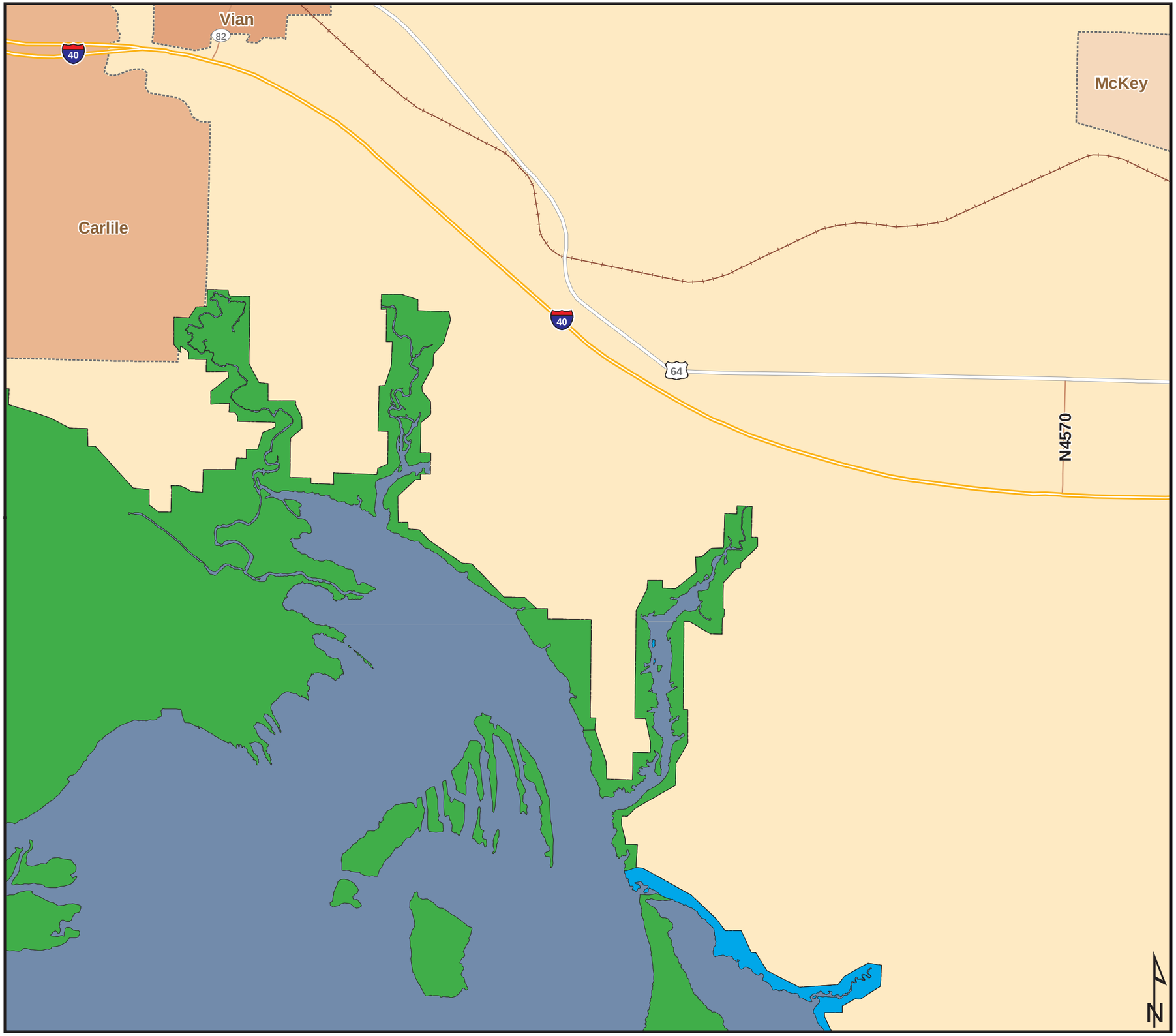
ROBERT S. KERR RESERVOIR

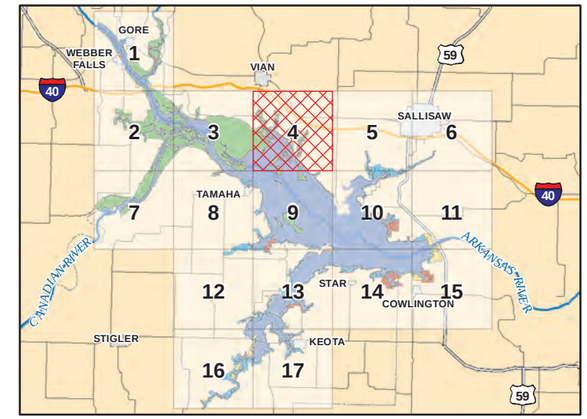
ROBERT S. KERR MASTER PLAN

LAND CLASSIFICATION (SHEET 03)

2,000 0 2,000 4,000 6,000 FEET

DATE:	MAP NO.
AUGUST 2015	RSKERR15MP-OC-03





FEE BOUNDARY

WATER SURFACE

LAND CLASSIFICATION

PROJECT OPERATIONS

HIGH DENSITY RECREATION

LOW DENSITY RECREATION

WILDLIFE MANAGEMENT

ENVIRONMENTALLY SENSITIVE

U.S. ARMY CORPS OF ENGINEERS

TULSA DISTRICT

ROBERT S. KERR LOCK AND DAM AND RESERVOIR — ARKANSAS RIVER, OKLAHOMA

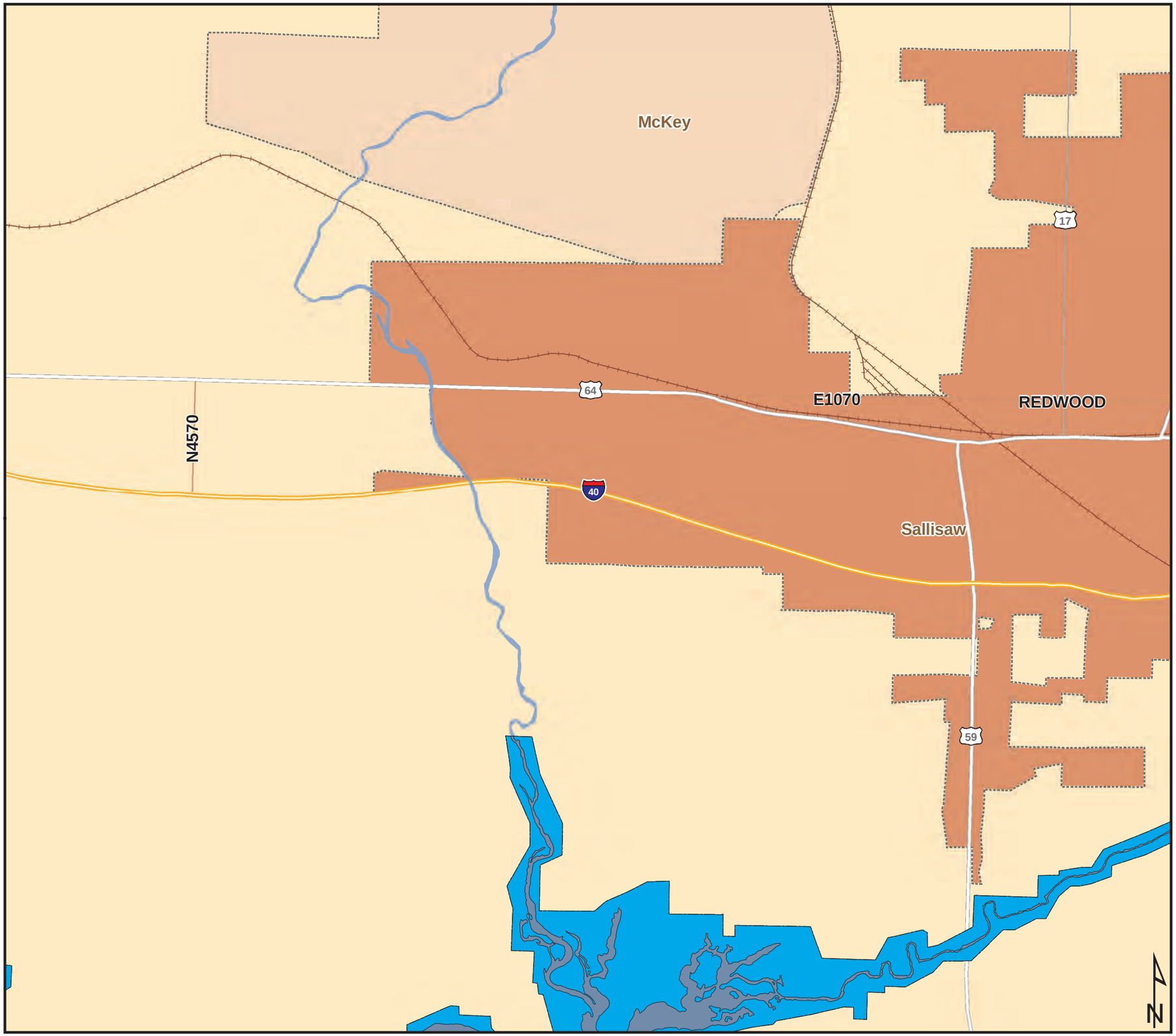
ROBERT S. KERR RESERVOIR

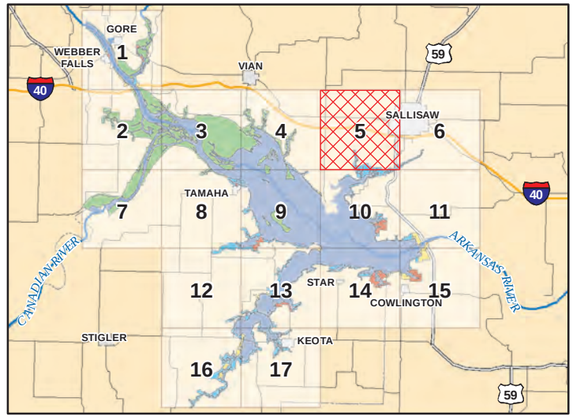
ROBERT S. KERR MASTER PLAN

LAND CLASSIFICATION (SHEET 04)

2,000 0 2,000 4,000 6,000 FEET

DATE:	MAP NO.
AUGUST 2015	RSKERR15MP-OC-04





FEE BOUNDARY

WATER SURFACE

LAND CLASSIFICATION

PROJECT OPERATIONS

HIGH DENSITY RECREATION

LOW DENSITY RECREATION

WILDLIFE MANAGEMENT

ENVIRONMENTALLY SENSITIVE

U.S. ARMY CORPS OF ENGINEERS

TULSA DISTRICT

ROBERT S. KERR LOCK AND DAM AND RESERVOIR — ARKANSAS RIVER, OKLAHOMA

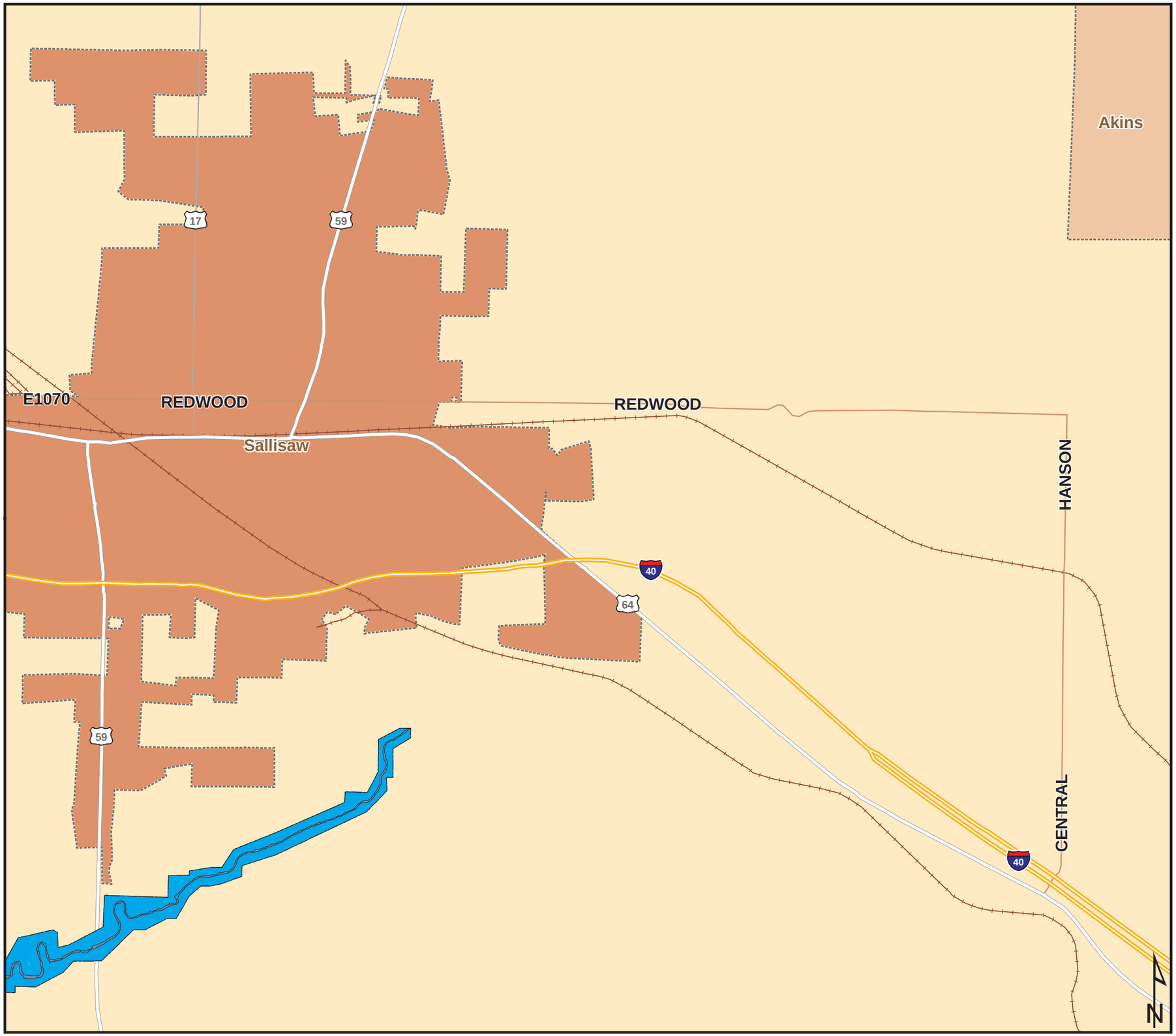
ROBERT S. KERR RESERVOIR

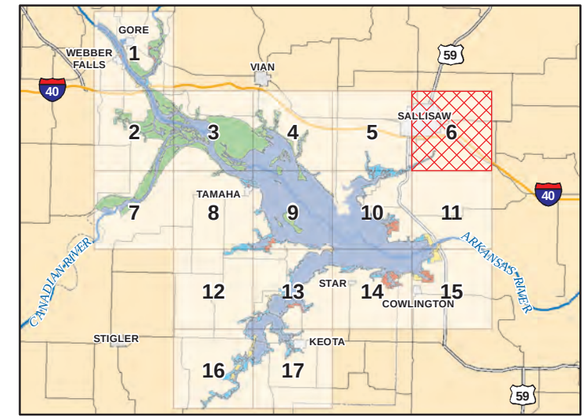
ROBERT S. KERR MASTER PLAN

LAND CLASSIFICATION (SHEET 05)

2,000 0 2,000 4,000 6,000 FEET

DATE:	MAP NO.
AUGUST 2015	RSKERR15MP-OC-05





FEE BOUNDARY

WATER SURFACE

LAND CLASSIFICATION

PROJECT OPERATIONS

HIGH DENSITY RECREATION

LOW DENSITY RECREATION

WILDLIFE MANAGEMENT

ENVIRONMENTALLY SENSITIVE

U.S. ARMY CORPS OF ENGINEERS

TULSA DISTRICT

ROBERT S. KERR LOCK AND DAM AND RESERVOIR — ARKANSAS RIVER, OKLAHOMA

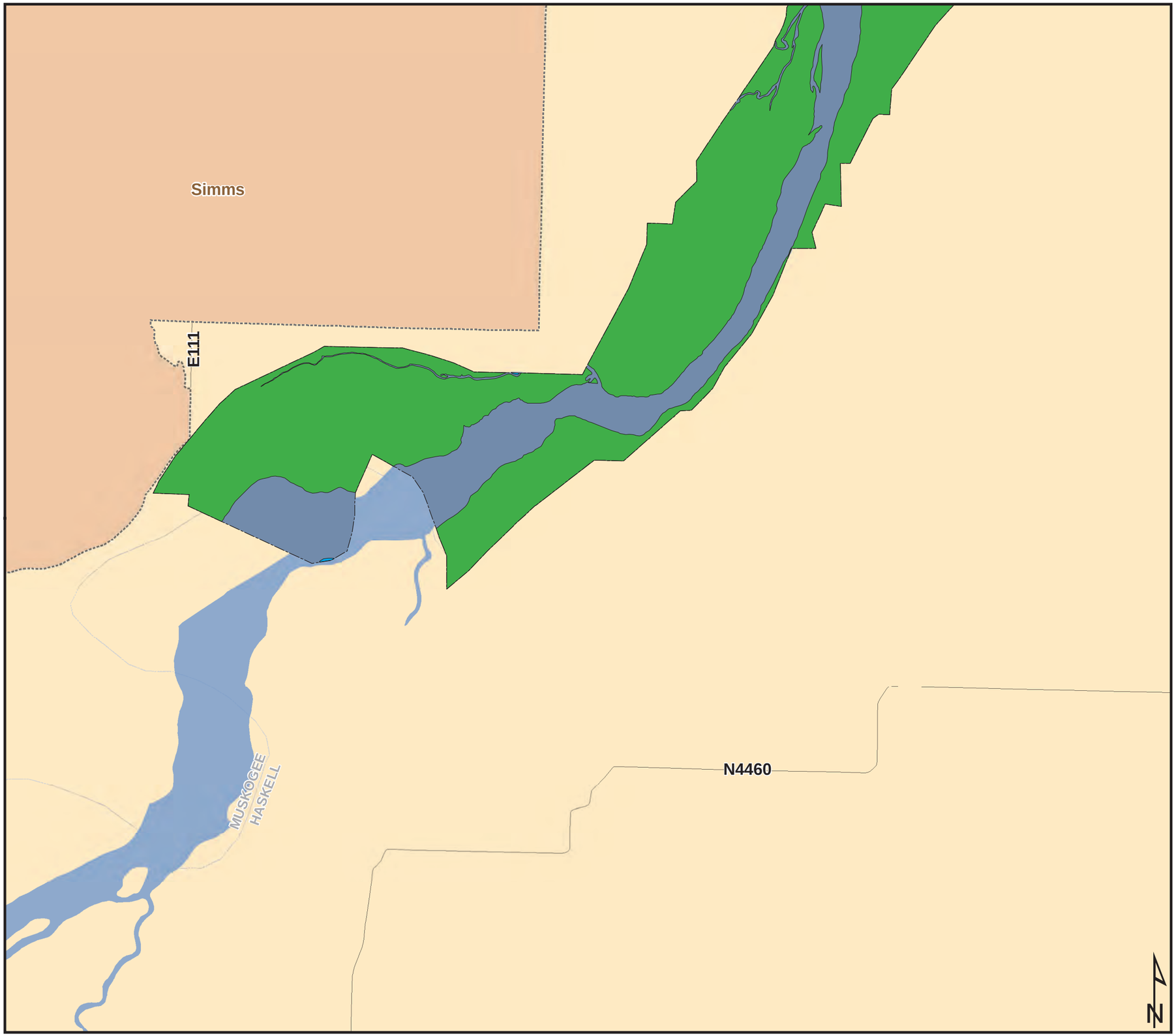
ROBERT S. KERR RESERVOIR

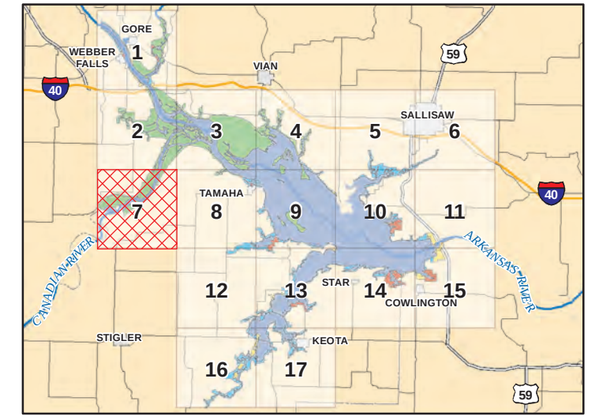
ROBERT S. KERR MASTER PLAN

LAND CLASSIFICATION (SHEET 06)

2,000 0 2,000 4,000 6,000 FEET

DATE:	MAP NO.
AUGUST 2015	RSKERR15MP-OC-06





FEE BOUNDARY

WATER SURFACE

LAND CLASSIFICATION

PROJECT OPERATIONS

HIGH DENSITY RECREATION

LOW DENSITY RECREATION

WILDLIFE MANAGEMENT

ENVIRONMENTALLY SENSITIVE

U.S. ARMY CORPS OF ENGINEERS

TULSA DISTRICT

ROBERT S. KERR LOCK AND DAM AND RESERVOIR — ARKANSAS RIVER, OKLAHOMA

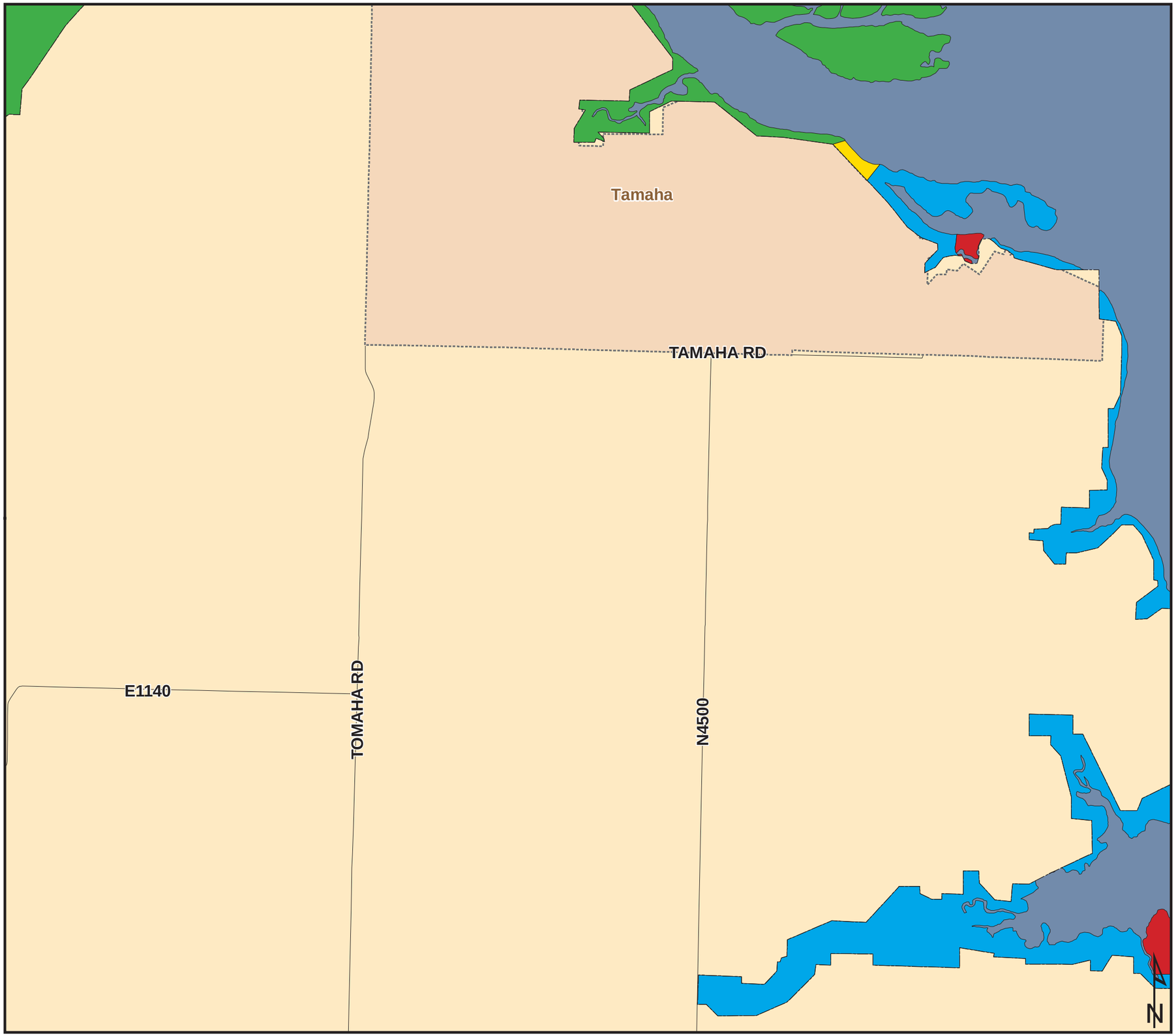
ROBERT S. KERR RESERVOIR

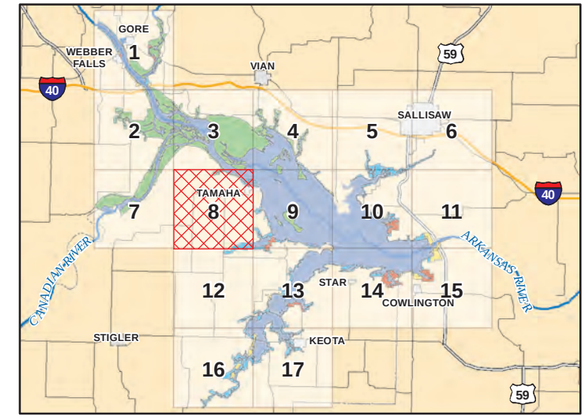
ROBERT S. KERR MASTER PLAN

LAND CLASSIFICATION (SHEET 07)

2,000 0 2,000 4,000 6,000 FEET

DATE:	MAP NO.
APRIL 2015	RSKERR15MP-OC-07





FEE BOUNDARY

WATER SURFACE

LAND CLASSIFICATION

PROJECT OPERATIONS

HIGH DENSITY RECREATION

LOW DENSITY RECREATION

WILDLIFE MANAGEMENT

ENVIRONMENTALLY SENSITIVE

U.S. ARMY CORPS OF ENGINEERS

TULSA DISTRICT

ROBERT S. KERR LOCK AND DAM AND RESERVOIR — ARKANSAS RIVER, OKLAHOMA

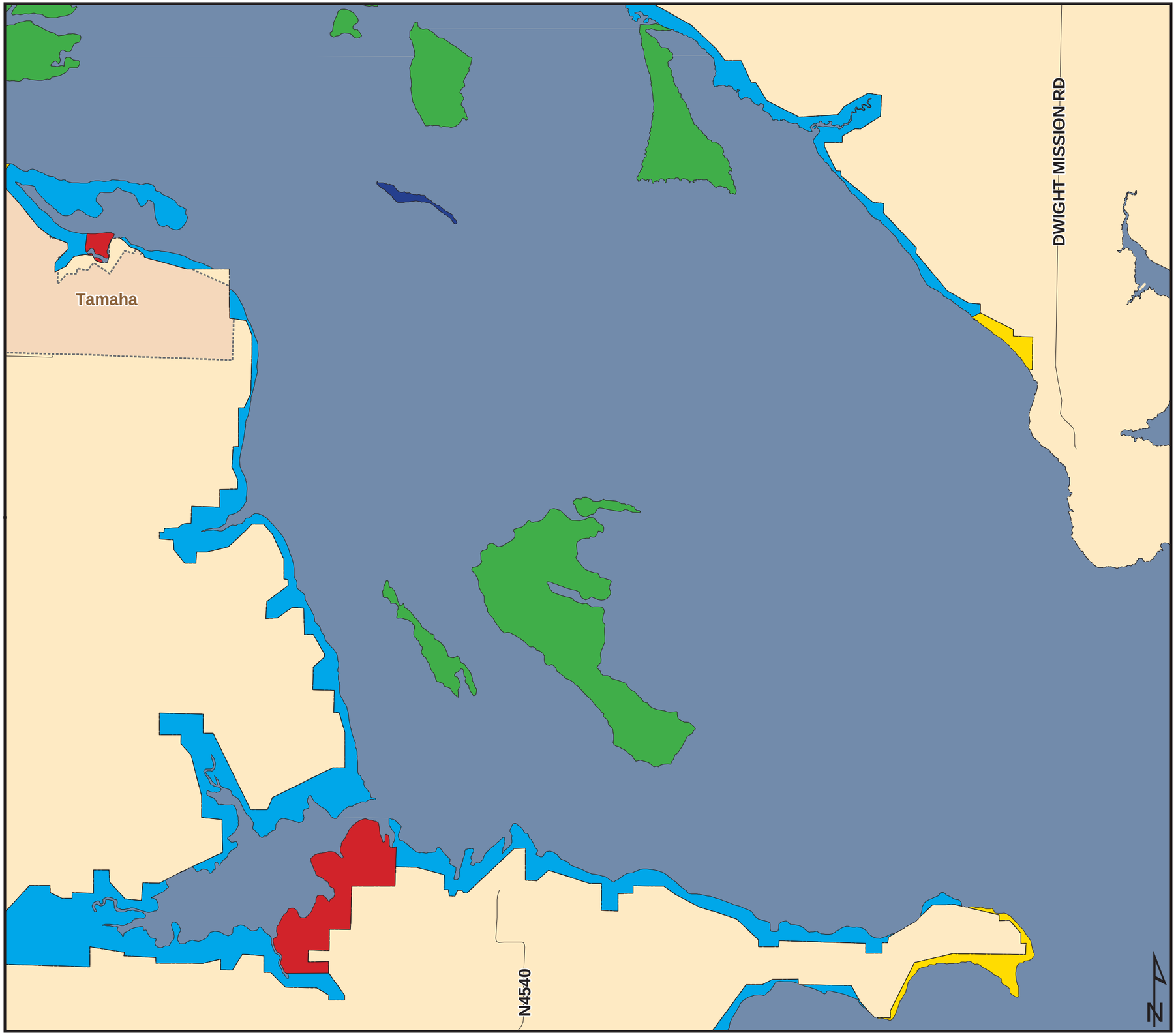
ROBERT S. KERR RESERVOIR

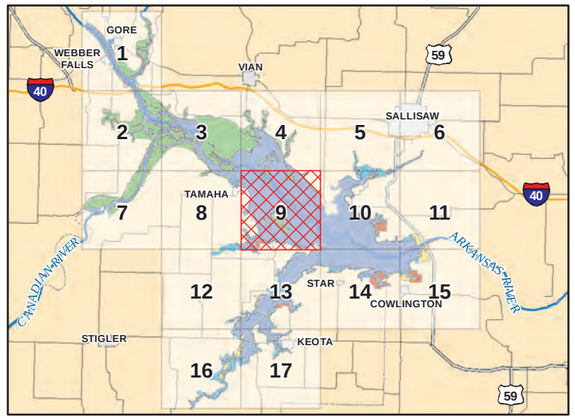
ROBERT S. KERR MASTER PLAN

LAND CLASSIFICATION (SHEET 08)

2,000 0 2,000 4,000 6,000 FEET

DATE:	MAP NO.
AUGUST 2015	RSKERR15MP-OC-08





FEE BOUNDARY

WATER SURFACE

LAND CLASSIFICATION

PROJECT OPERATIONS

HIGH DENSITY RECREATION

LOW DENSITY RECREATION

WILDLIFE MANAGEMENT

ENVIRONMENTALLY SENSITIVE

U.S. ARMY CORPS OF ENGINEERS

TULSA DISTRICT

ROBERT S. KERR LOCK AND DAM AND RESERVOIR — ARKANSAS RIVER, OKLAHOMA

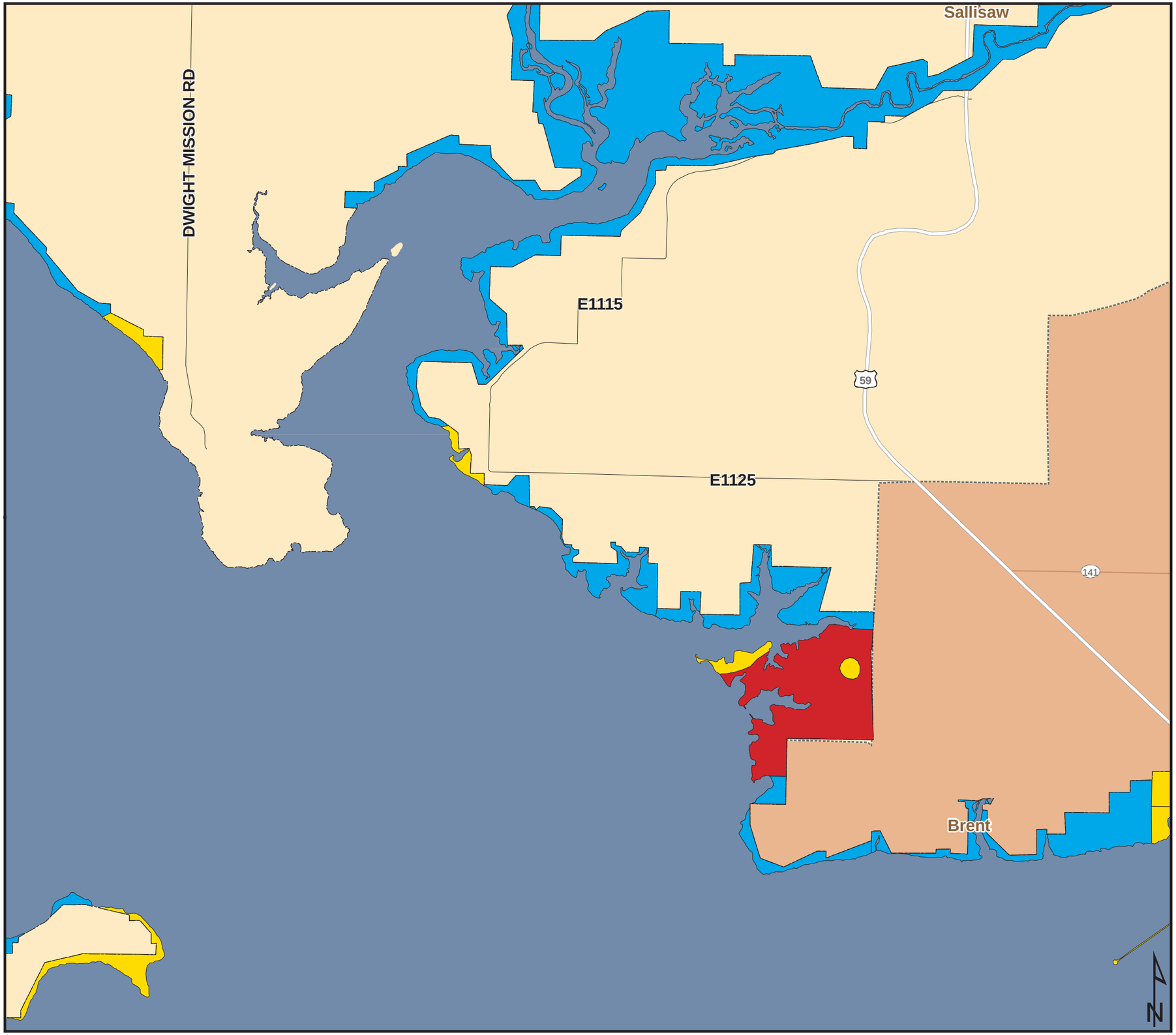
ROBERT S. KERR RESERVOIR

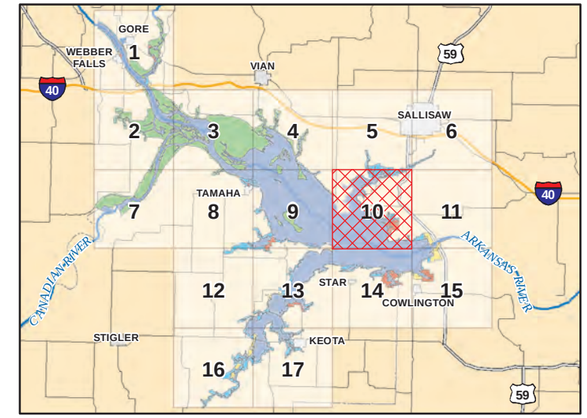
ROBERT S. KERR MASTER PLAN

LAND CLASSIFICATION (SHEET 09)

2,000 0 2,000 4,000 6,000 FEET

DATE:	MAP NO.
AUGUST 2015	RSKERR15MP-OC-09





FEE BOUNDARY

WATER SURFACE

LAND CLASSIFICATION

PROJECT OPERATIONS

HIGH DENSITY RECREATION

LOW DENSITY RECREATION

WILDLIFE MANAGEMENT

ENVIRONMENTALLY SENSITIVE

U.S. ARMY CORPS OF ENGINEERS

TULSA DISTRICT

ROBERT S. KERR LOCK AND DAM AND RESERVOIR — ARKANSAS RIVER, OKLAHOMA

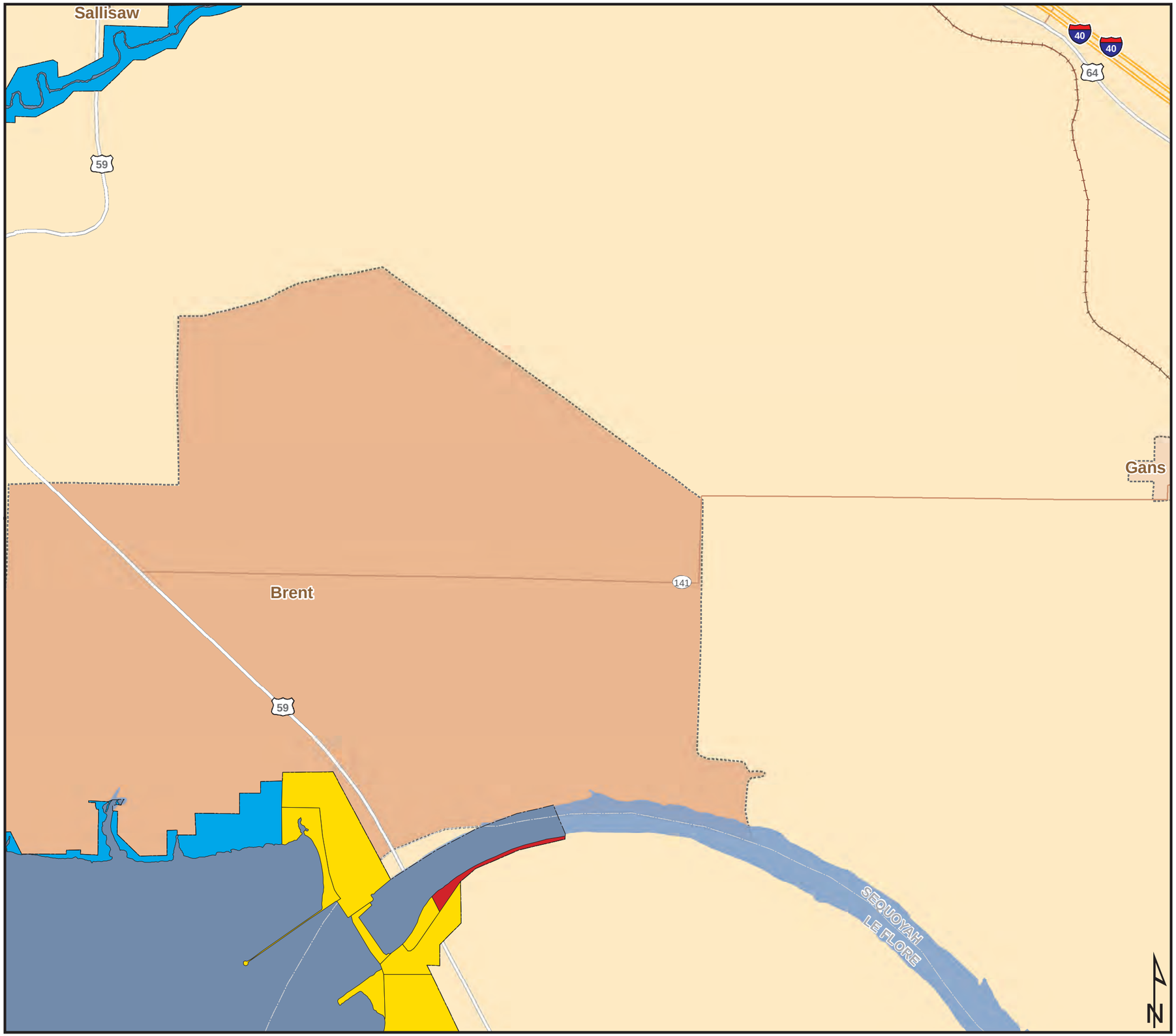
ROBERT S. KERR RESERVOIR

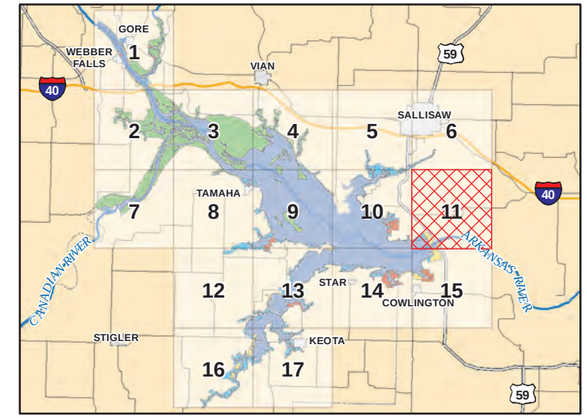
ROBERT S. KERR MASTER PLAN

LAND CLASSIFICATION (SHEET 10)

2,000 0 2,000 4,000 6,000 FEET

DATE:	MAP NO.
AUGUST 2015	RSKERR15MP-OC-10





FEE BOUNDARY

WATER SURFACE

LAND CLASSIFICATION

PROJECT OPERATIONS

HIGH DENSITY RECREATION

LOW DENSITY RECREATION

WILDLIFE MANAGEMENT

ENVIRONMENTALLY SENSITIVE

U.S. ARMY CORPS OF ENGINEERS

TULSA DISTRICT

ROBERT S. KERR LOCK AND DAM AND RESERVOIR — ARKANSAS RIVER, OKLAHOMA

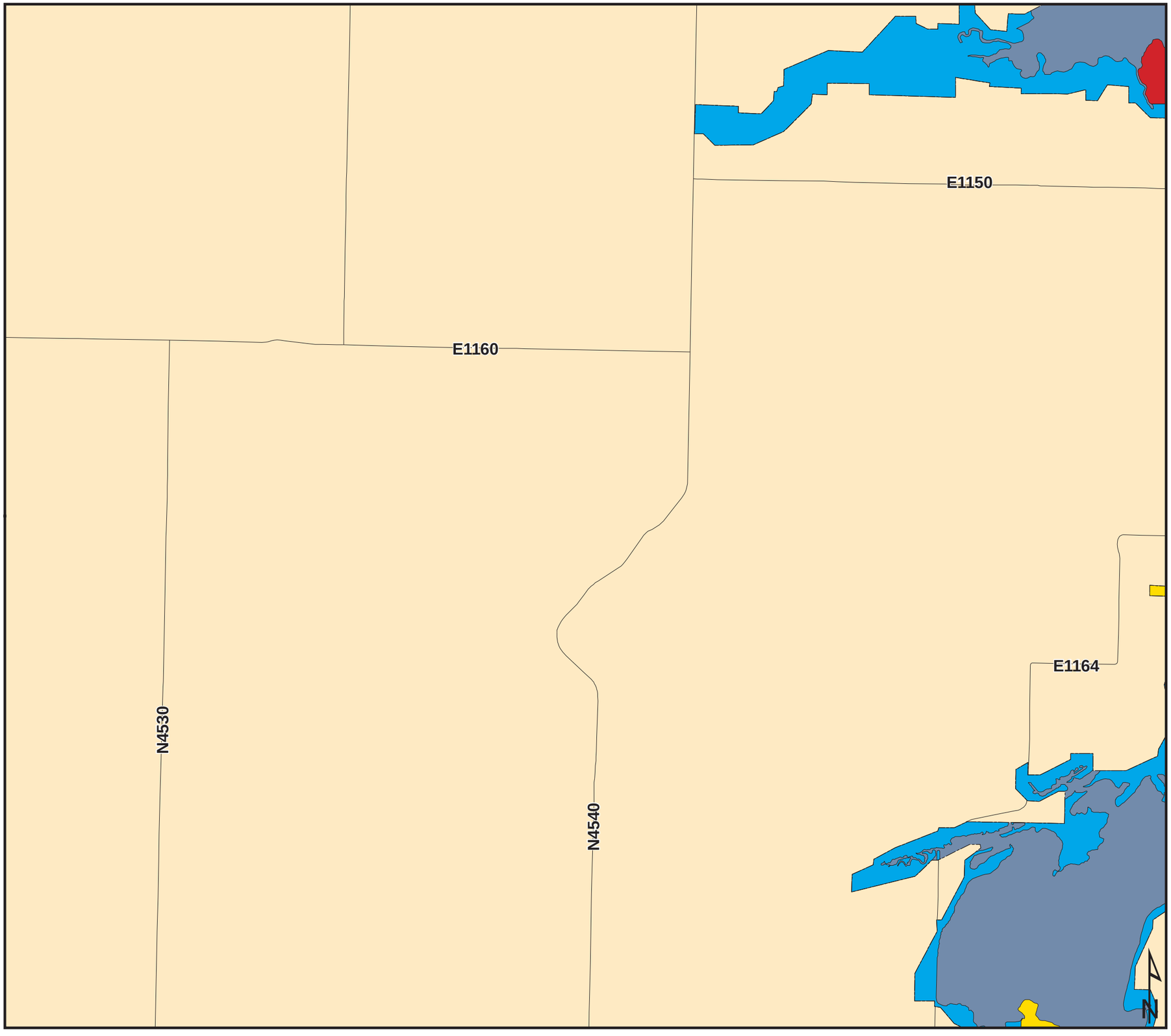
ROBERT S. KERR RESERVOIR

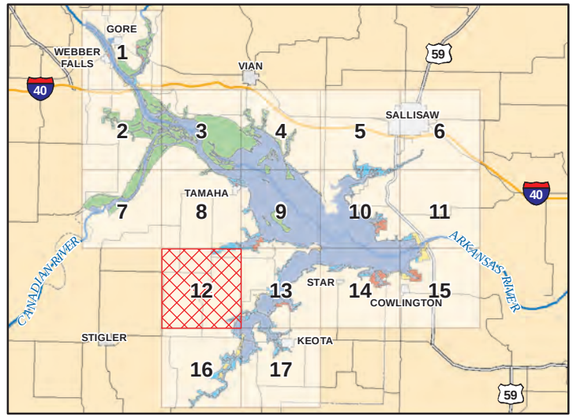
ROBERT S. KERR MASTER PLAN

LAND CLASSIFICATION (SHEET 11)

2,000 0 2,000 4,000 6,000 FEET

DATE:	MAP NO.
AUGUST 2015	RSKERR15MP-OC-11





FEE BOUNDARY

WATER SURFACE

LAND CLASSIFICATION

PROJECT OPERATIONS

HIGH DENSITY RECREATION

LOW DENSITY RECREATION

WILDLIFE MANAGEMENT

ENVIRONMENTALLY SENSITIVE

U.S. ARMY CORPS OF ENGINEERS

TULSA DISTRICT

ROBERT S. KERR LOCK AND DAM AND RESERVOIR — ARKANSAS RIVER, OKLAHOMA

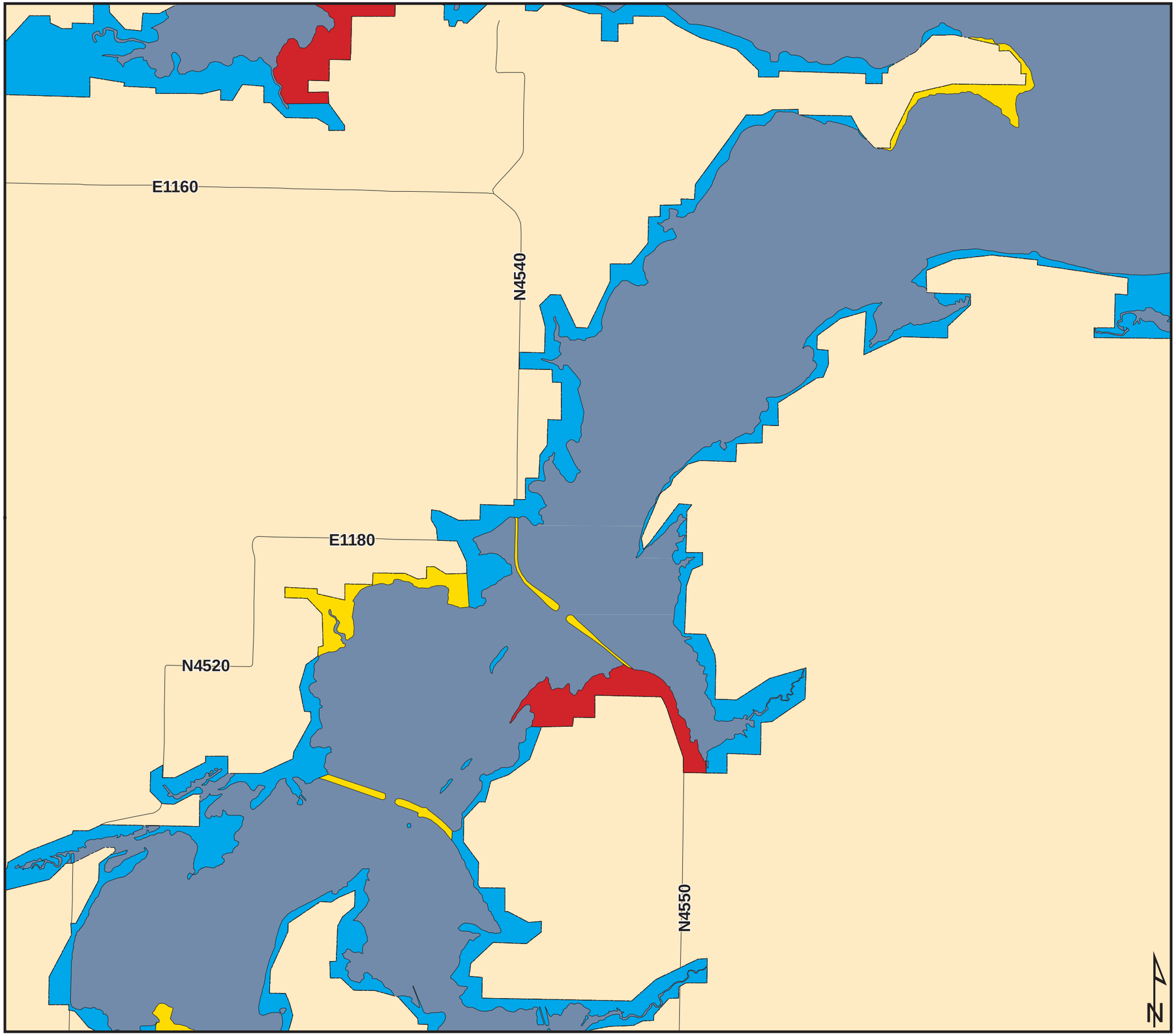
ROBERT S. KERR RESERVOIR

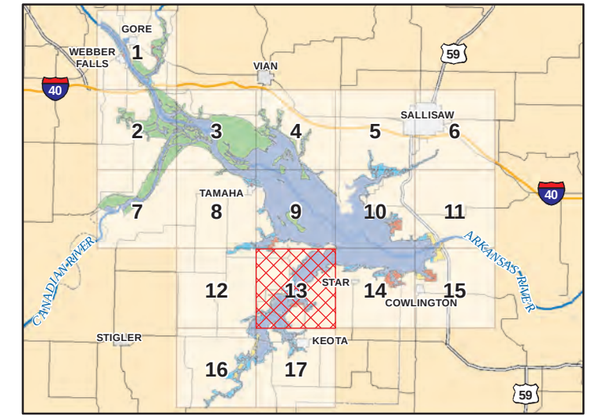
ROBERT S. KERR MASTER PLAN

LAND CLASSIFICATION (SHEET 12)

2,000 0 2,000 4,000 6,000 FEET

DATE:	MAP NO.
AUGUST 2015	RSKERR15MP-OC-12





FEE BOUNDARY

WATER SURFACE

LAND CLASSIFICATION

PROJECT OPERATIONS

HIGH DENSITY RECREATION

LOW DENSITY RECREATION

WILDLIFE MANAGEMENT

ENVIRONMENTALLY SENSITIVE

U.S. ARMY CORPS OF ENGINEERS

TULSA DISTRICT

ROBERT S. KERR LOCK AND DAM AND RESERVOIR — ARKANSAS RIVER, OKLAHOMA

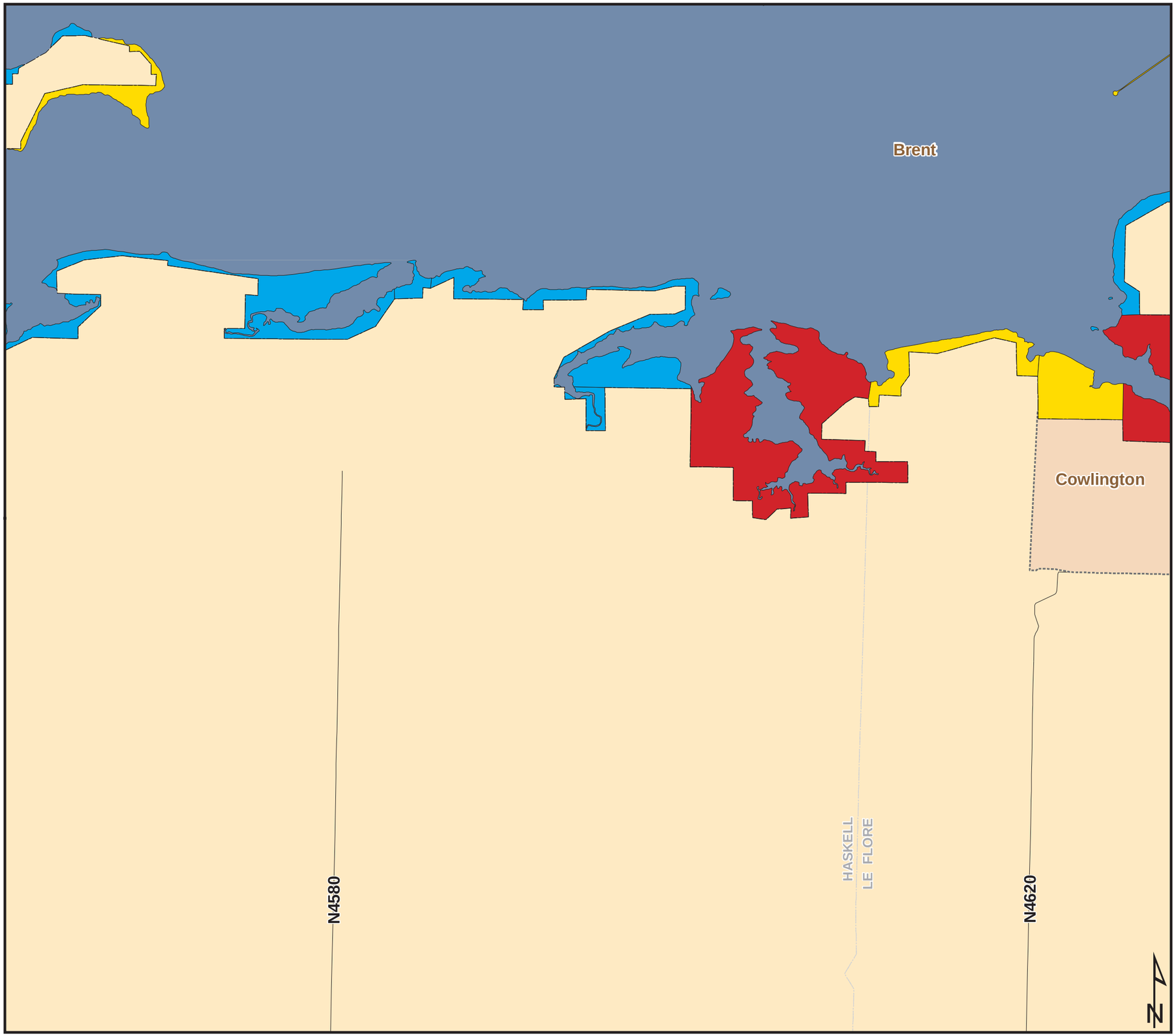
ROBERT S. KERR RESERVOIR

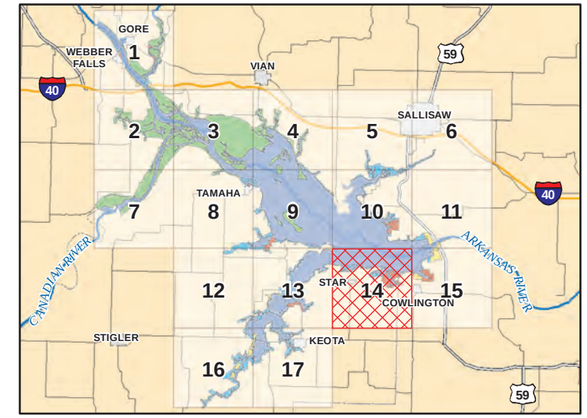
ROBERT S. KERR MASTER PLAN

LAND CLASSIFICATION (SHEET 13)

2,000 0 2,000 4,000 6,000 FEET

DATE:	MAP NO.
AUGUST 2015	RSKERR15MP-OC-13





FEE BOUNDARY

WATER SURFACE

LAND CLASSIFICATION

PROJECT OPERATIONS

HIGH DENSITY RECREATION

LOW DENSITY RECREATION

WILDLIFE MANAGEMENT

ENVIRONMENTALLY SENSITIVE

U.S. ARMY CORPS OF ENGINEERS

TULSA DISTRICT

ROBERT S. KERR LOCK AND DAM AND RESERVOIR — ARKANSAS RIVER, OKLAHOMA

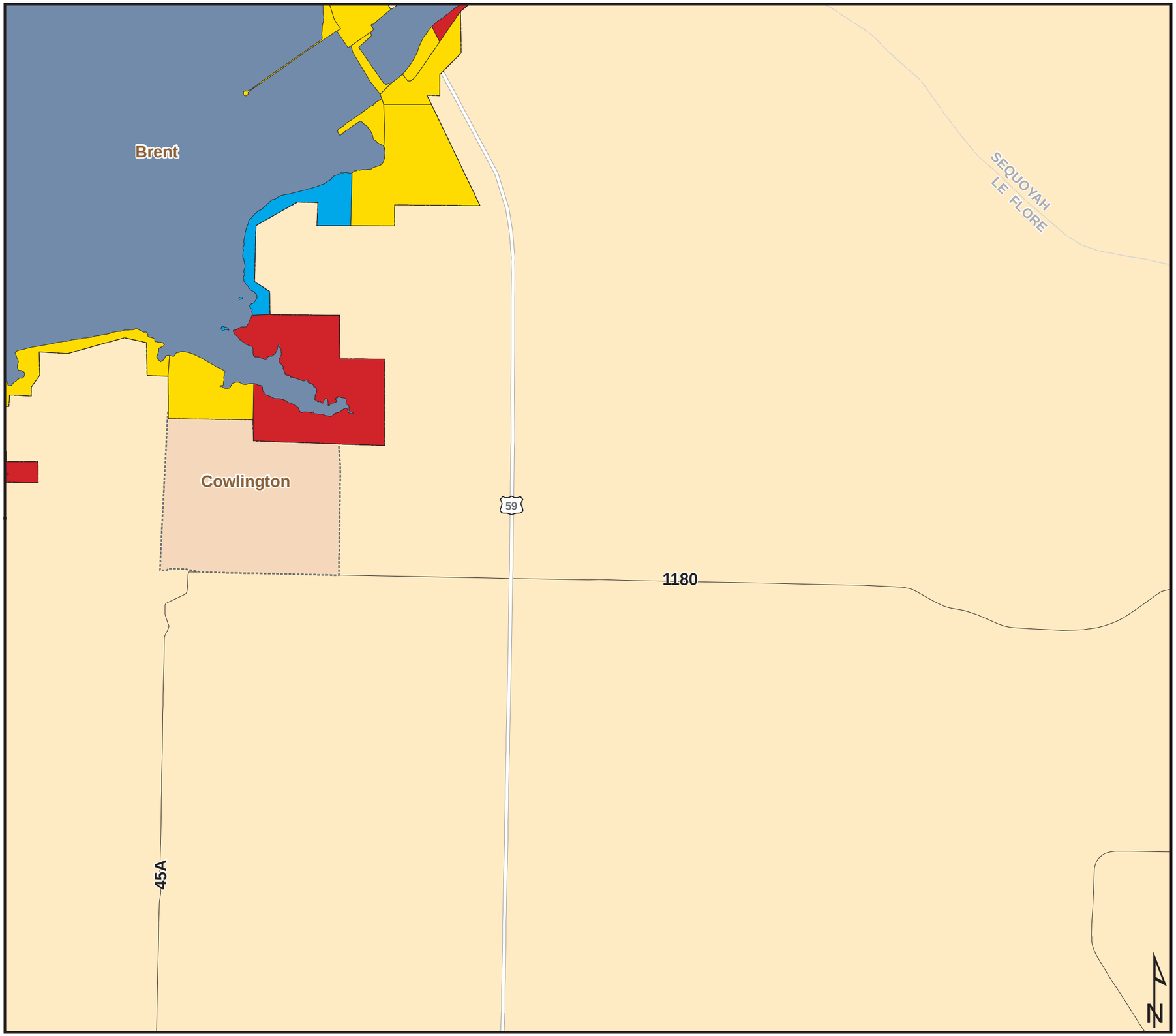
ROBERT S. KERR RESERVOIR

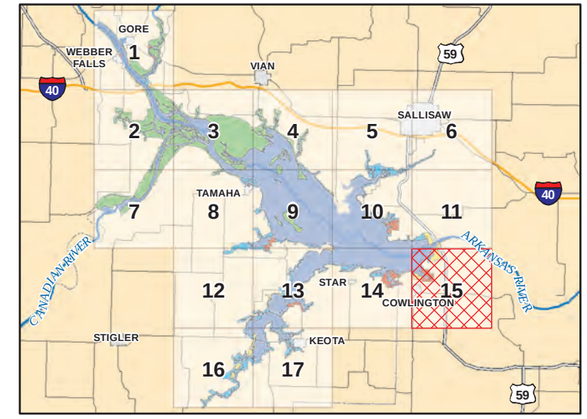
ROBERT S. KERR MASTER PLAN

LAND CLASSIFICATION (SHEET 14)

2,000 0 2,000 4,000 6,000 FEET

DATE:	MAP NO.
AUGUST 2015	RSKERR15MP-OC-14





FEE BOUNDARY

WATER SURFACE

LAND CLASSIFICATION

PROJECT OPERATIONS

HIGH DENSITY RECREATION

LOW DENSITY RECREATION

WILDLIFE MANAGEMENT

ENVIRONMENTALLY SENSITIVE

U.S. ARMY CORPS OF ENGINEERS

TULSA DISTRICT

ROBERT S. KERR LOCK AND DAM AND RESERVOIR — ARKANSAS RIVER, OKLAHOMA

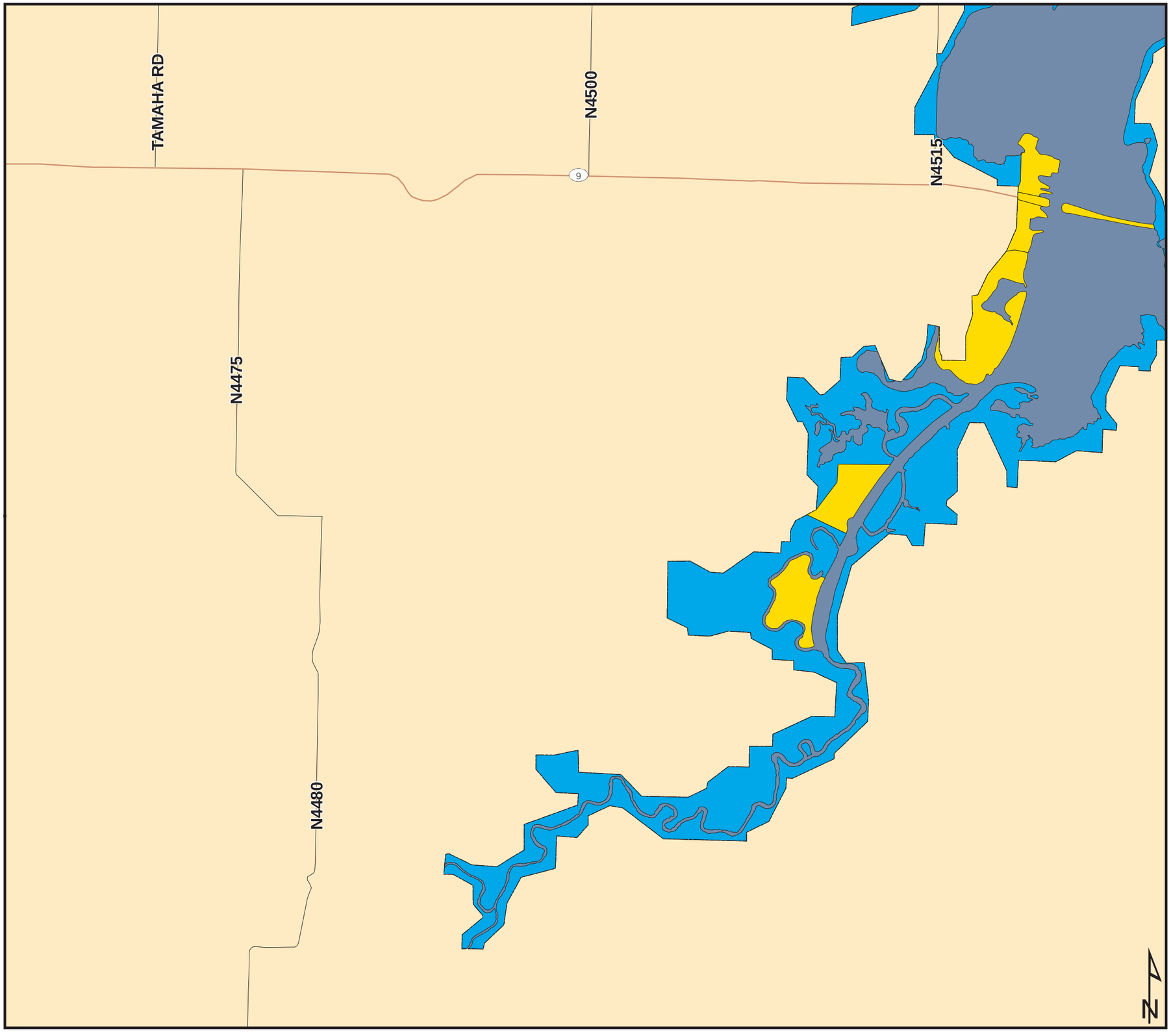
ROBERT S. KERR RESERVOIR

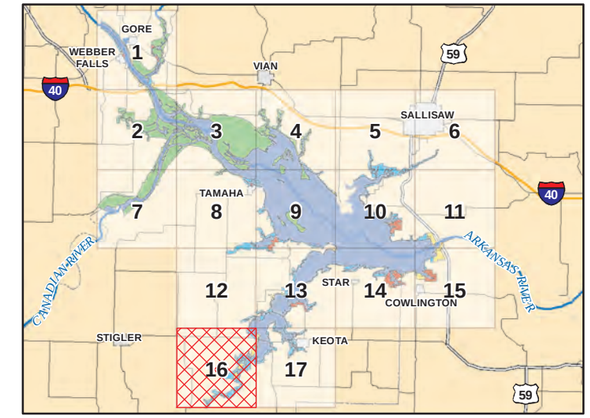
ROBERT S. KERR MASTER PLAN

LAND CLASSIFICATION (SHEET 15)

2,000 0 2,000 4,000 6,000 FEET

DATE:	MAP NO.
AUGUST 2015	RSKERR15MP-OC-15





FEE BOUNDARY

WATER SURFACE

LAND CLASSIFICATION

PROJECT OPERATIONS

HIGH DENSITY RECREATION

LOW DENSITY RECREATION

WILDLIFE MANAGEMENT

ENVIRONMENTALLY SENSITIVE

U.S. ARMY CORPS OF ENGINEERS

TULSA DISTRICT

ROBERT S. KERR LOCK AND DAM AND RESERVOIR — ARKANSAS RIVER, OKLAHOMA

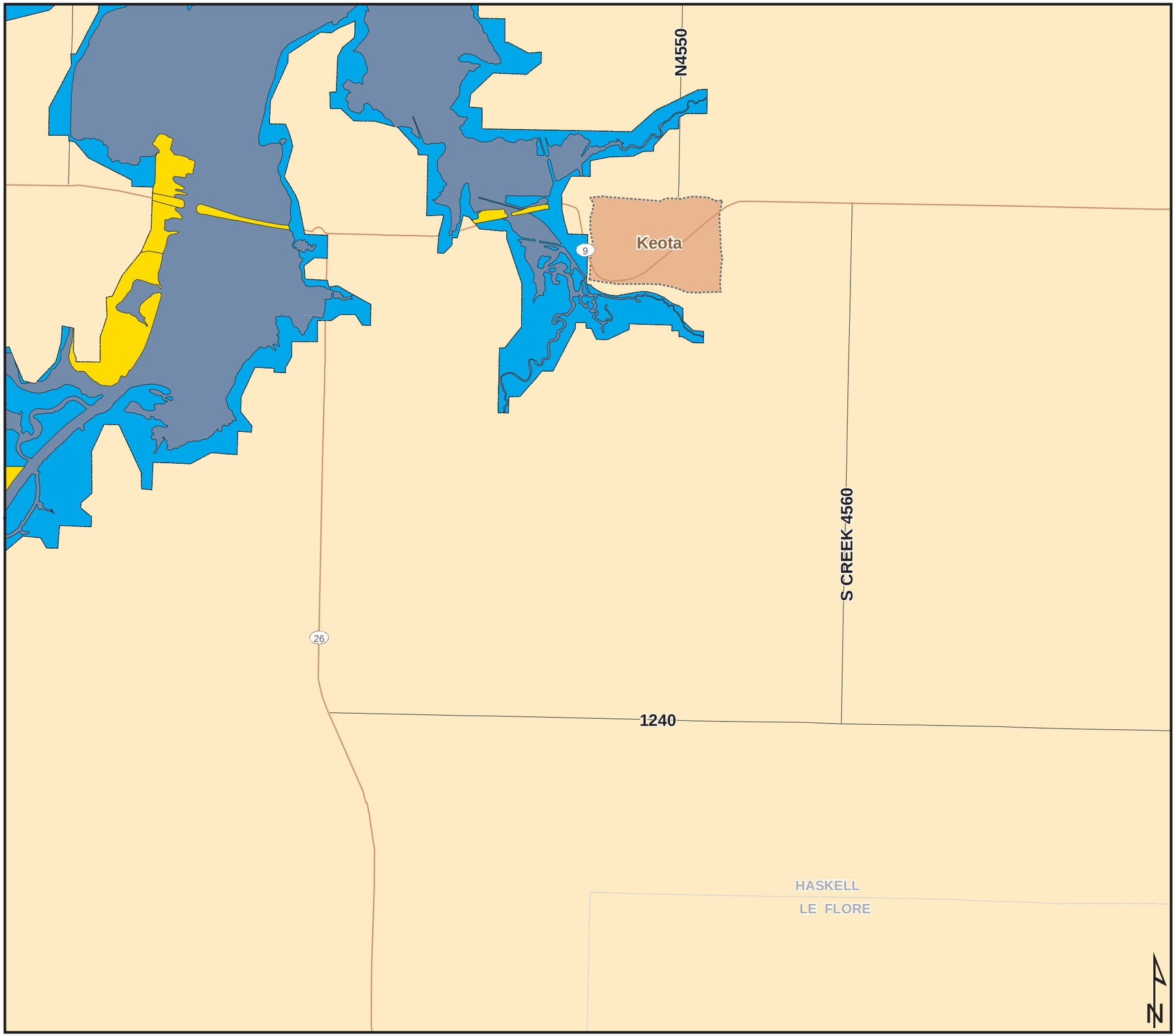
ROBERT S. KERR RESERVOIR

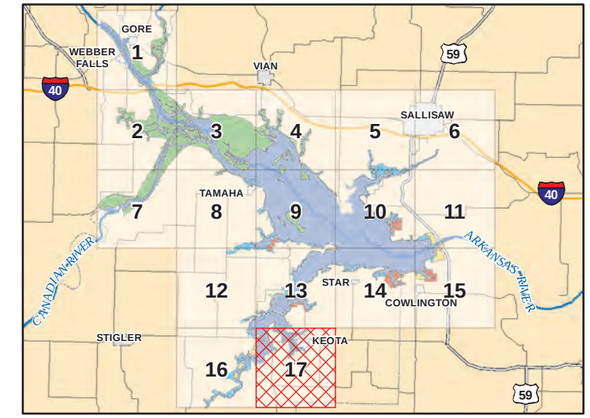
ROBERT S. KERR MASTER PLAN

LAND CLASSIFICATION (SHEET 16)

2,000 0 2,000 4,000 6,000 FEET

DATE:	MAP NO.
AUGUST 2015	RSKERR15MP-OC-16





FEE BOUNDARY

WATER SURFACE

LAND CLASSIFICATION

PROJECT OPERATIONS

HIGH DENSITY RECREATION

LOW DENSITY RECREATION

WILDLIFE MANAGEMENT

ENVIRONMENTALLY SENSITIVE

U.S. ARMY CORPS OF ENGINEERS

TULSA DISTRICT

ROBERT S. KERR LOCK AND DAM AND RESERVOIR — ARKANSAS RIVER, OKLAHOMA

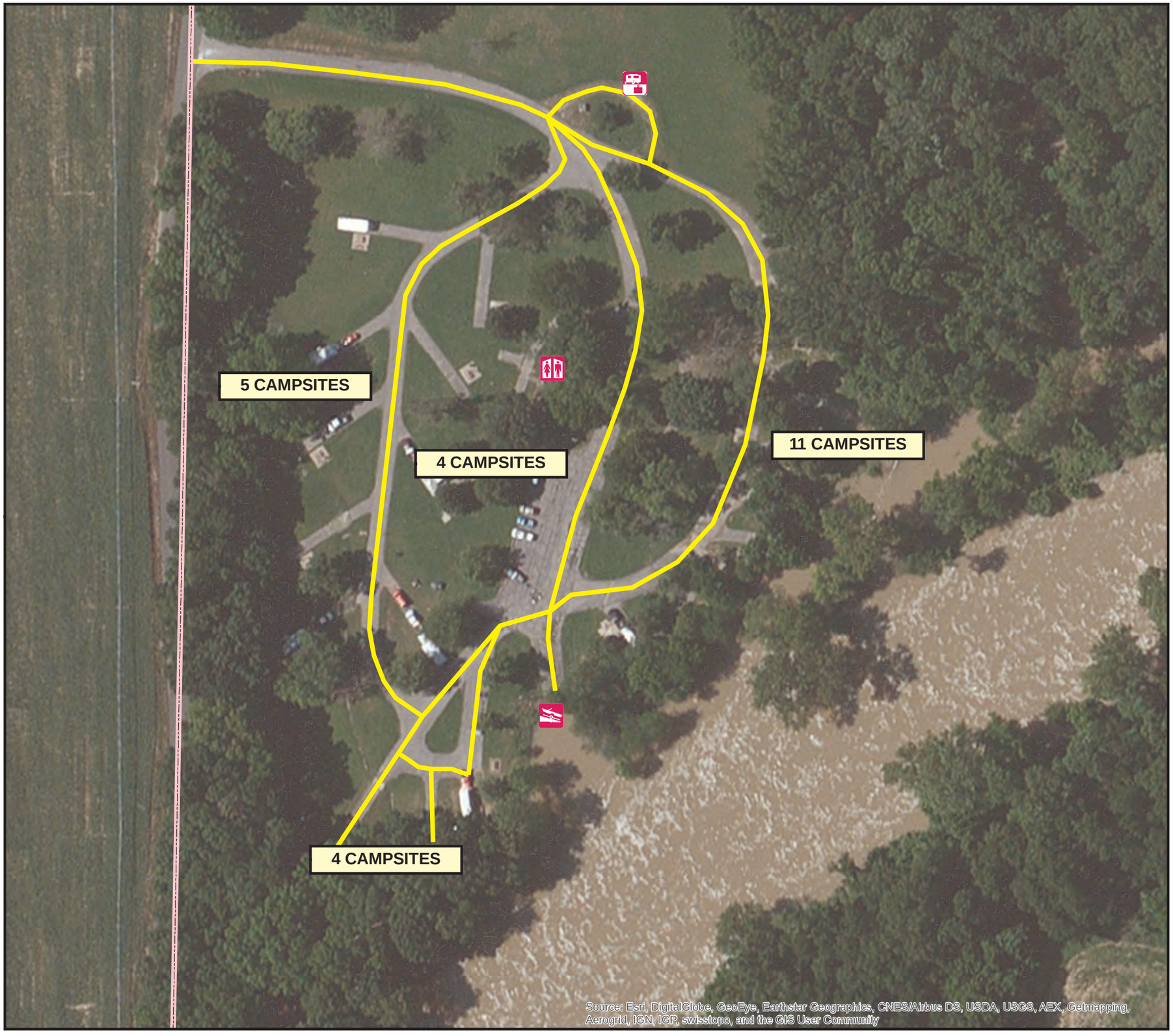
ROBERT S. KERR RESERVOIR

ROBERT S. KERR MASTER PLAN

LAND CLASSIFICATION (SHEET 17)

2,000 0 2,000 4,000 6,000 FEET

DATE:	MAP NO.
AUGUST 2015	RSKERR15MP-OC-17



ITEM	EXISTING
BOAT RAMP LANES	1
CAMPSITE	24
PEDESTAL COOKER	19
FIRERING	10
UITLITY TABLE	9
WATER HYDRANT	1
VAULT TOILET	1
DUMP STATION	1

- FEE BOUNDARY
- BOAT RAMP
- CAMPSITE (WITH ELECT. HOOKUP)
- COURTESY DOCK
- GROUP PICNIC SHELTER
- PICNIC SITE
- VAULT TOILET
- OVERLOOK
- DUMP STATION
- VISITOR'S CENTER
- SHOWERS

U.S. ARMY CORPS OF ENGINEERS

TULSA DISTRICT

ROBERT S. KERR LOCK AND DAM AND RESERVOIR — ARKANSAS RIVER, OKLAHOMA

ROBERT S. KERR RESERVOIR

ROBERT S. KERR MASTER PLAN

RECREATIONAL MAP (GORE LANDING NORTH)

N

0 50 100 150 200 FEET

DATE:	MAP NO.
AUGUST 2015	RSKERR15MP-OR-01

ITEM	EXISTING
BOAT RAMP LANES	1
COURTESY DOCK	1
VAULT TOILET	1
DUMP STATION	1

- FEE BOUNDARY
- BOAT RAMP
- CAMPSITE
- CAMPSITE (WITH ELECT. HOOKUP)
- COURTESY DOCK
- GROUP PICNIC SHELTER
- PICNIC SITE
- VAULT TOILET
- OVERLOOK
- DUMP STATION
- VISITOR'S CENTER
- SHOWERS

U.S. ARMY CORPS OF ENGINEERS

TULSA DISTRICT

ROBERT S. KERR LOCK AND DAM AND RESERVOIR — ARKANSAS RIVER, OKLAHOMA

ROBERT S. KERR RESERVOIR

ROBERT S. KERR MASTER PLAN

RECREATIONAL MAP (VIAN CREEK)

N

0 75 150 225 300 FEET

DATE:	MAP NO.
AUGUST 2015	RSKERR15MP-OR-02

ITEM	EXISTING
BOAT RAMP LANES	1
WATER HYDRANT	2
VAULT TOILET	2
DUMP STATION	1

- FEE BOUNDARY
- BOAT RAMP
- CAMPSITE
- CAMPSITE (WITH ELECT. HOOKUP)
- COURTESY DOCK
- GROUP PICNIC SHELTER
- PICNIC SITE
- VAULT TOILET
- OVERLOOK
- DUMP STATION
- VISITOR'S CENTER
- SHOWERS

U.S. ARMY CORPS OF ENGINEERS

TULSA DISTRICT

ROBERT S. KERR LOCK AND DAM AND RESERVOIR — ARKANSAS RIVER, OKLAHOMA

ROBERT S. KERR RESERVOIR

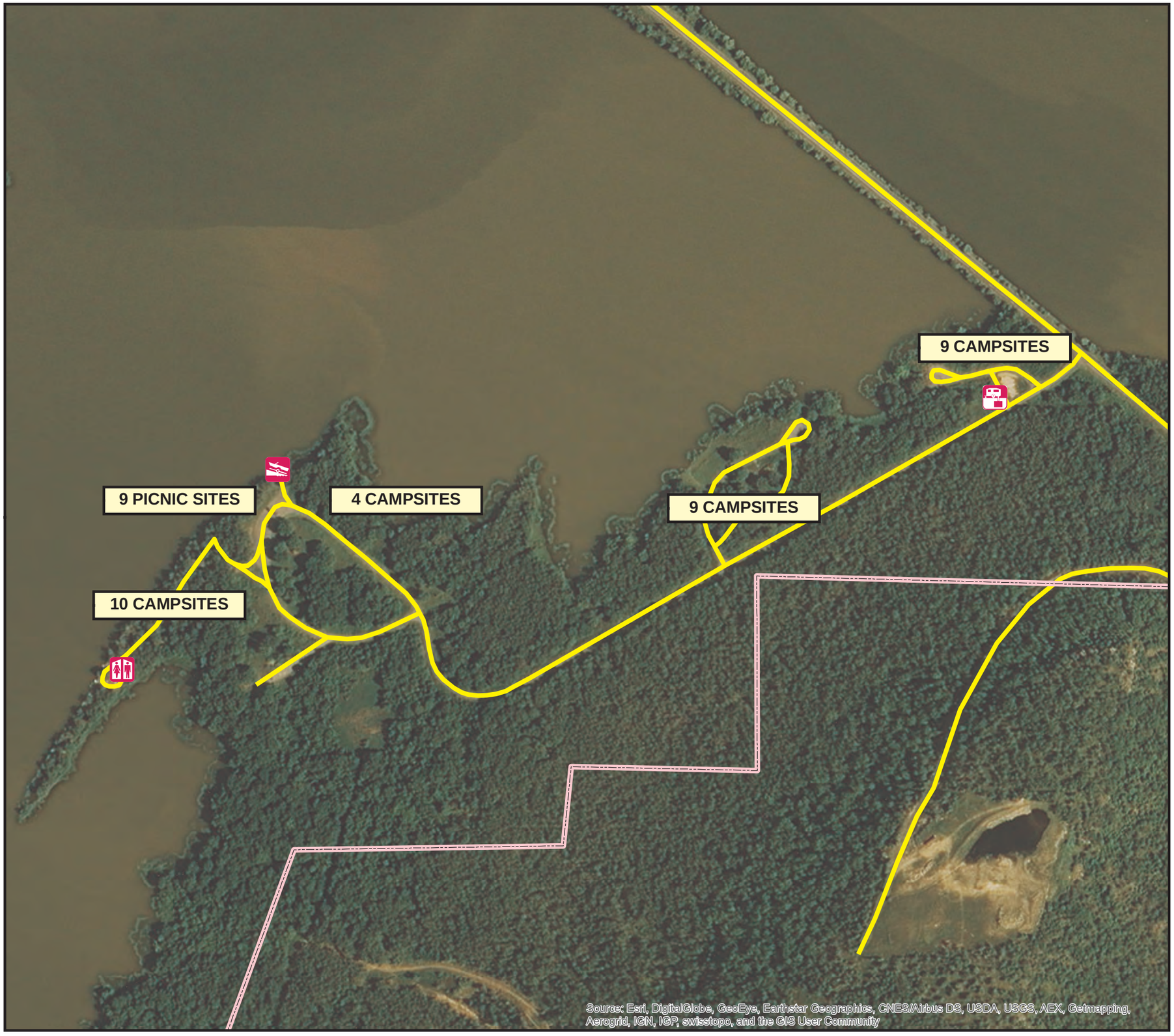
ROBERT S. KERR MASTER PLAN

RECREATIONAL MAP (LITTLE SANBOIS CREEK)

N

0 150 300 450 600 FEET

DATE:	MAP NO.
AUGUST 2015	RSKERR15MP-OR-03



ITEM	EXISTING
BOAT RAMP LANES	1
CAMPSITE	32
PEDESTAL COOKER	35
FIRERING	1
UITLITY TABLE	32
PICNIC SITE	9
VAULT TOILET	1
DUMP STATION	1

- FEE BOUNDARY
- BOAT RAMP
- CAMPSITE (WITH ELECT. HOOKUP)
- COURTESY DOCK
- GROUP PICNIC SHELTER
- VAULT TOILET
- OVERLOOK
- DUMP STATION
- VISITOR'S CENTER
- SHOWERS

U.S. ARMY CORPS OF ENGINEERS

TULSA DISTRICT

ROBERT S. KERR LOCK AND DAM AND RESERVOIR — ARKANSAS RIVER, OKLAHOMA

ROBERT S. KERR RESERVOIR

ROBERT S. KERR MASTER PLAN

RECREATIONAL MAP (KEOTA LANDING)

N

0 210 420 630 840 FEET

DATE:	MAP NO.
AUGUST 2015	RSKERR15MP-OR-04

ITEM	EXISTING
BOAT RAMP LANES	2
CAMPSITE	28
PEDESTAL COOKER	51
ELECTRICAL HOOK-UP	23
FIRERING	16
UITLITY TABLE	28
COURTESY DOCK	1
GROUP PICNIC SHELTER	2
PICNIC SITE	50
VAULT TOILET	2
RESTROOMS (WATERBORNE)	
SHOWERS	2
DUMP STATION	1

FEE BOUNDARY
BOAT RAMP
COURTESY DOCK
GROUP PICNIC SHELTER
VAULT TOILET
OVERLOOK
DUMP STATION
VISITOR'S CENTER
SHOWERS

U.S. ARMY CORPS OF ENGINEERS

TULSA DISTRICT

ROBERT S. KERR LOCK AND DAM AND RESERVOIR — ARKANSAS RIVER, OKLAHOMA

ROBERT S. KERR RESERVOIR

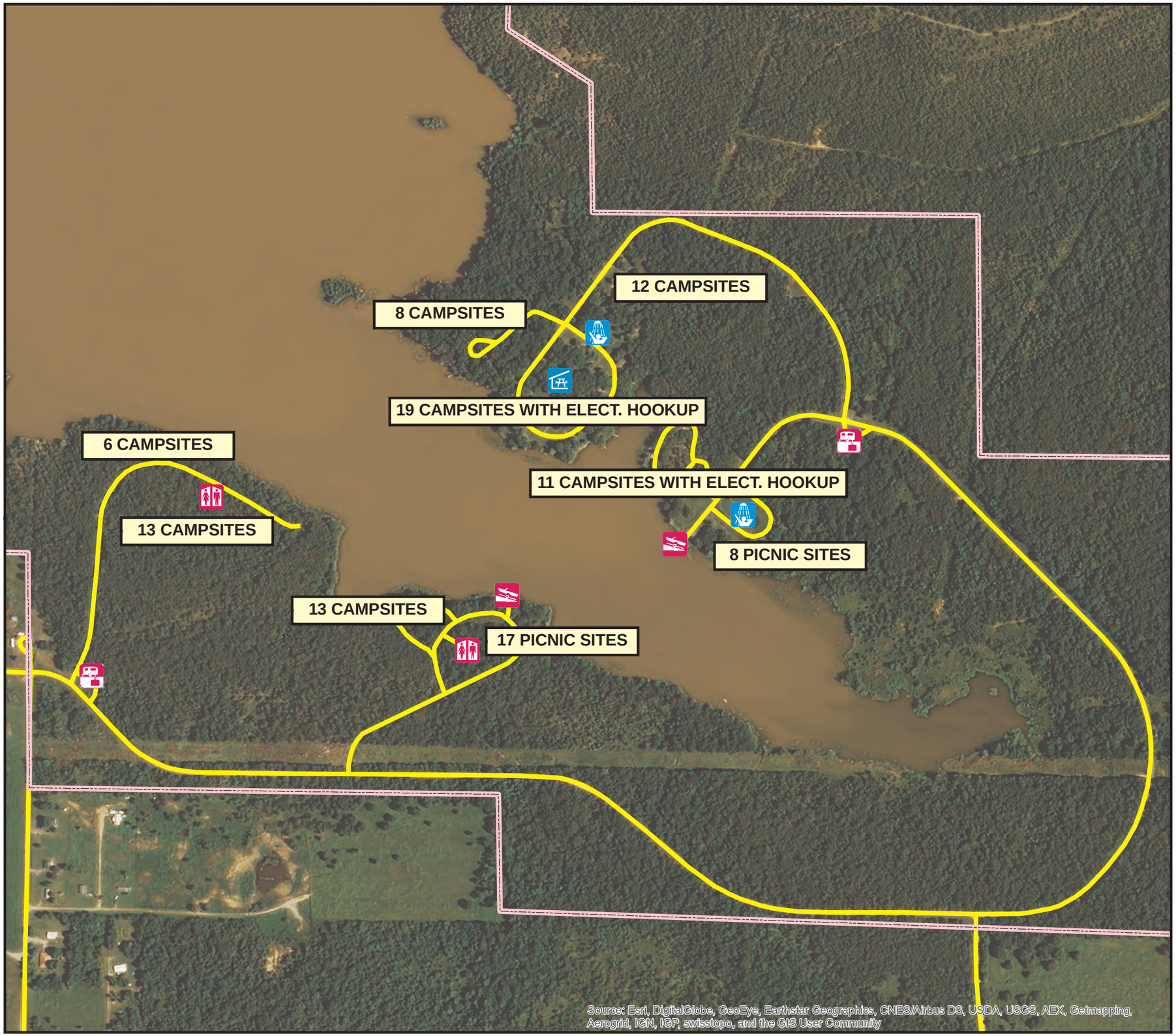
ROBERT S. KERR MASTER PLAN

RECREATIONAL MAP
(COWLINGTON POINT)

N

0 250 500 750 1,000 FEET

DATE:	MAP NO.
AUGUST 2015	RSKERR15MP-OR-05



ITEM	EXISTING
BOAT RAMP LANES	2
CAMPSITE	76
PEDESTAL COOKER	84
ELECTRICAL HOOK-UP	32
FIRERING	11
UITLITY TABLE	81
GROUP PICNIC SHELTER	1
PICNIC SITE	25
VAULT TOILET	2
RESTROOMS (WATERBORNE)	
SHOWERS	2
DUMP STATION	1

FEE BOUNDARY
BOAT RAMP
COURTESY DOCK
GROUP PICNIC SHELTER
VAULT TOILET
OVERLOOK
DUMP STATION
VISITOR'S CENTER
SHOWERS

U.S. ARMY CORPS OF ENGINEERS

TULSA DISTRICT

ROBERT S. KERR LOCK AND DAM AND RESERVOIR — ARKANSAS RIVER, OKLAHOMA

ROBERT S. KERR RESERVOIR

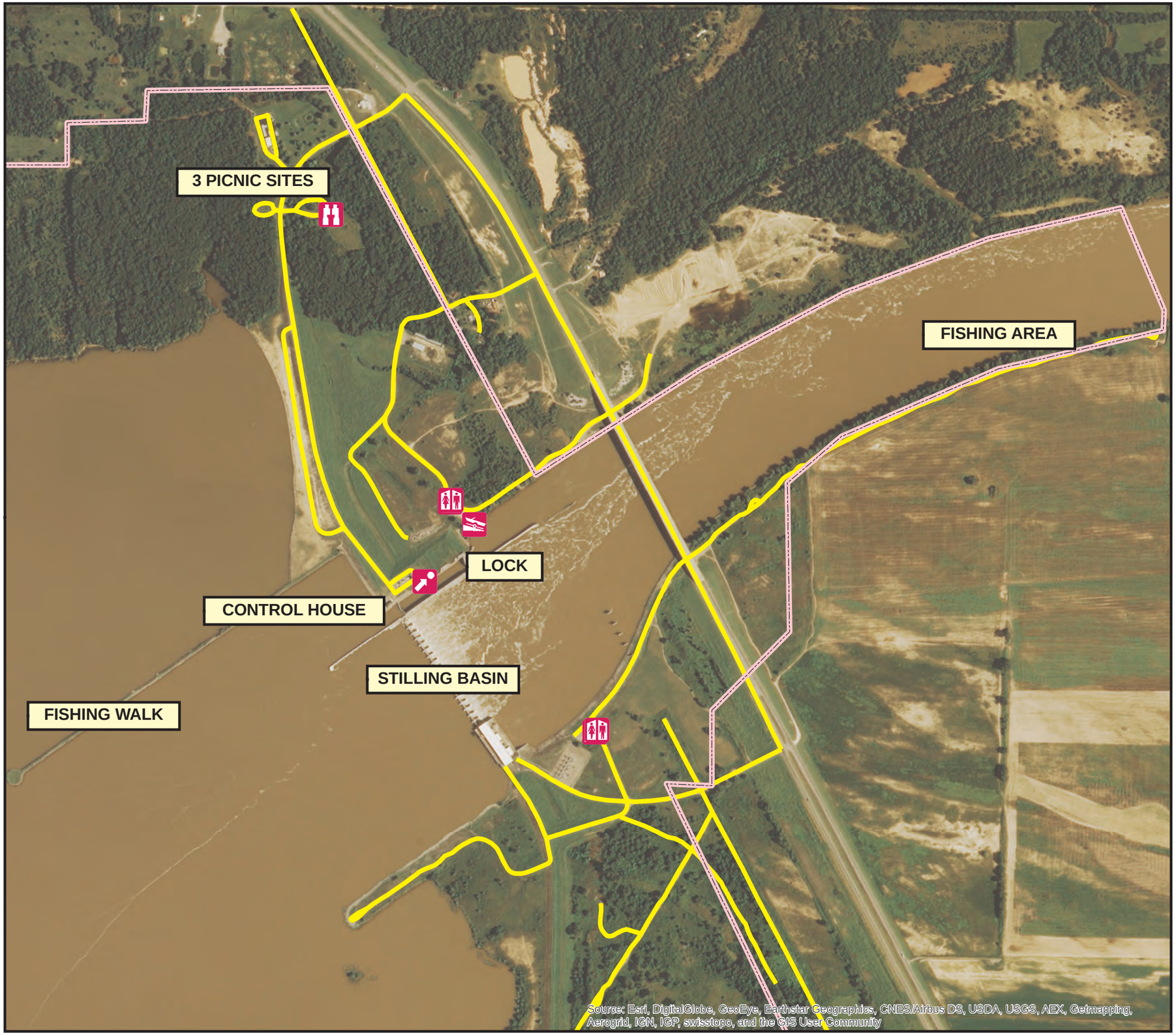
ROBERT S. KERR MASTER PLAN

RECREATIONAL MAP
(SHORT MOUNTAIN COVE)

N

0 375 750 1,125 1,500 FEET

DATE:	MAP NO.
AUGUST 2015	RSKERR15MP-OR-06



ITEM	EXISTING
BOAT RAMP LANES	1
RESTROOM (WATERBORNE)	2
CHANGE HOUSE	4
PICNIC SITE	3
VAULT TOILET	4

- FEE BOUNDARY
- BOAT RAMP
- CAMPSITE (WITH ELECT. HOOKUP)
- COURTESY DOCK
- GROUP PICNIC SHELTER
- VAULT TOILET
- OVERLOOK
- DUMP STATION
- VISITOR'S CENTER
- SHOWERS

U.S. ARMY CORPS OF ENGINEERS

TULSA DISTRICT

ROBERT S. KERR LOCK AND DAM AND RESERVOIR — ARKANSAS RIVER, OKLAHOMA

ROBERT S. KERR RESERVOIR

ROBERT S. KERR MASTER PLAN

RECREATIONAL MAP
(FISHERMAN'S LANDING)

N

0 500 1,000 1,500 2,000 FEET

DATE:	MAP NO.
AUGUST 2015	RSKERR15MP-OR-07

ITEM	EXISTING
BOAT RAMP LANES	2
CAMPSITE	27
PEDESTAL COOKER	26
ELECTRICAL HOOK-UP	27
UITLITY TABLE	27
WATER HYDRANT	21
COURTESY DOCK	1
GROUP PICNIC SHELTER	1
PICNIC SITE	14
DUMP STATION	1
RESTROOM (WATERBORNE)	
SHOWERS	1
VAULT TOILET	2

FEE BOUNDARY
BOAT RAMP
COURTESY DOCK
GROUP PICNIC SHELTER
VAULT TOILET
OVERLOOK
DUMP STATION
VISITOR'S CENTER
SHOWERS

U.S. ARMY CORPS OF ENGINEERS

TULSA DISTRICT

ROBERT S. KERR LOCK AND DAM AND RESERVOIR — ARKANSAS RIVER, OKLAHOMA

ROBERT S. KERR RESERVOIR

ROBERT S. KERR MASTER PLAN

RECREATIONAL MAP
(APPLEGATE COVE)

N

0 250 500 750 1,000 FEET

DATE:	MAP NO.
AUGUST 2015	RSKERR15MP-OR-08

APPENDIX B - NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) DOCUMENTATION

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Environmental Assessment
for the

Robert S. Kerr Lock and Dam and Reservoir Master Plan

Le Flore, Muskogee, Sequoyah, and Haskell Counties, Oklahoma

Arkansas River

September 2015

US Army Corps
of Engineers
Tulsa District

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FINDING OF NO SIGNIFICANT IMPACT
ROBERT S. KERR LOCK AND DAM AND RESERVOIR MASTER PLAN
ARKANSAS RIVER, OKLAHOMA

In accordance with the National Environmental Policy Act of 1969, including guidelines in 33 Code of Federal Regulations, Part 230, the Tulsa District and the Regional Planning and Environmental Center (RPEC) of the U.S. Army Corps of Engineers (USACE) have assessed the environmental impacts of the Robert S. Kerr Lock and Dam and Reservoir Master Plan review.

The revised Master Plan will provide guidance for stewardship of natural resources and management for long-term public access to, and use of, the natural resources of Robert S. Kerr Reservoir. The Master Plan provides a comprehensive description of the project, a discussion of factors influencing resource management and development, the resource plan, describing how project lands and waters will be managed, an identification and discussion of special problems, a synopsis of public involvement and input to the planning process, and descriptions of existing development.

Under the No Action alternative, USACE would be taking no action, which means the Master Plan would not be revised. With this alternative, no new resources analysis and land-use classifications would occur at the project. The operation and management of Robert S. Kerr Lock and Dam would continue as outlined in the current Master Plan. Because this alternative does not result in a Master Plan that meets current guidance and regulations, it was eliminated from further consideration.

The proposed action was reviewed, coordinated with the public, and updated to comply with current USACE regulations and guidance, and to reflect changes in land management and land uses that have occurred over time. This included refining land classifications that would meet authorized project purposes and determining current resource objectives that address a mix of natural resource and recreation management objectives that are compatible with regional goals. Required land classification changes associated with this action would include 13 reclassifications to balance resource objectives. This action results in the following:

Description	**Justification**
Reclassify 69 acres of the western area of Cowlington Point to Low Density Recreation.	This area has never been developed for High Density Recreation and current primary use is hunting.
Classify 18 acres of Least Tern managed habitat to Environmentally Sensitive Areas.	Least Tern is a federally threatened species. This habitat has been created from dredge material for the purpose of Least Tern habitat.
Reclassify the 539 acres of Restricted areas along bridges crossing public property to Project Operations.	This is consistent with how land use is managed.
Remove 1,050 acres Sallisaw Creek recreation area from federally managed property.	Sallisaw Creek recreation area has been transferred to the Bureau of Indian Affairs with the intent to dispose to the Cherokee Nation.
Reclassify all 160 acre lands classified as Industrial Use to Project Operations.	Current Master Plan guidance does not include Industrial classification. Project Operations is the best fit for the use of these lands.
Reclassify the 18 acre Recreation – Intensive Use area south of the dam lakeside known as Fisherman's Landing to Project Operations.	Project Operations is the correct classification for the use of these lands and is consistent with current land use management.
Reclassify 544 acres of Multipurpose areas to Project Operations where dredge disposal sites have been selected.	This is consistent with how land use is managed. Project Operations is the correct classification of these lands as these sites will continually be used as dredge disposal sites in the future.

Description	Justification
Reclassify the 6,006 acres of Multipurpose areas to Recreation – Low Density Use where dredge disposal sites have not been selected	Low Density Recreation Use best fits the use of these lands.
Reclassify the 48 acres of Quasi-Public areas to Low Density Recreation.	The classification of Quasi-Public lands is no longer a land classification under EP 1130-2-550. Low Density Recreation is more appropriate for this area, with the exception of the dredge disposal sites.
Reclassify the 2 acres of Project Operations on the eastern end riverside's Fisherman's Landing to High Density Recreation.	This is the location of a previous highway. Normal business practice classified these areas as Project Operations, yet the highway has been relocated. The area is not being used as an extension of Fisherman's Landing.
Reclassify the 21 acres of Kerr-McGee Corporation's industrial area to Environmentally Sensitive Area	The Kerr-McGee Corporation site, once an area for uranium production, should be changed to an Environmentally Sensitive Area due to site contamination found in 1986.
Reclassify 11 acres of Multipurpose areas upstream of the Consolidated Grain and Barge's port and facility to Project Operations.	The area upstream from this site is an extension of the existing port facility and across the river is used as a fleeting area for the port facility.
Classify Water Surface acres to 124 acres as Restricted, 40 acres as No-Wake, and 41,836 acres as Open Recreation.	Water Surface needs to be restricted near dam, lock, hydropower intakes, and USCG area for public safety and project security. Water Surface needs to be designated No-Wake near boat ramps and marinas for public safety. Classification of water surface complies with current Master Plan guidelines.

This action was chosen because it would meet regional goals associated with good stewardship of land and water resources, would meet regional recreation goals, and would allow for continued use and development of project lands without violating national policies or pubic laws.

The EA and comments received from other agencies have been used to determine whether the proposed action requires the preparation of an environmental impact statement (EIS). All environmental, social, and economic factors that are relevant to the recommended alternative were considered in this assessment. These include, but are not limited to, climate and climate change, environmental justice, cultural resources, air quality, prime farmland, water quality, wild and scenic rivers, wetlands, fish and wildlife, invasive species, migratory birds, recreational fisheries, and threatened and endangered species.

It is my finding, based on the EA that the revision of the 1973 Master Plan for Robert S. Kerr Reservoir will have no significant adverse impact to the environment and will not constitute a major Federal action significantly affecting the quality of the human environment. Therefore, an EIS will not be prepared.

15 Sep 15
Date

Richard A Pratt
Colonel, U.S. Army
District Commander

ENVIRONMENTAL ASSESSMENT ORGANIZATION

This Environmental Assessment (EA) evaluates the effects of implementing the revised Master Plan for Robert S. Kerr Lock & Dam & Reservoir in Le Flore, Muskogee, Sequoyah, and Haskell Counties, Oklahoma. This EA facilitates the decision process regarding the proposed action and alternatives.

SECTION 1	*INTRODUCTION, PURPOSE, NEED AND SCOPE* of the proposed action summarizes the purpose of a need for the proposed action, provides relevant background information and describes the scope of the EA.
SECTION 2	*ALTERNATIVES INCLUDING PROPOSED ACTION* examines alternatives for implementing the proposed action and describes the recommended action.
SECTION 3	*AFFECTED ENVIRONMENT* describes the existing environmental and socioeconomic setting *ENVIRONMENTAL CONSEQUENCES* identifies the potential environmental and socioeconomic effects of implementing the proposed action and alternatives, including cumulative effects. *MITIGATION* summarizes mitigation actions required to enable a Finding of No Significant Impact for the proposed alternative.
SECTION 4	*APPLICABLE ENVIRONMENTAL LAWS, REGULATIONS, and POLICY* provides a listing of environmental protection statutes and other environmental requirements.
SECTION 5	*FEDERAL, STATE AND LOCAL AGENCY COORDINATION* provides a listing of individuals and agencies consulted during preparation of the EA.
SECTION 6	*LIST OF PREPARERS* identifies persons who prepared the document and their areas of expertise.
SECTION 7	*REFERENCES* provides bibliographical information for cited sources
APPENDICES	*A* Alternatives Comparison to Key Selection Criteria
	B Agency Coordination

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TABLE OF CONTENTS

SECTION 1: INTRODUCTION 1
1.1 PURPOSE AND NEED FOR THE ACTION 1
1.2 SCOPE OF THE ACTION 1
1.3 PROJECT SETTING 2
SECTION 2: ALTERNATIVES 4
SECTION 3: AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION 8
3.1 CLIMATE 8
3.2 TOPOGRAPHY, PHYSIOGRAPHY, AND GEOLOGY 9
3.3 LAND USE 9
3.4 TERRESTRIAL RESOURCES 10
3.5 AQUATIC AND WATER RESOURCES 13
3.6 INVASIVE SPECIES 16
3.7 THREATENED AND ENDANGERED SPECIES 17
3.8 ARCHAEOLOGICAL AND HISTORIC RESOURCES 18
3.9 SOCIOECONOMIC RESOURCES AND ENVIRONMENTAL JUSTICE 25
3.10 AIR QUALITY 34
3.11 CLIMATE CHANGE AND GREENHOUSE GAS 35
3.12 HEALTH AND SAFETY 36
3.13 CUMULATIVE IMPACTS 37
SECTION 4: APPLICABLE FEDERAL LAWS 39
SECTION 5: FEDERAL, STATE, AND LOCAL AGENCY COORDINATION 43
SECTION 6: LIST OF PREPARERS 44
SECTION 7: BIBLIOGRAPHY 45
APPENDIX A: Alternatives Comparison to Key Selection Criteria 46
APPENDIX B: Agency Coordination 50

LIST OF FIGURES AND TABLES

Figure 1.1 Vicinity Map 2

Table 2.1 Land Use Classification Changes Associated With the Proposed Action 7

Table 3.1 2013 Population Estimates and 2065 Projections 26

Table 3.2 2013 Percent of Population Estimate by Gender 26

Table 3.3 2013 Population Estimate by Age Group 27

Table 3.4 2013 Population Estimate by Race/Hispanic Origin 28

Table 3.5 2013 Population Estimate by Highest Level of Educational Attainment, Population 25 Years of Age and Older 29

Table 3.6 2013 Annual Average Employment by Sector 30

Table 3.7 Labor Force, Employment and Unemployment Rates, 2014 Annual Averages 31

Table 3.8 2013 Households and Household Size 32

Table 3.9 Median and Per Capita Income, 2012 33

Table 3.10 Percent of Families and People Whose Income in the Past 12 Months is Below the Poverty Level (2013) 34

ENVIRONMENTAL ASSESSMENT
For the

Robert S. Kerr Lock and Dam and Reservoir Master Plan
Le Flore, Muskogee, Sequoyah, and Haskell Counties, Oklahoma

SECTION 1: INTRODUCTION

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

1.1 PURPOSE AND NEED FOR THE ACTION

The Master Plan for Robert S. Kerr Lock and Dam was last approved in September 1973 and supplemented in February 1981. Over time, several factors such as those listed below have influenced variations in usage and management of lands associated with Robert S. Kerr Lock and Dam. Therefore, it is necessary to revise the Master Plan for Robert S. Kerr Lock and Dam in order to record the most current land uses and land classifications associated with day to day operations of the Project.

<u>The following factors may influence reevaluation of management practices and land uses:</u>

- Changes in National Policies or Public Law Mandates
- Operations and Management Budget Fluctuations
- Recreation Area Closures
- Facility & Infrastructure Improvements
- Cooperative Agreements with other agencies such as Oklahoma Department of Wildlife Conservation (ODWC) and the United States Fish and Wildlife Service (USFWS) to operate & maintain public lands
- Evolving demands of the public

As a result of public coordination and a public information meeting, the project delivery team held a workshop March 3 – 6, 2015 to evaluate public comments, to evaluate current land uses and determine necessary changes to land classifications, and to formulate alternatives.

1.2 SCOPE OF THE ACTION

This Environmental Assessment (EA) was prepared to evaluate existing conditions and potential impacts of proposed alternatives. The alternative considerations were formulated to include all of Robert S. Kerr Reservoir and its appurtenant structures including the earthen embankment (dam), spillway, and outlet works; and surrounding lands up to an elevation commensurate with the top of the flood control pool. These

lands are comprised of all properties historically acquired to build the project including current U.S. Army Corps of Engineers (USACE) lands and those leased by USACE to or presently owned and operated by other governmental entities. This EA was prepared pursuant to the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) regulations (40 CFR,1500–1517), and USACE implementing regulation, Policy and Procedures for Implementing NEPA, Engineer Regulation (ER) 200-2-2 (1988).

1.3 PROJECT SETTING

Robert S. Kerr Lock and Dam are located on the Arkansas River at river mile 336.2 in Le Flore, Muskogee, Sequoyah and Haskell counties, Oklahoma. The reservoir is approximately 8 miles south of Sallisaw, Oklahoma as shown in Figure 1.1 below.

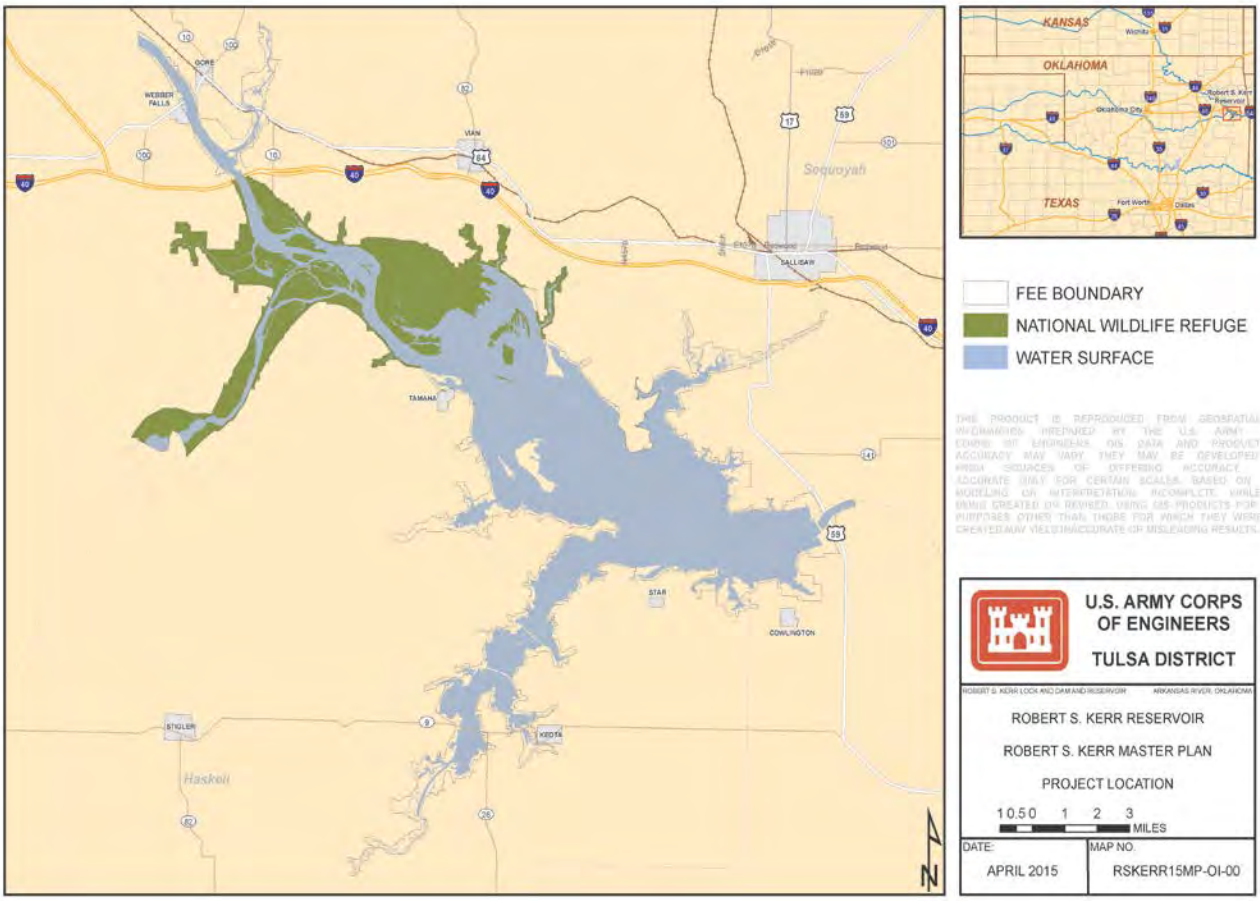

Figure 1.1 Vicinity Map

Robert S. Kerr Lock and Dam was authorized by the Flood Control Act of 17 May 1950 (Public Law 89-72 and 85-624, 79th Congress, Chapter 758, 2d Session) as a modification of the general comprehensive plan for flood control and other purposes approved by the Flood Control Act of 28 June 1938, and the multipurpose plan for the Arkansas River and Tributaries, Arkansas and Oklahoma, approved by the River and Harbor Act of 24 July 1946.

The reservoir encompasses a drainage area of approximately 147,756 square miles. Construction of the infrastructure features began in April 1964. The lock and dam became operational for navigation in December 1970. The four hydropower units were placed online and fully operational by November 1971.

The dam is approximately 75 feet above the streambed and constructed of rolled earth-filled material and is approximately 7,230 feet in length which encompasses the spillway, powerhouse intake, and navigation lock system. There are service roads to the right and left embankments primarily to allow access for authorized inspection or maintenance activities.

The spillway and outlet works incorporate a gated weir system that extends partly across the existing river channel and a portion of the right bank between the power improvements and the navigation lock. The spillway weir has a net length of 900 feet and is surmounted by eighteen 50 by 40 foot high tainter gates. The gates are separated by seventeen 10 foot piers, which support a 5 foot service roadway bridge.

The lock is located on the left side of the spillway, and is a single lift Ohio type system that integrates a culvert and port filling system which includes a chamber that is 110 feet wide by 600 feet long with a normal lift of 48 feet.

SECTION 2: ALTERNATIVES

Alternatives evaluated in this Environmental Assessment are compared to each other and to the No Action Alternative in order to identify the Preferred Alternative. The current project need is to revise the exiting Master Plan so that it is compliant with USACE regulation and guidance. As part of this process, which includes public outreach and comment, alternatives were developed for evaluation. Alternatives were developed using land allocation and land classifications. Land allocation is identified as the congressionally authorized purpose for which the project lands were classified. There are four categories of allocation identified as Operations, Recreation, Fish and Wildlife, and Mitigation. Land Classification indicates the primary use for which project lands area managed. There are five categories of classification identified as: Project Operations, High Density Recreation, Mitigation, Environmentally Sensitive Areas, and Multiple Resource Managed Lands. Multiple Resource Managed Lands are divided into four subcategories identified as: Low Density Recreation, Wildlife Management, Vegetative Management, and Future/Inactive Recreation Areas.

USACE guidance recommends the establishment of resource objectives for purposes of development, conservation and management of natural, cultural, and manmade resources at a project. They are guidelines for obtaining maximum public benefits while minimizing adverse impacts to the environment and are developed in accordance with: 1) authorized project purposes, 2) applicable laws and regulations, 3) resource capabilities and suitabilities, 4) regional needs, 5) other governmental plans and programs, and 6) expressed public desires. There are thirteen project-wide resource objectives established for Robert S. Kerr that were used in determining the proposed alternative (see Appendix A). The comparison table of alternatives is likewise contained in Appendix A.

Alternative 1: No Action

The No Action Alternative is defined as the USACE taking no action, which means the Master Plan would not be revised with this alternative, no new resources analysis and land-use classifications would occur at the project. The operation and management of Robert S. Kerr Lock and Dam would continue as outlined in the current Master Plan. Because this alternative does not result in a Master Plan that meets current guidance and regulations, it was eliminated from further consideration.

Alternative 2: Revise Only Land Classification Names, No Change in Operation and Use

Under this alternative, the Master Plan would be reviewed, coordinated with the public, and only the land classification names would be changed to comply with current USACE regulations and guidance and would result in the following:

1. 700 acres Project Operations
2. 1,714 acres High Density Recreation
3. 6,550 acres Low Density Recreation
4. 14,568 acres Wildlife Management
5. 42,000 acres Water Surface

This alternative would meet current USACE regulations and guidance. However, this action would not reflect changes in land management and land uses that have occurred over time to meet regional goals and objectives. Therefore, this alternative was eliminated from further consideration.

Alternative 3: Revise Master Plan to Meet Authorized Project Purposes and to Maximize Recreation

Under this alternative, the Master Plan would be reviewed, coordinated with the public, revised to comply with current USACE regulations and guidance, and reflect changes in land management to intensify recreation. This would involve refining land classifications that meet authorized project purposes and maximize recreation management objectives. This would include reclassification of all project lands to recreation intensive use (excluding Project Operations) and would result in the following:

1. 1,251 acres Project Operations
2. 22,287 acres High Density Recreation
3. 42,000 acres Water Surface

This action would provide recreation opportunities and economic uses to the public. However it would eliminate classifications such as low density and wildlife management land classifications which would not support regional goals associated with good stewardship of land and water resources, and would hamper wildlife management and conservation practices associated with the Sequoyah National Wildlife Refuge. This action would not be compatible with cultural resource management plans. This action could violate national policies or public laws. Therefore, this alternative was eliminated from further consideration.

Alternative 4: Revise Master Plan to Meet Authorized Project Purposes and to Maximize Natural Resource Management

Under this alternative, the Master Plan would be reviewed, coordinated with the public, and revised to comply with current USACE regulations and guidance, and to reflect changes in land management to intensify natural resource management. This

would involve refining land classifications that meet authorized project purposes and maximize natural resource management objectives. This would include reclassification of all project lands to wildlife management (excluding Project Operations) to meet authorized project purposes and maximize natural resource management objectives and would result in the following:

1. 1,251 acres Project Operations
2. 22,287 acres Wildlife Management
3. 42,000 acres Water Surface

This action would support regional goals associated with good stewardship of land water resources. However, it would eliminate classifications such as low and high density recreation which would reduce recreation opportunities and would not meet regional recreation goals. This action could violate national policies or public laws. Therefore this alternative was eliminated from further consideration.

Alternative 5 (Proposed Action): Revise Master Plan to Meet Authorized Project Purposes to Reflect Current Land Management and Uses That Are Compatible With Regional Natural Resource and Recreation Goals.

Under this alternative, the Master Plan would be reviewed, coordinated with the public, and revised to comply with current USACE regulations and guidance, and to reflect changes in land management and land uses that have occurred over time. This would include refining land classifications to reflect changes that would meet authorized project purposes and current resource objectives that address a mix of natural resource and recreation management objectives that would be compatible with regional goals. Required changes associated with this action would include 13 land reclassifications to balance resource objectives. Table 2.1 below shows the proposed reclassifications. This action would result in the following:

1. 1251 acres Project Operations
2. 1581 acres High Density Recreation
3. 6,112 acres Low Density Recreation
4. 14,555 acres Wildlife Management
5. 39 acres Environmentally Sensitive
6. 42,000 acres Water Surface

This action would reclassify 39 acres of lands as environmental sensitive areas that would support management of endangered species, and would allow for management of the former Kerr-McGee contamination site. This action would meet regional goals associated with good stewardship of land and water resources, would meet regional recreation goals, and would allow for continued use and development of project lands without violating national policies or pubic laws. Therefore, this alternative will carry forward as the proposed action.

Table 2.1 Land Use Classification Changes Associated With the Proposed Action

Proposed Reclassification	Description	Justification
1	Reclassify 69 acres of the western area of Cowlington Point to Low Density Recreation.	This area has never been developed for High Density Recreation and current primary use is hunting.
2	Classify 18 acres of least tern managed habitat to Environmentally Sensitive Areas.	Least Tern is a federally threatened species. This habitat has been created from dredge material for the purpose of Least Tern habitat.
3	Reclassify the 539 acres of Restricted areas along bridges crossing public property to Project Operations.	This is consistent with how land use is managed.
4	Remove 1,050 acres Sallisaw Creek recreation area from federally managed property.	Sallisaw Creek recreation area has been transferred to the Bureau of Indian Affairs with the intent to dispose to the Cherokee Nation.
5	Reclassify all 160 acre lands classified as Industrial Use to Project Operations.	Current MP guidance does not permit the classification of Industrial allocated lands. Project Operations is the best fit for the use of these lands.
6	Reclassify the 18 acre Recreation – Intensive Use area south of the dam lakeside known as Fisherman's Landing to Project Operations.	Project Operations is the best fit for the use of these lands and is consistent with current land use management.
7	Reclassify 544 acres of Multipurpose areas to Project Operations where dredge disposal sites have been selected.	Project Operations best is the fit for the use of these lands.
8	Reclassify the 6,006 acres of Multipurpose areas to Recreation – Low Density Use where dredge disposal sites have not been selected	Low Density Recreation Use best fits the use of these lands.
9	Reclassify the 48 acres of Quasi-Public areas to Low Density Recreation.	The classification of Quasi-Public lands is no longer a land classification under EP 1130-2-550. Low Density Recreation is more appropriate for this area, with the exception of the dredge disposal sites.
10	Reclassify the 2 acres of Project Operations on the eastern end riverside's Fisherman's Landing to High Density Recreation.	This is the location of a previous highway. Normal business practice classified these areas as Project Operations, yet the highway has been relocated. The area is not being used as an extension of Fisherman's Landing.
11	Reclassify the 21 acres of Kerr-McGee Corporation's industrial area to Environmentally Sensitive Area	The Kerr-McGee Corporation site, once an area for uranium production, should be changed to an Environmentally Sensitive Area due to site contamination found in 1986.
12	Reclassify 11 acres of Multipurpose areas upstream of the Consolidated Grain and Barge's port and facility to Project Operations.	The area upstream from this site is an extension of the existing port facility and across the river is used as a fleeting area for the port facility.
13	Classify Water Surface acres to 124 acres as Restricted, 40 acres as No-Wake, and 41,836 acres as Open Recreation.	Water Surface needs to be restricted near dam, lock, hydropower intakes, and USCG area for public safety and project security. Water Surface needs to be designated No-Wake near boat ramps and marinas for public safety. Classification of water surface complies with current Master Plan guidelines.

SECTION 3: AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION

Robert S. Kerr Reservoir, located within the Arkansas Valley provides habitat for a variety of plants, animals, and diverse fish communities. The Arkansas Valley is a transition area that separates the Ozark Highlands and the Ouachita Mountains. This transitional region exhibits a break in geological formation as well as vegetation community composition. Robert S. Kerr reservoir encompasses several irregular shaped reaches along multiple tributaries has a surface area of approximately 42,000 acres, and has approximately 250 miles of shoreline. The wild and craggy shoreline supports many opportunities for wildlife viewings. The reservoir is approximately 7 miles long and is known to maintain a consistent pool at 459 feet, mean sea level (msl) as a result of project operations. The following sections will disclose affected resources and environmental consequences associated with implementing the revised Robert S. Kerr Reservoir Master Plan.

3.1 CLIMATE

Affected Environment

The climate of eastern Oklahoma, including Robert S. Kerr Reservoir, lies within the humid, subtropical region, with warm, moist air moving northward from the Gulf of Mexico exerting much influence over the eastern and southern portions of the state. This region is characterized by moderate winters and comparatively long, hot summers. Robert S. Kerr Reservoir spans across portions of four counties and regional climate characteristics are discussed below.

The regions surrounding Robert S. Kerr Reservoir exhibit growing seasons averaging approximately 213 days. Temperatures range from an average daytime high of 95° (F) Fahrenheit in July and August with occasional temperatures above 100°F. January is known as the coldest month with an average low of 24°F with occasional temperatures in the single digits. Average annual snowfall across the area ranges from 7.2 inches to 7.6 inches. Average annual precipitation across the Robert S. Kerr Reservoir area ranges from 47 inches to 49 inches. April, May, June and often October are known to be the wettest months. The Arkansas River Valley channels the winds to a predominantly easterly direction, averaging seven miles-per-hour. Relative humidity, on average, ranges from 47% to 92% during the day. During the year, humidity is highest between May and July and lowest in March and April. Winter months tend to be cloudier than summer months. The percentage of possible sunshine ranges from an average of less than 50% in winter to about 75% in summer.

Environmental Consequences

Revision of the Robert S. Kerr Reservoir Master Plan will have no impact on the climate of the project area. Potential impacts of climate change are presented in Section 3.11 below.

3.2 TOPOGRAPHY, PHYSIOGRAPHY, AND GEOLOGY

Affected Environmental

Robert S. Kerr Reservoir is located within the Arkansas River Valley, a transitional area that forms a link between the Eastern Broadleaf Ozark Forest and Southeastern Mixed Forest Physiographic Provinces. The Arkansas Valley is known to exhibit low terraces that transition upward into rolling plains interrupted by scattered hills, and ridges. The area is underlain by Pennsylvanian and Quaternary formations comprised of sandstones, shale, limestone and coal. Soils within steeper upland areas are known to be rocky, low in fertility and best suited for woodlands. The lowland areas encompass Arkansas River Bottomlands comprised of sandy loams that exhibit high fertility suitable for farming and ranching. The river bottomland areas support a variety of croplands that provide prime habitat for migratory waterfowl.

Environmental Consequences

Topography, physiography, geology, and resource management plans were considered during the refining process of land classifications. No intrusive actions are proposed, and Robert S. Kerr project resource management plans would not be changed as the intent of the proposed action is to reflect current land uses. Therefore, no significant adverse impacts to topography, physiography, or geology would occur as a result of implementing revisions to the Robert S. Kerr Reservoir Master Plan.

3.3 LAND USE

Affected Environment

Primary project purposes for Robert S. Kerr Reservoir are navigation, recreation, and hydroelectric power. Land uses associated with Robert S. Kerr Reservoir are designated to support the overall goal of providing good stewardship of land and water resources while providing safe recreation opportunities and economic uses to the public. In order to implement authorized purposes and support regional management goals for recreation and natural resources, the project office maximizes resources through the use of cooperative agreements and leases with federal state, local and private agencies. The lands within the Robert S. Kerr Project include infrastructures to support hydroelectric power and navigation activities, and various parks and wildlife management areas to support recreation.

USACE operates and manages the hydroelectric power and navigation facilities through the use of contracts and cooperative agreements with other federal, state, local government agencies and private agencies. Navigation and hydropower facilities as described in section 1.4, support regional transportation and electrical needs, and are primary factors that influence day to day operations of Robert S. Kerr Reservoir.

The United States Fish and Wildlife Service (USFWS) manage 10,300 acres of high quality wildlife habitat known as the Sequoyah National Wildlife Refuge. The refuge is managed primarily as a resting and wintering area for migratory waterfowl. Management practices include planting plots with an assortment of wildlife forage crops such as, corn, grain sorghums and a variety of small grains, and the use of controlled water level marshes. Portions

of the refuge are open to the public for seasonal hunting activities and the majority of the refuge is open for fishing year round. In addition, the ODWC manages approximately 2,027 acres of project lands for wildlife management purposes and public hunting. USACE manages 18 acres of islands created using beneficial in-water disposal of dredge materials that are dedicated to enhancing nesting for the endangered least tern.

USACE and the ODWC manage several park areas that include wildlife management and recreation components. These areas provide recreation opportunities such as picnicking, camping, hiking, wildlife viewing, boating, fishing and hunting.

Environmental Consequences

The primary objective for revising the Robert S. Kerr Reservoir Master Plan is to capture current land use and management that has evolved to meet day to day operational needs. The reclassification changes required for the proposed action were developed to enhance regional goals associated with good stewardship of land and water resources that would allow for continued use and development of project lands. In addition, the proposed action would not change land use classifications in the areas associated with navigation and hydroelectric facilities. Therefore, implanting the proposed revisions to the Master Plan would not result in significant impacts to land uses on project lands.

3.4 TERRESTRIAL RESOURCES

Vegetation

Affected Environment

The reservoir and associated project lands are located within portions of the Arkansas River Floodplain ecoregion and the Arkansas Valley Plains ecoregion. Prairie grasslands and oak savannas, along with pasture lands dominate the valleys while the floodplains and terraces are characterized by bottomland hardwood forests. Areas of relief have a mixture of oak-hickory and oak-hickory-pine forests. Cross timbers are common in the project area and include blackjack oaks, post oak, scattered hickory species, and are underlain with a mix of shrubs and tall grass species including, black haw, farkleberry, St. Anderw's Cross, big bluestem, little bluestem, switchgrass, and Indian grass. North facing slopes and ravines support forests composed of maples, white oak, northern red oak and chinquapin oak. Tall grass prairies dominated by bluestems and a wide variety of herbaceous species including various wildflowers are also common to areas of Robert S. Kerr project lands. Mixed deciduous forests dominated by species such as pecan, oak, maple, birch, sycamore, cottonwood, elms, and willow, vines such as grape, poison ivy, and green briar that are underlain by a variety of grasses and other herbaceous species are common along floodplains of streams. The Robert S. Kerr Reservoir project has vegetative management plans in place that include measures to maximize wildlife habitat quality and aesthetic values, and to insure public safety.

Soils and Prime Farmland

Affected Environment

Loamy Bottomland soil types are characteristic of bottomlands in the vicinity of Robert S. Kerr Reservoir. The soils are deep and loamy and are comprised of: Crevasse soils, 0 to 2 percent slopes, consisting of Yahola fine sandy loam, 0 to 3 percent slopes, consisting of 90 percent Mason, 5 percent Speer, 3 percent Cleora, and 2 percent Cupco soils.

Savannah woodlands are on cherty uplands on the more gently sloping ridges. The soils are comprised of Bodine stoney silt loam, 15 to 20 percent slopes.

Loamy Savannah is in areas of nearly level to gently sloping, rolling, deep soils on uplands. The soils are comprised of Shermore loam, 1 to 3 percent slopes, consisting of Stigler soil; Stigler-Wrightsville complex, 0 to 1 percent slopes, consisting of Stigler and Vian soils; and Linker-Hector complex, 3 to 5 percent slopes, comprised of Stigler soil.

Sandy Savannah is in areas of nearly level to steep, sandy soils on uplands. The soils are comprised of Hector fine sandy loam, 3 to 5 percent slopes, consisting of Hector and Linker soils; Hector-Linker-Enders association, 5 to 30 percent slopes, consisting of Enders, Linker, and Eram soils; Rock outcrop-Hector complex, 40 to 100 percent slopes, consisting of Linker soil; and Shermore loam, 1 to 3 percent slopes, consisting of Shermore and Linker soils.

Shallow savannah is in areas of rugged topography on low, mountainous ridges. The soil is comprised of Hector fine sandy loam, 3 to 5 percent slopes, consisting of Hector soil; Enders-Linker-Hector association, 5 to 30 percent slopes, consisting of Hector soil; and Linker fine sandy loam, 3 to 5 percent slopes, consisting of Hector soil.

According to the U.S. Department of Agriculture (USDA), the definition of "prime farmland" is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and that is available for these uses. It has the combination of soil properties, growing season, and moisture supply needed to produce sustained high yields of crops in an economic manner if it is treated and managed according to acceptable farming methods. In general, prime farmland has an adequate and dependable water supply from precipitation or irrigation, a favorable temperature and growing season, an acceptable level of acidity or alkalinity, an acceptable content of salt or sodium, and few or no rocks. Its soils are permeable to water and air. Prime farmland is not excessively eroded or saturated with water for long periods of time, and it either does not flood frequently during the growing season or is protected from flooding.

Regions surrounding the Robert S. Kerr Reservoir are within the Arkansas River Bottomlands that are rich fertile soils well suited for farming and ranching. Historically the bottomlands were farmed, and even today some areas adjacent to the reservoir encompass farmlands. A portion of project lands are comprised of bottomland soils. The USFWS and ODWC use these areas to plant a variety of grains and grasses to support wildlife foraging. USFWS and ODWC use innovative processes and farming practices to enhance and protect soils and regional resources.

Environmental Consequences Vegetation, Soils & Prime Farmlands

The required reclassifications for the proposed action are compatible with Robert S. Kerr Reservoir's vegetative management plans. In addition, the proposed changes will allow USFWS and ODWC to continue innovative resource management practices associated with farm lands used to support wildlife. Therefore, no significant adverse impacts to vegetative resources, soils or prime farmlands would occur as a result of implementing revisions to the Robert S. Kerr Reservoir Master Plan.

Wildlife

Resident fish and wildlife belong to the State of Oklahoma. The ODWC has the authority and responsibility to preserve and manage all resident fish and wildlife species. The ODWC works closely with the U.S. Fish and Wildlife Service (USFWS) to provide conservation and management of all migratory animals. USACE, as the land owner cooperates with these agencies through formal agreements. These formal agreements include components that charge USACE with responsibilities to restore, to improve and preserve fish and wildlife through habitat development and conservation practices.

Terrestrial wildlife management practices are established for Robert S. Kerr Project lands to benefit all species. However, specific enhancements are in place for species that afford recreation opportunities such as hunting and wildlife viewing. These species include fox squirrel, gray squirrel, cottontail rabbit, bobwihite quail, whitetail deer, furbearers, waterfowl, and songbirds.

Migratory Birds

Executive Order (EO) 13186 implies that it is incumbent upon federal agencies to protect migratory birds. Under EO 13186, federal agencies are mandated to integrate conservation principles, measures, and practices into agency activities and prevent or abate the pollution or detrimental alteration of the environment for the benefit of migratory birds, as practicable.

As discussed above, the United States Fish and Wildlife Service (USFWS) administers wildlife practices within project lands associated with the Sequoyah National Wildlife Refuge. This area is managed primarily for migratory waterfowl including one of the largest concentrations of snow geese. Although management practices are in place to enhance migratory water fowl populations, there are a number of other species that are known to benefit from this area as well. Wintering bald eagles are common and few pair nest year round in the area. Other species known to winter within this area include double-crested cormorant, red-headed woodpecker, scissor-tailed flycatcher, Bell's and Warbling Viros, prothonotary warbler, lark sparrow, indigo and painted buntings, and dickcissel. In summer months other species have been observed resting and feeding in this area. Summer species include great blue and little blue herons, great and snowy egrets, American least terns, bitterns, rails and sedge marsh wrens in marshy areas.

Environmental Consequences

The required changes of land allocations and reclassifications to implement the proposed master plan revisions would be compatible with regional goals associated with good stewardship of land and water resources. The proposed action for revising the Robert S. Kerr Reservoir master plan would allow project lands to continue with supporting the USFWS and the ODWC missions associated with wildlife conservation. In addition, the proposed action would be compatible with conservation principles and measures to protect migratory birds as mandated Executive Order (EO) 13186. Therefore, no significant adverse impacts to wildlife including migratory birds would occur as a result of implementing revisions to the Robert S. Kerr Reservoir Master Plan.

3.5 AQUATIC AND WATER RESOURCES

Fisheries

Executive Orders 12962 and 13474 (an amendment to Executive Order 12962) require Federal agencies, to the extent permitted by law and where practicable, to improve the quantity, function, sustainable productivity, and distribution of U.S. aquatic resources for increased recreational fishing opportunities in cooperation with States and Tribes and ensure that recreational fishing shall be managed as a sustainable activity in national wildlife refuges, national parks, national monuments, national marine sanctuaries, marine protected areas, or any other relevant conservation or management areas or activities under any Federal authority, consistent with applicable law.

Pool levels fluctuate very little at Robert S. Kerr Reservoir creating habitat for a variety of fish species. The ODWC is responsible for managing fisheries in the state of Oklahoma. USACE works in cooperation with the ODWC to implement operational practices that will enhance fishery habitat. The Sequoyah National Wildlife Refuge, ODWC and USACE parks provide angler opportunities for to the public by providing access to banks and boat ramps. Common fishery species known to have established populations at Robert S. Kerr Reservoir include largemouth bass, smallmouth bass, striped bass, white crappie, black crappie, a variety of sunfish, channel catfish, blue catfish and a variety of minnows.

Environmental Consequences

The reclassifications required for the proposed action would allow land management and land uses to be compatible with the goals of good stewardship of water resources. USACE would continue to work in cooperation with the ODWC to implement operational practices that will protect and enhance fishery populations. In addition, the proposed action associated with revising the Robert S. Kerr Reservoir master plan would also be compatible with mandates associated with Executive Orders 12962 and 13474. Therefore, there would be no significant adverse affects to fishery resources.

Wetlands

Affected Environment

Robert S. Kerr Reservoir encompasses a variety of wetland features. These include the open water features such as river and creek areas, the main lake, and several small ponds. The reservoir also encompasses several acres of emergent wetlands and forested/shrub wetlands. Emergent wetlands known to exist in the shallow fringe areas of the reservoir encompass common aquatic vegetation species such as duckweed, swamp smart weed, common rush, spike rush, and soft stem bull rush. Forested/shrub wetlands in deeper areas are known to exhibit combinations of woody and grass-like species. Common species associated with these habitat areas include a Pennsylvania sedge, woodland sedge, inland rush, Torrey rush, switchgrass, rough leaf dogwood, dull leaf indigo bush, coral berry, bitternut hickory, cottonwood and pecan. Wetland resources support healthy ecosystems and provide important habitat for fish and wildlife. Therefore, to support regional good stewardship goals and ODWC management goals, the Robert S. Kerr project incorporates operational practices to enhance and protect these resources.

Environmental Consequences

The reclassifications required for the proposed action would allow land management and land uses to be compatible with the goals of good stewardship of water resources. USACE would continue to work in cooperation with the ODWC to implement operational practices that will protect and enhance wetland resources. Therefore, there would be no significant adverse affects to wetland resources.

Wild and Scenic Rivers (Public Law 90-542)

Affected Environment

Wild River Areas are defined as those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. Scenic river areas are defined as those rivers or sections of rivers that are free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads. None of the areas associated with the Robert S. Kerr Reservoir project are designated as wild and scenic rivers pursuant to PL 90-542.

Environmental Consequences

There are no areas within the Robert S. Kerr Reservoir project designated as wild and scenic rivers. However, the reclassifications required for the proposed action would allow land management and land uses to be compatible with the goals of good stewardship of water resources. Therefore, there would be no significant adverse impacts to wild or scenic rivers.

Section 10 Surface Waters

Affected Environment

Section 10 of the Rivers and Harbors Act of 1899, navigable waters of the United States are those waters that are subject to the ebb and flow of the tide and/or are presently being used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce (33 CFR 329.4). Navigable waters include lakes and other on-channel impoundments of navigable rivers. Under Section 10, USACE regulates any work in or affecting navigable waters of the United States. Current Robert S. Kerr Reservoir navigation operational plans were developed based on guidance specified in Section 10 of the Rivers and Harbor Act.

Environmental Consequences

If any project operations or construction at Robert S. Kerr Reservoir involves the discharge of dredge or fill material they will be evaluated and authorized under regulations at 33 CFR Parts 335-338 implementing Section 404 of the Clean Water Act. The revisions to the Robert S. Kerr Reservoir master plan would not change current navigation operations. Therefore, no adverse affects to Section 10 waters would occur as a result of the proposed action.

Section 404 Waters Of The U.S.

Affected Environment

The USACE regulates, under the authority of Section 404 of the Clean Water Act, the discharge of dredged and fill material into all waters of the U.S., including wetlands. Nontidal waters of the U.S. are generally described as rivers and streams including the smallest of tributaries, any impoundments on those rivers and streams (e.g., ponds and lakes), and any wetlands adjacent to those features. If any project operations or construction at Robert S. Kerr Reservoir involves the discharge of dredge or fill material they will be evaluated and authorized under regulations at 33 CFR Parts 335-338 implementing Section 404 of the Clean Water Act.

Environmental Consequences

If any project operations or construction at Robert S. Kerr Reservoir involves the discharge of dredge or fill material they will be evaluated and authorized under regulations at 33 CFR Parts 335-338 implementing Section 404 of the Clean Water Act. The revisions to the Robert S. Kerr Reservoir master plan would not change current operations. Therefore, no adverse affects to waters of the U.S. would occur as a result of the proposed action.

Water Quality

Affected Environment

The Robert S. Kerr Reservoir is within the Arkansas River Water shed and controls a drainage area of approximately 147,756 square miles of Oklahoma. Surface waters contributing to the drainage area include several tributaries associated with the Canadian and Poteau Rivers. In general, Robert S. Kerr Reservoir is classified as eutrophic based on Trophic State Index (TSI) index values calculated by the Oklahoma Water Resources Board in 2012. Robert S. Kerr waters

exhibit relatively high salinity and conductance value of 600 µS/cm with clarity readings ranging between 26 to 27 cm. Nutrient levels are fairly low with total phosphorous and total nitrogen concentrations shown to be approximately 0.13 and 1.00 ppm. Overall, the water quality at Robert S. Kerr Reservoir is good. The hydroelectric facilities operate according to established federal and state guidelines and laws. Operation management plans for these facilities include routine inspections and annual permitting to assure protection of water resources and public safety. Navigation activities are operated in cooperation with other federal and state agencies according to laws and regulations to protect water resources.

Environmental Consequences

The reclassifications required for the proposed action are compatible with management and operation plans associated with navigation and hydroelectric functions. Water quality is monitored on a routine basis under current project operations and that would not change under the proposed action. Therefore, there would be no significant adverse affects to water quality as a result of implementing the proposed master plan revisions.

3.6 INVASIVE SPECIES

Executive Order 13112 (EO 13112), Invasive Species, states that invasive species annually cause significant economic, ecological, and alien species whose introduction does or is likely to cause economic and environmental harm or harm to human health. EO 13112 requires Federal agencies to engage practices and prevention measures to minimize risks associated with the introduction or spread of invasive species.

Invasive terrestrial plants known to occur on Robert S. Kerr Reservoir project lands include Japanese honeysuckle, Chinese lespedeza, Japanese climbing fern, kudzu, common dandelion and autumn olive. Two invasive terrestrial animals that have been documented at or near project lands include the feral hog and the European starling. The populations of these plant and animal species are minimal and would not affect project operations. The project uses monitoring and established best management practices to limit these species as much as possible.

Alligator weed, Eurasian watermilfoil, hydrilla, purple loosestrife, salvinia, and water hyacinth are major invasive aquatic plant species of concern in the state of Oklahoma. These species can cause major degradation of natural habitats and often cause damage to infrastructure. Alligator weed, Eurasian watermilfoil, Salvinia, and water hyacinth have been documented in regions in or near the reservoir, however, populations of these species are minimal levels that would not impact lake operations. The project implements monitoring and management plans for invasive species in order to protect and preserve resources associated with the project.

The zebra mussel (*Dreissena polymorpha*) is an invasive, fresh water invertebrate that has a high filtration rate, high reproductive rate, strong byssal threads for substrate attachment, and limited number of natural predators. These characteristics accelerate population establishments that out-compete native mussel populations. Economic impacts caused by the invasive species include fouling water intake pipes, cooling systems, filtration systems, and fouling boat engine cooling systems. Zebra mussels fouling filtration systems associated with fire suppression at facilities using raw water can impede effectiveness of the system, increasing the potential of damage to the facility and danger human welfare. When a zebra mussel “die-

off" occurs, thousands of shells can wash up on the shoreline and/or beach area; the sharp edges of the mussels' shells could potentially cause human harm and subsequent public beach closure for public safety.

Zebra mussels were introduced to North America via trans-Atlantic barges to the commercial waterways of the United States from Europe in the 1980's. Once established, the spread of zebra mussels to inland waters has occurred via navigation system traffic, overland transportation of private boats from an infested water body to an uninfected water body, and natural downstream flows that carry the free floating larva form of the species. Within the Tulsa District, zebra mussels were first confirmed in Oklahoma in the McClellan-Kerr Arkansas River Navigation System (MKARNS) in January 1993 inside Locks 14 (W.D. Mayo), 15 (Robert S. Kerr), and 16 (Webbers Falls). The invasive species were subsequently found in the Verdigris River of the MKARNS at lock 17 (Chouteau) in June 1993 and at lock 18 (Newt Graham) January 1994. In conjunction with zebra mussel infestation at the locks along the MKARNS, the species were also observed to be in the powerhouses associated with Robert S. Kerr and Webbers Falls. Upon confirmation of zebra mussel establishment, monitoring efforts at locks and dams along the MKARNS were conducted by USACE biologists and Northeastern State University research faculty and boat ramps that provide access to the reservoirs along the MKARNS were posted with signs to educate the public concerning the presence of invasive species and assist in the prevention of spreading the species to other water bodies. Zebra mussels continue to populate the navigation system and populations are monitored via routine maintenance activities associated with the facilities along the MKARNS.

Environmental Consequences

The reclassification changes required to implement the proposed action are compatible with Robert S. Kerr project invasive species management practices. Therefore, invasive species will continue to be managed and no significant adverse impacts to resources would occur as a result of implementing revisions to the Robert S. Kerr Reservoir Master Plan.

3.7 THREATENED AND ENDANGERED SPECIES

Affected Environment

According to the United State Fish and Wildlife Service (USFWS), there are several protected species known to occur or have potential habitat within Robert S. Kerr project lands. Protected bird species include piping plover (*Charadrius melodus*), least tern (*Sternula antillarum*), and red knot (*Calidris canutus*). Protected aquatic species include scale shell (*Leptodea leptodon*) and winged maple leaf (*Quadrula fragosa*) mussels. One flowering plant, the harperella (*Ptilimnium nodosum*) has potential to occur within project lands. One insect, the American burying beetle *(Nicrophorus americanus)* has potential to occur on Robert S. Kerr project lands. Four protected bat species have potential to occur within Robert S. Kerr project lands, Gray bat (*Myotis grisescens*), Indiana bat (*Myotis sodalis*), northern long-eared bat (*Myotis septentrionalis*), and Ozark big eared bat (*Corynorhinus townsendii ingens*). As mentioned earlier in this document, USACE has management agreements with the USFWS and the ODWC to manage designated lands for wildlife management. The USFWS and the ODWC use a variety of innovative conservation practices to preserve, enhance and protect critical wildlife habitat within designated project lands. Past and present monitoring reports have

indicated that designated areas within the Sequoyah National Wildlife Refuge are providing benefit to many species including the least tern, piping plover, and gray bats. In addition, USACE created two least tern nesting islands using beneficial in-water disposal of dredge materials. Monitoring reports for those areas indicate these areas have been successful in enhancing least tern nesting habitat.

Environmental Consequences

Under the proposed action USACE would continue cooperative management plans with USFWS and ODWC to preserve, enhance and protect critical wildlife habitat resources. To further management opportunities to increase habitat diversity, the master plan revisions include reclassifying the least tern islands from wildlife management to environmentally sensitive areas. In addition, soil disturbing activities associated with land management, public recreation area maintenance, out-granted recreation area maintenance and improvements and other routine operations and maintenance activities will be assessed individually as they arise. Therefore, no significant adverse affects would occur as a result of implementing revisions to the Robert S. Kerr Reservoir master plan.

3.8 ARCHAEOLOGICAL AND HISTORIC RESOURCES

Affected Environment

Cultural resources preservation and management is an equal and integral part of all resource management at Civil Works operating projects. The term “cultural resources” is a broad term meant to include anything that is of cultural significance to humans and that has some historical value, and generally includes, but is not limited to, the following categories of resources: archaeological sites (historic and prehistoric), historic standing structures, traditional cultural properties, and sacred sites. There are approximately 140 known archaeological sites located on Project lands associated with the Robert S. Kerr Reservoir. Many archaeological sites have high sensitivity because of past recoveries of human remains and associated funerary objects.

Numerous cultural resources laws establish the importance of cultural resources to our Nation’s heritage. With the passage of these laws, the historical intent of Congress has been to ensure that the Federal government protects cultural resources. Stewardship of cultural resources on USACE Civil Works water resources projects is an important part of the overall Federal responsibility.

Archaeology

Many cultural resources investigations have been conducted on USACE land at Robert S. Kerr Reservoir. Investigations prior to impoundment of the Reservoir included archaeological survey and excavation of significant sites. A large number of additional investigations have been carried out at the Reservoir in the years since impoundment. In the larger regional area there are hundreds of archaeological sites and historic standing structures on record with the Oklahoma State Historic Preservation Office (SHPO) and Oklahoma Archeological Survey (OAS).

Cultural History Sequence

Seven broad cultural divisions are applicable to a discussion of the culture history of the Robert S. Kerr Reservoir region: Paleoindian, Archaic, Woodland – Fourche Maline Phase, Woodland/ Late Prehistoric Transition – Evans Phase, Late Prehistoric, Protohistoric, and Historic.

The following regional chronology is adopted in this Master Plan.

- Paleoindian 12,000 to 8500 BP
- Archaic 8500 to 2000 BP
- Woodland 2000 to 1200 BP (AD 1 to 800)
- Caddoan/Missisippian AD 800 to 1500
- Protohistoric (Contact) AD 1500 to 1825
- Historic AD 1825 to present

To aid in comparing divergent cultures and sequences in eastern Oklahoma, the following general adaptation types are used to characterize prehistoric cultural traditions.

Paleoindian Period

The Paleoindian Period is the earliest well substantiated archaeological period in the region. Signature stone tools are unnotched projectile points of fluted or lanceolate types, often found in contexts where mammoth or bison remains also occur. The distinctive projectile point styles of this period exhibit fluting (Clovis and Folsom), though later types (Plainview and Dalton) do not exhibit fluting but maintain a high level of technological sophistication.

During this period, small bands of hunters and gatherers relied largely on the hunting of megafauna such as mammoth and bison; however, several sites have exhibited evidence of reliance on a wide variety of plant and animal species. Remains of smaller mammals such as deer, squirrel, raccoon, and turkey, as well as riverine resources (turtles and fish), hickory nuts, and acorns have been identified at archaeological sites in the region of the Ozark Mountains during the Late Paleoindian Period. Structural remains of the Paleoindian Period are poorly understood, due to high residential mobility and the use of perishable construction materials.

Paleoindian sites have been identified in the general project region, but they are few in number.

Archaic Period

With the loss of the megafauna, a larger variety of floral and faunal resources were utilized during the Archaic Period. An increase in seasonal variability of resources and increasing populations resulted in changing settlement and subsistence patterns. Repeated occupation of sites, often on a seasonal basis, and features such as rock-lined hearths, roasting pits, and grinding tools reflect intensive plant processing and the cyclical exploitation of resources. Increasing diversity of stone tools through time reflects the increasing variability of resources and diversity of activities taking place at habitation sites. Projectile points from the Archaic are stylistically quite different (typically notched and stemmed) from those of the

Paleoindian Period. The Archaic period is traditionally divided into Early, Middle, and Late periods, the overall extent of which was approximately 8,500 BP to 2,000 BP.

At Robert S. Kerr Reservoir, sites definitively dating to the Archaic Period are numerous and often multicomponent. Several sites with Archaic components were excavated prior to Reservoir impoundment. The most commonly identified archaeological phase dating to the Archaic Period at Robert S. Kerr Reservoir is the Late Archaic Wister Phase.

Woodland

The Woodland Period in Eastern Oklahoma was a time of continuity marked by incorporation of new technologies and intensification of resources. The appearance in the archaeological record of small corner notched projectile points indicates that the bow and arrow was in use. The presence of ceramic sherds indicates that ceramic use in the form of pottery for storage and cooking had become widespread. Archaeological assemblages from this period indicate people were living in semi-permanent villages and dispersed communities, using settlement strategies such as seasonal mobility, targeted long distance resource procurement by portions of the community or household, and intensification of wild and domestic plants to meet their needs. Small game and aquatic resources remained essential in subsistence. Increased residential stability and concomitant intensification of resources led to social changes evident in diversification of stylistic traits and more elaborate burial rituals. Projectile points from this period include, in addition to the small corner notched points, large contracting stem points and large corner-notched projectile points in a variety of styles, indicating continued use of the atlatl and darts, as well as spears likely employed for symbolic political or religious effect.

In southeastern Oklahoma, the principle Woodland manifestation is known as the Fourche Maline Phase. Fourche Maline components are found in the upper levels of Wister Phase midden sites, suggesting continuity from the Wister Phase through the Fourche Maline Phase. Rather than an abrupt change in lifeways from the Archaic to the Woodland, the archaeological record indicates continuity even as populations in the area adopted new technologies and intensified resource use, which in turn drove increasing residential stability, community identity, and possibly territoriality. The Fourche Maline phase material culture tradition continues into the Mississippian influenced Caddoan culture of the Late Prehistoric Period. For this reason, some refer to the Woodland Fourche Maline phase as “Pre-Caddoan”. The number of sites in the Robert S. Kerr Reservoir area attributed to the Fourche Maline phase has grown substantially as the Arkansas Valley Fourche Maline Phase has been better defined. In northeastern Oklahoma, the principle Woodland manifestation is known as the Cooper Focus, which shares many material culture traits and settlement patterns with the Fourche Maline, and symbols and styles with Hopewellian groups to the north and east. The ceramics of the Cooper Focus are very similar to the Fourche Maline in paste and temper, but they are distinct in form and decoration. The decorations used in Cooper Focus sites include motifs that mirror those of Hopewellian groups to the east.

Sites associated with both predominant Woodland archaeological cultures are found at Robert S. Kerr Reservoir. Cultivation of plants began during this period and is often referred to as “insipient agriculture”.

Caddoan/Mississippian

Ranked societies and new forms of social integration emerged during the Caddoan/Mississippian period. The Caddoan and Mississippian traditions are known locally as the Northern Caddoan, Arkansas Valley Caddoan, or Ankansas River Caddoan subarea. Settlement patterns consisted of communities of dispersed farmsteads, hamlets, and small villages, often associated with nearby mound centers. Villages were often situated in lowland terraces of waterways where agriculture was viable. House structures were pole framed with waddle and daub, and subsistence was more focused on agriculture, supplemented by hunting and gathering. Agricultural tools are present in artifact assemblages, along with small triangular side and corner notched arrowpoints for hunting and warfare. Social hierarchy is evident in differential treatment of the dead. Both local and regional mound centers were constructed during this time. Some mounds contain primary or secondary burials, but others represent mounds on which a structure was located. Mounds such as these had a very specific role in the ceremonial lives of the region's inhabitants.

Pottery types are distinctive to the period, and are greatly increased in variability in form and function. Pottery was well made. Personal items such as earspools, pipes, gorgets, hairpins, and beads, as well as exotic artifacts such as copper plated pins, conch shells, galena crystals, and exotic ceramics and stone provide evidence for complex cultural traditions, rank, and widespread trade and interaction.

The Caddoan/Mississippian time period is broken down into three temporally sequential phases: the Harlan Phase, the Spiro Phase, and the Fort Coffee Phase.

Material and social changes of this period began in the Harlan Phase. This phase saw the rise of mound centers such as those at the type site for this phase- the Harlan site at Robert S. Kerr. Elements of local Fourche Maline culture remained the same, suggesting that interaction with Mississippian groups to the east resulted in adoption of Mississippian material, social, and ceremonial traits by local populations.

The Spiro Phase is considered to be the height of Caddoan long distance exchange and trade, mortuary and other ceremonialism, and inequality in social ranking. The type site for this phase is the Spiro Mound site located in LeFlore County.

The final phase of this time period, the Ft. Coffee Phase, is characterized by a decline in ceremonialism and long distance trade along with less evident social inequality.
Trade with Plains groups appears to have been more common than trade with eastern groups during this time. Subsistence appears to have become focused on agriculture and bison hunting, though small game continued to be hunted. Greater social integration is evident in the similarity of lifeways and material culture among sites of this time period, despite lack of ceremonial construction.

The Protohistoric (Contact) Period

The period from A.D. 1500-1825 is referred to as the Protohistoric (or Contact) Period. During this time non-native explorers, trappers, and traders visited the region, and land claims by first the Spanish, and then the French brought great change. Protohistoric sites in Oklahoma

appear to be directly related to an earlier manifestation of similar village sites located further north in Kansas, including the Great Bend Aspect with sites in central, south-central, and southeast Kansas. Great Bend manifestations represent the villages encountered by Francisco Coronado in 1541. People lived in large, circular grass houses, grew crops, and hunted bison and small game. The archaeological record documents significant long distance trade with the southwest. Items such as painted and glazed pottery, turquoise beads and pendants, and shell beads distinctive to the Southwest Pueblo cultures as well as bois d'arc and pottery from Caddo settlements in northeastern Texas attest to the extent of the trade networks in place. This way of life continued into the eighteenth century.

In 1682, Robert Cavelier, Sieur de la Salle, claimed the territory drained by the Mississippi as part of the French Empire in North America. By 1700, French traders were established in Oklahoma and had developed trading relationships with Wichita groups in the Arkansas Valley and the Osage to the east. Diseases swept through the region during this time period, dramatically reducing local populations. This, combined with increased intergroup violence, resulted in the coalescence of communities into large villages, often with defensive fortifications. Competition between rivals intensified through time as the fur trade brought significant and lasting changes to the economic systems of Villages. These economic systems in turn brought changes in social structure, including gender roles. During this time the Caddo were in the process of emigrating toward the Red River, largely due to the constant raiding by the Osage from the north. Many place names in the area of the Reservoir are indicative of the former French presence, including San Bois Creek and LeFlore County.

The Wichita and Affiliated Tribes were historically known as the Wichitas, Wacos, Taovayas, Tawakonis, and Kichais. Protohistoric Wichita sites from the early 1700's have been identified in Kay County, north-central Oklahoma, including the Bryson Paddock (34KA5) and Deer Creek Sites (34KA3), and in south-central Oklahoma at the Longest site (34JF1). These Protohistoric Wichita sites, dating from the early 1700s, provide evidence of the extent of French influence on the central and southern Plains, as artifact assemblages from these sites contain metal musket parts from French firearms, glass trade beads, copper kettle pieces, and European gunflints. Villagers did not dramatically change material culture in spite of this influx of European goods. Rather, they incorporated French goods into existing material culture frameworks. Guns were used until no longer viable, and then were hammered into hoes similar in shape to bison scapula hoes (which had seen long use on the Plains). Copper kettles were hammered flat and used to create tinklers- copper cones sewn to clothing- and other items of personal adornment. The Osage had villages to the east of the protohistoric Wichita Villages, and they often fought the Wichita over access to trade goods.

The Caddo, Wichita, Osage, and Quapaw, hunted in the Arkansas Valley. Territorial claims shifted between France and Spain during the rest of the eighteenth century; however, France controlled the land until it was acquired by the United States in the 1803 Louisiana Purchase.

After the Louisiana Purchase in 1803, military and political expeditions in the Robert S. Kerr Reservoir area included those by James B. Wilkinson (1806), Stephen H. Long (1821), Thomas James (1821), and Jacob Fowler (1821).

Historic Era

Congress created Arkansas Territory on March 2, 1819, and this territory included present-day Oklahoma. Between 1820 and 1907, Oklahoma was designated as Indian Territory on maps of the United States, and, during this time period, it was an Indian resettlement zone for tribes from various parts of the country.

In May 1830, Congress passed the Indian Removal Act, which resulted in lasting consequences for all native groups in the United States. By 1838, most of Indian Territory was assigned to five Indian nations from the eastern United States. These included the Cherokee, Choctaw, Chickasaw, Creek, and Seminole nations.

Land south of the Arkansas and Canadian Rivers in Oklahoma was ceded by the United States to the Choctaws residing in Arkansas Territory in 1825. In 1816, Osage hunting territory north of the Arkansas River was transferred to their rivals, the Cherokee residing in Arkansas during the late 1700s and early 1800s. In 1828, the Cherokee ceded all their Arkansas land for a tract of land that later became the Cherokee Nation and the Cherokee Outlet. This treaty required that all Cherokees (including those residing in the Southeast) move to the land in Indian Territory. The Arkansas River was established as the territorial boundary between the Cherokee and the Choctaw.

The Creek Nation ceded their lands to the United States and migrated to Indian Territory in 1827, and moved to lands west of the confluence of the Arkansas and Canadian rivers. The Chickasaw moved to an area west of the Choctaw settlements by 1840. After war to resist relocation in the 1830s, most of the Seminoles moved west by 1842.

Fort Gibson was established by Col. Matthew Arbuckle, commander of the Seventh Infantry, in 1824. The fort was the furthest west U.S. Army post, built to protect the southwestern border of the nation and to maintain peace, primarily between the Osage and Cherokee. Originally known as Cantonment Gibson, it was renamed in 1832. It was the first military post in what would become Oklahoma. The Fort was involved in removal of eastern tribes to Indian Territory and was occupied through most of the Indian Removal period. The War Department abandoned the post 1857, as the area was peaceful and the Cherokee complained about the liquor and brothels at Fort Gibson and asked Congress to remove the post. The property and structures were deeded to the Cherokee who established the village of Kee-too-wah on the site. The post was returned to military use during the Civil War when Union forces responded to invasion of Indian Territory. In April of 1863 The Union Indian Brigade, under the leadership of Col. William A. Phillips, occupied the post from April of 1863, and the Army maintained presence at the Fort through the Reconstruction and Indian Wars periods. The Fort was abandoned by the Army in 1890.

The Civil War in Indian Territory resulted in increased factionalism among the tribes, sentiments that had already formed in pre-Removal times. While some fought for the Confederacy, others were left vulnerable to threats from the Confederacy and Plains tribes after the Union removed its troops from Indian Territory.

Two important battles occurred near Robert S. Kerr Reservoir: one near the town of Webbers Falls in 1863, and one at Pheasant Bluff near Tamaha in 1864. The Pheasant Bluff battlefield may be inundated by the reservoir. On June 15, 1864, Brigadier General Stand Watie led Confederate forces to capture and sink the Union steamboat J.R. Williams on the Arkansas River. This was considered the most inland Naval battle of the Civil War. The troops included Choctaws, Chickasaws, Creeks, and Seminoles.

The Civil War resulted in huge losses for the tribes and resulted in new treaties with the Cherokee, Choctaw, Chickasaw, Creek, and Seminole. These treaties required tribes to give up land due to their association with the Confederacy. This opened their land to railroads and adoption of their slaves as full citizens (Freedmen). The railroads brought a large increase in immigration from the east. The Missouri, Kansas, and Texas Railway Company began building in Indian Territory in 1870, crossing both the Cherokee and Choctaw nations. The rail lines provided access to minerals and timber in Indian Country. Coal was also discovered in the Choctaw and Cherokee Nations, and this brought experienced miners from Europe.

The Dawes Allotment Act of 1887 required members of the tribes to accept an allotment of individual land in place of tribal ownership of land. All five Nations had signed allotment agreements by 1902. The state of Oklahoma was admitted into the Union in 1907.

At Robert S. Kerr Reservoir, several sites have been defined as dating to the Historic Period; however, most of these date from the late nineteenth to the early twentieth century. A few sites have been attributed to early Cherokee or Choctaw farmsteads. Several small historic cemeteries are located at Robert S. Kerr Reservoir, with most dating to the time period between the late nineteenth to the early twentieth centuries.

Several small towns and communities near Robert S. Kerr Reservoir are Webbers Falls, Keota, Cowlington, and Tamaha. These settlements have a common history of flourishing until the onset of the Great Depression.

Webbers Falls was established as a trading post in 1828 by Walter Webber, a Cherokee who brought supplies up the Arkansas River.

Keota was founded in 1904 by the Midland Valley Railroad, but its role of supporting local cotton growers and shipping their products diminished greatly during the Great Depression.

Cowlington (previously known as Short Mountain) was established in 1884 and named after two European-American settlers, Coke and Fowler Cowling.

Tamaha (Haskell County) was one of the earliest port towns and trading centers in the Choctaw Nation (ca. 1831) and from 1836 to 1912 was a ferry crossing on the Arkansas River. It was known as Pleasant Bluff prior to establishment of a post office on April 17, 1884. The Tamaha Jail is the oldest jail in Oklahoma, and still stands near Robert S. Kerr Reservoir in Tamaha. The jail was constructed in 1886 and listed on the National Register of Historic Places. The last steamboat to come to Tamaha Landing was in 1912.

In nearby Sallisaw, Oklahoma is the one room log cabin built by Sequoyah in 1829. The site is listed on the National Register of Historic Places and is a National Historic Landmark.

A historical marker in Keota, Oklahoma, commemorates Reverend Peter Folsom. He was instrumental in establishing the First Choctaw Baptist Church.

Environmental Consequences

Effects to Cultural Resources were considered during the refinement processes of land allocations and reclassifications. The required reclassifications would not change current cultural resource management plans or alter areas where these resources exist. Therefore, no significant adverse impacts to Cultural Resources would occur as a result of implementing revisions to the Robert S. Kerr Reservoir Master Plan.

3.9 SOCIOECONOMIC RESOURCES AND ENVIRONMENTAL JUSTICE

Affected Environment

Zone of Interest

The zone of interest for the socio-economic analysis consists of Adair, Cherokee, Haskell, Latimer, Le Flore, McIntosh, Muskogee Pittsburgh and Sequoyah Counties in Oklahoma and Crawford and Sebastian Counties in Arkansas.

Population

The total population for the zone of interest is 510,458, as shown in Table 3.1. Almost 25% of the population is in Sebastian County, 14% in Muskogee County, 12% in Crawford County, 10% in Le Flore County and 9% in Cherokee County. Each of the remaining counties makes up less than 9% each of the total population. The population in the zone of interest makes up approximately 13% of the total population of Oklahoma and 17% of Arkansas. From 2013 to 2065, the population in the zone of interest is expected to increase to 675,980, an annual growth rate of 0.6% per year. By comparison, the population of Oklahoma is projected to increase at an annual rate of 0.7% per year and Arkansas 0.8% per year. The distribution of the population among gender is approximately 49% male and 51% female in most geographical areas, and with the male/female ratio reversed in Latimer, Le Flore, and Pittsburgh Counties as shown in Table 3.2.

Table 3.1 2013 Population Estimates and 2065 Projections

Geographical Area	2013 Population Estimate	2065 Projection
Oklahoma	3,785,742	5,280,026
Arkansas	2,933,369	4,437,622
Adair County, OK	22,427	32,391
Cherokee County, OK	47,488	79,980
Haskell County, OK	12,849	16,060
Latimer County, OK	11,034	14,321
Le Flore County, OK	50,062	74,963
McIntosh County, OK	20,358	30,026
Muskogee County, OK	70,657	85,457
Pittsburgh County, OK	45,417	56,668
Sequoyah County, OK	41,834	67,920
Crawford County, AR	61,796	50,818
Sebastian County, AR	126,536	167,376
Zone of Interest Total	510,458	675,980

Source: U.S. Bureau of the Census, American Fact Finder (2013 Estimate); Oklahoma State Data Center (2065 Projections, OK), UALR Institute for Economic Advancement (2065 Projections for AR)

Table 3.2 2013 Percent of Population Estimate by Gender

Geographical Area	Male	Female
Oklahoma	49.5	50.5
Arkansas	49.1	50.9
Adair County, OK	49.1	50.1
Cherokee County, OK	49.1	50.9
Haskell County, OK	49.3	50.7
Latimer County, OK	50.6	49.4
Le Flore County, OK	50.3	49.4
McIntosh County, OK	49.3	50.7
Muskogee County, OK	48.9	51.1
Pittsburgh County, OK	50.9	49.1
Sequoyah County, OK	49.4	50.6
Crawford County, AR	49.0	51.0
Sebastian County, AR	49.0	51.0
Zone of Interest Total	49.4	50.6

Source: U.S. Bureau of the Census, American Fact Finder (2013 Estimate)

Table 3.3 shows the population by age group. The distribution by age group is similar among the counties, zone of interest and the state overall. The largest age group is the 45 to 54, with 14% of the total population for each geographic area. Approximately 12% of the total population for each area is between 25 and 34 years of age as well as the 35 to 44 age group. Haskell and McIntosh Counties have slightly older populations with 11% and 13% of their populations between 65-74, respectively while the other counties have less than 10% of their populations in this age group.

Table 3.3 2013 Population Estimate by Age Group

	Age Group												
Area	**<5**	**5 to 9**	**10 to 14**	**15 to 19**	**20 to 24**	**25 to 34**	**35 to 44**	**45 to 54**	**55 to 59**	**60 to 64**	**65 to 74**	**75 to 84**	**85 and over**
Oklahoma	264,159	262,213	256,923	260,843	277,306	512,819	464,680	513,248	243,245	208,692	292,159	165,856	63,599
Arkansas	195,357	200,246	196,350	201,018	203,844	379,638	366,541	399,904	188,978	169,771	243,527	136,433	51,762
Adair County, OK	1,540	1,701	1,840	1,690	1,314	2,700	2,874	3,090	1,392	1,283	1,805	957	241
Cherokee County, OK	3,240	3,134	3,028	3,983	4,782	5,751	5,272	6,007	3,027	2,637	3,927	1,968	732
Haskell County, OK	840	970	839	851	734	1,440	1,477	1,654	703	959	1,358	694	330
Latimer County, OK	701	735	741	927	679	1,240	1,201	1,470	755	636	1,065	587	297
Le Flore County, OK	3,177	3,421	3,557	3,394	3,085	6,128	6,095	6,882	3,348	3,137	4,602	2,447	789
McIntosh County, OK	1,079	975	1,422	1,240	936	1,908	2,140	2,894	1,537	1,542	2,673	1,546	466
Muskogee County, OK	4,985	4,573	5,039	4,716	4,699	8,938	8,563	9,687	4,406	4,494	5,797	3,389	1,371
Pittsburgh County, OK	2,800	2,883	2,671	2,734	2,559	5,820	5,483	6,438	3,216	2,819	4,461	2,516	1,017
Sequoyah County, OK	2,548	2,844	3,212	2,900	2,332	4,777	5,457	6,011	2,829	2,409	3,883	1,958	674
Crawford County, AR	4,077	4,667	4,495	4,146	3,885	7,325	8,184	8,880	3,953	3,684	5,167	2,598	735
Sebastian County, AR	8,980	9,248	8,291	8,494	8,829	16,648	16,146	17,811	8,408	6,871	9,349	5,675	1,786
Zone of Interest Total	33,967	35,151	35,135	35,075	33,834	62,675	62,892	70,824	33,574	30,471	44,087	24,335	8,438

Source: U.S. Bureau of the Census, American Fact Finder (2013 Estimate)

Population by race and Hispanic Origin is displayed in Table 3.4. For the zone of interest, 68% of the population is White, 10% American Indian or Native Alaskan, 9% two or more races, 7% Hispanic, and 4% Black. The remainder of the races makes up less than 2% each. By comparison, for the Oklahoma, 68% of the population is White, 9% Hispanic, 7% each for Black, American Indian/Native Alaskan, and two or more races, 2% Asian, with the remaining less than 1% each and for Arkansas, 74% is White, 15% Black, 7% Hispanic, 2% Two or more races, and 1% or less for each of the other groups.

Table 3.4 2013 Population Estimate by Race/Hispanic Origin

Area	White	Black	American Indian and Alaska Native alone	Asian alone	Native Hawaiian and Other Pacific Islander alone	Some other race alone	Two or more races	Hispanic or Latino
Oklahoma	2,582,335	269,717	255,929	66,720	4,208	2,854	258,840	345,139
Arkansas	2,176,057	452,099	16,382	37,460	5,653	2,652	50,802	192,264
Adair County, OK	9,453	80	8,102	144	3	13	3,383	1,249
Cherokee County, OK	23,699	547	13,304	304	59	51	6,489	3,035
Haskell County, OK	9,358	101	1,747	43	4	0	1,142	454
Latimer County, OK	7,573	100	1,385	26	0	0	1,623	327
Le Flore County, OK	36,489	1,091	4,483	300	27	10	4,253	3,409
McIntosh County, OK	14,069	694	2,914	76	0	0	2,164	441
Muskogee County, OK	40,984	7,766	9,610	411	11	23	8,050	3,802
Pittsburgh County, OK	32,403	1,528	4,106	204	10	17	5,257	1,892
Sequoyah County, OK	27,200	787	4,965	257	0	6	7,133	1,486
Crawford County, AR	53,364	811	842	935	0	29	1,920	3,895
Sebastian County, AR	91,557	7,153	1,238	5,416	115	63	5,041	15,953
Zone of Interest Total	346,149	20,658	52,696	8,116	229	212	46,455	35,943

Source: U.S. Bureau of the Census, American Fact Finder (2013 Estimate)

Education and Employment

In the zone of interest, for 35% of the population 25 years old and older, the highest level of education attained is a high school diploma or equivalent. Twenty-three percent have some college, but no degree, 11% have a Bachelor's degree 11% 9-12 years but with no diploma, 8% have an Associate degree, 5% have a graduate or professional degree and 6% have less than nine years of education. For Oklahoma, 32% has a high school diploma or equivalent, 24% has some college, but no degree, 16% has a Bachelor's degree , 9% 9-12 years of school but no diploma, 8% have a graduate or professional degree, 7% have an Associate degree, and 5% less than nine years of schooling. For Arkansas, 35% have are high school graduates, 22% have some college but no degree, 13% have a bachelor's degree, 10% have competed 9th to 12th grade but have no diploma, 7% have a graduate or professional degree, 6% have less than a 9th grade education, and 6% have an Associate's degree. Table 3.5 shows the population over 25 years of age by highest level of educational attainment for each of the geographical areas.

Table 3.5 2013 Population Estimate by Highest Level of Educational Attainment, Population 25 Years of Age and Older

Area	Highest Level of Educational Attainment							
	Population 25 years and over	**Less than 9th grade**	**9th to 12th grade, no diploma**	**High school graduate (includes equivalency)**	**Some college, no degree**	**Associate's degree**	**Bachelor's degree**	**Graduate or professional degree**
Oklahoma	2,464,298	113,560	221,671	782,753	595,862	171,995	387,885	190,572
Arkansas	1,936,554	118,011	197,050	679,339	433,799	119,038	257,157	132,160
Adair County, OK	14,342	1,137	2,098	5,766	2,989	536	1,304	512
Cherokee County, OK	29,321	1,437	2,931	8,607	7,529	1,633	4,405	2,779
Haskell County, OK	8,615	695	1,204	3,292	1,676	762	748	238
Latimer County, OK	7,251	237	922	2,464	1,770	856	607	395
Le Flore County, OK	33,428	2,343	4,176	12,759	7,026	2,813	2,604	1,707
McIntosh County, OK	14,706	817	1,912	5,597	3,426	1,049	1,242	663
Muskogee County, OK	46,645	2,171	4,879	15,361	11,902	3,982	5,867	2,483
Pittsburgh County, OK	31,770	1,603	3,696	11,637	7,191	2,793	3,156	1,694
Sequoyah County, OK	27,998	1,652	3,579	11,385	5,702	1,949	2,561	1,170
Crawford County, AR	40,526	3,078	4,148	15,308	9,014	3,165	4,008	1,805
Sebastian County, AR	82,694	6,110	8,605	25,970	19,726	6,402	10,579	5,302
Zone of Interest Total	337,296	21,280	38,150	118,146	77,951	25,940	37,081	18,236

Source: U.S. Bureau of the Census, American Fact Finder (2013 Estimate)

Employment by sector is presented in Table 3.6. In the zone of interest, approximately 24% of the workforce is employed in the Educational Services, Health Care and Social Assistance Sector, followed by 15% in Manufacturing, 12% in Retail Trade, 8% Arts, Entertainment, Recreation and Accommodation, 7% in Construction. Similarly, the largest employment sector for Oklahoma and Arkansas was also Educational Services Health Care and Social Assistance, with 23% and 24%, respectively, of the total employment. While manufacturing has importance in both the zone of interest and state, it is evident that the economies are driven by service sector employment.

Table 3.6 2013 Annual Average Employment by Sector

Employment Sector	Oklahoma	Arkansas	Adair County, OK	Cherokee County, OK	Haskell County, OK	Latimer County, OK	Le Flore County, OK	McIntosh County, OK	Muskogee County, OK	Pittsburgh County, OK	Sequoyah County, OK	Crawford County, AR	Sebastian County, AR	Zone of Interest Total
Civilian employed population 16 years and over	1,686,404	1,245,432	8,346	19,139	4,578	4,039	18,229	7,070	27,835	18,409	15,796	25,540	54,665	203,646
Agriculture, forestry, fishing and hunting, and mining	82,345	40,843	536	875	852	511	1,558	353	390	1,474	761	1,032	1,296	9,638
Construction	121,090	84,557	666	1,539	507	360	1,395	599	2,125	1,168	1,032	1,752	2,985	14,128
Manufacturing	164,597	173,568	1,712	1,452	266	309	2,261	633	3,831	1,744	2,048	4,777	10,566	29,599
Wholesale trade	46,259	32,344	177	584	106	91	462	64	736	499	294	756	1,574	5,343
Retail trade	195,647	166,380	766	2,155	591	377	2,190	1,004	3,133	2,022	1,835	2,980	6,887	23,940
Transportation and warehousing, and utilities	86,728	68,360	328	895	221	155	1,059	489	1,441	1,047	981	1,286	2,814	10,716
Information	31,422	20,543	115	168	25	19	209	74	410	276	258	133	694	2,381
Finance and insurance, and real estate and rental and leasing	97,958	60,424	223	757	137	230	769	269	1,423	754	503	1,170	2,454	8,689
Professional, scientific, and management, and administrative and waste management services	135,765	85,033	308	1,063	132	210	849	549	1,178	876	753	1,705	3,454	11,077
Educational services, and health care and social assistance	381,408	297,284	2,036	5,216	1,073	1,216	4,341	1,608	6,922	4,195	4,088	6,048	12,818	49,561
Arts, entertainment, and recreation, and accommodation and food services	150,284	98,452	543	1,790	254	172	1,292	576	2,636	1,541	1,509	1,665	4,641	16,619
Other services, except public administration	86,763	59,425	260	913	214	135	880	301	1,540	682	752	1,427	2,652	9,756
Public administration	106,138	58,219	676	1,732	200	254	964	551	2,070	2,131	982	809	1,830	12,199

Source: U.S. Bureau of the Census, American Fact Finder (2013 Estimate)

As shown in Table 3.7, the unemployment rate is slightly higher in the zone of interest, at 6.0%, than the Oklahoma, 4.5%, but comparable to Arkansas, 6.1%.. The difference is driven by a significantly higher unemployment rate in Latimer County (8.1%), Sequoya County (7.5 %) McIntosh County (7.3%) and Le Flore (7.2%).

Table 3.7 Labor Force, Employment and Unemployment Rates, 2014 Annual Averages

Geography	**Civilian Labor Force**	**Employed**	**Unemployed**	**Unemployment Rate**
Oklahoma	1,784,035	1,703,832	80,203	4.5%
Arkansas	1,300,608	1,220,875	79,733	6.1%
Adair County, OK	9,640	9,029	611	6.3%
Cherokee County, OK	23,323	22,209	1,114	4.8%
Haskell County, OK	5,388	5,072	316	5.9%
Latimer County, OK	3,859	3,546	313	8.1%
Le Flore County, OK	19,094	17,719	1,375	7.2%
McIntosh County, OK	8,541	7,914	627	7.3%
Muskogee County, OK	30,570	28,793	1,777	5.8%
Pittsburgh County, OK	21,616	20,524	1,092	5.1%
Sequoyah County, OK	16,230	15,034	1,196	7.4%
Crawford County, AR	26,513	24,881	1,631	6.2%
Sebastian County, AR	57,296	53,973	3,323	5.8%
Zone of Interest Total	222,069	208,694	13,375	6.0%

Source: U.S. Bureau of Labor Statistics

Households, Income and Poverty

There are approximately 194,000 households in the zone of interest with an average household size of 2.63 persons. For the Oklahoma, there are 1.4 million households and in Arkansas, 1.1 million, with an average size of households at 2.55 for Oklahoma and 2.53 for Arkansas, as shown in Table 3.8.

Table 3.8 2013 Households and Household Size

Area	**Total Number of Households**	**Average household size**
Oklahoma	1,444,081	2.55
Arkansas	1,129,723	2.53
Adair County, OK	8,046	2.76
Cherokee County, OK	16,875	2.68
Haskell County, OK	4,713	2.70
Latimer County, OK	4,160	2.53
Le Flore County, OK	18,412	2.63
McIntosh County, OK	8,092	2.48
Muskogee County, OK	26,802	2.51
Pittsburgh County, OK	18,456	2.32
Sequoyah County, OK	15,624	2.65
Crawford County, AR	23,368	2.62
Sebastian County, AR	49,294	2.53
Zone of Interest Total	193,842	2.63

Source: U.S. Bureau of the Census, American Fact Finder (2013 Estimate)

As shown in Table 3.9, the zone of interest is slightly poorer that the state overall. In the counties in zone of interest, the median household income is almost $36,000, compared to the state median household income of $45,000 in Oklahoma and $41,000 in Arkansas. The exceptions being Latimer, Pittsburgh and Sebastian Counties, whose medial household incomes are $40,000 or greater. Similarly, the zone of interest has a lower per capita income ($20,204) compared to the Oklahoma ($24,208) and Arkansas ($22,170). Within the zone of interest, Sebastian County has the highest per capita income ($23,222) with Latimer County ($22,603) and Pittsburgh County ($21,966) close behind.

Table 3.9 Median and Per Capita Income, 2012

Geography	**Median Household Income**	**Per Capita Income**
Oklahoma	45,339	24,208
Arkansas	40,768	22,170
Adair County, OK	32,556	15,116
Cherokee County, OK	37,260	18,582
Haskell County, OK	35,334	18,896
Latimer County, OK	40,970	22,603
Le Flore County, OK	36,542	18,141
McIntosh County, OK	36,096	19,100
Muskogee County, OK	38,502	19,686
Pittsburgh County, OK	41,252	21,966
Sequoyah County, OK	35,742	18,131
Crawford County, AR	39,479	19,477
Sebastian County, AR	40,471	23,222
Zone of Interest Total	NA	20,203

Source: U.S. Bureau of the Census, American Fact Finder (2013 Estimate)

The number of persons whose income was below the poverty level was considerably greater in the zone of interest (21%) as compared to Oklahoma (17%) and Arkansas (19%). Most of the counties in the zone of interest showed between 20% and 26% of all persons having incomes below the poverty level, with Haskell, Latimer and Pittsburgh Counties having less than 20% of their populations below the poverty level, as shown in Table 3.10.

Table 3.10 Percent of Families and People Whose Income in the Past 12 Months is Below the Poverty Level (2013)

Geography	**All Persons**
Oklahoma	16.9%
Arkansas	19.20%
Adair County, OK	26.40%
Cherokee County, OK	22.80%
Haskell County, OK	17.40%
Latimer County, OK	16.80%
Le Flore County, OK	22.20%
McIntosh County, OK	18.50%
Muskogee County, OK	21.40%
Pittsburgh County, OK	18.50%
Sequoyah County, OK	21.40%
Crawford County, AR	20.20%
Sebastian County, AR	21.20%
Zone of Interest Total	21.35%

Source: U.S. Bureau of the Census, American Fact Finder (2013 Estimate)

In compliance with Executive Order 12898, Federal Action to Address Environmental Justice in Minority and Low-Income Populations, the census data document that minority and low income populations are present in zone of interest, with higher percentages of minority and low income populations than the state of Oklahoma. However, Robert S. Kerr Reservoir recreational facilities are open to the public without discrimination. No new construction is proposed, and there would be no disproportionate adverse impact on minority or low-income population groups in the zone of interest.

Environmental Consequences

Robert S. Kerr Reservoir is beneficial to the local economy through indirect job creation and local spending by visitors. In addition, the Robert S. Kerr Reservoir project offers a variety of free recreation opportunities, and uses innovative maintenance and planning programs to minimize usage fees. There would be no adverse effects to area economic stability or environmental justice populations resulting from the revision of the Master Plan.

3.10 AIR QUALITY

Affected Environment

The air quality of any region is controlled primarily by the magnitude and distribution of pollutant emissions and the regional climate. The transportation of pollutants from specific source areas is often times augmented by local topography and meteorology. As with many areas throughout the Great Plains, relatively level topography characteristic of Oklahoma allows for uninhibited circulation of air pollutants. The State of Oklahoma ranks

high in the nation in average daily wind speed. Average annual wind speed in the Tulsa, OK region is 10.2 miles per hour based on 64 years of records through 2012 (NOAA 2015). http://www1.ncdc.noaa.gov/pub/data/ccd-data/wndspd12.txt.

The primary legislation governing federal air quality is the Clean Air Act Amendments (CAAA) of 1990. The CAAA delegates primary responsibility for clean air to the US Environmental Protection Agency (USEPA). The USEPA published a conformity rule on November 30, 1993, requiring all federal actions to conform to appropriate State Implementation Plans (SIPs) established to improve ambient air quality. Areas are classified as either "attainment" or "nonattainment" with respect to state and federal ambient air quality standards. The classifications are made by comparing actual monitored air pollutant concentrations to state and federal standards. The Conformity Rule applies to Federal actions in non-attainment areas.

National Ambient Air Quality Standards (NAAQS) currently exist for six criteria pollutants: carbon monoxide, lead, nitrogen dioxide, ozone, sulfur dioxide, particulate matter less than 10 micrometers in size, and particulate matter less than 2.5 micrometers in size (USEPA 2012). The Oklahoma Department of Environmental Quality (ODEQ) monitors air quality stations for both criteria pollutants and air toxins.

Sequoyah, Leflore, Haskell and Muskogee Counties are located within the Metropolitan Fort Smith Interstate Air Quality Control Region (AQCR) and are designated in attainment and meeting NAAQS for all criteria pollutants designated in the Clean Air Act (40 CFR Part 81.337). Consequently, a conformity determination is not required. The Robert S. Kerr project incorporates a mix of innovative operation and management principles along with conservation practices to implement its authorized purposes of navigation, hydroelectric power and recreation. In addition, the project incorporates public education and awareness to encourage protection of natural resources.

Environmental Consequences

Lands that encompass navigation and hydropower facilities will remain classified as project operation lands. Recreation facilities will continue to operate and abide by rules and regulations involving NAAQS in order to protect the Metropolitan Fort Smith Interstate AQCR. Therefore, no significant adverse impacts to air quality would occur as a result of implementing the proposed revisions to the Robert S. Kerr master plan.

3.11 CLIMATE CHANGE AND GREENHOUSE GAS

Affected Environment

The 2012 Update of the Oklahoma Comprehensive Water Plan, Water Demand Forecast Report Addendum, Conservation and Climate Change presents assessments on the impacts of climate change under various scenarios. Climate change scenarios included: Scenario 1 represents the ensemble projection developed from the set of individual projections with predicted mean annual temperature changes greater than the median projected change (upper half) and predicted mean annual precipitation changes less than the

median projected change (lower half) (i.e. hot and dry). Scenario 2 was developed from the lower half of both the temperature and precipitation change; Scenario 3 was developed from the upper half of both temperature and precipitation change (hot and wet); and Scenario 4 was developed from the lower half of temperature change and upper half of precipitation change (warm and wet). Climate change scenario analysis by the Oklahoma Water Resources Board conclude that maximum temperature in August could increase by 3.5^{o}F to 7.5^{o}F above the historical average temperatures (January 1, 1950 to December 31, 2007); annual precipitation deviations from historical averages could range from a decrease of up to 3.5 inches per year to an increase of up to 3.0 inches per year; municipal and industrial water supply demand increases are project to range from between 0 to 500 acre-feet per year to 2,000 to 5,000 acre-feet per year under various climate change scenarios.

Air emissions from the operation of internal combustion engines that produce exhaust result in Greenhouse Gas (GHG) emissions that could contribute to global climate change. The Council on Environmental Quality (CEQ) published "Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions," December 18, 2014. The Draft Guidance suggests that the impacts of projects directly emitting GHGs in excess of 25,000 metric tons or more of carbon dioxide (CO2)-equivalent (CO2e) GHG emissions per year be considered in a qualitative and quantitative manner in NEPA reporting. According to EPA's most recent estimate tools, the Fort Smith Metropolitan area which encompasses Robert S. Kerr Reservoir, there are only three major contributors in the region. The closest major contributing facility is the Sallisaw Solid Waste Facility. The general navigation operations, hydroelectric operations and recreation facilities associated with the reservoir do not approach the proposed reportable limits. The project does have management plans in place such as routine equipment maintenance, holistic vegetative management plans, natural resource management plans, and public education and outreach programs to protect regional natural resources. In addition, the project will continue monitoring programs as required to meet applicable laws and policies.

Environmental Consequences

Under the proposed action, current Robert S. Kerr project management plans and monitoring programs would not be changed. In the event greenhouse gas issues become significant enough to impact the current operations at Robert S. Kerr Reservoir, the Master Plan and all associated documents would be reviewed and revised as necessary.

3.12 HEALTH AND SAFETY

Affected Environment

As mentioned earlier in this document, Robert S. Kerr Reservoir authorized purposes included navigation, hydroelectric power, and recreation. Compatible uses incorporated in project operation management plans include conservation and wildlife management components. The reservoir has established public outreach programs in place to educate the public on water safety and conservation of natural resources. In addition to the water safety outreach programs, the project has established recreation management practices in place to protect the public. These include safe boating and swimming regulations, safe hunting

regulations, speed limit signs and pedestrian signs for park roads. The project also has solid waste management plans in place for camping and day use areas. The project has personnel in place to enforce these policies, rules and regulations during normal park hours.

Environmental Consequences

Under the proposed action, the required revisions to the Robert S. Kerr Reservoir master plan are compatible with Robert S. Kerr project safety management plans. The project has reporting guidelines in place should water quality become a threat to public health. Therefore, no significant adverse affects to human health or safety would occur as a result of implementing revisions to the Robert S. Kerr Reservoir master plan.

3.13 CUMULATIVE IMPACTS

A cumulative effect is defined as the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a long period of time (40 CFR Part 1508.7). The following analysis abides by the National Environmental Quality Act (NEPA) Council on Environmental Quality's (CEQ) Considering Cumulative Effects under NEPA (CEQ, 1997), and Guidance on the Consideration of Past Actions in Cumulative Effects Analysis (CEQ, 2005).

Historically, Leflore, Haskell, Sequoyah, and Muskogee counties have undergone extensive change with the introduction of farming and ranching in the 1800's. Land clearing and plowing destroyed much of the historic vegetation including old growth timber and native prairie. Past projects in the area include construction of the project and the McClellan Kerr Arkansas River Navigation System, construction of public highways and expansion of small rural communities.

Currently much of the area still encompasses farming and ranching operations. The counties surrounding the project area are included in the Fort Smith, Arkansas-Oklahoma Metropolitan Statistical Area. The Fort Smith area is known as a manufacturing hub. Area manufacturers include Rheem, Traine, Georgia-Pacific, Gerber, Planters Peanuts and many others. Other industries include education and medical facilities. Fort Smith area transportation demands are met through a series of US and state highways along with Fort Smith Regional Air Port, Kansas City Southern Railway, and Arkansas - Missouri Railroad.

It is anticipated that some areas within the region will grow as a result of economic developments. Therefore, reasonably foreseeable projects in the area are likely to include expansions and improvements to local thorough fares and major highways, improvements to or expansions to medical and educational facilities, new housing developments, along with the construction of supporting businesses such as retail shopping.

Environmental Consequences

The master plan revisions will refine current management of project lands and do not include any proposed new construction projects. Therefore, no increase in cumulative effects would occur as a result from revisions to the Robert S. Kerr Reservoir Master Plan.

SECTION 4: APPLICABLE FEDERAL LAWS

This EA has been prepared to satisfy the requirements of all applicable environmental laws and regulations, and has been prepared in accordance with the Council on Environmental Quality's implementing regulations for NEPA, 40 CFR Parts 1500 – 1508, and USACE Regulation ER 200-2-2, *Environmental Quality: Procedures for Implementing NEPA*. The revision of the master plan is consistent with the USACE's Environmental Operating Principles. The following is a list of applicable environmental laws and regulations that were considered in the planning of this project and the status of compliance with each:

National Environmental Policy Act – This EA has been prepared in accordance with Council on Environmental Quality regulations for implementing NEPA. The environmental and social consequences of master plan revision have been analyzed in accordance with NEPA and presented in the assessment.

Fish And Wildlife Coordination Act Of 1958, as amended **–** Because no construction or change in operation of the reservoir is proposed, there is no plan to coordinate under the Act; however, information provided by USFWS and ODWC on fish and wildlife resources has been utilized in the development of this assessment, and because USACE has agreements with USFWS to manage the Sequoyah National Refuge, coordination will be completed as a courtesy.

Solid Waste Disposal Act 1965 (SWDA) – Implies it is incumbent upon federal agencies to use responsible methods for disposal of solid wastes in order to protect air, water and other natural resources. This includes the disposal of garbage or refuse, sludge from wastewater treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities. The operation and management of the existing project complies with the SWDA and will not change with the master plan revisions.

Resource Conservation and Recovery Act - This act was enacted in 1976 as a result of amendments to the Solid Waste Disposal Act. This law addresses solid (Subtitle D) and hazardous (Subtitle C) waste management activities. The Hazardous and Solid Waste Amendments (HSWA) of 1984 strengthened RCRA's waste management provisions and added Subtitle I, which governs underground storage tanks (USTs). The existing project includes solid waste management operations that are in compliance with RCRA, the existing project doesn't include activities that generate hazardous wastes, and the existing project does not include any USTs. The existing operations will not change with the master plan revisions.

Endangered Species Act of 1973 (ESA), as amended – The District coordinated this project with the USFWS and NMFS regarding threatened, endangered or proposed species and their critical habitats in the project area. The District has concluded that the proposed project would not result in any significant adverse impacts to federally listed threatened or endangered species (Sections 3.6 and 4.5). Since the District's determination was a "no effect" determination, consultation under the ESA is not required for this project.

Clean Water Act of 1977 – The project is in compliance with all state and Federal Clean Water Act regulations and requirements and is regularly monitored by the Corp and ODEQ for water quality. A state water quality certification pursuant to Section 401 of the Clean Water Act is not required for the master plan update. There will be no change in the existing management of the reservoir that would impact water quality.

Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) – Requires the identification of sites where hazardous materials threaten the environment and or public health as a result of leakage, spillage, or general mismanagement, and then to identify the responsible party. The existing project includes one former site where hazardous materials migrated from an adjacent site and remediation activities have been completed. The site is managed under a routine monitoring plan that is in compliance with CERCLA requirements. The existing operations and management for this site will not change with the master plan revisions.

Section 404 Clean Water Act – The USACE regulates, under the authority of Section 404 of the Clean Water Act, the discharge of dredged and fill material into all waters of the U.S., including wetlands. Nontidal waters of the U.S. are generally described as rivers and streams including the smallest of tributaries, any impoundments on those rivers and streams (e.g., ponds and lakes), and any wetlands adjacent to those features. If any project operations or construction at Robert S. Kerr Reservoir involves the discharge of dredge or fill material they will be evaluated and authorized under regulations at 33 CFR Parts 335-338 implementing Section 404 of the Clean Water Act.

Rivers and Harbors Act, 33 U.S.C. 401 – Section 10 of the Rivers and Harbors Act of 1899, navigable waters of the United States are those waters that are subject to the ebb and flow of the tide and/or are presently being used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce (33 CFR 329.4). Navigable waters include lakes and other on-channel impoundments of navigable rivers. Under Section 10, the U.S. Army Corps of Engineers (USACE) regulates any work in or affecting navigable waters of the United States. If any project operations or construction at Robert S. Kerr Reservoir involves the discharge of dredge or fill material they will be evaluated and authorized under regulations at 33 CFR Parts 335-338 implementing Section 404 of the Clean Water Act.

Wild and Scenic Rivers Act, as amended, 16 U.S.C. 1271 – Wild River Areas are defined as those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. Scenic river areas are defined as those rivers or sections of rivers that are free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads. There are no project lands designated as Wild and Scenic Rivers.

Flood Control Act of 1944 – Section 4 of the act as last amended in 1962 by Section 207 of Public Law 87-874 authorizes USACE to construct, maintain, and operate public parks and recreational facilities in reservoir areas and to grant leases and licenses for lands, including facilities, preferably to Federal, State or local governmental agencies. This act also authorized the creation of the Southwestern Power Administration, then within the Department of the Interior and currently within the Department of Energy, as the agency responsible for marketing and delivering the power generated at Federal reservoir projects.

National Historic Preservation Act (NHPA) of 1966, as amended – Compliance with the NHPA of 1966, as amended, requires identification of all properties in the project area listed on, or eligible for listing on, the National Register of Historic Places. Surveys and site salvage were coordinated with the Oklahoma SHPO and conducted prior to the construction of the reservoir in the 1960s. Known sites are mapped and avoided by maintenance activities.

Clean Air Act (CAA) of 1977 – The EPA established nationwide air quality standards to protect public health and welfare. The State of Oklahoma has adopted the National Ambient Air Quality Standards as the state's air quality criteria. The project is located in the Fort Smith Metropolitan Area, which has attainment status. Existing operation and management of the reservoir is compliant with the CAA and will not change with the master plan revisions.

Farmland Protection Policy Act (FPPA) of 1980 and 1995 – The FPPA's purpose is to minimize the extent to which federal programs contribute to the unnecessary and irreversible conversion of farmland to non-agricultural uses. Prime and Unique Farmland is present on Robert S. Kerr Reservoir project lands but will not be impacted by master plan revision.

Council on Environmental Quality Memorandum dated August 11, 1980, Prime or Unique Farmlands – Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and is also available for these uses. Prime and Unique Farmland is present on Robert S. Kerr Reservoir project lands but will not be impacted by master plan revision.

Executive Order 11990, Protection of Wetlands – Executive Order 11990 requires federal agencies to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in executing federal projects. The operation and management of the existing project complies with Executive Order 11990.

Executive Order 11988, Floodplain Management – This Order directs Federal agencies to evaluate the potential effects of proposed actions in floodplains. The operation and management of the existing project complies with Executive Order 11988.

Executive Order 12898, Environmental Justice – This Order directs Federal agencies to achieve environmental justice to the greatest extent practicable and permitted by law, and consistent with the principles set forth in the report on the National Performance Review. Agencies are required to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations. The revision of the master plan will not result in a disproportionate adverse impact on minority or low-income population groups.

Executive Orders 12962 and 13474 (an amendment to Executive Order 12962) – Require Federal agencies, to the extent permitted by law and where practicable, to improve the quantity, function, sustainable productivity, and distribution of U.S. aquatic resources for increased recreational fishing opportunities in cooperation with States and Tribes and ensure that recreational fishing shall be managed as a sustainable activity in national wildlife refuges, national parks, national monuments, national marine sanctuaries, marine protected areas, or any other relevant conservation or management areas or activities under any Federal authority, consistent with applicable law. The operation and management of the existing project complies with Executive Orders 12962 and 13474.

Executive Order (EO) 13186 – Implies that it is incumbent upon federal agencies to protect migratory birds. Under EO 13186, federal agencies are mandated to integrate conservation principles, measures, and practices into agency activities and prevent or abate the pollution or detrimental alteration of the environment for the benefit of migratory birds, as practicable. The operation and management of the existing project complies with Executive Order (EO) 13186.

SECTION 5: FEDERAL, STATE, AND LOCAL AGENCY COORDINATION

The EA was coordinated with the following agencies having legislative and administrative responsibilities for environmental protection. A copy of the correspondence from the agencies that provided comments and planning assistance for preparation of the EA are in the appendices. The mailing list for the 30-day public review periods for this EA is in Appendix B.

U.S. Fish and Wildlife Service
U.S. Environmental Protection Agency, Region VI
U.S. Department of Agriculture, Natural Resources Conservation Service
U.S. Department of Energy, Southwestern Power Administration
Oklahoma Department of Wildlife Conservation
Oklahoma Department of Environmental Quality
Oklahoma Water Resources Board
Oklahoma Conservation Commission
Oklahoma Natural Heritage Inventory
Oklahoma Archeological Survey
Oklahoma State Historic Preservation Officer
Oklahoma Tourism and Recreation Department
Alabama-Quassarte Tribal Town, Oklahoma
Caddo Indian Tribe of Oklahoma
Cherokee Nation, Oklahoma
Kialegee Tribal Town, Oklahoma
Sixshooter Resort, Tenkiller Ferry Lake, Oklahoma
Pine Cove Marina, Tenkiller Ferry Lake, Oklahoma
Pettit Bay Marina, Tenkiller Ferry Lake, Oklahoma
Burnt Cabin Marina, Tenkiller Ferry Lake, Oklahoma
Caney Ridge Marina, Tenkiller Ferry Lake, Oklahoma
Cookson Bend Marina, Tenkiller Ferry Lake, Oklahoma
Snake Creek Marina, Tenkiller Ferry Lake, Oklahoma
Strayhorn Cove Marina, Tenkiller Ferry Lake, Oklahoma
Elk Creek Marina, Tenkiller Ferry Lake, Oklahoma

SECTION 6: LIST OF PREPARERS

Norman Lewis – Regional Economist; 9 years U.S. Army Corps of Engineers, Economics Section, Regional Planning and Environmental Center (RPEC)

Kathy Mitchell – Biologist; 15 years U.S. Army Corps of Engineers, NEPA and Cultural Resources Section, RPEC

Robert Morrow – Natural Resource Planner, 8 years U.S. Army Corps of Engineers; Master Planning Section, RPEC

Holly Smith – Archeologist; 12 years U.S. Army Corps of Engineers, Operations Division, Environmental Branch

SECTION 7: BIBLIOGRAPHY

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APPENDIX A: Alternatives Comparison to Key Selection Criteria

Key Selection Criteria for Revising Robert S. Kerr Reservoir Master Plan
Project-wide resource objectives.

- To give priority to the preservation and improvement of wild land values in public use planning, design, development, and management activities.

- To preserve and protect important paleontological, archeological, ecological, and esthetic resources.

- To manage habitat for threatened and endangered species and to support a diversity of fish and wildlife, and recreation use.

- To prevent the introduction of invasive species and aquatic nuisance species (ANS), detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner, monitor invasive species and ANS populations accurately and reliably, and provide for restoration of native species and habitat conditions in ecosystems that have been invaded.

- To manage and develop project lands to accommodate periodic fluctuations in lake elevations with minimal impacts.

- To develop and manage project resources to support types and levels of recreation activities indicated by visitor demand and consistent with carrying capacities and aesthetic, cultural, and ecological values.

- To manage identified recreational lands in ways that enhance benefits to wildlife.

- To provide access by Tribal members to any cultural resources, sacred sites, or other Traditional Cultural Properties.

- To preserve and protect cultural resources sites in compliance with existing federal statutes and regulations.

- To expand public outreach and education about the history of the area, project resources, and the USACE's role in developing and managing these resources.

- To foster stewardship by minimizing encroachments and other non-allowed uses.

- To develop and manage lands in cooperation and coordination with other management agencies and appropriate entities in the private sector.

- To maintain and manage project lands and waters to support regional management programs.

Evaluation of Possible Alternatives Against Key Criteria

Alternative	Positive	Negative
No Action – Do Not Revise Robert S. Kerr Reservoir Master Plan	No costs to project operations.	Master Plan would not be in compliance with current regulations. Lands may not be classified to meet current conditions.
Revise Only Land Classification Names, No Change In Operation And Use	Would comply with current regulations Minimal labor and costs.	Would not reflect changes in land management and land uses that have occurred over time to meet regional goals and objectives. May not address changes in National Policies or Public Law Mandates. Would not reflect recreation closures or address evolving public demands. Would not reflect any new Cooperative or Lease Agreements.
Revise Master Plan to Meet Authorized Project Purposes and to Maximize Recreation	Would provide recreation opportunities and economic uses to the public.	Would not support regional goals associated with good stewardship of land and water resources. Would hamper wildlife management and conservation practices associated with national refuge areas. Would not support cultural resource management practices. May violate national policies or public law mandates.
Revise Master Plan to Meet Authorized Project Purposes and to Maximize Natural Resource Management	Would support regional goals associated with natural resource management. Would reflect current agreements with USFWS & ODWC. Would be compatible with current management plans associated with the national	Would limit recreation opportunities. Would not meet public demands or regional goals associated with recreation. May violate national policies or public law mandates.

Alternative	Positive	Negative
	refuge areas. Would be compatible with current cultural resource management plans.	
Revise Master Plan to Meet Authorized Project Purposes to Reflect Current Land Management and Uses That Are Compatible With Regional Natural Resource and Recreation Goals.	Would be compatible with regional goals for natural resources and recreational resources. Would reflect current cooperative and lease agreements. Would reflect current land uses. Would still allow ample recreational opportunities for the public. Would be compatible with all project operational management plans.	Would require funding for personnel resources and time for MP revisions and the NEPA process.

APPENDIX B: Agency Coordination

AGENCY COORDINATION EXAMPLE LETTERS

DEPARTMENT OF THE ARMY
EUFAULA LAKE OFFICE, CORPS OF ENGINEERS
102 E. BK 200 Road
STIGLER, OK 74462-1693
(918) 799-5843 or (918) 484-5135

R.S. KERR LAKE OFFICE **WISTER LAKE OFFICE**

November 3, 2014

Name
Title
Agency
Division/Section
Address

Dear Stakeholder:

The Tulsa District is initiating a review and revision of the Master Plan (MP) for Robert S. Kerr Reservoir, Oklahoma. The MP is the strategic land management document that guides the comprehensive management and development of all project recreational, natural, and cultural resources throughout the life of a Corps lake project. It is a vital tool for efficient and cost-effective management, development, and use of project lands. We welcome your comments and participation in review and revision of the MP for Robert S. Kerr Reservoir.

An informal public workshop for discussion of the MP revision for Robert S. Kerr Reservoir is scheduled for 6:00 to 8:00 p.m. on November 18, 2014, Carl Albert State College Student Center, 1138 S. Opdyke Street, Sallisaw, OK 74955. The workshop will be come-and-go format with no formal presentation. We invite and encourage you to attend this workshop anytime between the listed times, visit the information tables, and discuss MP issues with our staff. Comment forms will be provided at the workshop or you are welcome to submit comments in any form throughout the MP revision process.

Thank you for your interest in Robert S. Kerr Reservoir. We welcome your comments and participation at the public workshop and throughout the master plan review process. Questions should be directed to Mr. Dean Roberts, Robert S. Kerr Lake Manager, at 918-484-5135, ext. 3118 or e-mail Dean.A.Roberts@usace.army.mil.

Sincerely,

Jeff Knack
Operations Project Manager

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, TULSA DISTRICT
1645 SOUTH 101st EAST AVENUE
TULSA, OKLAHOMA 74128-4609

Operations Division
Natural Resources and Recreation Branch

JUN 12 2015

TO INTERESTED PARTIES:

The Tulsa District and Regional Planning and Environmental Center (RPEC) have revised the existing Robert S. Kerr Lock and Dam and Reservoir Master Plan and have assessed the environmental impacts of this Master Plan revision. The Master Plan is the strategic land use management document that guides the comprehensive management and development of all project recreational, natural, and cultural resources throughout the life of the water resource project. The Master Plan guides the efficient and cost-effective comprehensive management and development of all project recreational, natural and cultural resources throughout the life of the Corps project.

The Master Plan revision and Environmental Assessment (EA) were prepared in accordance with U.S. Army Corps of Engineers Regulation 1130-2-550, Project Operations - Recreation Operations and Maintenance Policies, and Part 230, Policy and Procedures for Implementing the National Environmental Policy Act, respectively. It has been determined from the referenced EA that adoption of the Master Plan revision will have no significant adverse impacts on the natural or human environment.

The Draft Master Plan and Draft Environmental Assessment are available on the Tulsa District web page for your review (http://www.swt.usace.army.mil). If you have comments they should be submitted by July 15, 2015 to the U.S. Army Corps of Engineers, Tulsa District, ATTN: OD-NR (Robert S. Kerr Master Plan Revision), 1645 South 101st East Avenue, Tulsa, Oklahoma 74128 or via email to Mr. Stephen Nolen at Stephen.L.Nolen@usace.army.mil.

Should you have any questions, I can be reached at 918.669.7660 or at the above email address. Thank you for your interest in Robert S. Kerr Lock and Dam and Reservoir.

Sincerely,

Stephen L. Nolen
Chief, Natural Resources and Recreation Branch

STAKEHOLDER MAILING LIST

Principal Chief Bill John Baker
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Tahlequah, OK 74465

Governor Bill Anoatubby
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Mr. Jontie Aldrich, Acting Field Supervisor
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Oklahoma Ecological Services Field Office
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Mr. J. D. Strong
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Mike Broderick
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Radiation Management Section
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Oklahoma City, Ok. 73101

PUBLIC ADVERTISEMENT ANNOUNCING MASTER PLAN REVISION

~ Announcing ~

OPEN HOUSE WORKSHOP

related to the

Master Plan Review/Revision
Robert S. Kerr Lake, Oklahoma

The Tulsa District, U.S. Army Corps of Engineers will host an open house workshop related to the review and revision of the project master plan (MP) for Robert S. Kerr Lake; Haskell, Sequoyah, Leflore and Muskogee Counties, Oklahoma. Interested persons are invited to stop by the open house to visit the information tables and discuss the project with Corps personnel. The open house takes place between 6:00 - 8:00 p.m. on Tuesday, Nov. 18, 2014 in an informal, come-and-go format with no formal presentation. While the Corps will provide forms to attendees so that comments can be made during the workshop, comments are welcome throughout the MP revision process. The open house workshop takes place at:

Carl Albert State College Student Center
1138 S. Opdyke Street
Sallisaw, Okla. 74955

Tuesday, Nov. 18, 2014

6:00-8:00 p.m.

Master Plan (MP)

The Tulsa District is initiating a review and revision of the MP for Robert S. Kerr Lake. The MP is the strategic land management document that guides the comprehensive management and development of all project recreational, natural, and cultural resources throughout the life of a Corps project. The MP is a vital tool for efficient and cost-effective management, development, and use of project lands. Comments and questions regarding the open house workshop or MP review process can be directed to:

Dean Roberts
Robert S. Kerr Lake Manager
102 E. BK 200 Road
Stigler, Okla. 74462
Phone: 918-484-5135
e-mail: Dean.A.Roberts@usace.army.mil