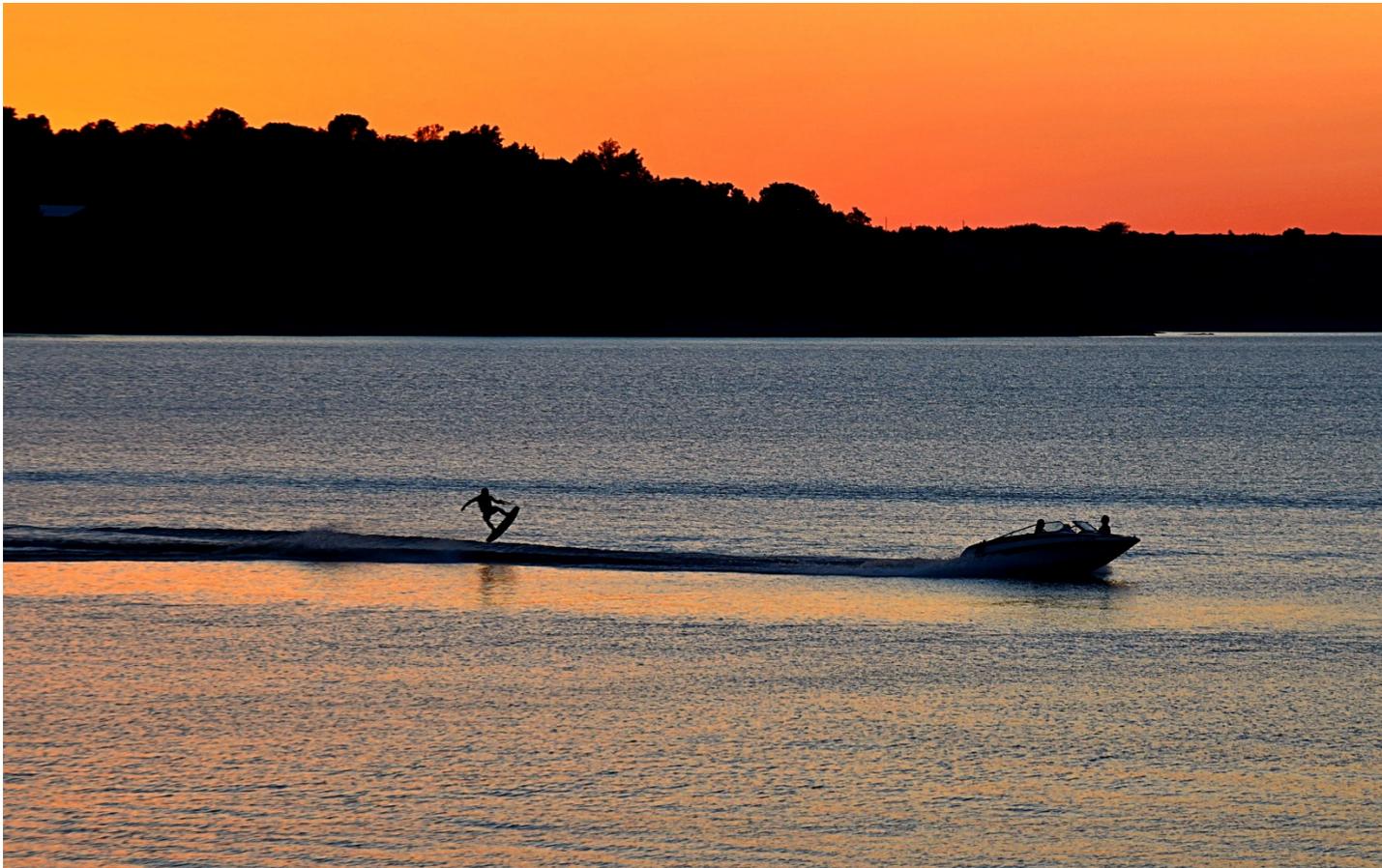


**US Army Corps
of Engineers**
Kansas City District

KANSAS RIVER BASIN

BIG BLUE RIVER

TUTTLE CREEK LAKE MASTER PLAN



August 2019

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PREFACE

The Master Plan for Tuttle Creek Lake was first approved June 1969. Subsequent revisions were prepared with the latest revision approved in September 1984.

In 2002 the US Army Corps of Engineers (Corps) developed and released a set of Environmental Operating Principles to instill environmental stewardship across all Corps business practices. As the Nation’s resource challenges and priorities have evolved, the principles have been refined and the Corps has re-committed to adhere to these principles. The re-energized Environmental Operating Principles are:

Foster sustainability as a way of life throughout the organization.

Proactively consider environmental consequences of all Corps activities and act accordingly.

Create mutually supporting economic and environmentally sustainable solutions.

Continue to meet our corporate responsibility and accountability under the law for activities undertaken by the Corps, which may impact human and natural environments.

Consider the environment in employing a risk management and systems approach throughout the life cycles of projects and programs.

Leverage scientific, economic and social knowledge to understand the environmental context and effects of Corps actions in a collaborative manner.

Employ an open, transparent process that respects views of individuals and groups interested in Corps activities.

The format used for this plan is outlined in Engineering Regulation/Engineer Pamphlet 1130-2-550 (DATED 30 January 2013), which sets forth policy and procedure to be followed in preparation and revision of project Master Plans. THIS GUIDANCE IS DIFFERENT FROM THE ORIGINAL Master Plan format which was a design memorandum. Tuttle Creek Lake's original Master Plan can be found in design memorandum 18C: a listing of all the previous Master Plan design memorandums and prior supplements can be found in Chapter 1, Section e.

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Chapter 1 - Introduction

a. Project Authorization

The Tuttle Creek Lake Project was authorized by the Flood Control Act of 1938 (Public Law (PL) 75-761), as modified by PL 77-228 and PL 78-534.

b. Project Purpose

The project was authorized for flood control, low-flow supplementation for the Kansas and Big Blue Rivers, navigation supplementation for the Missouri River, water quality, recreation and fish and wildlife.

c. Purpose and Scope of Master Plan

This revised Master Plan replaces Design Memorandum 18C, Master Plan for Tuttle Creek Lake dated September 1984. The Master Plan is the strategic land-use management document that guides the comprehensive management and development of all project recreational, natural, and cultural resources throughout the life of the water-resource project. The Master Plan guides the efficient and cost-effective management, development, and use of project lands. It is a vital tool for the responsible stewardship and sustainability of project resources for the benefit of present and future generations.

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

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

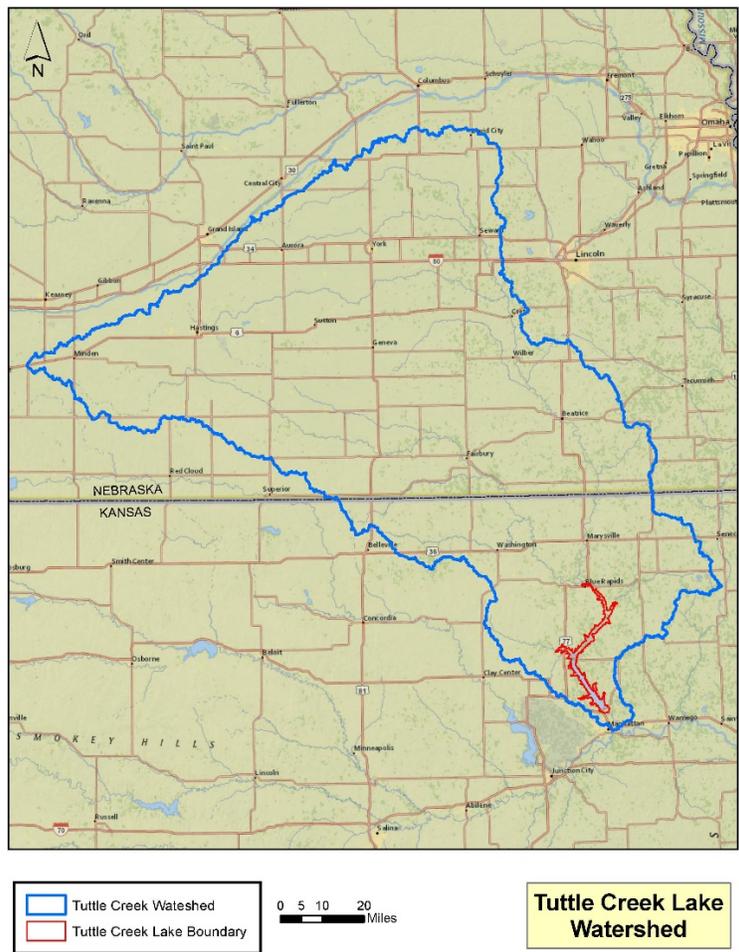
The Master Plan is not intended to address the specifics of regional water quality, shoreline management, or water-level management; these areas are covered in a project's shoreline-management plan or water-management plan. However, specific issues identified through the Master Plan revision process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

d. Brief Watershed and Project Description

Tuttle Creek Lake dam is located on the Big Blue River, 12.3 miles upstream of the confluence of the Big Blue and Kansas Rivers. It is approximately six miles north of Manhattan, Kansas. Tuttle Creek Lake is located primarily in Riley and Pottawatomie Counties with the far upper end of the lake extending into Marshall County, Kansas.

The dam site is situated five miles north of Manhattan, Kansas, 60 miles west of Topeka, 125 miles west of Kansas City, and 130 miles south of Lincoln, Nebraska. At multipurpose pool, elevation 1075.0 mean sea level (msl), the lake covers about 10,900 acres, extending some 14 miles above the dam, and averaging three quarters of a mile in width. At flood control pool, elevation 1136.0 msl, the lake swells to cover 54,139 acres. Tuttle Creek Lake is comprised of 33,437 acres of fee land and 26,483 acres of flowage easement

The Big Blue River has a drainage area of 9,600 square miles (roughly the size of Vermont). There are no major impoundments above Tuttle Creek Dam, but about one tenth of the drainage area is controlled by various Soil Conservation Service watershed development projects. The remaining, vast uncontrolled drainage above the dam results in lake fluctuations which exceed those of other district reservoirs in terms of intensity and frequency.



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e. Listing of Prior Design Memorandums

Table 1.1

Design Memorandum	Title	Date Submitted	Date Approved
-	Definite Project Report, Appendix I, Hydrology	18 Dec 1951 Rev. 4 Apr 1952	3 Jul 1952
-	Definite Project Report	31 Jan 1952	26 Mar 1952
-	Definite Project Report, Appendix XIV, Project Cost Estimates	31 Jan 1952	
-	Definite Project Report, Appendix IV, Hydraulic Design	15 Oct 1952	16 Feb 1953
-	Definite Project Report, Appendix V, Structural Design	19 Dec 1952	27 Mar 1953
1	Control Gates, Outlet Works	9 Jan 1953	17 Mar 1953
2	Outlet Works	29 Mar 1954	1 Jul 1954
3	Sources of Construction Materials	30 Sep 1954	31 Jan 1955
4	Soil Data and Embankment Design	29 Apr 1955	3 Aug 1955
5	Spillway	12 Mar 1956	14 May 1956
6	Geology	6 Jan 1956	6 Mar 1956
7	Relocations	31 Oct 1955 Rev. 27 Apr 1956	26 Jul 1956
8	Real Estate Memorandum	18 Nov 1955	10 Apr 1956
9	Pottawatomie County Road Relocations	2 May 1958	23 Jun 1958
10	Diversion and Closure	14 Aug 1956	12 Oct 1956
11	Municipally Owned Facilities, Town of Irving, Kansas	3 Dec 1956	21 Jul 1957

12	Missouri Pacific Railroad Relocation	31 Oct 1956	29 May 1957
13	Municipally Owned Facilities, Town of Randolph, Kansas	26 Apr 1957	27 Sep 1957
14	Pressure Relief Wells	10 Jun 1957	29 Jul 1957
15	State Highway Relocations	21 May 1957	29 Jul 1957
16	Preliminary Plan for Public Use Areas	13 Dec 1957	11 Mar 1958
17	Flood-Protection Plan Blue Rapids, Kansas	Rev. 17 Apr 1959	6 Oct 1959
18A	Master Plan	29 Feb 1960	9 Feb 1961
18B (C-1)	Access Roads to Public Use Areas	20 Jul 1960	30 Sep 1960
18A (C-2)	Water Supplies for Public Use Areas	26 Aug 1960	12 Oct 1960
18A (C-3)	River Pond and Outlet Fishing	17 Nov 1960	13 Jan 1961
18A (C-4)	Tree Planting for Public Use Areas	26 Jan 1961	10 Feb 1961
18C	Master Plan	21 Aug 1968	24 Apr 1969
18C	Master Plan	Sep 1984	
19	Kansas Power and Light Co. Power Line Relocations	Rev. 24 Oct 1958	4 Mar 1959
20	Riley County Road Relocations	20 Jun 1958	24 Nov 1958
21	Marshall County Road Relocations	10 Sep 1958	18 Dec 1958
22	Joint Rural High School District No. 7	5 Nov 1958	17 Feb 1959
23	Reservoir Clearing	9 Feb 1959	30 Mar 1959
24	Joint Common School District No. 82	17 Jun 1959	23 Sep 1959

25	Southwestern Bell Telephone Co. Telephone Line Relocation	1 Mar 1960	21 Jun 1960
26	Rural Electric Cooperative Assns. Power Line Relocations	27 Jun 1960	2 Sep 1960
27	Fish and Wildlife Conservation	26 Jan 1961	20 Feb 1961
28	Improvement of Big Blue River Channel below Dam	31 Jul 1961	21 Sep 1961
29	Municipally Owned Facilities, Town of Waterville, Kansas	23 Aug 1961	16 Oct 1961
30	Boundary Surveys and Marking	2 Aug 1966	13 Sep 1966
31	Pottawatomie County Road Improvements	25 Jun 1976 Rev. Jan 1977	25 Feb 1977
32	Remodeling of Storage Building for Class C Visitor Center	4 May 1982	
33	Operational Management Plan	23 Sep 1982	2 Nov 1982

f. Pertinent Project Information

Table 1.2

GENERAL	
Location of the Dam	12.3 miles upstream from the confluence of the Big Blue and Kansas Rivers and 6 miles north of Manhattan, Kansas.
<u>Drainage Areas</u>	
Mouth of the Mouth of Big Blue River	9,731 square miles
Controlled area above Tuttle Creek dam site	9,628 square miles
LAND	
Total Acquisition (as of 30 Oct 2018)	
Fee	33,486 acres
Easement	27,376 acres
Separable Recreation in Fee Fish and Wildlife General Plan (Approved 3 Jul 81)	83 acres 9,200

Acquisition Guideline Fee	1101 msl or 300 feet. horizontal distance from 1075 msl, whichever was greater
Flowage Easement Elevation	1140.0 feet, msl
AUTHORIZED RESERVOIR CAPACITY (Acre Feet) (2009 Bathymetric Survey)	
Multipurpose Pool	257,014
Flood Control Pool	1,884,312
Sedimentation	129,683
RESERVOIR SURFACE AREA (2009/2010 Bathymetric/Lidar Survey)	
Water area at full pool	54,139 acres
Water area at multipurpose pool	10,900 acres
Shoreline at multipurpose pool	112 miles
ELEVATION (feet, msl)	
Top of Dam	1,159.0
Spillway Crest	1,116.0
Valley Floor	1,025.0
Full Pool	1,151.4
Multipurpose Pool	1,075.0
5-Year Flood	1,100.0
10-Year Drawdown	1,066.0
EMBANKMENT	
Type	Earth and Rockfill
Base Width	1,640 feet
Crown Width	50 feet
Maximum Height above Streambed	157 feet
Maximum Height above Valley Floor	134 feet
Total Length	8,546 feet

OUTLET WORKS	
Type	Gated conduits (2) with low-flow outlets (2)
Capacity at top of flood pool	48,800 cubic feet per second (CFS)
Service Control Gates	4 each sluice gates 10 X 20 feet each
Low Flow valves (low flows)	Up to 100 CFS / low flow (2 available)
SPILLWAY	
Location	On left bank north of left abutment
Type	Controlled Chute with 18 tainter gates, 40 x 20 feet each
Capacity (full flood pool)	233,500 CFS
Capacity (full surcharge pool)	600,000 CFS
Width	1,059 feet gross, 720 feet net (less piers and bulkheads)
Spillway Crest	1116.0 feet, msl
Top of tainter gates	1136.0 feet, msl

Chapter 2 - Project Setting and Factors Influencing Management and Development

a. Description of Reservoir

At multipurpose pool, Tuttle Creek Lake covers 10,900 acres and can expand to as much as 54,139 acres during periods of heavy rain as excess runoff is impounded to prevent downstream flooding. Tuttle Creek Lake works in conjunction with other lakes operated by the Corps to provide flood protection for the Kansas River Basin and the lower Missouri and Mississippi Rivers.

Tuttle Creek Lake has approximately 112 miles of shoreline which traverse up the Big Blue River. The Lake has approximately 425,000 acre-feet (acre-feet) of storage for multipurpose and sedimentation and at flood control pool increases to 1,942,000 acre-feet of storage.

b. Hydrology and Groundwater

The Big Blue River is the major source of surface water in the basin. Stream flow is dominated by surface runoff. The drainage area upstream of the dam is over 9,600 square miles. There are no major impoundments above Tuttle Creek Dam, but about one tenth of the drainage area is controlled by various Soil Conservation Service watershed development projects. The remaining vast uncontrolled drainage above the dam results in lake fluctuations which exceed those of other district reservoirs.

The major groundwater aquifers underlying the watershed include portions of the Glacial Drift and Dakota aquifers along with the alluvial aquifers. Water quality in the alluvial aquifers is generally good although nitrates, minerals, pesticides, and bacteria can be localized concerns.

c. Sedimentation and Shoreline Erosion

Sedimentation at Tuttle Creek Lake has reduced the surface area by 4900 acres between 1957 to 2010. The sedimentation rate in the multi-purpose pool is 3,600 acre feet per year, which is 13% less than expected when designed. Loss of current uses at Tuttle Creek Lake are expected and sediment management options are currently being discussed with stakeholders. Turbidity is a major factor affecting water quality. Sedimentation reduces the lifespan of coves for recreation, creates mudflats which are exposed during low water periods, and limits production of desirable benthic organisms. Typically, 60-80% of suspended matter settles out as water moves from the upper end of the lake towards the dam.

The 2017 assessment by the Kansas Water Office (KWO) quantified annual tons of sedimentation from streambank erosion over the period between 1991, 2002, or 2003 and 2015 in the Tuttle Creek Watershed within the Kansas Regional Planning Area (KS RPA). A total of 367 streambank erosion sites, covering 300,258 feet of unstable streambank were identified. Of the identified streambank erosion sites, 89% were identified as having a poor riparian condition (riparian area identified as having cropland, grass/crop streamside vegetation or narrow woodland (single line of trees between stream and cropland/pastureland)). Sediment transport from identified streambank erosion sites accounts for 947,211 tons (768 acre feet) of sediment per year transported from the Tuttle Creek Watershed streams to Tuttle Creek Reservoir annually, accounting for roughly 21% of the total load estimated from the most recent

bathymetric survey performed by a U.S. Army Corps of Engineers in 2009. It should be noted that the identified streambank erosion locations are only a portion of all streambank erosion occurrences in the watershed. Only those streambank erosion sites covering an area 2,000 sq. feet, or more, were identified.

d. Water Quality

The US Army Corps of Engineers (Corps) Water Quality Program collects monthly water samples at Tuttle Creek Lake and inflows from April through September. These figures present data collected between 2007 through 2016 from four sites. The sites include inflow, two lake sites, and the outflow. Thirty-four chemical, physical and biological parameters are measured to evaluate water quality. The Corps uses this data to describe conditions and changes from the inflow streams, within the main lake, and outflow focusing on eutrophication, nutrients, sediment, herbicides, metals, and contaminants.

Nutrients (i.e. phosphorus and nitrogen) are essential for aquatic life and are the primary factor driving fish and aquatic plant growth rates and productivity. Excess nutrients from urban, agricultural or natural sources increases the natural aging or eutrophication process in lakes. This can alter plant and aquatic life in lakes and water bodies, cause algal blooms, create low dissolved oxygen that affect fish survival, and lead to taste and odor issues in drinking water. The lack of sunlight penetration due to turbidity and suspended sediments in Tuttle Creek Lake limits plant/algae growth and other measures of productivity. Tuttle Creek Lake is listed as “impaired” on the 2016 Kansas 303 (d) list due to accelerated eutrophication and siltation and has a Total Maximum Daily Load (TMDL) for phosphorus and sediment load reduction since 2000. Kansas Department of Health and Environment (KDHE) and Environmental Protection Agency (EPA) are working with water quality partners, landowners and an active Tuttle Creek Watershed Restoration and Protection Strategy (WRAPS) group. Together they provide recommended best management practices for target areas in the watershed to meet long term goals for Tuttle Creek Lake. Working in the watershed to reduce nutrient and sediment runoff will help slow the eutrophication process and reduce siltation improving water quality and increasing the lifespan of Tuttle Creek Lake. Tuttle Creek Lake frequently has the highest nutrient levels in the Kansas City District.

e. Project Access

A map showing the primary access highways is provided in Appendix B. Major highways serving the area are I-70 and US 24 to the south, US 36 to the north, US 77 to the west, and Kansas highways 13, 16, and 99 to the east.

f. Climate

The Tuttle Creek Lake area experiences warm humid summers and moderately cold dry winters. Typical of the central plains, the variations from season to season and from year to year can be great. Average annual rainfall is 34 inches. Precipitation is heaviest in late spring and early summer. About 70% of the annual precipitation falls during the growing season.

The average frost-free season is about 172 days, April 23 to October 15. Relative humidity averages about 55%. Prevailing summer winds are from the south, and from the northwest during the winter. Periods of high winds can be expected in March, April, and May; May and June are months of greatest severe storm frequency. Wind velocity

averages 11 mph. The lake area receives about 66% of the possible annual sunshine with an average of 130 clear days.

Table 2.1

Climatological Data for Manhattan, Kansas														
	Temperature (F)									Precipitation (inches)				
	Means			Extremes		Mean # of Day				Mean	Snow Mean	Mean Number of Days		
	Daily Max	Daily Min	Monthly	Record High	Record Low	Max		Min				.10 or More	.50 or More	1.00 or More
						90 and Above	32 and Below	32 and Below	0 and Below					
Jan	38.8	16.1	27.4	76	-31	0	9.6	29.6	2.6	.48	2.5	1.6	0.2	0
Feb	43.6	19.9	31.8	84	-26	0	5.8	24.4	1.6	1.06	2.7	2.3	0.5	0.1
Mar	54.8	30.2	42.5	95	-12	0	1.5	18.6	0	2.15	1.8	4.3	1.5	0.4
Apr	65.5	40.7	53.1	99	5	0.4	0	6	0	2.96	0	5.6	1.8	0.7
May	74.5	51.8	63.2	103	23	0.9	0	0.3	0	4.84	0	7.7	3.4	1.3
Jun	83.6	61.6	72.6	112	39	5.6	0	0	0	5.23	0	7.0	3.4	1.7
Jul	89.1	66.9	78.0	115	38	14.3	0	0	0	4.19	0	6.2	2.8	1.3
Aug	88.3	64.7	76.5	116	40	13.1	0	0	0	4.01	0	5.7	2.5	1.3
Sep	80.0	54.7	67.3	112	26	4.3	0	0.2	0	3.04	0	5.0	2.0	0.8
Oct	67.7	42.0	54.9	98	13	0.2	0	4.8	0	2.47	0	4.5	1.6	0.6
Nov	53.6	30.2	41.9	88	-9	0	1.4	18.3	0	1.56	0.2	3.0	0.8	0.3
Dec	40.6	18.8	29.7	77	-22	0	7.5	28.6	1.8	0.96	1.6	1.8	0.4	0.1
Year	65.0	41.5	53.2	116	-31	38.8	25.8	130.8	6.0	32.95	8.8	54.7	20.9	8.6

g. Topography, Geology, and Soils

The land surrounding Tuttle Creek Lake is situated in the northern portion of the Flint Hills, an area characterized by flat-topped hills with long, steep slopes, limestone rock outcrops, and well-defined stream channels. Relief between the stream floodplains and the hilltops adjacent to the lake averages about 300 feet. Much of the land is too stony to cultivate.

The project is situated in the attenuated drift border, a region which was glaciated and is covered in places with glacial till and outwash. From about Green Randolph Rd./K-16 Bridge north, glacial drift forms a discontinuous mantle, attaining a maximum thickness of 300 feet. South of Randolph Bridge, alluvial deposits range from 10 to 50 feet deep. Bedrock consists of a sequence of cherty limestones and shales.

Upland soils are commonly very shallow, stony and gravelly. They are developed from limestone and limy shales and occupy slopes of 7% to 20% or more. The topsoils are silty clay loams three to five inches thick. The unweathered parent material is usually encountered at eight to 20 inches.

Lower slope and bottomland soils are moderately deep, dark, friable, silty clay loams five to 10 inches thick. They are derived from loess, limestone, and limy shales. The subsoils are silty clay loams found to a depth of 38 inches. Under normal erosion conditions, exposed topsoil may be totally displaced.

Mineral resources within the project area include sand, gravel, crushed rock, gypsum and very limited oil deposits. Sand, gravel, and limestone are also extracted at several locations within the project's three county area. No known significant deposits of oil, gas or other important minerals are on project lands, and there have been no requests for oil or gas leasing at Tuttle Creek Lake.

h. Resource Analysis (Level One Inventory Data)

Operational civil works projects administered by the Corps are required, with few exceptions, to prepare an inventory of natural resources. The basic inventory required is referred to within Corps regulations (ER and EP 1130-2-540) as a Level One Inventory. This inventory includes the following: vegetation in accordance with the National Vegetation Classification System through the sub-class level; assessment of the potential presence of special status species including but not limited to federal- and state-listed endangered and threatened species, migratory species, and birds of conservation concern listed by the U.S. Fish and Wildlife Service (USFWS); land (soils) capability classes in accordance with the Natural Resource Conservation Service criteria; and wetlands in accordance with the USFWS Classification of Wetlands and Deepwater Habitats of the United States. This basic inventory information is used in preparing project master plans and the Operations Management Plan (OMP). The OMP is a five-year management plan setting forth detailed information required to implement the concepts set forth in the master plan. An overview of the natural resources and related management actions at the project is provided in the following sections and paragraphs.

1) Fish and Wildlife Resources

The impoundment of the Big Blue River and other tributary streams and rivers, which form Tuttle Creek Lake, changed it from a riverine to a lake system. Fisheries in Tuttle Creek Lake are managed by the Kansas Department of Wildlife, Parks and Tourism (KDWPT) Division of Fisheries. A variety of sport and non-sport fish species are found in the lake. Stocking programs, fish sampling and creel surveys are conducted under the direction of a state fisheries biologist. A trout stocking program is conducted each fall in Willow Lake below the dam, and provides some 2,500 trout for anglers. A list of fish species can be found in appendix C.

The project lands, with its variety of habitats, support a number of game animals, furbearers, and other mammal species. A wide variety of resident and migratory bird species use project lands and water for at least a portion of the year. These provide visitors with both consumptive and non-consumptive use. Reptiles and amphibians typical of the upper Flint Hills region are also located on Tuttle Creek Lake.

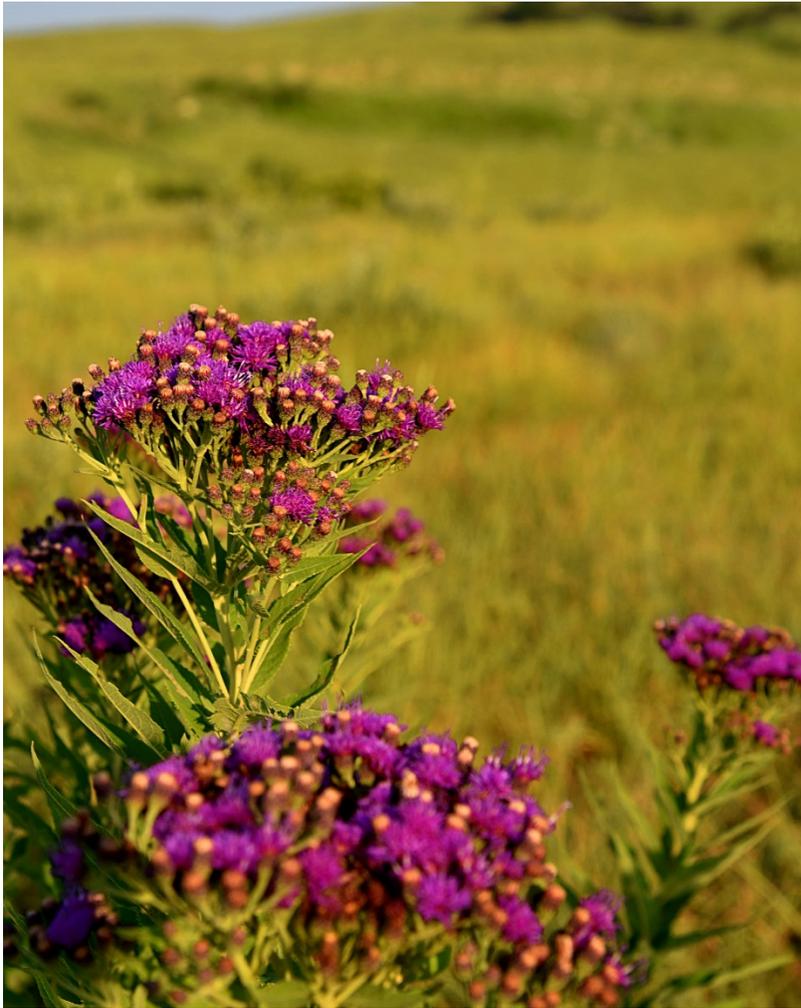
Figure 1: Waterfowl utilizing the lake for stopover habitat



2) Vegetative Resources

As part of the Level I inventory the project lands were classified according to the National Vegetation Classification System down to the sub-class level. In addition, an assessment was made as to the condition of those lands to determine if they are sustainable.

Figure 2: Prairie Plants in bloom



Description of each of the assessment categories:

Sustainable - Meeting the desired state. The acreage is not significantly impacted by any factors that can be managed and does not require intensive management. The acreage also meets operational goals and objectives set out in the project OMP or other applicable management document. These acres are considered healthy and sustainable for future generations. Only minor management practices may be required to maintain the health.

Transitioning - Managed to meet desired goals. The acreage is impacted by human or other environmental factors that require management of the acreage to meet goals and objectives outlined in the project OMP or other applicable management document.

Degraded - Does not meet desired goals. The acreage is significantly impacted by human or other environmental factors that prevent the acreage from meeting desired goals outlined in the project OMP or other management documents. The acreage is not considered healthy. Intense management may be required to meet desired goals.

Table 2.2

Project Site Vegetation Classification and Condition Records for								
Fiscal Year 2017								
Version 9								
** THE FOLLOWING CLASSIFICATION INFORMATION IS DERIVED FROM THE NATIONAL VEGETATION CLASSIFICATION SYSTEM **								
Division NORTHWESTERN DIVISION								
District KANSAS CITY								
Project Site TUTTLE CREEK LAKE KANSAS								
Fiscal Year 2017								
Project Fee-Owned Area 33643								
Division	Order	Class	Sub-Class	Total Sub-Class Acreage	Sustainable Acres	Transitioning Acres	Degraded Acres	Total Condition Acres
NON-VEGETATED	Non-Vegetated	Non-Vegetated	Non-Vegetated	10900	0	10900	0	10900
VEGETATED	Herb Dominated	Herbaceous Vegetation	Annual graminoid or forb vegetation	3508	0	3508	0	3508
VEGETATED	Herb Dominated	Herbaceous Vegetation	Perennial graminoid vegetation (grasslands)	3438	1146	1042	1250	3438
VEGETATED	Shrub Dominated	Shrubland (Scrub)	Mixed evergreen-deciduous shrubland (scrub)	6457	969	4197	1291	6457
VEGETATED	Tree Dominated	Closed Tree Canopy	Deciduous closed tree canopy	5745	4000	1745	0	5745
VEGETATED	Vegetation Not Dominant	Sparse Vegetation	Unconsolidated material sparse vegetation	3595	0	0	3595	3595
TUTTLE CREEK LAKE KANSAS Totals				33643	6115	21392	6136	33643

3) Threatened and Endangered Species

The USFWS maintains the list of federally listed Threatened or Endangered Species, and their designated Critical Habitat, under the Endangered Species Act. KDWPT is responsible for maintaining the state-listed species. The state Endangered Species Act and Kansas Wildlife Code are the guiding legislation for the state. A table of federally listed species and their state status believed to occupy Marshall, Pottawatomie and/or Riley County is found below.

Table 2.3

Name	State Status	Federal Status	Habitat
Northern Long-Eared Bat (<i>Myotis septentrionalis</i>)		Threatened	Hibernates in caves and mines - swarming in surrounding wooded areas in autumn. Roosts and forages in upland forests during spring and summer.
Least Tern (<i>Sterna antillarum</i>)		Endangered	Non-vegetated sandbars, primarily downstream on the Kansas River
Piping Plover (<i>Charadrius melodus</i>)		Threatened	Non-vegetated sandbars, primarily downstream on the Kansas River
Topeka Shiner (<i>Notropis topeka</i>)	Threatened	Endangered	Ephemeral/permanent stream boundaries in the upper portion of the basin

4) Invasive Species

A variety of aquatic and terrestrial species inhabit the lake and surrounding project land. A listing of those species and their prominence can be found in table 2.4.

Table 2.4

Species Group	Species Common Name	Type of Occurrence	Acreage Impacted	% Acreage Impacted
Aquatic and Wetland Animals	Bullfrog	Minor	5	0.01%
Aquatic and Wetland Animals	Zebra Mussel	Significant/Major	10,900	32.4%
Aquatic and Wetland Animals	Common Reed	Minor	3	0.01%
Aquatic and Wetland Plants	Purple Loosestrife	Minor	1	0.01%
Terrestrial Animals	European Starling	Significant/Major	33,000	98.09%
Terrestrial Animals	House Sparrow	Significant/Major	33,000	98.09%
Terrestrial Animals	Rock Dove	Minor	1	0.00%
Terrestrial Plants	Bur Ragweed	Minor	5	0.01%
Terrestrial Plants	Canada Thistle	Moderate	200	0.59%
Terrestrial Plants	Caucasian Bluestem	Moderate	150	0.45%
Terrestrial Plants	Common Mullein	Significant/Major	500	1.49%
Terrestrial Plants	Crown Vetch	Significant/Major	1,000	0.52%
Terrestrial Plants	Curly Dock	Moderate	400	1.19%
Terrestrial Plants	Field Bindweed	Moderate	300	0.89%
Terrestrial Plants	Japanese honeysuckle	Moderate	50	0.15%
Terrestrial Plants	Johnson Grass	Moderate	125	0.37%
Terrestrial Plants	Kentucky Bluegrass	Moderate	50	0.15%
Terrestrial Plants	Leafy Spurge	Moderate	100	0.30%
Terrestrial Plants	Marijuana	Moderate	150	0.45%
Terrestrial Plants	Common Teasel	Moderate	150	0.67%
Terrestrial Plants	Musk Thistle	Minor	20	0.06%
Terrestrial Plants	Queen Anne's Lace	Significant/Major	700	2.08%
Terrestrial Plants	Red Cedar	Significant/Major	2,000	23.06%
Terrestrial Plants	Sericea Lespedeza	Significant/Major	1,500	4.46%
Terrestrial Plants	Siberian Elm	Significant/Major	650	1.93%
Terrestrial Plants	Smooth Brome	Significant/Major	1,400	4.16%
Terrestrial Plants	Tall Fescue	Moderate	250	0.74%

5) Ecological Setting

The Lake is situated in the northern portion of the Flint Hills, an area characterized by flat-topped hills with long, steep slopes, limestone rock outcrops, and well-defined stream channels. Relief between the stream floodplains and hilltops adjacent to the lake averages about 300 feet. Much of the land is too stony to cultivate. Tuttle Creek Lake is situated in Riley, Pottawatomie, and Marshall Counties in northeast Kansas. The dam is located on the Big Blue River, nine miles upstream from the confluence of the Blue and Kansas Rivers. The dam site is situated five miles north of Manhattan, Kansas, 60 miles west of Topeka, 125 miles west of Kansas City, and 130 miles south of Lincoln, Nebraska.

Tuttle Creek Lake is located in the ecologically and culturally significant Flint Hills region of Great Plains of the mid-West which contains the largest contiguous stand of tall grass prairie left in the world. With only 4% of its historic range remaining, the Tall grass Prairie is more endangered than tropical rainforests and coral reefs. The climax cover is a mixture of tall and midgrasses characteristic of the true prairie. Big bluestem and indiagrass dominate the plant communities, with other tall and midgrasses being subordinate. Examples of predominant plants are the bluestems, switchgrass, indiagrass, grammas, goldenrods, sunflowers, and native legumes. Tree cover is limited to narrow strips adjacent to stream channels and draws, and on steep slopes that border the lake. The predominant trees are oak, hickory, cottonwood, sycamore, elm, hackberry, green ash, and black walnut. Along the rivers and streams, trees such as hackberry, mulberry, cottonwood, American elm, and willow thrive. Typical shrubs include dogwood, coralberry, sumac, plum, and blackberry. Typical vines are grape, Virginia creeper, and green briar.

The upper reaches of the lake offer a marsh-like environment when flooded. Vegetation types on the mudflats and silt delta are often undesirable, although more desirable plants such as smartweed can abound when conditions are favorable.

Figure 3: Kansas State Highway 16/Green Randolph Road Bridge



6) Wetlands

Much of the wetland systems classified at the project are associated with the lake and the tributaries feeding into the lake. Classification of the wetlands was derived from the USFWS Classification of Wetlands and Deepwater Habitats of the United States. A table listing the wetland Systems and acreages is found below.

Table 2.5: Wetland Area within Tuttle Creek Lake Project

System	Sub-system	Class	Class Acres
Estuarine	Intertidal	Emergent Wetland	491
Lacustrine	Limnetic	Unconsolidated Bottom	12,367
Palustrine	NO SUB-SYSTEM	Unconsolidated Bottom	152.8
Riverine	Lower Perennial	Unconsolidated Bottom	62.2
Total Un-inventoried Project Fee-Owned Land			20,570

7) Borrow Areas and Utilities

Borrow areas for original construction of the embankment and other operational structures are submerged immediately upstream from the dam and located in River Pond directly below the dam. The River Pond site now provides water-based recreational benefits. A handful of borrow sites supporting continued operation and maintenance of the project are limited in scope and have no apparent effects, adverse or beneficial, to the natural resource management (NRM) program.

The project has easements for road right-of-ways, overhead and buried electric lines, water lines, sewer lines, gas lines, telephone lines, and communication cables. In addition, a 250-foot self-supporting communications tower and equipment building is located in Unit 36 – Observation Point, located just above the right dam abutment. In total these easements comprise approximately 450 acres.

Tuttle Creek is authorized for a water supply allocation of 50,000 acre feet from conservation storage. The entire allocation is contracted to the Kansas Water Office (KWO) in accordance with the contract (dated 1996). All of this allocation is “in-service”, for which the state makes annual payments. The remaining conservation storage is allocated to water quality/navigation, and is estimated to be 72,000 acre feet (according to contract). All water under contract is released via water control structures and withdrawn downstream from the Kansas River.

Historically, there were a handful of small water intake structures around the lake serving subdivisions and parks; however, all have become unusable primarily due to siltation. There are currently no active water intakes located on the project.

j. Mineral and Timber Resources

Sand and gravel mining take place on an infrequent basis. No other mineral extraction activities take place on project lands. No commercial harvesting of timber has taken place at the project. Hazard trees are removed when they are identified.

k. Paleontology

Paleontological resources include both the organic and mineralized remains in body or in trace forms of living organisms, often referred to as fossils. These resources are almost always a separate management issue from cultural resources, and have their own resource protection laws, most notable the Paleontological Resources Preservation Act (PRPA), which was signed into law on March 30, 2009.

Appraisal of the Archeological and Paleontological Resources of the Tuttle Creek Reservoir, Marshall, Pottawatomie, and Riley Counties, Kansas, prepared by the Missouri Basin Project, Smithsonian Institution.

A report of the paleontological resources of the Tuttle Creek Reservoir was prepared by Dr. Theodore E. White of the Smithsonian Institution. This report dated May 16, 1952, follows:

“In this area the valley of the Big Blue River is cut into the Lower Permian marine sediments of the Wolf Camp Group. The valley walls are either well wooded or grassed over and exposures are limited to recent road cuts. The vertebrate fossils known from this series of deposits are both fragmentary and rare. In view of the limited exposures, prospecting for vertebrate fossils in this area will not be profitable.”

I. Cultural Resources

1) Previous Investigations

Cultural resource studies at the Tuttle Lake Project began in the early 1950s in anticipation of the construction of the reservoir. This early work was completed by the Smithsonian Institution’s River Basin Survey, designed to identify and study sites potentially affected as a result of dam construction and subsequent reservoir creation. In the early 1970s the National Park Service (NPS) contracted with the University of Kansas (KU) and Kansas State University (KSU) to identify, test, and manage cultural resources at the Tuttle Creek Lake Project in accordance with federal laws and regulations. In the middle 1970s, the Corps took over the cultural resource management involving many testing projects at sites to ascertain eligibility for the National Register of Historic Places (NRHP). The most research has focused on site 14PO1, the Coffey site. The Coffey Site is a multi-component prehistoric Native American site listed on the NRHP that was eroding from the bank of the Big Blue River. Beginning in the early 2000s, the majority of survey and testing of cultural resources have been focused on specific projects planned at the lake to assess the potential effects of the undertakings in accordance with Section 106 of the National Historic Preservation Act. The Corps developed a Historic Properties Management Plan (HPMP) in 2001 to better manage Corps-owned sites and identify future management priorities. A listing of Tuttle Creek Lake cultural resource reports is included in Table 2.6.

Table 2.6 Previous Archaeological Investigations of the Tuttle Creek Lake Project

Publication Year	Author	Description
1953	Solecki/River Basin Survey, Smithsonian Institution	Initial survey of lands believed to be affected by dam construction and reservoir construction; 119 archeological sites found
1958	Cumming/River Basin Survey, Smithsonian Institution	Excavation of site 14PO14 (Sweat Bee Mound) and testing at 14PO12, 14PO13, and 14RY10
1963	Shippee	Flintknapping techniques at 14PO12
1963	Haller and Haller/citizen report	History of the destroyed town of Winkler on Fancy Creek
1966	Kelley/NPS	Analysis of material collected from the Smithsonian work curated in Lincoln, Nebraska

1970	Johnson/KU/NPS	Excavations at 14PO4, the Budenbender Site
1973	Johnson/KU/NPS	Excavations at 14PO4, the Budenbender Site and testing at 14MH1, 14MH2, and 14PO1
1976	Ziegler/KU	First iteration of a program for managing cultural resources at the Project, with overview and recommendations
1977	Tompkins and LeeDecker/Iroquois private firm	Historic properties inventory
1977	Witty/Kansas Historical Society (KSHS)	Survey of three areas in Tuttle Creek State Park
1979	Ashworth/KSHS	Survey of proposed borrow area, Randolph Park, and site condition assessments
1980	Johnson et al. /KU	Survey of the lake edge to assess damage due to wave action and slumping at many sites; testing at many sites; with overview and recommendations
1980	Miller and Schmits/Soil Systems private firm	Shoreline survey, limited area
1981	Thies/KSHS	Survey of proposed Wildlife Marsh Area
1984	Corps	Tuttle Creek Lake Master Plan Design Memorandum 18C
1985	Lees/KSHS	Kansas Department of Transportation (KDOT) bridge survey
1985	Lees/KSHS	Kansas Department of Transportation (KDOT) road survey
1985	Schmits/Environmental Systems Analysis (ESA), private firm	Research design for testing at 27 archeology sites
1987	Schmits/ESA	NRHP testing at 27 archeological sites and recommendations for future research
1987	Klinger et al./Historic Preservation Associates/Burns and McDonnell	NRHP testing at 14MH148 prior to its sale as "excess land"
1988	Hedden et al.	Conference Paper on ceramics and radiocarbon dates from 14RY8
1988	Schmits et al. /ESA	NRHP testing at 14RY8, a Smoky Hill phase hamlet or village
2001	Lucido/Corps	Historic Properties Management Plan. Detailed inventory of historic resources, history of investigations, and recommendations for further work

2003	DeVore and Nickel/NPS	Geophysical Investigations at Alcove Springs
2003	Logan	Survey of floodplain ahead of wetlands development
2003	Ritterbush/KSU	Survey of proposed crewhouse, boathouse, and parking lot
2003	Rust/private firm	Survey and geomorphology of proposed campground improvements
2005	Meade	Borrow areas
2006	Meade and Weidhaas/Corps	Survey for tree planting project
2007	Nickel and Nickel/private firm	Magnetic and ground-penetrating radar survey at Alcove Springs
2009	Tomasic/KSHS	Survey of KDOT road project
2011	Tomasic/KSHS	Survey of streambank stabilization projects
2011	Tomasic/KSHS	Survey of KDOT borrow area
2011	Dycus/private firm	Wireless antenna project
2012	Cain/Corps	Survey of proposed erosion control project
2014	Meade/Corps	Survey of proposed erosion control project
2015	Meade/Corps	Survey of spillway bridge deck replacement
2015	Meade/Corps	Survey of erosion control project
2016	Hall/Corps	Survey of proposed flood gate repair
2017	Hall/Corps	Survey of stilling basin repair
2017	Alig/Corps	Survey of proposed erosion control project
2017	Alig/Corps	Survey of proposed erosion control project
2017	Alig/Corps	Survey of proposed erosion control project

In addition, several academic articles involve excavations data obtained from the Coffey Site, 14PO1.

Table 2.7. Reports Using Coffey Site Data

Publication Year	Author	Description
1973	O'Brien et al./KSU	Small-scale excavations at 14PO1, the Coffey Site
1977	Schmits/KU	Coffey Site National Register of Historic Places (NRHP) Form
1976a, 1976b, 1978	Schmits/KU/NPS	Coffey Site excavation and analysis

1981	Schmits/KU/NPS	Coffey Site geomorphology and archeology with detailed overview of previous investigations
2008	Unruh/KU	Master's thesis on Coffey Site animal remains
2010	Mandel et al./Goodwin Associates private firm	Geoarcheology at the Coffey Site to assess condition and management recommendations
2011	Sellet/KU	Summary of Kansas Archeological Training Program (KATP) excavation at the Coffey site
2011	Wyatt/avocational	Summary of Paleoindian sites in Kansas

2) Current Status of Cultural Resources

As a result of the studies listed above there are currently 220 discrete archeological cultural resources sites recorded at the Tuttle Lake project, 147 of which are located fee-owned lands and the rest, 73, are located on flowage easement lands. One of the sites mentioned by the HPMP (14MH185) is not near Tuttle Creek Lake. These numbers represent an increase of 42 sites since the publication of Lucido's 2001 HPMP. Of these 42 sites, 18 are newly recorded since around 2001 (7 on fee-owned land) and the remaining 24 sites (4 on fee-owned land) represent either mistakenly missed sites or result from changes in the project's easement boundaries since 2001. Among this number are archaeological sites, possible or confirmed mounds, a cemetery, Oregon Trail sites, historic farmsteads and town sites, and other human-made features on the landscape. Approximately 70 of these cultural resources are completely underwater or partially submerged and the rest are located above the normal pool elevation.

Two sites have been listed on the NRHP. As mentioned, the Coffey site, 14PO1, is a multi-component site with buried archaic deposits and has been extensively excavated. The Coffey site is on fee-owned land. Alcove Springs, 14MH324, is an Oregon Trail campsite with trail ruts and historic graffiti. The Alcove Springs site is located partly on flowage easement land but is mostly on privately owned land. Eight other sites have been formally evaluated and determined eligible for listing on the NRHP: 14MH1, 14PO3, 14PO6, 14PO102, 14RY8, 14RY28, 14RY30, and 14RY356. Additionally, four sites have been formally declared not-eligible for listing on the NRHP in accordance with the National Historic Preservation Act (NHPA) and its implementing regulations 36 CFR § 800. Three of these are historic archaeological sites—the town sites of Barrett (14MH146), Bigelow (14MH147), and Winkler (no site number). The fourth is the portion of prehistoric site 14MH148 that is on fee-owned land. The remaining sites are all considered potentially eligible for listing, because their NRHP-eligibility has not been evaluated as required in the regulations.

Several architectural historic properties were identified by Tompkins and LeeDecker (1977) but most were in ruins at the time of survey and no other information is available.

Figure 4: Excavations at the Coffey Site



3) Future Priorities for Cultural Resources Management

The bullets below contain summary explanations of future cultural resources management priorities. Specific guidance, and more detailed descriptions of these measures, can be found in the Tuttle Creek Lake HPMP (Lucido 2001).

- Compliance with the NHPA Section 106 (36 CFR § 800). The Corps must continue to evaluate potential effects of its undertakings in accordance with federal regulations. This includes any undertaking having the potential to affect historic properties. These assessments of effect must be done by qualified archaeologists and must be consulted on with the KS SHPO, Tribes, the public, and the ACHP as appropriate. Evaluation of undertakings on Corps fee land are also required for any other entity wishing to conduct a project on federal lands,

including lessees, as are any actions occurring on easement lands where the Corps funds or explicitly permits the action.

- Inventory of Historic Properties in Accordance with NHPA Section 110. The Corps has currently completed inventory on approximately 17.5% of fee-owned lands. However, almost all of this survey was pedestrian reconnaissance, meaning that archaeologists were walking transects looking at the ground. This technique is fairly efficient in environments like plowed fields, but much less so in areas with any ground cover. Furthermore, it completely fails to identify sites that may be buried, such as areas along drainages where sediment has accumulated over time. The priority would be to complete survey of previously unsurveyed lands, and then to evaluate previous surveys and identify areas where methods were insufficient to conclusively evaluate the presence/absence of cultural resources.
- Compliance with the Archaeological Resources Protection Act. Compliance with this act requires that federal land managers evaluate and permit any proposed archeological survey conducted by a third party, and consult with Tribes that have a demonstrated interest in cultural resources at the project. Examples of this include scientific work carried out by universities, or contract archaeologists working for lessees to evaluate projects they have been proposed on Corps land. The Corps does not require permits for its own archaeologists or contract archaeologists working for the Corps. The Northwest Division of the U.S. Army Corps of Engineers has issued guidance on ARPA permitting, and the actual permitting process is a function of the Real Estate Division with support from qualified archaeologists. The permit ensures that the Corps has an opportunity to review draft reports of findings on its land and that artifacts being taken from Corps land, which are government property, are returned to the Corps at the end of the study.
- Archaeological Site Monitoring. Monitoring of recorded cultural resources should be an on-going and systematic process. The intent is to identify sites of significance that may be experiencing detrimental impacts as a result of the on-going operation and maintenance of the Tuttle Creek Lake Project. Only by repeated, systematic monitoring can trends in, and potential solutions to, ongoing effects be properly identified.
- Site Protection. After implementation of an effective monitoring program, the Corps will be able to institute protective measures that may be applied where sites are being adversely affected by on-going operation and maintenance. Potential problems could include erosion along the shoreline, plowing as a result of sites being included in agricultural leases, or adverse effects as a result of recreation practices. Solutions may vary widely, and should be consulted with the KS SHPO and regional Tribes when proposed for implementation.

- Interpretation and Educational Opportunities. The Corps has been approached in the past, and may be in the future, regarding opportunities to interpret historical events or properties for the public that recreates at the project. Such proposals should be evaluated for their appropriateness in accordance with federal regulations, and for the potential effects that may result. Driving foot traffic to a prehistoric archaeological site is discouraged, as this opens the area to potential looting and violations of the ARPA. Conversely, education presentations promoting awareness of conservation of cultural resources with groups such as the Boy Scouts or Girl Scouts are beneficial to the Corps' cultural resources management objectives.

m. Interpretive/Visual Qualities

The general goal of the Corps' interpretive programming is to inform and educate the public with regard to the purposes and concept of lake operation and the natural and cultural features of the area. Interpretation at Tuttle Creek Lake includes nature trails, a series of school and community programs, park presentations and nature walks, and various water safety and environmental education programs. These programs provide excellent opportunities to educate lake visitors on a number of topics. Special guest speakers are invited to provide diversity in subject matter and presentation styles. In addition, Kansas State University students may be recruited for special projects to help fulfill their "Methods of Interpretation" classwork. In addition, the Corps is often invited to speak or have an informational booth at local fairs, civic group gatherings, and school functions.

Figure 5: View at Observation Point Park



Figure 6: Park Ranger and Bobber giving a Water Safety Demonstration to School Kids



n. Demographics

The population of the State of Kansas is over 2.9 million people. According to the Kansas State Comprehensive Outdoor Recreation Plan, the population density in Kansas has steadily shifted from rural agricultural regions to urban areas. The overall population of Kansas has only grown 2.1% from 2010 to 2015, which is lagging behind the National growth projection of about 4.1% during that same time period.

The 2014 U.S. census data reports the population for Riley and Pottawatomie counties is 98,000. This area is unique in that it is home to two large transient populations associated with Kansas State University and the Fort Riley military installation (each with a populace of 25,000). Manhattan, located just five miles south of the dam, is the largest city in a 30-mile radius, with a population of 56,000.

In general, when compared to the rest of the state, this population skews younger with a larger than average influx of young families and adults (18-25 years of age) over the past 15+ years. Growth of Latino populations continues to be moderately high.

Economic growth is very strong as compared with the rest of the state and the Midwest as indicated by high rates of employment and earnings. Not surprisingly both Pottawatomie and Riley counties are ranked second and third in the state for highest growth rates (6.0% and 5.7%, respectively).

o. Economics

The money spent by visitors to Corps lakes on trip expenses adds to the local and national economies by supporting jobs and generating income. Visitor spending represents a sizable component of the economy in many communities around Corps lakes. Tuttle Creek Lake Project contributed the below to the economy (USACE 2017):

321,602 visits per year (Fiscal Year (FY) 2016) resulted in:

- \$8,089,000 in visitor spending within 30 miles of the lake
- \$4,898,990 in sales within 30 miles of the lake
- 82 jobs within 30 miles of the lake
- \$1,919,350 in labor income within 30 miles of the lake
- \$2,589,972 in value added within 30 miles of the lake

With multiplier effect, visitor trip spending resulted in:

- \$7,235,121 in total sales
- 101 jobs
- \$2,516,338 in labor income
- \$3,757,688 in value added (wages & salaries, payroll benefits, profits, rents, and indirect business taxes)

Cumulative damages prevented from project implementation through FY17 totaled \$8,344,965,000.

p. Recreational Facilities, Activities and Needs

1) Zones of Influence

Manhattan, Fort Riley, and Southern Nebraska account for the largest share of visitors, however there are a number of smaller towns which contribute visitors to Tuttle Creek Lake and its facilities.

2) Visitation Profile

During the period of FY07 – FY16 visitation ranged from 321,602 to over 521,621 visits with an average of 421,112 total visits each year. Total overnight visits during this time period ranged from about 16,700 visits to 23,956 visits with an average of 18,508 overnight visits per FY. Day-use visits accounted for between 302,048 and 521,621 visits with an average of 413,332 day-use visits per FY during FY07 – FY16.

Table 2.5. Total Visitation	
Fiscal Year	Visitation Total
2007	438,282
2008	426,949
2009	521,621
2010	452,715
2011	468,474
2012	493,515

Average visitation of this period of time is 466,923 visits per year.

**Up until 2012, a different formula for determining visitation numbers was used than the current methodology found in FY 2014 and later. Thus there is a large difference in visitation number in the more current data likely due to methodology in estimating rather than a large visitation drop between these two time periods.

Table 2.6. Total Visitation	
Fiscal Year	Visitation Total
2014	335,178
2015	331,673
2016	321,602

Average visitation during this time period was 329,484 visits per year.

**See note above

3) Recreational Analysis

By providing opportunities for active recreation, Corps lakes help combat one of the most significant of the nation's health problems: lack of physical activity. Recreational programs and activities at Corps lakes also help strengthen family ties and friendships; provide opportunities for children to develop personal skills, social values, and self-esteem; and increase water safety and awareness. The program also increase community involvement and ownership of shared resources. Physical recreation contributes to a full and meaningful life, which is good for the mind and body, good for the economy, and great for the outdoors.

Tuttle Creek's recreation areas, trails, and water add to the attraction, vitality, and appreciation for the outdoors. These areas provide a sense of place and allow a growing population to enjoy outdoor recreation opportunities in an ever growing landscape. While visitation in recreation areas remains strong, there are indications that there is new demand for upgraded facilities, non-traditional and land based recreation opportunities as the city of Manhattan and the surrounding area continue to grow as projected.

Recreation has evolved into a more modernized and high-tech activity since the construction of Tuttle Creek's recreation areas. For example, sewer hookups, 50-amp or

larger electrical hookups, concrete sites, and wireless internet are becoming the new standard for campers. Technology has changed the habits of modern camping and campgrounds, which are vital to Tuttle Creek Lake. The Off Road Vehicle Area, which is open to all motorized and non-motorized vehicles, also continues to increase in reputation and demand due to its singular public access in the region and diverse terrain. The popularity of cabins, all-season shelters, natural surfaced trails, dog parks, horse facilities, and disc golf have also become apparent in other federal, state, county, and municipal parks in the region.

Facilities in FY17

- 11 recreation areas
- 94 picnic sites
- 1,068 camping sites
- 12 playgrounds
- 2 swimming areas
- 38 number of trails
- 50.3 trail miles
- 6 fishing docks
- 11 boat ramps (18 Lanes)
- 81 marina slips

Visits (person-trips) in FY16*

- 329,250 in total
- 24,337 picnickers
- 2,201 campers
- 8,737 swimmers
- 5,535 water skiers
- 17,508 boaters
- 153,542 sightseers
- 30,836 fishermen
- 4,052 hunters
- 138,355 others

4) Recreational Carrying Capacity

No official study of carrying capacity has been done on Tuttle Creek Lake.

q. Related Recreational, Historical, and Cultural Areas

The recreational, historical, and cultural opportunities near Tuttle Creek Lake are varied and vast. Milford Lake, which is operated by the Kansas City District, is located within 50 miles of Tuttle Creek Lake.

Konza Prairie Biological Research Station

Milford Nature Center (KDWPT)

Kansas State Botanical Gardens and Insect Zoo

Call Hall Dairy

The City of Manhattan offers many recreational, historical, and cultural areas within a fifteen to twenty minute drive from the lake.

Recreational:

Swimming Pools

Golf Courses

City Parks

Multiple Trail Systems

Sunset Zoo

Kansas State University Sporting Events

Historical:

OZ Museum

Oregon Train Park and Rock Creek Historical Society Museum complex.

Wolf House Museum

Riley County Historical Museum

US Cavalry Museum

Cultural:

Flint Hills Discovery Center

Wamego Dutch Mill and Prairie Town

Marianna Kistler Beach Museum of Art

r. Real Estate Acquisition Policy

The Acquisition Criteria for Tuttle Creek Lake was established in November 19 in Design Memorandum No. 8.

Fee title as be acquired for lands described those reservoir lands so frequently inundated as to destroy their usefulness to the owner except for (1) mineral rights, (2) possible recreational purposes, and (3) grazing and access to water for livestock.

The Joint Policy agreement allows the acquisition of land in fee 300 feet horizontally from the edge of the permanent pool, if any, or not to exceed the 5-year reservoir level unless

special conditions exist. Generally the policy provides that either the 300-foot line or the 5-year flood line will be used

Flowage Easements were acquired for those lands up to elevation 1140 that otherwise don't meet the criteria for fee simple title.

s. Pertinent Public Laws

1) Application of Public Laws.

Development and management of federal reservoirs are regulated by a number of statutes and guided by Corps documents. The following sections provide a summary of the relevant policies and federal statutes.

2) Recreation

The policies and public laws listed below address development and management of recreational facilities on public lands and are pertinent to the Tuttle Creek Lake Project.

PL 78-534, Flood Control Act of 1944 (22 December 1944), authorized the Chief of Engineers to provide facilities in reservoir areas for public use, including recreation and conservation of fish and wildlife.

PL 79-526, Flood Control Act of 1946 (24 July 1946), amends PL 78-534 to include authority to grant leases to nonprofit organizations at recreational facilities in reservoir areas at reduced or nominal charges.

PL 83-780, Flood Control Act of 1954 (3 September 1954), further amends PL 78-534 and authorizes the Secretary of the Army to grant leases to federal, state, or governmental agencies without monetary considerations for use and occupation of land and water areas under the jurisdiction of the Department of the Army for park and recreational purposes when in the public interest.

PL 87-874, Flood Control Act of 1962, broadened the authority under PL 78-534 to include all water-resource projects.

Joint Land Acquisition Policy for Reservoir Projects (Federal Register, Volume 27, 22 February 1962) allows the Department of the Army to acquire additional lands necessary for the realization of potential outdoor recreational resources of a reservoir.

PL 88-578, Land and Water Conservation Fund Act of 1965 (1 September 1964), prescribes conditions under which the Corps may charge for admission and use of its recreational areas.

PL 89-72, Federal Water Project Recreation Act of 1965 (9 July 1965), requires sharing of financial responsibilities in joint federal and non-federal recreational and fish and wildlife resources with no more than half the cost borne by the federal government.

PL 90-480, Architectural Barriers Act of 1968 (12 August 1968), as amended, requires access for persons with disabilities to facilities designed, built, altered, or leased with federal funds.

PL 101-336, Americans with Disabilities Act of 1990 (ADA) (26 July 1990), as amended by the ADA Amendments Act of 2008 (PL 110-325), prohibits discrimination based on disabilities in, among others, the area of public accommodations and requires reasonable accommodation for persons with disabilities.

PL 102-580, Water Resources Development Act of 1992 (31 October 1992), authorizes the Corps to accept contributions of funds, materials, and services from non-federal public and private entities to be used in managing recreational facilities and natural resources.

PL 103-66, Omnibus Budget Reconciliation Act - Day-Use Fees (10 August 1993), authorized the Corps to collect fees for the use of developed recreational sites and facilities, including campsites, swimming beaches, and boat ramps.

PL 104-333, Omnibus Parks and Public Lands Management Act of 1996 (12 November 1996), created an advisory commission to review the current and anticipated demand for recreational opportunities at lakes and reservoirs managed by the federal government and to develop alternatives to enhance the opportunities for such use by the public.

PL 104-303 (the Water Resources Development Act of 1996), authorizes recreation and fish and wildlife mitigation as purposes of the project, to the extent that the additional purposes do not adversely affect flood control, power generation, or other authorized purposes of the project.

3) Water Resource Protection and Flood Risk Management

A number of public laws address water resources protection and flood risk management and integration of these goals with other Project purposes such as recreation. The following are pertinent to Tuttle Creek Lake:

PL 75-761, Flood Control Act of 1938 (28 June 1938), authorizes the construction of civil engineering projects such as dams, levees, dikes, and other flood risk management measures through the Corps.

PL 78-534, Flood Control Act of 1944 (22 December 1944), specifies the rights and interests of the states in water resources development and requires cooperation and consultation with State agencies in planning for flood risk management.

PL 79-14, Rivers and Harbors Act of 1945 specifies the rights and interests of the states in watershed development and water utilization and control, and the requirements for cooperation with state agencies in planning for flood control and navigation improvements.

PL 85-500, Water Supply Act of 1958 (3 July 1958), authorizes the Corps to include municipal and industrial water supply storage in multiple-purpose reservoir projects.

PL 87-88, Federal Water Pollution Control Act Amendments of 1961 (20 July 1961), requires federal agencies to address the potential for pollution of interstate or navigable waters when planning a reservoir project.

PL 89-80, Water Resources Planning Act of 1965 (22 July 1965), provides for the optimum development of the Nation's natural resources through coordinated planning of water and related land resources. It provides authority for the establishment of a water resources council and river basin commission.

PL 89-298, Flood Control Act of 1965 (27 October 1965), authorizes the Secretary of the Army to design and construct navigation, flood risk management, and shore protection projects if the cost of any single project does not exceed \$10 million.

PL 92-500, Federal Water Pollution Control Act (Clean Water Act) (October 18, 1972) Establishes a national goal of eliminating all discharges into U.S. waters by 1985 and an interim goal of making the waters safe for fish, shellfish, wildlife and people by July 1, 1983. Also provides that in the planning of any Corps reservoir consideration shall be given to inclusion of storage for regulation of streamflow. PL 95-217, Clean Water Act of 1977 (15 December 1977), amends PL 87-88 and requires the Environmental Protection Agency (EPA) to enter into written agreements with the Secretaries of Agriculture, the Army, and the Interior to provide maximum utilization of the laws and programs to maintain water quality.

PL 99-662, Water Resource Development Act of 1986 (17 November 1986), establishes cost sharing formulas for the construction of harbors, inland waterway transportation, and flood risk management projects.

4) Fish and Wildlife Resources

A number of public laws address protection and maintenance of fish and wildlife resources. The following are pertinent to the Tuttle Creek Lake project:

PL 79-732, Fish and Wildlife Coordination Act (10 March 1934), provides authority for making project lands available for management by interested State agencies for wildlife purposes.

Title 16 U.S. Code (U.S.C.) §§ 668-668a-d, Bald and Golden Eagle Protection Act of 1940 (8 June 1940) as amended, prohibits anyone, without a permit issued by the Secretary of the Interior, from taking bald eagles (*Haliaeetus leucocephalus*), including their nests or eggs.

PL 85-624, Fish and Wildlife Coordination Act (12 August 1958), states that fish and wildlife conservation will receive equal consideration with other project purposes and be coordinated with other features of water resources development programs.

The Federal Water Project Recreation Act of 1965 (PL 89-72) requires consideration of opportunities for fish and wildlife enhancement in planning water resources projects. Non-federal bodies are encouraged to operate and maintain the project fish and wildlife enhancement facilities. If non-federal bodies agree in writing to administer the facilities at their expense, the fish and wildlife benefits are included in the project benefits and project cost allocated to fish and wildlife. Fees may be charged by the non-federal bodies to repay their costs. If non-federal bodies do not so agree, no facilities for fish and wildlife may be provided.

PL 91-190, National Environmental Policy Act of 1969 (NEPA) (1 January 1970), establishes a broad federal policy on environmental quality stating that the federal government will assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings, and preserve important historic, cultural, and natural aspects of our national heritage.

PL 93-205, Conservation, Protection, and Propagation of Endangered Species (28 December 1973), requires that federal agencies will, in consultation with the USFWS, further conservation of endangered and threatened species and ensure that their actions are not likely to jeopardize such species or destroy or modify their critical habitat.

PL 95-632, Endangered Species Act Amendments of 1978 (10 November 1978), specifies a consultation process between federal agencies and the Secretaries of the Interior, Commerce, or Agriculture for carrying out programs for the conservation of endangered and threatened species.

PL 101-233, North American Wetland Conservation Act (13 December 1989), directs the conservation of North America wetland ecosystems and requires agencies to manage their lands for wetland/waterfowl purposes to the extent consistent with missions.

PL 104-303 (the Water Resources Development Act of 1996). Authorized recreation and fish and wildlife mitigation as purposes of the project, to the extent that the additional purposes do not adversely affect flood control, power generation, or other authorized purposes of the project.

PL 106-147, Neo-tropical Migratory Bird Conservation Act (20 July 2000) promotes the conservation of habitat for neo-tropical migratory birds.

5) Forest Resources

The following law pertains to management of forested lands and is pertinent to the Tuttle Creek Lake project:

PL 86-717, Conservation of Forest Land Act of 1960 (6 September 1960), provides for the protection of forest cover in reservoir areas and specifies that reservoir areas of projects developed for flood risk management or other purposes that are owned in fee and under the jurisdiction of the Secretary of the Army and the Chief of Engineers will be developed and maintained so as to encourage, promote, and ensure fully adequate and dependable future resources of readily available timber through sustained yield programs, reforestation, and accepted conservation practices.

6) Cultural Resources

A number of public laws mandate protection of cultural resources on public lands. The following are pertinent to Corps project lands at the Tuttle Creek Lake project:

PL 59-209, Antiquities Act of 1906 (8 June 1906), applies to the appropriation or destruction of antiquities on federally owned or controlled lands and has served as the precedent for subsequent legislation.

PL 74-292, Historic Sites Act of 1935 (21 August 1935), declares that it is a national policy to preserve for public use historic sites, buildings, and objects of national significance for the inspiration and benefit of the people of the United States.

PL 86-523, Reservoir Salvage Act of 1960 (27 June 1960), provides for the preservation of historical and archaeological data that might otherwise be lost as the result of the construction of a dam and attendant facilities and activities.

PL 89-665, National Historic Preservation Act of 1966 (NHPA) (15 October 1966), establishes a national policy of preserving, restoring, and maintaining cultural resources. It requires federal agencies to take into account the effect an action may have on sites that may be eligible for inclusion on the National Register of Historic Places.

PL 93-291, Archaeological and Historic Preservation Act of 1974 (24 May 1974), amends PL 86-523 and provides for the Secretary of Interior to coordinate all federal survey and recovery activities authorized under this expansion of the Reservoir Salvage Act of 1960. The federal construction agency may expend up to 1% of project funds on cultural resource surveys.

PL 96-95, Archaeological Resources Protection Act of 1979 (31 October 1979), updates PL 59-209 and protects archaeological resources and sites on public lands and fosters increased cooperation and exchange of information among governmental authorities, the professional archaeological community, and private individuals.

PL 101-601, Native American Graves Protection and Repatriation Act (16 November 1990), requires federal agencies to return Native American human remains and cultural items, including funerary objects and sacred objects, to their respective peoples.

7) Leases, Easements, and Rights-of-Way

A number of laws and regulations govern the granting of leases, easements, and rights-of-way on federal lands. The following are pertinent to Corps project lands at the Tuttle Creek Lake project:

16 U.S.C. § 663, Impoundment or Diversion of Waters (10 March 1934), for wildlife resources management in accordance with the approved general plan.

10 U.S.C. § 2667, Leases: Non-excess Property of Military Departments and Defense Agencies (10 August 1956), authorizes the lease of land at water-resource projects for any commercial or private purpose not inconsistent with other authorized project purposes. U.S.C. Titles 10, 16, 30, 32, and 43 address easements and licenses for project lands;

16 U.S.C. § 460d authorizes use of public lands for any public purpose, including fish and wildlife, if it is in the public interest.

16 U.S.C. §§ 470h-3, Lease or Exchange of Historic Property (15 October 1966), for historic properties.

PL 91-646, Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (2 January 1971), establishes a uniform policy for fair and equitable treatment of persons displaced as a result of federal or federally assisted programs.

PL 94-579, Federal Land Policy and Management Act of 1976 (21 October 1976) establishes a policy that the federal government receives fair market value for the use of the public lands and their resources unless otherwise provided for by statute. It also provides for the inventory of public land and land-use planning and establishes the extent to which the executive branch may withdraw lands without legislative action.

t. Management Plans

Operation Management Plan - Dated 2018

Whereas the Master Plan is a more conceptual framework to guide the park, the OMP gives more specificity to what work will be accomplished over the next two to three years. The OMP is updated annually.

Chapter 3 - Resource Objectives

Resource use objectives are written statements, specific to a given project stipulating the attainable options for resource use. They are determined from study and analysis of resource use capabilities and public needs, consistent with established regulatory guidance. The following are general objectives for Tuttle Creek Lake.

- 1. To assure operation and administration of congressionally authorized project purposes as they relate to the natural resource management program.**

Infrastructure, work and storage space, and administrative facilities are required to adequately operate and maintain developed recreation areas, and insure stewardship of natural resources.

- 2. To provide objective-based interpretative services and facilities regarding the purposes and concept of lake operation, recreation, and natural and cultural features of the project.**

An effective interpretive services and outreach program, consistent with industry standards and principles, establishes a vital communication link between the visitor and the Corps insuring continued public understanding and support of project purposes.

- 3. To maintain natural and recreational resources for future generations.**

The Natural Resource Management Mission (as defined in ER 1130-2-550) is to manage and conserve natural resources, consistent with ecosystem management principles, while providing quality public outdoor recreation experiences to serve the needs of present and future generations.

- 4. To provide the public quality recreation facilities, opportunities, and lake access, in cooperation with other Federal, State, and local agencies as well as the private sector.**

Public needs for diverse, developed recreation opportunities and continuing lake access is well established at Tuttle Creek. Modern facilities and services that support traditional and specialized day and overnight visitor use continue to be in high demand by a growing local population and transient user base.

- 5. To provide the public with unstructured recreational opportunities while maintaining scenic qualities and minimally developed space in a natural environment.**

Tuttle Creek is located within the ecologically distinct Flint Hills region. Maintaining view-sheds, biological communities, and landscapes while providing

the public opportunities to explore and connect to this environment provides significant value to visitors and the natural resource program.

6. To manage project natural resources for the benefit of plant and animal wildlife.

The management of project natural resources is essential to meeting all other resource objectives. Sound environmental stewardship, protection, compliance and restoration practices insure sustainability, vigor, and management of soil, water, plant and animal life, as well as other natural resources; while providing consumptive and non-consumptive use and access to the public.

a. Project Operations

The resource use objectives for lands in this allocation at Tuttle Creek Lake are listed below. Paragraph references to further explanation of the particular resource objected are noted.

- 1) To provide land for the administration of facilities and operational structures (Ch. 3-a).
- 2) To insure surveillance and safe operation of the flood control structure (Ch. 3-a).
- 3) To assure that authorized project purposes will be met and to insure public safety. The embankment, control tower and project office are necessary for impoundment and coordination of controlled releases. The emergency spillway is needed as a dam safety measure (Ch. 3-a).
- 4) To assure that authorized project purposes will be met and to insure public safety. The level is necessary for city of Blue Rapids flood risk management (Ch. 3-a).
- 5) To interpret project structures that are of interest to the public such as the dam and control tower. The function of these structures can be interpreted through exhibits, presentations (including guided tours), and publications (Ch. 3-b).

b. Recreation - High Density Use

The resource use objectives for lands in this allocation at Tuttle Creek Lake are listed below. Paragraph references to further explanation of the particular resource objected are noted.

- 1) To maintain natural and recreational resources for future generations (Ch. 3-c).

- 2) To provide for an intensive, structured recreation opportunity through a concentration of park facilities than can withstand the impact of heavy visitor use (Ch 3-d).
- 3) To provide day use facilities and services consistent with intensive visitor use patterns (Ch. 3-d).
- 4) To provide day use facilities (Ch. 3-d).
- 5) To provide overnight camping related facilities for both transient and destination users and groups (Ch. 3-d).
- 6) To provide land for the administration of State Park facilities and services at Tuttle Creek (Ch. 3-a).
- 7) To provide boating and fishing access (Ch. 3-d).
- 8) To provide a resource base for interpretive programs and facilities (Ch. 3-b).
- 9) To provide facilities and access for remote operated aircraft and related recreational activities (Ch. 3-d).
- 10) To provide small wheelbase off-road vehicle access (Ch. 3-d).
- 11) To provide off-road vehicle access (Ch. 3-d).
- 12) To provide rowing facilities and services consistent with intensive visitor use patterns (Ch. 3-d).

Figure 6: Busy Weekend at the Boat Ramp



c. Recreation – Low Density Use

The resource use objectives for lands in this allocation at Tuttle Creek Lake are listed below. Paragraph references to further explanation of the particular resource objected are noted.

- 1) To maintain natural and recreational resources for future generations. (Ch. 3-c).
- 2) To maintain scenic qualities (Ch. 3-e).
- 3) To provide unstructured recreation opportunity in a natural environment (Ch. 3-e).
- 4) To provide a buffer between housing subdivisions and parks. (Ch. 3-e).

d. Recreation – Wildlife Management

The resource use objectives for lands in this allocation at Tuttle Creek Lake are listed below. Paragraph references to further explanation of the particular resource objected are noted.

- 1) To maintain natural and recreational resources for future generations (Ch. 3-c).
- 2) To provide a dedicated and secure site for long-term forestry research, extension, and improved tree seed production activities (Ch. 3-f).
- 3) To provide wildlife habitat and food supply to insure successful natural propagation of native species (Ch. 3-f).
- 4) To provide stream and river fishing access (Ch. 3-f).
- 5) To manage project natural resources for the benefit of wildlife (Ch. 3-f)

Figure 7: Using Prescribed Fire as a Prairie Restoration/Maintenance Technique



Chapter 4 - Land Allocation, Land Classification, Water Surface, and Project Easement Lands

a. Land Allocation

Lands are allocated by their congressionally authorized purposes for which the project lands were acquired. There are four land allocation categories applicable to Corps projects:

1) Operations (i.e., flood control, hydropower, etc.)

Lands acquired for the congressionally authorized purpose of constructing and operating the project. Most project lands are included in this allocation.

2) Recreation

Lands acquired specifically for the congressionally authorized purpose of recreation. These are referred to as separable recreation lands. Recreation lands in this allocation can only be given a land classification of "Recreation."

3) Fish and Wildlife

Lands acquired specifically for the congressionally authorized purpose of fish and wildlife management. These are referred to as separable fish and wildlife lands. Lands under this allocation can only be given a land classification of "Wildlife Management."

4) Mitigation

Lands acquired or designated specifically for the congressionally authorized purpose of offsetting losses associated with development of the project. These are referred to as separable mitigation lands. Lands under this allocation can only be given a land classification of "Mitigation."

Table 4.1

Land-Use Allocations	
Allocation	Acres
Operations	434 (433.9)
Recreation	3,273 (3,107.5)
Fish and Wildlife (including Vegetative Management)	19,660 (19,915.5)
Total Land-Use Allocations	23,367 (23,456.9)
Water	11,000 (11,141)
Total Fee Acquisitions	34,367 (34,597.9)

b. Land Classification

Land classification designates the primary use for which the lands are managed. Project lands are zoned for development and resource management consistent with authorized project purposes and the provisions of the National Environmental Policy Act and other federal laws. The land classifications in this Master Plan are found in EP 1130-2-500 dated June 2013 and differ from those found in the previous 1985 version of the Master Plan which was a design memorandum. The classification names vary only slightly from the previous classification system and do not result in any direct changes to the way the land is managed.

1) Project Operations

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

2) High-Density Recreation

Lands developed for intensive recreational activities for the visiting public including day-use areas and/or campgrounds. These could include areas for concessions (marinas, comprehensive resorts, etc.), and quasi-public development.

3) Mitigation

This classification will only be used for lands with an allocation of Mitigation and that were acquired specifically for the purposes of offsetting losses associated with development of the project.

4) Environmentally Sensitive Areas

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

5) Multiple Resource Management (MRM) Lands

This classification allows for the designation of a predominate use as described below, with the understanding that other compatible uses described below may also occur on these lands (e.g. a trail through an area designated as Wildlife Management.) Land classification maps must reflect the predominant sub-classification, rather than just Multiple Resource Management.

a) Low-Density Recreation

Lands with minimal development or infrastructure that support passive public recreational use (e.g. primitive camping, fishing, hunting, trails, wildlife viewing, etc.)

b) Wildlife Management

Lands designated for stewardship of fish and wildlife resources.

c) Vegetative Management

Lands designated for stewardship of forest, prairie, and other native vegetative cover.

d) Future/ Inactive Recreation Areas

Areas with site characteristics compatible with potential future recreational development or recreation areas that are closed. Until there is an opportunity to develop or reopen these areas, they will be managed for multiple resources.

6) Water Surface

c. Project Easement Lands

Project easement land classification is for those lands for which the Corps holds an easement interest, but not fee title. Planned use and management of easement lands will be in strict accordance with the terms and conditions of the easement estate acquired for the project. Easements were acquired for specific purposes and do not convey the same rights of ownership to the Corps as other lands.

1) Operations Easement

The Corps retains rights to these lands necessary for project operations (access, etc.).

2) Flowage Easement

The Corps retains the right to inundate these lands for project operation.

3) Conservation Easement

The Corps retains the rights to lands for aesthetic, recreation, and environmental benefits.

Chapter 5 - Resource Plan

Maps of each project area can be found in Appendix B.

Unit 1 - Project Operations Areas

1) Classification: Project Operations

2) Management Agency: Corps

3) Location/Acreage: This 378.3-acre area is broken into five sub-units as listed below.

(a) SUB-UNIT 1A. (13.3 acres) located some 1,800 feet downstream of the right dam abutment, just off Tuttle Creek Boulevard. This unit includes areas surrounding the project office bounded by the parking lots and River Pond Road to the east, Tuttle Creek Blvd. to the south and Wolf Creek to the north.

(b) SUB-UNIT 1B. (172 acres) inclusive of the embankment, toe drain system, and outlet works. Four drainage ditches and numerous instrumentation located downstream within unit 3 (River Pond) are also included in this unit, but are too small to be identified in the unit map.

(c) SUB-UNIT 1C. (136.6 acres) located just east of the dam. This unit includes 1) the length of the spillway from the inlet to its confluence with River Pond. 2) The hilltop areas between the dam and spillway; extending downstream, bound by the spillway to the east and River Pond Road to the west to the point of the observation pull-off area. And, 3) The hilltop area upstream and east of the channel bound by the spillway to the south, the rowing lease to the north, and K-13 and Marina Roads to the east.

(d) SUB-UNIT 1D. (15.6 acres) is a narrow area, some 1,800 feet in length, located one half mile downstream of the spillway gates. This area is bound by the Spillway Cycle Area to the west and the project boundary to the east.

(e) SUB-UNIT 1E. (40.8 acres) is located directly west of the project office and is bound by K-13 to the west, the right abutment and unnamed service road to the east, and Wolf Creek to the south.

4) Description and Use: This unit includes the project office, dam, outlet works, spillway, emergency rock storage areas, and small parcels of lands between said structures

Primary access to the area is provided from state and local maintained roadways including Tuttle Creek Blvd., Kansas Hwy 13, Dyer and River Pond Roads (all paved). Over six miles of gravel and dirt service roads (single lane), and one mile of paved park road (maintained by the Corps) throughout the unit provide access to operational structures and maintenance areas. Undisturbed, upland terrain slopes moderately to various draws, streams, and the lake. Wolf Creek is a perennial stream located in sub-unit 1A and 1E. A natural seep, located approximately 900 feet upstream of the River Pond Road Bridge, maintains year-round flows on lower Wolf Creek. There are no wetlands identified in this unit.

Disturbed areas include the earthen dam embankment, cut spillway channel, borrow pits (rock stockpile areas), and improved project office and associated maintenance compound. Approximately 30% of this unit is undisturbed upland hillslopes with shallow (3-30"), well drained, and erodible silty-clay soils accompanied by sporadic rock outcrops on side slopes. Small areas of deeper soils (80"+) are located on lower elevation hillslopes, primarily around watercourses. The remaining acreage is human-altered and human-transported soils and materials inclusive of the dam and various barrow pits, including 12 acres of cultivable soil located just downstream of the spillway apron. Additional, minor components located throughout the unit constitute < 3% of this area. Upland cover is predominated by warm season grasses interspersed with invading eastern redcedar. Slopes are primarily cedar/hardwood forest type with climax communities located along riparian zones. Areas around the project office are heavily landscaped with cool season grasses and a mix of native and non-native landscape and shade trees and shrubs. The project tree nursery is located in the southwest corner of unit 1A. Disturbed areas are extremely prone to primary succession (sumac, elm, dogwood, etc.) and invasive species (pampas grass/phragmite, caucasian bluestem, etc.).

Cultural resources surveys have only been conducted for the spillway channel upstream of the gates. Additional surveys in the unit are not recommended as the areas have been heavily disturbed during original construction. There are three sites located in the unit, all which are ineligible for the National Register of Historic Places (NRHP).

This area is designated for Project Operations; providing safe, efficient operation of the project consistent with authorized flood damage reduction, water supply, and water quality missions. Recreation, and fish and wildlife activities are permitted on an interim basis when not in conflict with authorized purposes. There are no lands in this allocation which do not aid in the successful operation of authorized purposes. Improvements include:

- OPERATIONAL

- ADMINISTRATION OFFICE & MAINTENANCE COMPOUND. This area consists of a 5,300 square foot (sf) office, 4,000 sf maintenance building, and roughly 8,500 sf of covered storage (pole barns, sheds, shelters, etc.). Some five acres are landscaped with a mixture of cool and warm season grasses, and manicured trees / shrubs; inclusive of a 400 sf garden located at the entrance to the office. Hardened surfaces include approximately 2.5 acres of graveled storage yards and roadways, and a half acre of paved asphalt parking lots and drive lanes (11 single spaces available to public). Storage and work yards are bound by some 2,000 linear feet of security fencing.
- EMBANKMENT (DAM). The Dam is a 7,487-foot-long earthen embankment measuring 50 feet wide at the crest and (at its widest) 1,640 feet at the base. Just over four miles of gravel service roads are located along the length of the up and downstream mid-slopes, toe, and abutments. At a cost of \$175 million, the dam was heavily modified from 2006 to 2010 to stabilize the foundation in the event of an earthquake. To

mitigate construction impacts to recreation, funding from the project was used to build Rocky Ford camping loop in River Pond (unit 3), and Lakeshore and Point loops in Tuttle Cove (unit 34).

- SPILLWAY. The spillway is 10,059 feet wide and some 6,000 feet in length from the lake inlet to the confluence with River Pond. Just over 1.5 miles of gravel service roads provide access up and downstream of the gates. Downstream areas are only accessible via a service road through the Spillway Cycle Area (unit 7) off Dyer Road. Any releases will heavily impact River Pond (unit 3) and points downstream including the KDWPT Wildlife Area at Rocky Ford, located just off-project.
- OUTLET WORKS. The outlet works consist of the intake tower (and access bridge), conduits, and stilling basin. Guided tours of the intake tour are very popular, but otherwise the public is prohibited beyond the bridge gate. River Pond road around the basin, adjoining parking, and sidewalks are considered part of Outlet Park (unit 2) and typically open to the public. Public access to these areas is occasionally restricted during periods of elevated security measures, maintenance work, and high releases. Boats, swimming, and other water-based recreation is permanently restricted from entering the outlet works and waters within 250 feet of the basin wing-walls. A manual alarm system notifies visitors at the basin and Rocky Ford Wildlife Area of increases in outflow.
- ROCK STOCKPILE AREAS. There are two rock stockpile areas located in this area, one in southern portion of unit 1E and one in 1D. The pile in 1E (in addition to a second in unit 3) is maintained according to dam safety emergency action plan requirements. Rock stored in 1D is intended for day-to-day operational needs. These areas are secured by locked gates, fences and/or natural barriers.
- RECREATIONAL
 - WEST DAM PARKING LOT. This is an unmetered land access point consisting of a 23,600 sf paved parking lot (75 single spaces), two pole lights, pedestrian overlook, and masonry interpretive marker commemorating completion of the dam. A 20-foot pipe gate, and a series of parking bumpers and extruded metal guardrail prohibits vehicle access beyond the parking lot. Popular activities include sightseeing, and parking access for visitors walking the upstream mid-slope roadway.
 - EAST DAM PARKING LOT. This is an unmetered land access point consisting of a 3,800 sf paved parking lot (five single spaces), and half-acre mowed area. A 20-foot pipe gate, parking bumpers, extruded metal guardrail prohibits vehicle access beyond the parking lot. Popular activities include sightseeing, and parking access for visitors walking various service roads upstream of the dam and spillway.

- SPILLWAY OBSERVATION LOT. This is an unmetered land access point consisting of a 6,500 sf paved parking area (20 single spaces), and a wayside panel addressing spillway operations and the 1993 flood. A 20 ft. pipe gate, parking bumpers, and extruded metal guardrail prohibit vehicle access beyond the parking lot. Popular activities include sightseeing.
- PROJECT ADMINISTRATION OFFICE. This unmetered area is open to the public and includes a type B project visitor center with a 825 sf exhibit space featuring information on project history and missions, and recreational, natural resource, and cultural resources. Project staff conduct permit/pass sales and provide lake information to visitors via the adjoining window counter. Restroom facilities located off the exhibit space service visitors and staff. Visitors can collect brochures and view notices in the entryway vestibule, accessible 24 hours.
- BISON SCULPTURE. Several metal bison were acquired by retired Park Ranger Paul Weidhaas and installed in 1995 on the hill above the right abutment by local metalwork artist, and former Konza Prairie caretaker, Dave Sampson to commemorate absent Flint Hills mega fauna.
- FISH AND WILDLIFE
 - LU 1. An agricultural hay lease is located just downstream of the spillway apron. The lease provides wildlife benefits through production of native grass.
 - TREE NURSERY. The project tree nursery (< 1 acre) is located west of the administration office and provides various species of regeneration size to be planted in the parks.
 - FOOD PLOT. A half-acre food plot, is located just north of the west rock stockpile area for the benefit of wildlife.

5) Resource Objectives

(a) To provide land for the administration of facilities and operational structures.

(b) To assure that authorized project purposes will be met and to insure public safety. The embankment, control tower and project office are necessary for impoundment and coordination of controlled releases. The emergency spillway is needed as a dam safety measure.

(c) To insure surveillance and safe operation of the flood control structure.

(d) To interpret project structures that are of interest to the public such as the dam and control tower. The function of these structures can be interpreted through exhibits, presentations (including guided tours), and publications.

6) Development Needs:

(a) INTERPRETATION. Exhibits within the administration office have long exceeded their operational lifetime and are no longer effective in communicating the

project story. Similarly, stand-alone interpretive elements (wayside panels, presentations/tours, publications, etc.) do not provide a cohesive message to reinforce significant meaning. Resolution of these shortcomings will require a two-phase strategy. 1) Development of an objective driven long-term interpretive master plan to identify project-wide goals and communication strategies, and 2) design and fabrication of these strategies consistent with the plan.

(b) CANYON TRAIL. During the 1993 spillway release a canyon was created downstream of the concrete apron, exposing rock strata. Geologic exploration of this area by individuals, school and other groups is popular. A multi-purpose trail is recommended to provide improved access and interpretation of this resource; understanding spillway releases, although exceedingly rare, would likely result in total loss of the proposed.

7) Special Considerations:

(a) SECURITY. Access to areas can be restricted or denied subject to elevated security measures dictated by threat level assessments overseen by Department of Defense (DoD) and other federal agency directives. An approved interagency dam closure plan preventing traffic across the dam (via Hwy K-13) coordinates closure efforts between the Corps, Kansas Department of Transportation, and other stakeholders.

(b) CULTURAL RESOURCES. No historic surveys have been conducted for this unit. Most of this area is heavily disturbed and additional surveys are not recommended for these sites. However, undisturbed areas subject to erosion, agricultural activity, elevated visitation, or otherwise subject to disturbance should be surveyed (some 35 acres). There is one recently confirmed site (likely NRHP eligible) in this unit that has not been included in the Historic Properties Management Plan. Details are on file with the Environmental Resource Section at the District Office.

(c) OPERATION & MAINTENANCE (O&M) MANUAL. O&M activities and needs specific to operational structures are directed, in detail in the O&M Manual.

Unit 2 – Outlet Park Public Use Area (PUA)

1) Classification: High Density Recreation

2) Management Agency: Corps

3) Location/Acreage: This unit includes 143 acres located immediately downstream from the west end of the dam inclusive of the outlet channel (Blue River) and land on both sides¹. Outlet Park is bound by Tuttle Creek Blvd., Tuttle Creek Project Office, and River Pond Road to the west, the toe of the Dam to the North, the old river channel to the east (the Dam Safety Assurance Program spoil pile is leased to KDWPT and is part of unit 3), and extending some 500 feet downstream of the confluence with River Pond to the project fee boundary.

¹ Park areas west of the channel are referred to as West Outlet and areas east as East Outlet.

4) Description and Use: Primary access to the area is provided from the west via Tuttle Creek Blvd. / U.S. Highway 24 (maintained by state). Additional access is provided from the east via K-13 through River Pond (unit 3, maintained by KDWP). Three magnetic loop traffic counters record all ingress traffic, except those vehicles entering through the project office parking lot. Terrain is generally flat and level with cut banks along streams and the river. Four water courses are located in this area: Wolf Creek, Pfeil Creek, the outlet channel (Blue River), and the old river channel. With the exception of the old channel, banks along these courses are very steep and average 10 feet high (although some banks are more than 30 feet high). The old channel is now occupied by a five-acre pond surrounded by four acres of emergent and shrub wetlands (fed by drainage ditch A), as identified by the U.S. Fish and Wildlife Service (FWS) National Wetland Inventory maps.

With the exception of human-altered and human-transported transition zones around the channel and embankment, virtually all soils are typical of a flood plain and alluvial in nature. Soils are deep (80+”), well drained, with low runoff potential due to minimal grades. Soils located in the old river channel are categorized as very fine and somewhat less well drained. Minor components located throughout the unit constitute less than 1%. Vegetative cover is primarily warm season grasses and fescue interspersed with numerous landscape and shade plantings. Native tree species include mature cottonwood, elm, oak, and hackberry; with successional plantings averaging less than 10 years of age. Tree cover increases along the river and is a climax hardwood type. The old river channel is partially filled and provides excellent wetland communities of herbaceous plants, and woody trees and shrubs.

Cultural Resources surveys have only been conducted on lands east of the outlet channel. Additional surveys in the unit are not recommended as the area has been heavily disturbed. There are two sites located in the unit were extensively excavated and ultimately determined ineligible for the NRHP.

This area is designated for recreation-intensive use; providing a developed public use area (PUA) for intensive recreation activities by the visiting public consistent with the authorized recreation mission. There are no lands in this allocation that do not aid in the successful completion and operation of this authorized purpose. Improvements include:

- OPERATIONAL
 - WASTEWATER POND. A pond/lagoon is located south of Pfeil Creek and receives wastewater from the Project Office, Maintenance Building (both in unit 1A), and the Outlet Park comfort station via a lift station. This area is accessed via a nominally improved stream crossing through Pfeil Creek (inaccessible during high water events).
 - OUTLET WORKS. Located on the north end of the unit, inclusive of the roadway, parking and sidewalks surrounding the stilling basin. The embankment, abutment, conduits and basin (everything beyond the fence and handrails) are designated for project operations (unit 1B) and public access is prohibited.

- STAGING AREA. A two-acre staging area for fill and rock material is located in East Outlet, downstream from Shelter 3. Public vehicle access is blocked by a locked gate; however, non-motorized access is permitted.
- RESIDENT VOLUNTEER SITES. Two all-season campsites provide hook-ups for resident volunteers supporting NRM activities project-wide. Sites include electric, water, and sewer utilities, storage sheds, and gravel parking/living pads. Additional improvements include gardens and landscape plantings established and maintained by the residents.
- RECREATION. Outlet Park is exclusively a day-use area and receives intense use given its proximity to the City of Manhattan and direct access from Tuttle Creek Blvd./U.S. Highway 24. As such, the area provides a full complement of recreation facilities. Popular activities include fishing, picnicking, hiking, wildlife/bird watching, organized sports, and quiet reflection.
 - PICNIC SHELTERS & AREAS. A total of six shelters with a compliment of concrete pads, pedestal grills, tables, trash corrals, and pathways are located in Outlet Park (four in West Outlet and two in East Outlet)². Most were completed during original construction (1963) with a couple added in the 1980's. Electrical and water service is provided to select shelters and heavily influences use patterns. Additional picnic areas, nominally improved with tables and pedestal grills, are scattered throughout the park
 - PLAYGROUNDS. Four playgrounds are located in the area (two in West Outlet, and two in East Outlet), completed in the early part of the 21st Century. Playgrounds are located near shelters to accommodate associated use patterns. A few stand-alone play structures (diggers, ride ons, etc.) are located near shelters, but not associated with a larger playground.
 - SPORTS FACILITIES. Organized sports facilities include three ball fields (mowed area with backstop), four sand volleyball courts, a nine-basket disc golf short-course, a concrete basketball court, and a handful of horseshoe pits. The disc golf course is located in West Outlet. All other facilities are located near picnic shelters to accommodate associated use patterns.
 - MULTIPURPOSE TRAIL. The Blue River Trail is a ½ mile, looping trail available to non-motorized use located in West Outlet. The trail head is East Outlet and the trail winds between the Outlet and Old River

² A pedestrian bridge across Pfeil Creek provided the only public access to the shelter located south of the creek. Erosion of the abutments and structural defects forced removal of the bridge in 2010 rendering the shelter, vault toilet, and ball field inaccessible to the public although the facilities remain.

channels. Improvements include a wildlife viewing shelter overlooking the old channel/wetland, a wayside panel at the trailhead, and a handful of off-the-shelf interpretive signs along the trail.

- FISHING ACCESS. Several features have been installed to access at the stilling basin (locally called “the tubes”). A low-maintenance fish cleaning station, located along the right wing wall, is gravity fed by a natural spring (located directly uphill, Lat 39°15'5.88”N Lon. 96°36'2.98”W), that discharges remains into the basin below. Trashcans and visitor signage further direct and accommodate high use.
- BULLETIN BOARD. A quad-panel bulletin board is provided at the comfort station.
- SANITARY FACILITIES. A concrete block waterborne comfort station with stick-built roof built in 1982, located at the west entrance (visible to highway traffic), provides toilets and sinks year-round to park visitors and is functionally a rest stop for U.S. Highway 24. Five pre-fabricated vault toilets added in the aughts, accommodate year-round use at the Stilling Basin, East Outlet, and south of Pfeil Creek.
- UTILITIES. Water is provided via hydrants and drinking fountains at three shelters and the comfort station. Electrical power is provided via 120 AMP outlets and lighting to three shelters, comfort station, and the stilling basin (lighting only).
- ROADS & PARKING. Interior park roads include 1.5 miles of two-lane asphalt paved road and 580 linear feet of single-lane gravel service road (maintained by the Corps). Asphalt paved, unlined parking spaces (most with parking bumpers) accommodate some 450 single (no trailer) vehicles.
- CONSEQUENTIAL USE. Use patterns not accommodated by improved facilities include shoreline fishing along all streams and the river channel. Numerous foot trails and worn patches of shoreline are readily apparent throughout the area.
- FISH & WILDLIFE. The only effort/improvement effecting fish and wildlife in this unit is trapping activities to minimize beaver activity in the old river channel pond and wetland. This work primarily prevents backflow into drainage ditch A, rendering the downstream flume inoperable. As a secondary benefit, the population control efforts minimize park shade tree damage in the area.

5) Resource Objectives:

- (a) To maintain natural and recreational resources for future generations.

(b) To provide day use facilities and services consistent with intensive visitor use patterns.

(c) To provide stream and river fishing access.

(d) To provide stream and river fishing access.

6) Developmental Needs:

(a) In general, implement current Corps design and service standards to 1) improve health, safety, security and comfort of park visitors (including universal design), 2) reduce operational and maintenance costs, 3) meet local and regional recreational needs, 4) reduce site degradation from intensive use, 5) correct original design problems resulting in conflicting use patterns, 6) improve park aesthetics, and 7) enhance revenue generation.

(b) Lake fluctuation and sedimentation often renders lake access unusable and demand for alternative recreation opportunities is high. Efforts to increase the quantity and quality of land-based recreation include:

Renovate existing Blue River Trail to incorporate sustainable trail design and achieve interpretive objectives including new wayside panels. Expand trail to include elevated boardwalk exploring old channel wetland. Refurbish and improve spur trail to wildlife viewing platform. Consider link to River Pond (unit 3) and/or City of Manhattan trail systems to promote alternative access to park facilities.

Install additional playgrounds and/or equipment to compliment all existing and planned picnic shelters. Consider incorporation of naturalized design elements to encourage diversity in play opportunities for variety of development/learning stages.

Improve existing and add additional single/double-table picnic sites by aligning with existing roadways, parking areas and restrooms, and install delineation, additional pedestal grills, accessible pads and pathways.

Install a wet playground or splash pad, and support amenities (parking, pathways, benches, shade canopies, lighting, etc.) to promote safe access for water play, as an alternative to swimming in an undesignated areas. Consideration should be made to incorporate naturalized elements consistent with park aesthetic.

Maintain contiguous block of level, mowed turf for multi-purpose use not limited to field sports, open play, and overflow parking.

(c) Re-establish access to and operation of Pfeil Creek shelter area. Replace all existing shelters with modern construction and renovate associated use areas with full complement of dedicated and expanded parking, pathways, water and electrical utilities, restrooms, playgrounds, etc. Incorporate a plaza-style shelter grouping to accommodate large-scale gatherings or multiple small groups. Construct an enclosed, multiple-use pavilion with climate controlled meeting and/or kitchen space and adjoining outdoor picnic area. Construct an outdoor/indoor event space to facilitate interpretive presentations, cultural events, and cooperative meetings. Design allowing for multiple use consistent with "Enclosed Pavilion" described above should be considered.

(d) Install fishing pier(s) to provide universal access to outlet channel and improved fishing access during basin closures.

(e) Flood events and high outflows have resulted in significant erosion of stream banks with land loss upwards of five acres in some areas. Effort should be made to reestablish lost land and stabilize banks to prevent continued backcutting and eventual loss of government assets.

(f) Consideration should be made for lost access associated with existing, ongoing operational conflicts and unlikely potential for permanent closure of the stilling basin. It is recommended a bypass (bridge or otherwise) allowing uninterrupted vehicle and pedestrian access to East Outlet and River Pond be incorporated. As well as restrictive barriers to deter and prevent traffic from entering the basin/work area.

7) Special Considerations:

(a) PERMITS & FEES. Permits and fees are applicable to Outlet Park, consistent with established Corps Recreation Use Fee regulations. Pertinent use activities include shelter reservations and specialized use.

(b) OUTLET STRUCTURE OPERATIONS. Public access to the stilling basin is occasionally restricted during periods of elevated security measures, maintenance work, and high releases. Boats, swimming, and other water-based recreation is permanently restricted from entering the outlet works and waters within 250 of the basin wing-walls. During basin closures, East Outlet is only accessibly through River Pond (unit 3).

(c) STATE PARK ACCESS. Access to River Pond (unit 3) is maintained through Outlet Park by way of River Pond Road, and impacts require coordination with KDWP. This traffic patterns is incorporated into the visitation estimation reporting system. Large events in River Pond will impact traffic in Outlet Park. Likewise, closure of the stilling basin routinely eliminates this access; forcing traffic to utilize an additional access off Highway 13.

(d) REGIONAL PLANNING. Developed subdivisions and the Manhattan Urban Area Planning Boundary currently surrounds Outlet Park. Furthermore, the City of Manhattan is projected to double in size by 2030. Development is bound by flood plains to the east and south, and Ft. Riley to the west; meaning much of this growth will continue to expand northward towards the project making Outlet Park essentially a community park. As such, close coordination with City planners is recommended to evaluate and strategize complementary facilities and services.

(e) VANDALISM. Incidents of vandalism are typically minor, but relatively frequent given the area's proximity to population centers, ready access, and intense use.

Unit 3 – River Pond Public Use Area (PUA)

1) Classification: High-Density Recreation

2) Management Agency: Kansas Department of wildlife, Parks & Tourism, Tuttle Creek State Park

3) Location/Acreage: This unit includes 557 acres located immediately downstream of the dam inclusive of River/Willow Ponds and all lands immediately surrounding them. River Pond is bound by Outlet Park (unit 2) and the outlet channel/Big Blue River to the west, the tow of the Dam to the North, River Pond and Beach Roads to the east, and Beach Road and the project fee boundary to the south.

4) Description and Use: Primary access to the area is provided via K-13 across the crest of the dam (eastbound traffic) and spillway (westbound traffic). Additional access is provided from the west via Tuttle Creek Blvd./U.S. Highway 24 through Outlet Park (unit 2, maintained by the state and the Corps respectively). A service gate provides controlled access off Dyer Road to meet operational and maintenance needs. Two magnetic loop traffic counters record all ingress traffic except the limited number of vehicles entering through the Dyer Road gate. Terrain is flat and level throughout most of the area with the exception of the easternmost edge which rises sharply 125 feet (15-80% grade) to the hillside above the dam's left abutment. Seven water courses, are located in this area: the old river channel and Blue River to the west, and the man-made embankment drainage ditches A, B, C, and D, and the spillway channel. This unit also includes the 170-acre river pond and 16-acre Willow Lake – fed by backwaters of the Blue River, defined by barrow pits and the old river channel. Some 14 acres of emergent and shrub wetlands surround the ponds and occupy the old river channel, as identified by FWS.

Bottomland soils are typical of a flood plain and alluvial in origin. Majority of soils are deep (80+”), well drained, with low runoff potential due to minimal grades. The eastern upland hill slope is exclusively shallow (<20”), well drained, highly erodible silty-clay soils accompanied by sporadic rock outcrops. Bottomland vegetative cover is a mix of warm season grasses (primarily north of River Pond Road) and fescue interspersed with landscape and shade plantings. Most common native tree species include mature cottonwood, elm, sycamore, and ash; with successional plantings averaging 10 years of age. Tree cover increases along the ponds, old channel, and river, and is a climax hardwood type. The area south of River Pond is dominated by mature cottonwood/willow forest. Eastern Red Cedar occupy the easternmost upland hillsides with native grass and encroaching cedar hilltops.

Cultural Surveys have been conducted for a portion of the unit. Additional surveys are recommended by the Historical Properties Management Plan (HPMP) and are categorized as high priority due to vulnerability for disturbance and looting. There is one site located in the unit which was gridded, excavated, and ultimately determined ineligible for NRHP.

This area is designated for Recreation-intensive use; providing a developed PUA for intensive recreation activities by the visiting public consistent with the authorized recreation mission. There are no lands in this allocation that do not aid in the successful completion and operation of this authorized purpose.

- OPERATIONAL
 - EMBANKMENT DRAINAGE DITCHES. Four drainage ditches, totaling some 5,000 feet in length, are located between the embankment and

River Pond and generally flow on a north-south axis. These ditches are part of the embankment drainage system and are maintained as such.

- INSTRUMENTATION. A variety of instrumentation is located throughout the unit to monitor performance of embankment, and has a footprint less than 1/10 acre.
- SPILLWAY. The spillway traverses the unit from the channel located east of Beach Drive, through River Pond and Willow Lake, and into the river channel. Spillway releases heavily impact this unit, requiring extensive cleanup and repair of recreation facilities.
- ROCKPILE STORAGE. An emergency rock stockpile is located on the top of the eastern most hill as part of the emergency management plan. Access is provided via a locked gate off River Pond Road.
- STATE PARK OFFICE/COMPOUND. KDWPT administrative office, maintenance compound, and sewage lagoons occupy some three acres; located at the eastern park entrance.
- RESIDENT VOLUNTEER SITES. Eight campsites are allocated for seasonal to year-round volunteer/contractor occupancy in support of park operations. Eight campsites are allocated for seasonal to year-round volunteer/contractor occupancy in support of park operations.
- RECREATION. River Pond is a recreational complex offering overnight, day use, and specialized activities and is reliably ranked in the top two performing parks in the state park system, both in terms of visitation and revenue. Popular activities include camping, fishing, organized sports, hiking, boating, wildlife/bird watching, and quiet reflection.
 - SANITARY FACILITIES. Sanitation facilities include two vault toilets, two water-borne toilets, and three toilet/shower house buildings. Two dump stations with multiple cleanouts supports the campground. The sewage system includes a lagoon with two cells (0.50 surface acres), accompanied by six lift stations throughout the unit.
 - OVERNIGHT FACILITIES. The campground is divided into two areas; River Pond (north of pond) and Rocky Ford (south of pond). The River Pond campground was constructed shortly after the dam in the 1960s. Rocky Ford was funded as a mitigation project through the Dam Safety Assurance Program and completed in 2006. There are 667 campsites designated as 3-utility (water, sewer, electric), 2-utility (water, electric), and 1-utility (electric) in a variety of layouts. Sites typically include tables, fire rings, and lantern posts. In addition to campsites, seven cabins offering kitchen, bath, and living accommodations are located within the unit. Two entrance stations and self-pay stations are located at each park entrance to manage reservations. A small camp store and laundry facility is operated under an agreement with a cooperative association.

- BOATING FACILITIES. Three ramps offer access to River Pond and are the sole public access to the Blue River upstream of Rocky Ford Dam. There is no boat access to Willow Lake. Additionally, the state operates a storage facility and rental booth for paddle craft rentals (kayaks, canoes, standup paddle boards).
- SWIMMING BEACH. A two-acre sand beach is located along the River Pond, accompanied by a $\frac{3}{4}$ acre designated swim area. This is one of two designated swim areas on the project. No lifeguards monitor the area.
- PICNIC SHELTERS & AREAS. A total of 10 shelters with a complement of concrete pads, pedestal grills, tables and pathways are located in the unit. Most were completed during original construction. Additional picnic areas, nominally improved with tables and pedestal grills, are scattered throughout the park. Finally, a multi-purpose area inclusive of a shelter and outdoor seating / amphitheater is located near the Cottonwood Trailhead.
- PLAYGROUND. One playground with multiple structures is located in the area, completed in 2007. A swing set was also added in 2009.
- SPORTS FACILITIES. Organized sports facilities include two volleyball courts, and one eighteen-basket disc golf course. A handful of horseshoe pits are located throughout the unit.
- ARCHERY RANGE. A one-acre archery range provides up to 65 yard targets, and ground level, elevated, and sheltered firing positions. A youth archery area is available as a component in the range.
- DOG PARK. A one-acre off-leash dog park area is located in this unit, inclusive of agility equipment.
- TRAILS. Four trails are located in the area available to non-motorized use. The Canyon trailhead is designated where Beach Drive intersects the spillway channel and offers unimproved access to the canyon above (unit 1). Cottonwood is a quarter-mile linear trail following the old river channel. Eagle Pass trail is a three-quarter a mile linear trail along the southern River Pond shoreline connecting the Rocky Ford and River Pond camping areas. A trailhead for the Western Heritage Trail is located in the Rocky Ford camping area and connects to a 1.5-mile concrete linear trail along the Blue River (located off-project).
- FISHING ACCESS. There are six floating fishing docks located in River Pond and two in Willow Lake. A cleaning station is located at the primary boat ramp. Fish feeding stations/attractors are located in River Pond.
- UTILITIES. Underground utilities within the unit include water, electric and sewer lines. Electrical loads are significantly developed to

accommodate large special events, most notably Country Stampede. Public WiFi service was added in 2010.

- ROADS & PARKING. Interior park roads include 13 lane miles of asphalt paved road, one lane mile of gravel road. Hardened parking can accommodate some 300 vehicles.
- CONSEQUENTIAL USE. Use patterns not accommodated by improved facilities include shoreline fishing.
- FISH & WILDLIFE. Periodic stocking of fish to improve angler success in River Pond. Willow Lake stocked during winter season with trout. Active Bald Eagle nest along shoreline of River Pond. Users monitored to not disrupt nest. River Pond Area popular birding site, habitat maintained to not disrupt 31 bird populations. Large Canada geese managed to avoid conflicts with users. Beaver and Muskrat popular in water areas and managed to not be detrimental to facilities, waterways and trees.

5) Resource Objectives:

- (a) To maintain natural and recreational resources for future generations.
- (b) To provide land for the administration of State Park facilities and services at Tuttle Creek.
- (c) To provide for an intensive, structured recreation opportunity through a concentration of park facilities than can withstand the impact of heavy visitor use.
- (d) To provide overnight camping related facilities for both transient and destination users and groups.
- (e) To provide day use facilities.
- (f) To provide boating and fishing access'
- (g) To provide a resource base for interpretive programs and facilities

6) Development Needs

(a) VISITOR CENTER & ADMINISTRATION COMPLEX. Construct a multi-purpose facility inclusive of new administrative offices, visitor center, exhibits, and outdoor interpretive space. Renovate existing maintenance compound and repurpose old office.

(b) EXPANDED SANITATION. Install additional sewage lagoons to accommodate loads from expanded overnight facilities and increased occupancy rates. Likewise, construct additional large shower building to meet River Pond camping area demands. Install sewer at sight at approximately 30 additional campsites.

(c) RENOVATE CAMPSITES. Renovate campsites 711-912 to accommodate modern campers inclusive of green space, living and camping pads, and utility hookups. Expand sewer hookups for campsites 30-50. Expand electrical services throughout campground. Incorporate bike-friendly features into campground.

(d) TRAILS. Expand Western Heritage Trail to further link City of Manhattan trail systems and promote alternative access to park facilities.

(e) ENCLOSED PAVILLION. Construct an enclosed, multiple-use group pavilion with climate controlled meeting space, kitchen, bathrooms, and adjoining outdoor picnic area.

(f) ARCHERY RANGE. Expand Nihart Archery Range to include a walk-through 3-D archery course.

7) Special Considerations

(a) TRANSIENT CAMPING. In 2005 KDWPT was authorized a transient or long-term camping program allowing visitors to camp up to 30-days, instead of the previous 14-day limit. Some 20 campsites are eligible to be enrolled in the program.

(b) SEASONAL CAMPING. In 2012 KDWPT instituted a seasonal camping program, consistent with a supplemental lease agreement. This program authorized camping stays exceeding the lessee's previous 30-consecutive-day camping limit. Seasonal camping is authorized in River Pond for March 1 through November 30. Some 20 campsites are available for seasonal camping.

(c) BLUE RIVER PUBLIC ACCESS. Public access river trails in Kansas are limited to navigable waterways, and such access is highly valued as a result. The Blue River is not a navigable waterway; however, several pieces of contiguous public property along the river provide limited public boating access from Tuttle Creek Dam downstream to the Rocky Ford Dam located 1,500 feet downstream of the project fee boundary.

(d) COUNTY JURISDICTION. The Riley-Pottawatomie County line meanders through the unit, following the old river channel, and is obscure. This feature can create confusion for those persons and agencies unfamiliar with the area.

Unit 4 - Forestry Area

1) Classification: Vegetative Management

2) Management Agency: Kansas State University, Department of Horticulture and Natural Resources

3) Location/Acreage: This unit includes 89.7 acres and all lands located south of Rocky Ford / River Pond (unit 3). The unit is bound by Beach Drive to the Northwest, and the original river channel (project boundary) to the south and east.

4) Description and Use This unit exclusively includes the Kansas State University Tuttle Forestry Research Area in its entirety. Access to the area is provided via a gated, gravel service road off Beach Drive, through River Pond (unit 3). Visitor traffic is not recorded for this area. Terrain is indicative of the original river channel bottomlands and generally flat and level. The only water course located in the area is the old river channel creek which is functionally a backwater of the Blue River and accounts for the 0.22 acres of freshwater forest/shrub wetland, as identified by the FWS.

Virtually all soils are silty loam and alluvial in nature - typical of a flood plain. Soils are deep (80+”), well drained, with low runoff potential due to minimal grades. Soils located in the old river channel are categorized as very fine and somewhat less well drained. Roughly $\frac{3}{4}$ of the area is used for forestry research projects and comprised of native timber stands of various age, shrub propagation fields, and wildlife foot plots. The remaining $\frac{1}{4}$ of the area is used for agricultural production related to a student farm.

Cultural resources surveys have not been conducted in this unit and are recommended by the HPMP due to vulnerability for disturbance and looting.

This area is designated for vegetative management in support of the authorized wildlife mission. There are no lands in this allocation that do not aid in the successful completion and operation of this authorized purpose. Improvements include:

- OPERATIONAL. None.
- RECREATION. None.
- FISH & WILDLIFE. The Forestry Area is exclusively dedicated to horticulture, forestry, natural resource, and wildlife related studies. Improved facilities in support of this use include:
 - STORAGE. A 1,200 sf pole barn provides storage and lab space. A shipping container is also located in the unit to house additional equipment and materials.
 - GREENHOUSES. Two greenhouse/hoop building support agricultural production and experiments.
 - FENCING. A perimeter fence was installed in 2003 to protect assets following repeated vandalism and theft. Public access to the area is permitted under coordination with the University.
 - WELL. A non-potable well is located near the student farm to meet water demands for crop production.
 - FOOD PLOTS. Numerous food plots benefiting wildlife are located throughout the unit

5) Resource Objectives:

(a) To provide a dedicated and secure site for long-term forestry research, extension, and improved tree seed production activities.

(b) To provide wildlife habitat and food supply to insure successful natural propagation of native species.

(c) To maintain project natural resources and public lands for future generations

6) Development Needs

None

7) Special Considerations

None

Unit 5 – East Dyer Road

1) Classification: MRM - Low-Density Recreation

2) Management Agency: Corps

3) Location/Acreage: This unit includes 27.9 acres and all property located east of Dyer Road in Pottawatomie County. The unit is bound by Dyer Road to the west and the project fee boundary to the north, south and east.

4) Description and Use: No vehicle access is provided to the area. Dyer Road provides the closest access for walk-in traffic. Visitor traffic is not recorded for this area. Terrain is upland with moderate hill slope. There are no water courses or wetlands identified in this unit. Disturbed areas include the Dyer Road right-of-way.

Approximately 90% of this unit is undisturbed upland hillslopes with shallow (5-30”), well drained, and erodible silty-clay soils with rocky breaks on side slopes. The remaining lower elevation colluvium soils (concentrated in the southernmost acreage) are somewhat deeper (80”) and remain well drained and erodible. Majority of the unit is a side slope dominated by warm season grasses interspersed with invading eastern redcedar, sumac and locust. Foot and back slopes are primarily first succession cedar/hardwood forest type. The grass stand and disturbed road right-of-way are extremely prone to primary succession (sumac, elm, dogwood, etc.) and invasive species.

Cultural resources surveys have not been conducted for this unit and are recommended by the Historic Properties Management Plan, but low in priority as the area remains largely undisturbed with established vegetative cover.

This area is designated for Low Density Recreation; providing open space between developments and land which, by virtue of use, is incompatible with recreation development and would detract from the quality of public use. There are no lands in this allocation that do not aid in the successful completion and operation of this authorized purpose. Improvements include:

- OPERATIONAL. Improvements include an overhead power line easement parallels Dyer Road and the western boundary of this unit.
- RECREATION. None
- FISH & WILDLIFE. None.

5) Resource Objectives:

(a) To maintain project natural resources and public lands for future generations.

6) Development Needs

(a) OFF-ROAD VEHICLE BARRIERS. Unauthorized vehicles degrade erodible soils, and promote trespass on/from adjacent private property. Install physical barrier (gate, rocks, tree row, etc.) to control unauthorized vehicle use entering the unit.

7) Special Considerations

(a) BLUE TOWNSHIP FIRE DEPARTMENT. Vegetative management activity on this unit has historically included prescribed burns conducted under volunteer agreement with Blue Township Fire Department (station located adjacent to northern property boundary), which uses the activity to meet wild land fire training requirements

Unit 6 - RC Airstrip

1) Classification: High Density Recreation

2) Management Agency: Riley County Fliers, Inc. and the Corps

3) Location/Acreage: This unit includes 17.8 acres of land located along the west bank of the spillway channel. The unit is bound by River Pond Road to the west, the downstream spillway overlook to the north, and the spillway channel to the south and east.

4) Description and Use: This unit includes a 4.40 acre lease to Riley County Fliers, Inc. (RCF) and surrounding lands managed by the Corps. Vehicle access to the leased facility is provided from a locked gate off River Pond Road. The remainder of the unit is limited to walk-in, non-motorized traffic. Visitor traffic is not recorded for this area. Terrain is upland consisting of a foot slope (1%) descending across the length of the unit. The eastern boundary consists of a sharp drop-off to the spillway channel below. There are no water courses or wetlands identified in this unit.

Some 60% of the unit is foot slope silty clay colluvium soils which are deep (80"), well drained, and erodible with rocky breaks along transition areas. The remaining moderate side slope soils are similar in character, but less deep (40"). Warm season grasses dominate the majority of the unit with invading patches of sumac, dogwood, and red cedar. The southernmost back slope transitions to a small, mature woodland of oak, hickory, and elm.

Cultural resources surveys have not been conducted for this unit and are not recommended as the area was heavily disturbed during original construction.

This area is designated for Recreation-intensive use; providing a developed area for intensive recreation activities by the visiting public consistent with the authorized recreation mission. There are no lands in this allocation that do not aid in the successful completion and operation of this authorized purpose. Improvements include:

- OPERATIONAL. None
- RECREATIONAL.
 - AIRFIELD. Since 1991 RCF has operated a radio controlled miniature flying field that is the sole improvement in the area. The field consists of

mowed airstrips, operator / pilot area with flight stations, a pit or maintenance area, and observation area with tables and bleachers. A small shed provides storage for maintenance equipment and materials. A 6,300 sf gravel lot accommodates parking.

- FISH & WILDLIFE. None.

5) Resource Objectives:

- (a) To maintain natural and recreational resources for future generations.
- (b) To provide facilities and access for remote operated aircraft and related recreational activities.

6) Development Needs:

- (a) None.

7) Special Considerations

(a) AIRFIELD OPERATION. RCF maintains membership to the Academy of Model Aeronautics and operates the facility according to Academy standards.

Unit 7 – Spillway Cycle Area PUA

- 1) Classification: High-Density Recreation
- 2) Management Agency: Corps
- 3) Location/Acreage: This unit includes 42.7 acres located along the length of the east downstream spillway channel bank. The Spillway Cycle Area (SCA) is bound by the channel to the west, K-13 highway and the project fee boundary to the north, and Dyer road and east dam stockpile area (unit 1d) to the east.
- 4) Description and Use: Access is provided off Dyer Road, a half mile south of K-13. A magnetic loop traffic counter records all ingress traffic. Terrain is mostly upland foot and side slopes. An ephemeral stream runs through the middle of the unit, surrounded by undulating gullies. The northern half of the unit is a long foot slope with a consistent 5% grade; with the exception of a 2 (two) acre leveled excavation site related to original construction. The southern half is a linear side slope (10% grade). There are no wetlands identified in the unit.

Over 75% of the unit is silty clay, weathered shale residuum soils which are moderate to shallow in depth, well drained and erodible. The remaining acreage is the excavated area with gravel-pit like soil. The northernmost area is a limestone glade with warm season grass stands interspersed with sumac, dogwood, and redcedar. Forest cover increases as one progresses southward to a climax oak/hickory forest type that dominates the entire southern half of the unit. Small patch of mowed grass turf surrounds the parking lot and entrance road.

Cultural resources surveys have not been conducted for this unit and are recommended by the HPMP, as the area is vulnerable for disturbance and looting.

This area is designated for Recreation-intensive use; providing a developed public use area (PUA) for intensive recreation activities by the visiting public consistent with the authorized recreation mission. There are no lands in this allocation that do not aid in the successful completion and operation of this authorized purpose. Improvements include:

- OPERATIONAL

- SERVICE ROADS. Two gated service roads (1,300 feet in length) are accessed through the parking lot and provide the sole vehicle access to the spillway apron and left channel wall.
- TRAINING DIKE. An 800 foot dike is located at the extreme southern end of the east unit boundary and aids in the channeling of spillway releases.

- RECREATION

- MOTORIZED TRAIL. The primary recreational improvement to this unit is a roughly 3.5-mile trail system open to motorized and non-motorized use. A 66" wheelbase restriction effectively limits motorized use to motorcycles and ATVs. This is an open-ride area (traffic not limited to trails) and the system is constantly evolving with rider preferences.
- PICNIC AREA. A few picnic tables are provided in a grassy, shaded area next to the parking lot.
- BULLETIN BOARD. A single panel bulletin board is provided adjacent to the parking lot.
- SANITARY FACILITIES. A single-user prefabricated concrete vault toilet provides the sole sanitary facility to the area, accompanied by a concrete paved ADA pathway.
- ROADS & PARKING. A 460 foot long, two-lane asphalt road provides public vehicle access to the parking lot / staging area. Asphalt paved, unlined parking spaces (most with parking bumpers) accommodate some 22 single (non-trailer) vehicles. A concrete loading ramp is also located in the parking lot. An entrance gate and cabled posts surrounding the road and lot perimeters maintains exclusive day use access.
- BOUNDARY FENCE. Off-road traffic is contained within the riding area by a two-mile long smooth-wire perimeter fence.

- FISH & WILDLIFE. None.

5) Resource Objectives

- (a) To maintain natural and recreational resources for future generations.
- (b) To provide day use facilities and services consistent with intensive visitor use patterns.
- (c) To provide small wheelbase off-road vehicle access

6) Development Needs

(a) PICNIC SITES. Install multiple delineated picnic sites inclusive of hardened pads and pathways to better define use areas and meet modern design and service standards

7) Special Considerations

(a) PERMITS & FEES. Permits and fees are applicable to SCA, consistent with established Corps Recreation Use Fee regulations. No permits or fees are currently approved for the area.

Unit 8 - Rowing Facility

1) Classification: High-Density Recreation

2) Management Agency: Kansas State University

3) Location/Acreage: This unit includes 29.1 acres located just upstream of the spillway on the eastern shoreline. The unit is bound by the lake to the west, fee boundary to the north, Marina Road to the east, and a draw to the south.

4) Description and Use: Access to the area is provided via a gated, gravel road off Marina Road, 750 feet west of K-13 highway. Visitor traffic is not recorded for this area. Terrain is primarily a hilltop running along the eastern edge of the unit with considerable slopes (20% grade) to the lake shore. An east-west draw intersects the southern portion of the area. The lakeshore is gradual in relief and predictably rocky with finer sediment and gravel bar deposits towards the northern edge of the unit. There are no watercourses or wetlands identified by FWS.

The upland hilltop is a shallow silty clay residuum soil which gives way to rocky outcrops along the hillside break. Lower elevations below the break consist of colluvium footslopes which are somewhat deeper, but similarly well drained and erodible. The hilltop is dominated by a vigorous tall grass prairie stand with minimal woody encroachment. Eastern red cedar dominates the hilltop south of the access road. Lower footslopes are of a climax oak/hickory forest type. Disturbed areas around the rowing facility exhibit first succession regrowth of dogwood, sumac and locust. The shoreline is rocky and exposed with no vegetation to an elevation of some 1130 feet (MSL).

Historical surveys have been conducted for this area and there is one inundated site located adjacent to the unit which is ineligible for NRHP. Additional surveys are recommended by the HPMP due to vulnerability for disturbance and looting.

This area is designated for Recreation-intensive use; providing a developed area for intensive recreation activities by the visiting public consistent with the authorized recreation mission. There are no lands in this allocation that do not aid in the successful completion and operation of this authorized purpose. Improvements include:

- OPERATIONAL. None
- RECREATION.

- ROWING FACILITY. A rowing facility consisting of a 5,400 sf team building with meeting and office space, kitchenette, and locker rooms, a 5,000 sf boat storage and maintenance building, courtesy docks accommodating up to 10 support vessels, a 275 sf floating team dock, and some 450 feet of concrete sidewalks and stairway.
- NO WAKE BUOY. A No-Wake buoy is authorized at the mouth of the cove (outside unit) to minimize wave action and resulting damage to moored equipment. The buoy is maintained by the University.
- UTILITIES. Facilities are connected to rural water and overhead electrical lines. Wastewater is managed by septic tanks. Gasoline and propane storage tanks are also located on site.
- ROADS & PARKING. A 2,600 foot, single lane gravel road provides access within the unit. A 30,000 sf unimproved storage yard is located on the hilltop, south of the access road. The primary parking area is a 12,000 sf gravel lot located on the hilltop.

- FISH & WILDLIFE

5) Resource Objectives

(a) To maintain natural and recreational resources for future generations.

(b) To provide rowing facilities and services consistent with intensive visitor use patterns.

6) Development Need

None.

7) Special Considerations

(a) EASEMENT WATER ACCESS. This unit is located in Elk's Cove. At conservation pool, the headwaters of the cove afford boat access from the adjoining easement lands to the north of the unit which can impact rowing facility operations. The Corps retains no authority for this activity beyond flowage easement rights.

(b) ADJACENT DEVELOPMENT. Heavy residential development on adjacent private lands surrounds the unit.

Unit 9 – Marina Road (9a) and Washington Heights (9b)

1) Classification: MRM — Wildlife Management (9a) and Low-Density Recreation (9b)

2) Management Agency: Corps

3) Location/Acreage: This unit contains two sub-units. Sub-unit 9a is 10.5 acres, located near the intersection of Spillway Marina Road and K-13. It is bound by Spillway Marina Road to the south and west, and fee boundary to the north and west. Sub-unit 9b is a triangular in shape with 33.4 acres located just north of Elk's Cove. It is bound by Elk's Cove to the south, the lake to the west, and fee boundary to the north.

4) Description and Use: No vehicle access is provided to the area. Agricultural equipment access is provided for 9a via a culvert ditch crossing off Spillway Marina Road, and walk-in access for 9b via Lakeside Avenue road through Prairie Crest subdivision. Terrain for 9a consists of a gradual backslope (6% grade). There is no lakeshore access from this sub-unit, nor are there any watercourses or wetlands identified by FWS. Terrain for 9b consists of a small hilltop which quickly transitions to a variable side slope of 15-40% grade. The lakeshore is gradual in relief to the southeast and very steep to the west. There are no watercourses or wetlands identified by FWS in this sub-unit.

9a is a shallow silty clay residuum soil with rockier soils along the southern hillside break. 9b upland hilltop is similar in character to 9a, with lower elevations below the break consisting of colluvium footslopes which are somewhat deeper, but similarly well drained and erodible. 9a is dominated by a vigorous warm season grass stand with minimal woody encroachment centered in the southern portion with sumac and dogwood. 9b is primarily first successional species of sumac, dogwood, locust, and redcedar along hillslopes with declining warm season grasses at higher elevations. The shoreline is rocky and exposed with no vegetation to an elevation of some 1130 feet (MSL).

Historical surveys have been conducted for this area and there are no sites identified in the unit. Additional surveys are recommended by the HPMP.

Sub-unit 9a is designated for Wildlife Management; providing lands for fish and wildlife habitat or for the propagation of such species, consistent with the authorized fish and wildlife management mission. Such lands are also available for low density recreation activities. There are no lands in this allocation that do not aid in the successful completion and operation of this authorized purpose. Sub-unit 9b is designated for low density recreation; providing open space between developments and land which, by virtue of use, is incompatible with recreation development and would detract from the quality of public use. Again, there are no lands in this allocation that do not aid in successful completion and operation of this authorized purpose. Improvements include:

- OPERATIONAL. None.
- RECREATION. None.
- FISH & WILDLIFE
 - AGRICULTURAL LEASE. An agricultural lease unit (LU4) consists of all acreage within 9a. Agricultural practice includes haying to maintain the native grass stand and improve vigor while supporting a variety of native wildlife.

5) Resource Objectives:

- (a) To manage project natural resources for the benefit of wildlife.
- (b) To maintain scenic qualities.
- (c) To provide the public with quality hunting opportunities.

6) Development Needs

(a) PRESCRIBED BURNING. Continue use of seasonal prescribed burns as land and vegetative management tool, with consideration for adjacent development.

7) Special Considerations:

(a) PUBLIC ROAD. PUBLIC ROAD. Land access is provided by Lakeside Avenue, maintained by the county to the point in which the fee boundary intersects the road termination.

(b) EASEMENT WATER ACCESS. Similar to unit 8, portions of the conservation pool intersect this unit and flow onto adjacent easement land at the Elk's Cove headwaters and a small, unnamed cove located below Washington Boulevard in the northern section of 9a (no public access).

(c) ADJACENT DEVELOPMENT. Heavy residential development on adjacent private lands surround this unit.

Unit 10 - Cedar Ridge PUA

1) Classification: High-Density Recreation

2) Management Agency: Kansas Department of Wildlife Parks & Tourism, Tuttle Creek State Park

3) Location/Acreage: This unit includes 152.6 acres located approximately one mile upstream of the dam on the eastern (Pottawatomie County) shoreline. Cedar Ridge is bound by the lake to the south, McIntyre Cove to the west, the second eastern inlet of McIntyre Cove to the north, and the fee boundary to the east.

4) Description and Use: Access to the developed southern half of the unit is provided via Spillway Marina Road, some two miles north of its intersection with K-13. Taylor's View Road is a short spur road off Spillway Marina and provides egress from the PUA. One magnetic loop traffic counter records all ingress traffic. The Dead End Road spur off Marina Road provides public access to the undeveloped northern half of the unit.

Terrain is primarily very steep upland hillslopes (50% grade) with less than a quarter of the unit constituted of narrow ridge tops. The unit is intersected by two gullies that merge to an inlet of McIntyre Cove. The lakeshore is dominated by towering limestone layers and rocky deposits left exposed by lake fluctuation, with pockets of somewhat less rocky sediments concentrated in the coves. There are no watercourses or wetlands identified by FWS.

Soils are typical of upland hillslopes along the eastern lakeshore: shallow silty clay residuum soils which are well drained and susceptible to erosion. The narrow ridge tops constitute less than a quarter of the unit, but soils are distinctive of the Flint hills region with shallow, highly erodible silt-clay residuum over calcareous shale. The southernmost boundary of the unit contains slightly deeper colluvium soils. Ridge tops are dominated by tall grass prairie with minimal encroachment of cedar and woody shrubs. Prairie transitions to mature oak-cedar forest along hillslopes and gullies. Vegetation is largely fragmented in the southern half of the unit, but large tracts of vigorous prairie define the northern half.

Historical surveys have been conducted for portions of this area and there is one site located in the unit which is potentially eligible for NRHP pending additional evaluation. Additional surveys are recommended by the HPMP due to vulnerability for disturbance and looting.

This area is designated for Recreation-intensive use; providing a developed area for intensive recreation activities by the visiting public consistent with the authorized recreation mission. There are no lands in this allocation that do not aid in the successful completion and operation of this authorized purpose. Improvements include:

- OPERATIONAL. The marina utilizes an approximately ½ acre parking lot for boat trailer storage.
- RECREATION. Cedar Ridge is a recreational complex offering overnight and day use facilities. Popular activities include boating, fishing, camping, hiking, and wildlife/bird watching.
 - SANITARY FACILITIES. Sanitation facilities include three vault toilets, one water-borne toilet with shower. Waste water is managed through a specially developed lateral field, accompanied by one lift station.
 - OVERNIGHT FACILITIES. The campground consists of 60 non-delineated, primitive campsites. Six group shelters (no utilities) accommodate small and large groups within the camping area. A handful of sites provide tables and fire rings, but the campground is otherwise undeveloped. In addition to campsites, four cabins provide kitchen, bath and living accommodations within the unit. Three self-pay stations facilitates registrations in addition to online reservations.
 - BOATING FACILITIES. Cedar Ridge is arguably the most popular facility for boating on the lake. One, three lane ramp offers access to Tuttle Creek Lake via McIntyre Cove, accompanied by a courtesy dock. A full-service marina is located adjacent to the ramp offering 81 wet slips (seasonal and transient), dry storage, gas, boat rentals, food, event space, and retail items. Both the ramp and marina are located in the inlet which is designated as no wake.
 - FISHING ACCESS. A cleaning station, added in 1998, is located above the boat ramp parking lot.
 - PLAYGROUND. A swing set is located near the cabins in 2010.
 - TRAILS. The Cedar Ridge Trail is a 0.7 mile, universal access, looping trail with a trailhead located above the boat ramp parking lot.
 - UTILITIES. Underground utilities within the unit include water, electric, and sewer lines. Overhead power lines (approximately a half mile in length)

remain and will be direct buried as facility improvements are made. A tornado siren incorporated into the county notification system was added in 2012 and is maintained by KDWPT.

- ROADS & PARKING. Interior park roads include 3.5 lane miles of asphalt paved road, and one lane mile of gravel road. Hardened parking can accommodate some 100 vehicles (50 trailered).
- CONSEQUENTIAL USE. Use patterns not accommodated by improved facilities include shoreline fishing, and hiking in the northern half of the unit.
- FISH & WILDLIFE. The area is burned as possible to minimize cedar invasion and maximize wildlife benefits of early successional forest. Native wildflowers are prolific, benefitting pollinators. A Monarch Butterfly way station was developed in 2015.

5) Resource Objectives:

- (a) To maintain natural and recreational resources for future generations
- (b) To provide for an intensive, structured opportunity through a concentration of park facilities that can withstand the impact of heavy visitor use
- (c) To provide overnight camping related facilities for transient and destination users and groups
- (d) To provide day use facilities
- (e) To provide boating and fishing access

6) Development Needs

- (a) BOAT RAMP RENOVATION. Expand and repave ramp. Enlarge and reconfigure parking area to accommodate additional boat trailers and improved traffic lanes. Add security lighting.
- (b) CAMPGROUND UTILITIES. Add electric, water, and sewer service to camping area inclusive of a dump station.
- (c) BREAKWATER. Construct breakwater for inlet to reduce wave action.
- (d) IMPROVEMENTS IN NORTH AREA. Construct additional overnight lodging facilities as visitation and demand require.
- (e) SWIM BEACH. Construct a designated swim beach.
- (f) FISHING ACCESS. Construct paths, piers, and/or docks to improve fishing access within Marina Cove.

7) Special Considerations:

(a) NAME CHANGE. Cedar Ridge was previously named Spillway. The name was changed in 2002 to reduce visitor confusion with other areas known as spillway.

(b) BUOYS. No wake buoys located in the inlet are maintained by KDWPT.

(c) NORTH AREA. Colloquially known as Gobbler's Knob this area is maintained as an undeveloped area for non-consumptive use.

(d) ADJACENT DEVELOPMENT. Heavy residential development on adjacent private lands surround this unit.

Unit 11 - McIntyre Creek

1) Classification: MRM: Wildlife Management

2) Management Agency: Corps

3) Location/Acreage: This unit contains three sub-units of land surrounding McIntyre Cove. Sub-unit 11a is 41.9 acres, located along the eastern shoreline of McIntyre Cove. Sub-unit 11b is 191.4 acres, constituting the land and headwaters north of the cove. And, sub-unit 11c is 189.5 acres, located along the western shoreline of the cove.

4) Description and Use: Primary access is a lone public roadway through sub-unit 11b via McIntyre Creek Road (maintained by Pottawatomie County). Agricultural equipment access to 11b is provided off McIntyre Road via multiple culvert ditch crossings. Sub-units 11a and 11c have no improved access and are land locked by terrain and private property. This unit is a narrow, flat valley incised by McIntyre Creek. The valley floor of sub-unit 11b is exposed bottomland that transitions to frequently inundated mudflats and heavily silted lakeshore. Sub-units 11a and 11c are comprised of sharp hillsides descending to the lake with the steepest grades (40%) concentrated in 11a. Lakeshore along these sub-units is rocky and exposed, with less rocky and heavier sediment deposits concentrated in small inlets and the cove headwaters. McIntyre Creek is the principle water course with four additional intermittent, unnamed tributaries. 18.52 acres of freshwater emergent and forest/shrub wetlands have been identified by FWS.

Upland soils are typical of residuum hillslopes along eastern lakeshore: shallow, rocky silty clay with sub layers of calcareous shale on ridge tops. Lowland alluvial soils concentrated in the headwaters and inlets are deep (up to 80+ inches) and well drained silty loam and silty clay loam. West facing hillslopes are heavily forested with mature oak-cedar due to absence of fire. Hilltops and east facing slopes are routinely burned and grazed, promoting vigorous stands of warm season grasses and minimal woody intrusion. Cultivable bottomlands are maintained in agricultural production benefitting wildlife with rotations primarily of sorghum/milo, corn, soybean, and wheat. Non-cultivable lands consist of bare soils and low-value mono forage (Rough Cocklebur, Velvetleaf, etc.) in the lowest elevations, to pockets of young deciduous woodlands in higher elevations.

Historical surveys have been conducted for portions of this area and there are five sites located in the unit, four of which are potentially eligible for NRHP pending additional

evaluation. Additional surveys are recommended by the HPMP due to vulnerability to erosion and other disturbance.

This unit is designated for Wildlife Management; providing lands for fish and wildlife habitat or for the propagation of such species, consistent with the authorized fish and wildlife management mission. Such lands are also available for low density recreation activities. There are no lands in this allocation that do not aid in the successful completion and operation of this authorized purpose. Improvements include:

- OPERATIONAL. None
- RECREATION. – LAND ACCESS POINT. The Corps of Engineers maintains 430 feet of single-lane gravel road and a 3,500 sf gravel parking area at the terminus of McIntyre Creek Road as a public land access (no improved shoreline access). Popular uses include shoreline fishing and vehicle access for hunting within the unit.
- FISH & WILDLIFE. - AGRICULTURAL LEASES. There are two agricultural lease units in this area. LU6, located in sub unit 11b, consists of 105 acres (55 beneficial) typically utilized for row crop production with negotiated set asides for wildlife benefits. LU8, located in sub unit 11c, consists of 148 acres (86 beneficial) typically utilized for grazing benefitting native grass management

5) Resource Objectives:

- (a) To manage project natural resources for the benefit of wildlife.
- (b) To maintain scenic qualities.
- (c) To provide the public with quality hunting and fishing opportunities.

6) Development Needs

(a) LAND ACCESS. Provide improvements to better define and control land access beyond McIntyre Road easement, not limited to: physical barriers, hardening of parking area, and information board/signs.

7) Special Considerations:

(a) CATTLE FENCE. In the 1960's Pottawatomie County Commission authorized a livestock gate/fence across McIntyre Creek Road on private property, some 3,000 feet prior to the road's intersection with the public land boundary. Although motorists may open and close the gate/fence and travel beyond; the barrier combined with frequent lack of signage is misleading and significantly impedes access on the public roadway and Corps lands beyond.

Unit 12 - Wildflower

1) Classification: MRM: Wildlife Management

2) Management Agency: Corps

3) Location/Acreage: This unit includes 166.2 acres located approximately two miles upstream of the dam on the eastern (Pottawatomie County) shoreline. The unit is bound by McIntyre Cove to the south, the lake to the west, Park Road in Carnahan Cove to the north (generally), and the fee boundary to the east.

4) Description and Use: This unit is essentially landlocked. Two private, single-lane dirt roads provide the only improved access. Park Road via Carnahan Park provides the closest public access, but only to the northernmost tip of the unit. This roughly three-mile long unit is a narrow band of land (averaging some 250 wide) comprised of steep hillsides which descend sharply (20-50% grades) to the lakeshore. A handful of unnamed, small, somewhat less steep coves and inlets intersect the band, but the overall unit's shape remains narrow. The Lakeshore is well defined, rocky, and exposed with less rocky sediment deposits concentrated in coves and inlets. Six watercourses narrowly intersect the unit and 4.08 acres of freshwater emergent wetlands have been identified by FWS (concentrated in small coves).

Upland soils are typical of residuum hillslopes along the eastern lakeshore: shallow, rocky silty clay with sub layers of calcareous shale on the highest ridge tops. Lowland alluvial soils are limited to the two largest coves (<25% of unit acreage) and comprised of deeper silty clay loams. Much of the upland components of this unit are regularly burned by adjacent landowners resulting in a vigorous bluestem prairie with virtually no woody encroachment. Remaining lower elevations are frequently inundated resulting in bare to poor quality vegetative cover. Woody intrusion is limited to isolated patches of sumac, dogwood, and red cedar.

Historical surveys have been conducted for portions of this area and there are no sites identified in the unit. Additional surveys are recommended by the HPMP due to the vulnerability for erosion and other disturbance.

This unit is designated for Wildlife Management; providing lands for fish and wildlife habitat or for the propagation of such species, consistent with the authorized fish and wildlife management mission. Such lands are also available for low density recreation activities. With the exception of the Living Waters Ranch lease, there are no lands in this allocation that do not aid in the successful completion and operation of this authorized purpose. Improvements include:

- OPERATIONAL. None.
- RECREATION. LIVING WATERS RANCH. Located just south of Carnahan Cove, 21.3 acres are leased by Living Waters Ranch for recreation. The acreage is prone to inundation and development is limited to a two-track trail. Activities are typical of low-density recreation, not limited to: shoreline access, hiking, horseback riding, and archery. Hunting is permitted.
- FISH & WILDLIFE. None

5) Resource Objectives:

- (a) To manage project natural resources for the benefit of wildlife.
- (b) To maintain scenic qualities.

- (c) To provide the public with quality hunting and fishing opportunities.
- (d) To provide unstructured recreation opportunity in a natural environment.

6) Development Needs:

- (a) None

7) Special Considerations

(a) DIAL COVE. The cove at the terminus of Wildflower Road has historically been called Dial Cove (39°17'59.32"N, 96°36'53.09"W).

Unit 13 - Carnahan Park PUA

1) Classification: High Density Recreation

2) Management Agency: Pottawatomie County

3) Location/Acreage: This unit includes 232.2 acres located at the headwaters of Carnahan Cove which is approximately two miles upstream from the dam on the eastern (Pottawatomie County) shoreline. Carnahan is bound by the lake to the south, mudflats to the west, Carnahan Creek to the north, and the fee boundary to the east.

4) Description and Use: Access is provided via Park Road (gravel), ¾ miles from its intersection with Carnahan Road (paved). One magnetic loop traffic counter records all ingress traffic. Two watercourses, Booth and Carnahan Creeks, merge to form the northern third of this unit, which is largely flat bottomland. A rounded hilltop ascends from the plain some 150-200 feet and comprises roughly half of the unit. The remaining acreage is a saddle bordering the western edge of the unit with minimal grades (2-3%). The lakeshore is isolated from the main lake by the approximately one-mile long Carnahan Cove. It is rocky and steep along the hillside to the west and transitions to less rocky debris and sediment deposits and gradual slopes along the saddle to the east. FWS has identified 17.57 acres of freshwater emergent wetlands, concentrated in bottomlands along the north and west unit boundaries.

Bottomland alluvial soils are generally a well-drained mix of deep silty and silty clay loams. Upper stream channels are rocky with streambeds being silt loam over fine sand, poorly drained, and somewhat shallow. Uplands are typical of the Flint hills region with shallow, highly erodible silt-clay residuum over calcareous shale. Carnahan contains one of the largest, contiguous tall grass prairie stands on the project. The hilltop and saddle is regularly burned/mowed resulting in vigorous warm season grasses with virtually no woody encroachment. The northern hillslopes are very steep and more difficult to manage with isolated stands of thick red cedar (75+% canopy) and other first-succession trees. Bottomlands to the north are frequently inundated and cover is low-value mono forage (cocklebur, velvetleaf, etc.).

Historical surveys have been conducted for portions of this area and there are five sites located in the unit, three of which are potentially eligible for NRHP pending additional evaluation. Additional surveys recommended by the HPMP due to vulnerability to disturbance and looting.

This unit is designated for Recreation-intensive use; providing a developed area for intensive recreation activities by the visiting public consistent with the authorized recreation mission. There are no lands in this allocation that do not aid in the successful completion and operation of this authorized purpose. Improvements include:

- OPERATIONAL. None
- RECREATION. Carnahan Park has historically received low use, primarily due to its remote location. Facilities are primitive, minimally developed, and isolated. Popular activities for this area include shoreline fishing, small craft boating, hiking and equestrian trail riding, and primitive camping.
 - SANITARY FACILITIES. Sanitation facilities include two, nearly 50 year old, stick-built vault toilets and one older concrete block vault toilet. Waste is managed via pump-out service.
 - OVERNIGHT FACILITIES. Six campsites are designated by rock fire rings and tables, but otherwise undeveloped. No fees are charged for camping in this area.
 - BOATING FACILITIES. One, single lane, paved ramp provides access to the shallow headwaters of Carnahan Cove. Boating from Carnahan is limited to small craft and heavily influenced by lake fluctuation.
 - TRAILS. Five miles of trail are located within the park. The system consists of legacy park roads and two flagged/blazed, concentric loop trails with no defined or improved trailheads. Trails are open to all non-motorized use including (and primarily) horses. Trails are maintained by cooperative agreement with the Kansas Trail Council. An old northbound spur trail connects the Carnahan system to the Garrison system (unit 16, via units 14 and 15), but is impassible due to erosion and largely abandoned.
 - SHELTERS. A 50+ year old metal picnic shelter measuring 20'x 36' accompanied by trash cans and fire ring provides group space for picnics and camping.
 - UTILITIES. There are no utilities within Carnahan Park.
 - ROADS & PARKING. Interior park roads include 1.5 miles of gravel road and 0.2 miles of paved road (less than half regularly maintained). Hardened parking can accommodate some 45 vehicles.
 - CONSEQUENTIAL USE. Use patterns not accommodated by improved facilities include substantial shoreline fishing
- FISH & WILDLIFE. None.

5) Resource Objectives:

- (a) To maintain natural and recreational resources for future generations

(b) To provide for an intensive, structured opportunity through a concentration of park facilities that can withstand the impact of heavy visitor use.

(c) To provide overnight camping related facilities for transient and destination users and groups

(d) To provide day use facilities

(e) To provide boating and fishing access

6) Development Needs

(a) None.

7) Special Considerations

(a) HISTORICAL MANAGEMENT. The Corps of Engineers managed Carnahan Park until the early 1980's when the park was scheduled for closure, consistent with agency-wide efforts to consolidate facilities and costs into higher performing parks. At that time Pottawatomie County expressed interest in leasing the park in order to maintain access for country residents. The county has managed the park under a recreational leases since 1984.

(b) LEGACY FACILITIES. Like many parks, Carnahan has facilities that are no longer usable due to siltation and disuse. This includes a boat ramp further upstream along the Carnahan Creek, and a capped well east of the current ramp. The through road between the two boat ramps was closed to vehicles in 2018 as the result of lakeshore erosion.

(c) CEMETARY. The Garrison-Carnahan Cemetery and associated church are located on adjacent private property near the park entrance. Graves originally located at the Garrison cemetery (near southern end of unit 17) were relocated to this cemetery as the result of Dam construction and lake inundation.

Unit 14 - Carnahan Creek

1) Classification: MRM – Low Density Recreation

2) Management Agency: Corps

3) Location/Acreage: This unit contains 165.8 acres of land along Carnahan Creek, located upstream of its confluence with the lake. It is bound by the fee boundary to the west, north, and east, and Carnahan Creek to the south.

4) Description and Use: Improved access is limited to agricultural equipment via a locked gate at the terminus of Larkspur Road, a quarter mile from the intersection with Park Road. This unit is comprised of bottomland surrounding the rocky creek bed channels of Carnahan and Booth Creeks, which then transition to frequently inundated mudflats and the heavily silted lakeshore at the headwaters of Carnahan Cove. Carnahan and Booth Creeks are the sole water courses. The lower area (some 84 acres) is largely identified by the FWS as freshwater emergent and forest/shrub wetlands.

Some 90% of the unit is bottomland silty clay to silty clay loam, deep, alluvial soils which are moderately well drained. The few rocky outcrops reflect somewhat less deep, highly erodible colluvium soils. Roughly 2/3 of the area is low-value, mono forage (cocklebur). The northernmost 1/3 is cultivable bottomlands maintained in hay and agricultural production benefitting wildlife with rotations of corn, soybean, wheat, and sorghum/milo. Timber is limited to steep stream banks and fencerows of hedge, oak, and willow.

Historical surveys have been conducted for portions of this area and there is one site located in the unit, which is inundated and inaccessible. Additional surveys are recommended by the HPMP due to vulnerability to erosion and other disturbance.

This area is designated Wildlife Management; providing lands for fish and wildlife habitat or for the propagation of such species, consistent with the authorized fish and wildlife management mission. Such lands are also available for low density recreation activities. There are no lands in this allocation that do not aid in the successful completion and operation of this authorized purpose. Improvements include

- OPERATIONAL. None.
- RECREATION.
 - CARNAHAN PARK. This park was slated for closure in 1982 due to low usage and sedimentation of the original boat ramp area. 246.69 acres were subsequently leased to Pottawatomie County for recreational use. Facilities include an improved boat ramp, picnic shelter, vault toilets, 1.77 miles of asphalt paved and gravel roads, and parking areas. Camping is authorized at a handful of nominally improved campsites. No utilities are available within the park.
 - TRAILS. Five to Eight miles of trail exist within the unit and are open to non-motorized use (including horses). Trails are maintained and marked through a cooperative agreement with the Kansas Trails Council.
- FISH & WILDLIFE
 - AGRICULTURAL LEASE. There is one agricultural lease unit in this area. LU11, consists of 58 acres (24 beneficial) typically utilized for row crop production (20 acres) and hay (4 acres) with negotiated set asides for wildlife.

5) Resource Objectives:

- (a) To manage project natural resources for the benefit of wildlife
- (b) To maintain scenic qualities.
- (c) To provide the public with quality hunting and fishing opportunities

6) Development Needs

(a) TRAIL SYSTEM. Continue to maintain and improve trail system. Seek opportunities to re-establish an east lakeshore trail system connecting Carnahan, Garrison, Randolph, and other use areas.

7) Special Considerations

(a) LEGACY FACILITIES. An old boat ramp is located on the west side of the park and is no longer accessible due to siltation. Four vault toilets and a hydrant were removed following vandalism and disuse. Several park roads are no longer accessible due to erosion and disrepair.

Unit 15 - Dry Creek

1) Classification: MRM - Wildlife Management

2) Management Agency: Corps

3) Location/Acreage: This unit includes 233.9 acres located approximately four to eight miles upstream of the dam on the eastern (Pottawatomie County) shoreline. The unit is bound by Carnahan Cove to the south, the lake to the west, Broken Arrow Ranch to the north, and the fee boundary to the east.

4) Description and Use: This unit is largely landlocked, but accessible at two points: Red Cedar Road (gravel), $\frac{3}{4}$ miles from its intersection with Dry Creek Road (gravel), and South Haven via Blue Mesa Roads (gravel), one mile from their intersection with Dry Creek Road (gravel). The southern $\frac{1}{3}$ of the unit has no vehicular access. This nearly five-mile long unit is a narrow band of land (averaging some 350 feet wide) comprised of steep hillsides which descent sharply (20-50% grades) to the lakeshore. A handful of small, somewhat less steep coves and inlets intersect the band, but the overall shape of the unit remains narrow. Two coves are named: Sunset Cove at the terminus of Red Cedar Road, and Oak Canyon at the terminus of South Haven via Blue Mesa roads. Four watercourses narrowly intersect the unit and 1.37 acres of freshwater emergent wetlands have been identified by FWS (concentrated in small coves).

Upland soils are typical of residuum hillslopes along the eastern lakeshore: shallow, rocky silty clay with sub layers of calcareous shale on the highest ridge tops. Lowland alluvial soils are limited to a few coves (<10% of unit acreage) and comprised of deeper silty clay loams. Shape and access limit prairie management activities and the area has largely become forested with thick stands of well-established cedar interspersed amongst mature tree-shrub communities of oak, elm, and hackberry. Lowland areas susceptible to lake inundation are bare to poor quality vegetative cover.

Historical surveys have been conducted for portions of this area and their two sites located in the unit, neither are eligible for NRHP listing. Additional surveys are recommended by the HPMP due to vulnerability to erosion and other disturbance.

This unit is designated for Wildlife Management; providing lands for fish and wildlife habitat or for the propagation of such species, consistent with authorized fish and wildlife management missions. Such lands are also available for low density recreation activities. With the exceptions of the Oak Canyon lease, there are no lands in this

allocation that do not aid in the successful completion and operation of this authorized purpose. Improvements include:

- OPERATIONAL. None.
- RECREATION.
 - SUNSET COVE. Sunset Cove is a named cove located six miles upstream from the dam. A road, boat ramp, and parking area were authorized by permit to a developer during original construction. The adjacent lands remain largely undeveloped. An adjacent landowner has assumed operation and maintenance of the public access under a recreational lease since 1986. Sedimentation and disrepair has rendered the ramp unusable and the area now serves as a public shoreline access point with minimal use due to the remote location (7 miles from nearest paved road).
 - OAK CANYON. Oak Canyon is a small isolated, but developed subdivision located adjacent to public property 7.5 miles upstream from the dam. Since 1984, residents have leased some two acres of the lands adjoining a small cove for recreation. Improvements include gravel roads, a single-lane paved boat ramp (open to public), and security pole light. A dock zone located in the cove is one of three remaining active and accessible dock zones on the lake. Four private docks are authorized by shoreline permits within the zone. Oak Canyon residents have dredged the cove twice to maintain access.
- FISH & WILDLIFE. None

5) Resource Objectives:

- (a) To manage project natural resources for the benefit of wildlife.
- (b) To maintain scenic qualities.
- (c) To provide the public with quality hunting and fishing opportunities.
- (d) To provide unstructured recreation opportunity in a natural environment.

6) Development Needs

(a) TRAIL SYSTEM. Seek opportunities to re-establish an east lakeshore trail system connecting Carnahan, Garrison, Randolph and other use areas.

7) Special Considerations

(a) TRAILS. Legacy trails once traversed this unit, connecting Carnahan and Garrison areas, but have largely been lost to shoreline erosion.

Unit 16 - Garrison

1) Classification: MRM - Wildlife Management

2) Management Agency: Kansas-Nebraska Seventh Day Adventists; Corps

3) Location/Acreage: This unit includes 234.4 acres located some nine miles upstream of the dam on the eastern (Pottawatomie County) shoreline. The unit is generally bound by the first creek to the south of Broken Arrow Ranch, the lake to the west, Dry Creek to the north, and the fee boundary to the east.

4) Description and Use: This unit exclusively includes the Kansas-Nebraska Seventh Day Adventists lease in its entirety. This unit is accessed by Round Up via Sagebrush Roads, 2.5 miles from their intersection with Dry Creek Road. The nearest paved road is a five mile drive away. Terrain consists of a wide, flat lakeshore that steeply ascends 150 feet to narrow ridge tops dominating the northwest portion of the unit. Unlike the rocky or muddy silt lakeshores elsewhere on the lake; the majority of the unit's shore is a unique natural sand beach. The shoreline to the north becomes rockier before transitioning to a cove with more typical fine sediment deposits. Three watercourses intersect the area (Dry Creek and two unnamed) with 8.17 acres of freshwater emergent wetlands identified by FWS.

Upland soils are typical; shallow silty clay residuum soils which are well drained and susceptible to erosion. Ridge tops are unsurprisingly less shallow than colluvium deposits on foot slopes. Alluvial soils are limited to small coves and somewhat deeper. The natural beach which dominates the majority of the unique lakefront shoreline is a wide, exposed sand layer. Upland slopes are dominated by thick stands of cedar which continue to encroach on the remaining patches of warm season grasses along the highest ridge top. A handful of landscape ponderosa and white pine denote the long-closed Garrison Park. Some 40 acres of cultivable lowlands are maintained in hay production benefitting wildlife. The remaining acreage is communities of ragweed, buttonbush, and similar forbs intersected by locust and hedge fence lines.

Historical surveys have been conducted for portions of this area and there are nine sites located in the unit, eight of which are potentially eligible for NRHP pending additional evaluation. Addition surveys are recommended by the HPMP due to vulnerability to erosion and other disturbance.

This area is designated for Wildlife Management; providing lands for fish and wildlife habitat or for the propagation of such species, consistent with the authorized fish and wildlife management mission. Such lands are also available for low density recreation activities. There are no lands in this allocation that do not aid in the successful completion and operation of this authorized purpose. Improvements include:

- OPERATIONAL. None
- RECREATION.
 - OLD GARRISON PARK. Remaining, semi-serviceable improved facilities include one mile of asphalt paved road in poor to failed condition, and 23,000 sf of asphalt paved parking areas (primarily old boat ramp parking lot) in very poor to failed condition. All other associated facilities have been raised, relocated, or rendered unusable due to siltation.
 - GARRISON BEACH / BROKEN ARROW ACCESS. A half mile of dirt two-track trails provide access to the beach from Round Up Road and Broken

Arrow Ranch. Licensed vehicles are authorized on these two-tracks, but maintenance is virtually none existent, limiting traffic to 4-wheel drive vehicles. Parking and staging areas are unhardened, not delineated, and generally inadequate.

- TRAILS. Some two miles of legacy trail exist within the old park area, open to non-motorized use (primarily horses). Trails are infrequently used/maintained and nominally marked.
- FISH & WILDLIFE. Some 40 acres are maintained in hay production to improve vigor of warm season grasses, prevent encroachment of wood species, and provide wildlife forage benefits.

5) Resource Objectives:

(a) To manage project natural resources for the benefit of wildlife and public lands for future generations.

(b) To maintain scenic qualities.

(c) To provide the public with quality hunting opportunities

6) Development Needs

(a) LAND ACCESS POINT. Improve roads, trails, and/or parking to provide managed lakeshore (natural beach) access consistent with environmental stewardship goals.

(b) RESTORATION OF LEGACY FACILITIES. Remove old, disused park facilities and restore area to native prairie.

(c) TRAIL SYSTEM. Continue to maintain and improve trail system. Seek opportunities to re-establish an east lakeshore trail system connecting Carnahan, Garrison, Randolph, and other use areas.

7) Special Considerations

(a) NATURAL BEACH. An approximately seven-acre natural sand beach dominates 4,500 linear feet of lakeshore. The gently slopped lake bottom combined with the beach is ideal for shoreline day use and attracts significant summer crowds. Due to its remote location and intensive summer use, Title 36 violations are common and typically include littering, ground fires, off-road vehicles, and disruptive/disorderly use. Previous efforts to control vehicle access have proven unsuccessful at best and encourage further resource damage at worst. Effective control will require extensive barriers and/or costly road improvements.

(b) OLD GARRISON PARK. This park was closed in 1980 due to low usage and sedimentation of the boat ramp. 192.4 acres of the park proper were subsequently leased to the Kansas-Nebraska Association of Seventh Day Adventists for quasi-public recreational use in conjunction with the Broken Arrow Ranch. Recreation activities are generally low-intensity consisting of shoreline access, equestrian trail riding and hiking. Hay production of old lease unit 17 (LU17) is authorized by the lease.

Unit 17 - Warpole

1) Classification: MRM – Wildlife Management

2) Management Agency: Corps

3) Location/Acreage: This unit includes 244.1 acres located approximately nine to 13 miles upstream of the dam on the eastern (Pottawatomie County) shoreline. The unit is bound by Dry Creek to the south, the lake to the west, Randolph Park to the north, and the fee boundary to the east.

4) Description and Use: This unit is landlocked with no public roadway access. Vehicle and equipment access must be negotiated with adjacent landowners via private field trails from the terminus of Warpole, Wyandot, and Turkey Run Roads. This nearly four-mile-long unit is primarily a narrow band of land, some 60-1,500 feet wide, anchored by two small coves; Garrison to the south and an unnamed cove to the north. Terrain is comprised of rock outcrop cliffs to south, and a relatively wide, flat (5% grade) floodplain to the north. The two coves area characteristically steep (20-30% grade) sided gullies descending to the lake shore. Six watercourses narrowly intersect the unit. 27.82 acres of emergent and forest/shrub wetlands have been identified by FWS (concentrated in coves).

Upland soils are typical of residuum hillslopes along the eastern lakeshore: shallow, rocky silty clay with sub layers of calcareous shale on the highest ridge tops. Lowland alluvial soils are limited to the coves and floodplain towards the north (roughly 25% of unit) and comprised of deeper silty clay and fine sand loams. The narrowest portions of this unit are all but exposed rock. Bottomlands in the coves are dominated by low value mono-forage (cocklebur, velvetleaf, etc.) with woodland edges of brushy willow, elm and dogwood transitioning to pockets of mature cedar stands on the highest slopes. The wide floodplain provides some 30 acres of warm season grass that is routinely hayed.

Historical surveys have been conducted for portions of this area and there are three sites located in the unit, two of which are eligible for NRHP pending additional evaluation. Additional surveys are recommended by the HPMP due to vulnerability to erosion and other disturbance.

This unit is designated for Wildlife Management; providing lands for fish and wildlife habitat or for the propagation of such species, consistent with authorized fish and wildlife management missions. There are no lands in this allocation that do not aid in the successful completion and operation of this authorized purpose. Improvements include:

- OPERATIONAL. None.
- RECREATION. None.
- FISH & WILDLIFE
 - AGRICULTURAL LEASE. There is are two agricultural lease unit in the area. LU20 and LU21B, consisting of 115 acres (65 beneficial) used for hay production and grazing as prairie management tools benefitting wildlife.

5) Resource Objectives:

- (a) To manage project natural resources for the benefit of wildlife.
- (b) To maintain scenic qualities.
- (c) To provide the public with quality hunting and fishing opportunities
- (d) To provide unstructured recreation opportunities in a natural environment.

6) Development Needs

(a) TRAIL SYSTEM. Seek opportunities to re-establish an east lakeshore trail system connecting Carnahan, Garrison, Randolph and other use areas.

7) Special Considerations

(a) TRAILS. Legacy trails once traversed this unit, connecting Randolph to Garrison Park areas, but have largely been lost to shoreline erosion.

Unit 18 - Randolph PUA

1) Classification: High Density Recreation

2) Management Agency: Kansas Department of Wildlife Park & Tourism, Tuttle Creek State Park

3) Location/Acreage: This unit includes 200.6 acres located approximately 14 miles upstream from the dam on the eastern (Pottawatomie County) shoreline off Kansas Highway 16. Randolph is bound by the first creek south of K-16 to the south, the lake to the west, the first creek north of K-16 to the north, and the fee boundary to the east.

4) Description and Use Highway K-16 bisects this unit into two areas: Randolph North and Randolph South. Each area is immediately accessed from K-16 via Randolph Park Road. One magnetic loop traffic counter records traffic for the more developed south area. Gullies and the lakeshore define the very steep upland hillslopes (25-40% grade) and comprise the majority of the terrain. Facilities are concentrated on the flat ridge tops constituting approximately 25% of the total area. The lakeshore is rocky and exposed with virtually no access from the ridge tops above. Two unnamed water courses define the northern and southern boundaries, and less than one acre of freshwater emergent wetlands are identified by FWS within the unit.

Soils are typical of upland hillslopes along the eastern lakeshore: shallow silty clay residuum soils which are well drained and susceptible to erosion. The ridge tops are distinctive of the Flint hills region with shallow, highly erodible silt-clay residuum over calcareous shale. The northern and southernmost boundaries of the unit contain slightly deeper colluvium and alluvium soils. Ridge tops are dominated by tall grass prairie with occasional shade plantings, and has minimal encroachment of cedar and woody shrubs. Prairie transitions to mature oak-cedar forest along hillslopes and gullies.

Historical surveys have been conducted for portions of this area and there are four sites located in the unit, one of which is potentially eligible for NRHP pending additional

evaluation. Additional surveys are recommended by the HPMP due to vulnerability for disturbance and looting.

This area is designated for Recreation-intensive use; providing a developed area for intensive recreation activities by the visiting public consistent with the authorized recreation mission. There are no lands in this allocation that do not aid in the successful completion and operation of this authorized purpose. Improvements include:

- OPERATIONAL. None.
- RECREATION. Randolph is a developed park offering overnight and day use facilities. Popular activities include camping, hiking, horseback riding, and wildlife/bird watching. Current facilities do not accommodate water-based recreation at conservation pool.
 - SANITARY FACILITIES. Sanitation facilities are exclusively located in South Randolph and include one vault toilet, one waterborne shower house, and a dump station. Waste water is managed by lateral fields and pump-out services.
 - OVERNIGHT FACILITIES. The campground consists of 16 water and electric campsites, four water/electric/sewer campsites, and an additional 50 non-delineated, primitive sites. Four picnic shelters accommodate small and large groups within the unit. Two self-pay stations facilitate registrations in addition to online reservations.
 - EQUESTRIAN USE. The South Randolph campground provides amenities to accommodate equestrian use in the area including horse pens, wash racks, and manure dump.
 - TRAILS. A 14.75-mile system of well-maintained and marked trails is located within the unit. Trails are open to all non-motorized used, and primarily used for horseback riding. Trails are maintained under cooperative agreement with the Kansas Trails Council.
 - UTILITIES. Underground utilities within the unit include water, electric, and sewer lines. One overhead power line exists within the unit. A tornado siren incorporated into the county notification system was added in 2012 and is maintained by KDWPT.
 - ROADS & PARKING. Interior park roads include 1.37 lane miles of asphalt paved roads, and 0.76 lane mile of gravel/dirt road. Hardened parking can accommodate some 60 vehicles (20 trailered).
- FISH & WILDLIFE. None

5) Resource Objectives:

(a) To maintain natural and recreational resources for future generations

(b) To provide for an intensive, structured opportunity through a concentration of park facilities that can withstand the impact of heavy visitor use.

(c) To provide overnight camping related facilities for transient and destination users and groups.

(d) To provide day use facilities.

(e) To provide boating and fishing access.

6) Development Needs

(a) TRAIL EXPANSION. Expand multiple-use trail system and associated amenities. Seek opportunities to re-establish an east lakeshore trail system connecting Carnahan, Garrison, Randolph and other use areas.

(b) RENOVATE CAMPSITES. Renovate and add additional campsites to accommodate modern campers inclusive of green space, living and camping pads, and utility hookups. Incorporate additional horse-friendly features into park.

(c) DEMOLITION / REPURPOSE LEGACY STRUCTURES. Remove old shower house and remediate site. Renovate and repurpose old water plant. Renovate boat ramp parking lot to facilitate high water use patterns.

7) Special Considerations

(a) LEGACY FACILITIES. Visitation has greatly decreased since original construction due to sedimentation. A shower house and water plant, located in Randolph North, stand vacant following the loss of a water intake structure. Likewise siltation has rendered the boat ramp, also located in Randolph North, unusable except for small craft during high water events; where access nevertheless remains frequently limited by accumulated flood debris. The associated parking lot has, in turn, largely been abandoned.

Unit 19 – Wildlife Area

1) Classification: MRM – Wildlife Management

2) Management Agency: Kansas Department of Wildlife & Parks, Tuttle Creek Wildlife Area

3) Location/Acreage: This unit includes 17,543.4 acres and virtually all public lands located north of Kansas Highway 16. The unit encompasses land surrounding the Big Blue River (main stem of lake) for some 40 river miles upstream of K-16, Fancy Creek some six miles upstream from its confluence with the Big Blue River, and the Black Vermillion River some seven miles upstream from its confluence with the Big Blue River. Lands are located in Riley, Pottawatomie, and Marshall Counties

4) Description and Use: This unit exclusively includes the Tuttle Creek Wildlife Area in its entirety. State and county roads (paved and unpaved) provide access to and throughout the area. Additional field trails, parking areas, and similar access are provided and maintained by KDWPT. Visitor traffic is not recorded for this unit, but hunting activity is monitored via an electronic self-reporting system. This unit is located in the northernmost edge of the Flint hills physiographic province as it transitions to the

central dissected till plain. Generally speaking, south of the confluence of the Big Blue and Black Vermillion Rivers, the terrain remains steep to undulating. North of the confluence the terrain transitions to moderate, rolling hillsides. Sediment has largely filled the multipurpose pool north of K-16 and lowlands are relatively flat, wide floodplains that are frequently inundated (especially points south of Shannon Creek). Principle watercourses include the Big Blue and Black Vermillion Rivers, and Fancy Creek. An additional 11 smaller, named creeks are also located within the unit. Freshwater emergent and forest/shrub wetlands and riparian zones are extensively identified throughout the unit by FWS.

Soils are distinct between the southern (Flint hills) and northern (till plain) portions of the unit. South of the Big Blue and Black Vermillion confluence, soils are generally similar to the rest of the project area; shallow silty clay residuum soils on upland hillslopes, with somewhat deeper colluvium and alluvial deposits from weathered shale on lowlands. North of the confluence mollisols are glacial till and loess in origin and much deeper. Glacial erratic fragments of Sioux Quartzite originating from South Dakota and Minnesota are common north of the Marshall County line. Due to the frequency of flooding, most of the area below 1100 foot elevation that is not farmed is a mix of upland and moist soil species. This constitutes about 80% of the unit. Areas between cultivable fields are left to provide various types of cover and travel corridors for wildlife. Sedges and cool season grasses tend to make up the grass component in these areas while Giant Ragweed, Common Sunflower, Perennial Smartweed, and Curly Dock make up the bulk of the broadleaf species. Cottonwood, Willow, Mulberry, and Honey Locust are quick to establish in these areas due to the lack of fine fuel that would make controlled burning a viable tool. The remaining 20% of the unit above 1100 foot elevation is composed of patches of unbroken Tall grass Prairie dominated by Bluestems and a variety of warm season forbs. The higher elevations have allowed for mature oak forest in a few places. Noxious weeds (sericea lespideza, johnson grass, and musk thistle) are found throughout the unit and managed through cultural and chemical means. Nuisance and invasive species not currently listed as noxious, but actively controlled include Japanese Hops, Common Cocklebur, Tree of Heaven, Multiflora Rose, Trumpet Vine, and Crown Vetch. The control of invasive tree species (Mulberry, Honey Locust, Green Ash, Siberian Elm, and Hackberry) are also managed to promote the vigor of grasses and forbs outside of riparian areas. Cottonwood, Willow, Silver Maple, and Mulberry are well established in riparian corridors.

Historic surveys have only been conducted for a small portion of this area and additional surveys are recommended by the HPMP due to vulnerability to erosion and other disturbance. There are over 80 sites located in the unit; seven are historic properties (one listed in the national register), and 36 are eligible for NRHP pending additional evaluation.

This unit is designated for Wildlife Management; providing lands for fish and wildlife habitat or for the propagation of such species, consistent with authorized fish and wildlife management missions. There are no lands in this allocation that do not aid in the successful completion and operation of this authorized purpose. Improvements include:

- OPERATIONAL. A one-acre storage barn and compound is located near the corner of 12th and Zenith Roads, in support of wildlife area management.
- RECREATION.
 - BOAT RAMPS. Boat ramps are located at Swede and Timber Creek (Red Bud) accesses. Launches are single-lane, concrete ramps offering small craft access to the river. A gravel parking lot at each ramp accommodates a small number of vehicles.
- FISH & WILDLIFE
 - MARSHES. Just over 1579 acres of marshlands (287 acres pumpable, 1292 acres backwater) are managed for waterfowl.
 - FOOD PLOTS. KDWPT maintains 151.8 acres of food plots benefitting wildlife.
 - AGRICULTURAL LEASING. There are 23 agricultural leases in the unit totaling 2918.03 acres. Authorized activities include crop (2,918.03 acres), and 92 acres authorized for grazing (lease administered by the Corps). Benefits include thermal and visual cover provided by crops left for wildlife in the field, and food either in the form of waste grain or from the crops left standing. Agricultural leases are also the most effective way to control succession and keep the large areas from being dominated by invasive tree species. For the last three years the Department has been planting more cover crops for the benefits to the soil, weed suppression, while providing more wildlife food and cover opportunities.

5) Resource Objectives:

- (a) To manage project natural resources for the benefit of wildlife.
- (b) To maintain scenic qualities.
- (c) To provide the public with quality hunting and fishing opportunities
- (d) To provide unstructured recreation opportunities in a natural environment.

6) Development Needs

- (a) MARSH RENOVATIONS. Renovate existing marshes to improve control structures (to include electric utility), seasonal inundation, and vegetation.
- (b) MARSH EXPANSION. Construct additional and expand existing marshes to meet growing demands. Seek opportunity to improve youth and disabled hunter access to marshland.
- (c) ACCESS. Establish additional roads/trails, parking, barriers, and signage to improve and control public access. Construct additional boat ramps as terrain and river channel allow to include new ramp for eventual cut-off (ox-bow) of Timber Creek/Red Bud boat ramp.

(d) STORAGE. Provide additional, secured storage locations throughout unit to meet modern operational needs.

7) Special Considerations. None.

Unit 20 – Blue Rapids Levee

1) Classification: Project Operations

2) Management Agency: Corps

3) Location/Acreage: This 55.6-acre unit is located along the northern city limits of Blue Rapids, Kansas. The unit is bound by the city limits to the south, and the levee to the north, east, and west.

4) Description and Use. Primary access to the unit is provided via a locked gate at the terminus of Park Street, approximately 1/3 miles north of U.S. Highway 77. Additional access is also available near the intersection of First and Lincoln Streets. The levee is 47 feet high, 4,500 feet long, 400-480 feet wide, with a 1:2.5 slope, and a 10-foot wide crown. An unnamed watercourse runs through a gated channel at approximately the mid-point of the levee. 5.97 acres of freshwater emergent wetlands are identified by FWS.

100% of soils in this unit are human-altered and human-transported. Vegetation exclusively consists of mowed grass sod armoring.

Surveys have not been conducted for this unit and there are no sites identified in the HPMP. Surveys are not recommended as the area was heavily disturbed during original construction.

This area is designated for Project Operations; providing safe, efficient operation of the project consistent with authorized flood damage reduction, water supply, and water quality missions. Recreation, and fish and wildlife activities are permitted on an interim basis when not in conflict with authorized purposes. There are no lands in this allocation which do not aid in the successful operation of authorized purposes Improvements include:

- OPERATIONAL. The levee, inclusive of berms, pumping plant, relief wells, and drainage structure.
- RECREATION. None. Visitors are permitted to walk the crown and do so on a frequent basis.
- FISH & WILDLIFE. Hunting and fishing access (walk-in) to the wildlife management area north of the levee is popular and has necessitated a need for access. A parking area and access point at the west end of the dam has been developed with KDWPT and is planned for implementation within the next 5 years.

5) Resource Objectives:

(a) To provide land for the administration of facilities and operational structures.

(b) To assure that authorized project purposes will be met and to insure public safety. The level is necessary for city of Blue Rapids flood risk management.

(c) To insure surveillance and safe operation of the flood control structures.

6) Development Needs

(a) TRAIL. Improve visitor control measures to mitigate impacts to operational structures as needed. Consider integration of crown path/road into any proposed trail systems

7) Special Considerations

(a) OPERATION & MAINTENANCE (O&M) MANUAL. O&M activities and needs specific to operational structures are directed, in detail, in the O&M Manual.

(b) ADJACENT DEVELOPMENT. Heavy residential development on adjacent private lands surround this unit.

Unit 21 - Fancy Creek PUA

1) Classification: High Density Recreation

2) Management Agency: Kansas Department of Wildlife Parks & Tourism, Tuttle Creek State Park

3) Location/Acreage: This unit includes 394.1 acres located 14 miles upstream from the dam on the western (Riley County) shoreline, directly north of Highway 16. Fancy Creek is bound by Highway 16 to the south, the project fee boundary to the west, Fancy Creek to the north, and the Big Blue River to the east.

4) Description and Use. This unit exclusively includes Fancy Creek (Tuttle Creek State Park unit) in its entirety. Dual access is provided directly off Highway 16 via Gardener and Fancy Creek Roads (both paved). Two magnetic loop traffic counters record traffic for the area. The unit encompasses hillslopes that ascend steeply (40-60% grade) to less steep (5% grade), undulating hilltops. Hills are surrounded by the flat floodplains of the Big Blue River and Fancy Creek. One unnamed ephemeral tributary of Fancy Creek is located in the unit. The river shoreline is wide and gradual, with well-defined dirt cut banks. 0.44 acres of freshwater emergent wetlands have been identified by FWS in this unit.

Bottomland alluvial soils are generally a well-drained mix of deep silty and silty clay loams. Uplands are typical of the Flint hills region with shallow, highly erodible silt-clay residuum over calcareous shale. Numerous exposed rock outcrops are located on the hillslopes. Low value mono forage (primarily cocklebur) dominates low lying areas subject to frequent inundation. Giant Ragweed, Perennial Smartweed, Curly Dock and similar Forbes dominate the areas less prone to inundation. Uplands are dominated by some 200 acres of a mature oak-cedar forest. A tall grass prairie stand of approximately 30 acres is located on the highest hilltop.

Historical surveys have been conducted for portions of this area and there are two sites located in the unit, neither of which are eligible for NRHP. Additional surveys are recommended by the HPMP due to vulnerability for disturbance and looting.

The area is designated for Recreation-intensive use; providing a developed area for intensive recreation activities by the visiting public consistent with the authorized recreation mission. There are no lands in this allocation that do not aid in the successful completion of this authorized purpose. Improvements include:

- OPERATIONAL.
 - MAINTENANCE COMPOUND. An approximately one-acre maintenance compound is located off a spur from the Gardner entrance road. The compound offers 2,100 sf of enclosed storage and work space and a paved yard in support of KDWPT State Park operations.
- RECREATION. Fancy Creek offers overnight, day use, and specialized activities. Popular activities include camping, mountain biking, hiking, target shooting, fishing, and wildlife/bird watching.
 - SANITARY FACILITIES. Fancy Creek is not currently connected to potable water and as a result sanitary facilities are limited to two vault toilets. There is no dump station located in Fancy Creek, campers are directed to use Randolph (1.3 miles away).
 - OVERNIGHT FACILITIES. The campground is divided into three loops; Hidden Hollow, Pine Meadow, and Lakeview. The campground provides 24 electric campsites, in a variety of layouts. An additional 200, non-delineated, primitive sites are also available. Nine group shelters (no utilities) and a handful of tables and fire rings accommodate small and large groups within the undesignated campsite area, but the remaining campground is otherwise undeveloped. Two self-pay stations facilitate registrations in addition to online reservations.
 - BOATING FACILITIES. Two boat ramps offer access to the Big Blue River and Fancy Creek. The Fancy Creek ramp, located at the old marina, is only accessible during high lake elevations.
 - PICNIC SHELTERS & AREAS. Two shelters with a complement of concrete pads, pedestal grills and tables are located in the unit. Both were completed during original construction.
 - ARCHERY RANGE. One firearms range provides 50/100 meter, 25/50 meter, and pistol ranges. Additional facilities include covered firing sheds, baffles, berms, backstops, multipurpose storage building, and gravel parking. Sanitation is provided by portable toilets.
 - TRAILS. The Fancy Creek Mountain Bike Trail System provides over six miles of looping single track with minimal legacy trail. The system is open to all non-motorized use (no horses), but is specifically designed for mountain biking.

- DISC GOLF. A nine-hole course was installed in 2018.
- UTILITIES. Underground utilities include active electric lines and legacy water and sewer lines. Overhead power also runs through the park.
- ROADS & PARKING. Interior park roads include 3.62 lane miles of asphalt paved roads, and 0.59 lane miles of gravel road. Hardened parking can accommodate some 240 vehicles (150 trailer length).
- CONSEQUENTIAL USE. Use patterns not accommodated by improved facilities include numerous shoreline fishing trails.
- FISH & WILDLIFE. None

5) Resource Objectives:

- (a) To maintain natural and recreational resources for future generations.
- (b) To provide land for the administration of State Park facilities and services at Tuttle Creek.
- (c) To provide for an intensive, structured recreation opportunity through a concentration of park facilities that can withstand the impact of heavy visitor use.
- (d) To provide overnight camping related facilities for both transient and destination users and groups.
- (e) To provide day use facilities.
- (f) To provide boating and fishing access.
- (g) To provide a resource base for interpretive programs and facilities.

6) Development Needs

- (a) WATER UTILITY. Continue efforts to renew water service within area to include replacement of legacy shower house, renovation of dump station, addition of other waterborne sanitary facilities, and water-utility campsites.
- (b) TRAIL EXPANSION. Expand existing system with additional trails and amenities. Install bike-friendly design elements into existing campground.
- (c) RANGE RENNOVATION AND EXPANSION. Renovate existing baffles, berms and other structures to meet modern standards. Expand range to include shot gun and archery lanes.
- (d) TECHNICAL RIDE AREA. Install a technical riding course for off-road vehicles near Lakeview camp loop. Install off-road friendly design elements into existing campground.
- (e) DEMOLISH LEGACY FACILITIES. Demolish legacy roads and parking and restore to native habitat.

7) Special Considerations

(a) LEGACY FACILITIES. Visitation has greatly decreased since original construction primarily due to sedimentation. Shower houses and well houses stand vacant following the loss of a water intake structure. Likewise siltation has rendered the original boat ramp (located north of Lakeview camp loop) unusable. The old marina ramp (located at the terminus of Gardiner Road is largely unusable except for small craft during high water events. Associated parking lots and secondary roads have, in turn, largely been abandoned. All other facilities have been raised or relocated outside the unit.

(b) WATER UTILITY. Water is currently unavailable and heavily influences visitor use patterns. A connection to the rural water system was installed in 2018 and water-borne facilities are in development.

(c) ORV AREA USERS. Users of the Tuttle Creek ORV Area (unit 23), located 3.5 road miles away, take advantage of Fancy Creek's overnight accommodations on a frequent basis. While the majority of users travel between the parks legally, unauthorized off-roading along the lakeshore between Fancy Creek and the ORV Area (through unit 22) is a chronic problem. Other visitor assistance concerns related to this use include operation of unlicensed/permitted vehicles on park roads, and some limited off-roading within the park.

(d) FRIENDS OF FANCY CREEK RANGE. The range is operated by the Friends under a third party contract (concession) of the State Park lease.

Unit 22 – Bridgeview Heights

1) Classification: MRM: Low Density Recreation

2) Management Agency: Corps

3) Location/Acreage: This unit includes 167.2 acres located 13-15 miles upstream miles of the dam on the western (Riley County) shoreline. The unit is generally bound by Hwy K-16 to the north, the Big Blue River and lake to the east, the ORV Area to the south, and fee boundary to the west.

4) Description and Use. This unit is largely landlocked, with no public vehicle access. Access for authorized vehicles is provided from a legacy shoreline trail connecting Fancy Creek to the north (unit 21) to the ORV Area (unit 23) to the south. Visitation is not recorded for this unit. This approximately two-mile long unit is a corridor of land comprised of steep hillsides (30-60% grade) descending sharply to a flat, narrow river/lake shore. Two small, somewhat less steep coves intersect the band, but overall the shape of the unit remains narrow. One unnamed watercourse narrowly intersects the unit and 5.31 acres of freshwater and forest/shrub wetlands have been identified by FWS (concentrated in southernmost cove).

Upland soils are typical of residuum hillslopes along the Big Blue and lake shore: shallow, rocky silty clay and silty clay loams. Exposed rocky outcrops are typical of the northern hill slope. Foot slopes and shoreline are weathered shale colluvium in origin, comprised of deeper (+80") silty clay and silty clay loams. Terrain and access limit

prairie management activities and hillsides have largely become forested with thick stands of cedar interspersed amongst mature tree-shrub communities of oak, elm, and hackberry. Lowland areas susceptible to inundation are covered with low value mono forage of Cocklebur and Velvet Leaf.

Historical surveys have been conducted for most portions of this area and there are five sites located in the unit, all of which are eligible for NRHP pending further evaluation. Additional surveys are not recommended by the HPMP.

This area is designated for Low Density Recreation; providing open space between developments and land which, by virtue of use, is incompatible with recreation development and would detract from the quality of public use. There are no lands in this allocation that do no aid in successful completion and operation of this authorized purpose. Improvements include:

- OPERATIONAL. None.
- RECREATION. None.
- FISH & WILDLIFE. None.

5) Resource Objectives:

- (a) To maintain project natural resources and public lands for future generations.
- (b) To provide the public with an unstructured recreation opportunity in a natural environment.
- (c) To provide a buffer between housing subdivisions and parks.

6) Development Needs

- (a) TRAIL CLOSURE. Permanently close the trail by installing robust physical barriers to prevent illegal off-roading.

7) Special Considerations

(a) LEGACY TRAIL. As mentioned previously a shoreline trail extends along the length of the unit. The trail is unauthorized and was created by off-road traffic moving between the ORV Area to the south and campground facilities at Fancy Creek. Illegal off-roading is a chronic problem. Increased surveillance and enforcement, and signage have proven short lived and unsustainable.

(b) ADJACENT DEVELOPMENT. Moderate residential development is located on adjacent private lands.

Unit 23 – Off-Road Vehicle (ORV) Area PUA

1) Classification: High Density Recreation

2) Management Agency: Corps

3) Location/Acreage: This unit contains 250.7 acres located some 12 miles upstream from the dam on the western (Riley County) shoreline. It is bound by the fee boundary to the north, south and west, and the lake to the east.

4) Description and Use. This unit exclusively contains the ORV Area in its entirety. Access is provided from Seacrest Road (gravel) via Gardiner Road (paved), two miles east of U.S. Highway 77. A magnetic loop traffic counter records traffic for the area. This unit is comprised of numerous ridge tops which steeply descend (30-50% grades) to two unnamed creek valleys that converge to form a small cove off the lake. The lakeshore is gradual and silted. Two watercourses run through the area and there are 5.73 acres of wetland (concentrated in cove).

Ridge tops and hillsides are composed of shallow, highly erodible silty-clay residuum from shale. Exposed rock outcrops are very common. Foot slopes and bottomland colluvium and alluvium soils are a well-drained mix of moderately deep silty clay and silty loams. Ridge tops are a mix of warm season grasses with moderate to significant encroachment of woody first success species (dogwood, sumac, and cedar). Hillslopes are dominated by mature oak-hickory forest with encroaching cedar stands. Bottomlands exposed to frequent inundation are bare soils and low value mono-forage (Cocklebur).

Historic surveys have been conducted for portions of this area and there are no sites located in the unit. Additional surveys are not recommended by the HPMP.

This area is designated for Recreation-intensive use; providing a developed area for intensive recreation activities by the visiting public consistent with the authorized recreation mission. There are no lands in this allocation that do not aid in the successful completion of this authorized purpose. Improvements include:

- OPERATIONAL. None.
- RECREATION. The ORV Area offers day use activities. Use is almost exclusively off-road vehicle sports (trail riding, rock climbing, mudding), but other trail users are permitted.
 - SANITARY FACILITIES. Facilities include one single-stall vault toilet. Waste is managed through pump-out services.
 - OFF-ROAD TRAILS. Over 12 miles of stacked loop and legacy trails are designated with trail markers, but the entire 250 acres are available for open riding with the exception of the lakeshore. Terrain includes forested trail riding, steep hill climbs, technical rock gardens, relatively flat open fields, and mud bogs.
 - DAY USE. Facilities are minimal and limited to a handful of picnic tables on unimproved rock, and trash cans.
 - ROADS & PARKING. Interior park roads are limited to a 1,600 foot long, semi-improved rock/gravel road through the staging area and into the riding area. The second half of the road extends into the riding area to

provide limited access to emergency responders. The approximately two-acre staging area can accommodate some 75 vehicles

- LANDING ZONE. A 12,000 sf area located in the western half of the unit is routinely mowed and maintained as a secondary landing zone.
- UTILITIES. There are no utilities in the ORV Area.
- FISH & WILDLIFE.
 - INVASIVE PLANTS. *Sericea Lespedeza* is a reoccurring problem in the unit and is routinely treated with herbicide.

5) Resource Objectives:

- (a) To maintain natural and recreational resources for future generations.
- (b) To provide for an intensive, structured recreation opportunity through a concentration of park facilities that can withstand the impact of heavy visitor use.
- (c) To provide off-road vehicle access.

6) Development Needs

(a) EMERGENCY ACCESS. Off-road motorsports are a high-risk activity and transportable injuries are common. Currently emergency responders rely on good Samaritans and self-rescue to transport injured individuals out of the riding area. This results in delayed care and increased potential for further injury. This project would include construction of gravel roads providing access to features and obstacles with the highest incidents of injury, and improvements to existing landing zones (delineation, signage, etc.).

(b) DAY-USE FACILITIES. The Area has minimal facilities. Improvements would include hardened and delineated family picnic sites, a group shelter area, and information kiosk featuring park information and interpretive messaging.

(c) ADDITIONAL RESTROOM. Popularity of the Area has grown and additional sanitation facilities are needed. Project would include construction of an additional two-stall vault toilet.

(d) PHYSICAL BOUNDARY. Install a robust physical barrier to prevent unauthorized shoreline trails. Barrier shall be of suitable quality to withstand aggressive trespass of modified off-road vehicles, and effects of lake inundation and sedimentation.

(e) TRAIL RENOVATION. Portions of trail have become severely degraded with deep mud holes (5+ feet deep) and rutting. As a result users are widening and blazing trails resulting in loss of valuable natural space and visual screens between users. Project would include filling and grading trails and utilizing natural barriers to consolidate traffic to a single trail corridor.

(f) DESIGNATED STREAM CROSSINGS. Install culverts and hardened stream crossings to concentrate off-road traffic and limit impacts of stream bed riding.

(g) HOST CAMPSITE. Install a park host/custodian campsite complete with full hookups to reduce operation and maintenance costs associated with increased visitation and park improvements.

7) Special Considerations

(a) HISTORY. The ORV Area is a former tank maneuvering area utilized by Fort Riley.

(b) REGIONAL ACCESS. The ORV Area has no size restriction and is the only off-road access within a 300+ mile area open to full-size Jeeps, trucks, and side-by-sides. License plate surveys indicate visitors are traveling from a 3-state region to utilize the access. Visitation is trending upward with the decrease of public accesses and prolific sales of side-by-sides.

(c) VOLUNTEERS & PARTNERS. Numerous clubs and enthusiast groups support continued operation of the Area through trail maintenance, work days, mapping efforts, and general advocacy.

(d) SHORELINE RIDING. An unauthorized shoreline trail leading outside the designated riding area through unit 22, ending at Fancy Creek (unit 21) has been a chronic problem. Efforts to close the trail with signage and fencing have been unsuccessful.

Unit 24 - White Canyon

1) Classification: MRM: Wildlife Management

2) Management Agency: Corps

3) Location/Acreage: This unit includes 76 acres located approximately 11-12 miles north of the dam on the western (Riley County) shoreline. The unit is bound by the ORV Area to the north, lake to the east, Old Baldwin Park to the south and the fee boundary to the west.

4) Description and Use. This unit is largely landlocked. Access to the southernmost acreage is provided by Ramp Road, via Baldwin Park Road (both gravel), some two miles from its intersection with US Hwy. 77. This nearly two-mile long unit is a narrow band of land, averaging approximately 250 feet wide, with two coves narrowly intersecting the area. Terrain is comprised of steep hillsides descending sharply to a less steep foothill comprising the narrow shoreline with occasional eroded rocky outcrops. The two coves are somewhat less steep with flat bottomlands exposed to frequent inundation. Two unnamed watercourses intersect the area through the coves. 0.78 acres of freshwater emergent wetlands have been identified by FWS (concentrated in coves).

Upland soils are typical of residuum hillslopes along the lakeshore: shallow, rocky silty clay and silty clay loams. Foot slopes and shoreline are weathered shale colluvium in origin, comprised of deeper (>80") silty clay and silty clay loams. Rocky outcrops are common. Hillslopes are dominated by mature oak-hickory forest type, speckled with

encroaching cedar stands from adjacent private property. Lowland coves are dominated by brushy shrub communities of willow, elm, and cottonwood while exposed lakeshores are generally bare.

This unit is designated for Wildlife Management; providing lands for fish and wildlife habitat or for the propagation of such species, consistent with authorized fish and wildlife management missions. There are no lands in this allocation that do not aid in the successful completion and operation of this authorized purpose. Improvements include:

- OPERATIONAL. None.
- RECREATION.
 - WHITE CANYON. White Canyon is a named cove located 11.25 miles upstream from the dam. A boat ramp, parking area, and eventually roads were authorized by permit to a developer during original construction. Individual landowners in the adjacent White Canyon Subdivision assumed operation and maintenance of the public access under recreational lease until 2017, at which point the lease was abandoned and management reverted back to the Corps. Sedimentation and disrepair have rendered the ramp and parking area largely unusable. The area now serves as a low-use public shoreline access point.
- FISH & WILDLIFE. None.

5) Resource Objectives:

- (a) To manage project natural resources for the benefit of wildlife.
- (b) To maintain scenic qualities.
- (c) To provide the public with quality hunting and fishing opportunities.
- (d) To provide unstructured recreation opportunity in a natural environment.

6) Development Needs

(a) RESTORATION OF LEGACY FACILITIES. Raise ramp, parking area, and access road, and restore area to native vegetation. Renovation/modification of existing facilities to establish a land access point (no ramp), under a recreational lease would also be considered.

7) Special Considerations

(a) ROADS. Roads across public lands, associated with White Canyon, are authorized by an easement with Riley County, and maintained by the township.

Unit 25 – Baldwin Creek

1) Classification: MRM: Wildlife Management

2) Management Agency: Corps

3) Location/Acreage: This unit includes 289.1 acres of land surrounding Baldwin Cove, located some 11 miles north of the dam on the western (Riley County) shoreline. The unit is generally bound by the White Canyon subdivision to the north, the lake to the east, Baldwin Cove and Creek to the south, and the fee boundary to the west.

4) Description and Use. Access to the area is provided via Baldwin Park and Baldwin Creek (both gravel) Roads, approximately two miles from their intersection with US Hwy. 77. This unit comprises the northern shoreline of Baldwin Cove and consists of a rolling hilltop, steeply descending to the lakeshore and floodplain of Baldwin Creek. The lakeshore is steep, rocky and exposed before transitioning to the heavily silted and shallow cove. Baldwin Creek and an additional unnamed watercourse are located within the unit. 25.15 acres of freshwater emergent wetlands are identified by FWS.

Uplands are typical of the Flint hills region with shallow, highly erodible silty-clay residuum from limestone and shale. Bottomland alluvial soils are generally a well-drained mix of deep silty and silty clay loams. Rock outcrops are typical along the hill slope breaks. Uplands are a mix of native tall grass prairie and thick, mature stands of encroaching cedar. Hillsides are interspersed with mature oak-hickory forest. Cultivable bottomlands are maintained in agricultural production benefitting wildlife with rotations of corn, soybean, milo, and wheat. Non-cultivable lands consist of bare soils and cover of Cocklebur, Ragweed, and similar broadleaf forbes. Johnson grass has been found in this unit and managed through chemical means.

Historical surveys have been conducted for most portions of this area and there are five sites located in the unit, three of which are eligible for NRHP pending further evaluation. Additional surveys are recommended by the HPMP.

This unit is designated for Wildlife Management; providing lands for fish and wildlife habitat or for the propagation of such species, consistent with authorized fish and wildlife management missions. There are no lands in this allocation that do not aid in the successful completion and operation of this authorized purpose. Improvements include:

- OPERATIONAL. None.
- RECREATION.
 - OLD BALDWIN PARK. Remaining, semi-serviceable improved facilities include one mile of asphalt paved road in poor condition, some 24,000 sf of asphalt paved parking areas in very poor to failed condition, and a 3-lane boat ramp. All other facilities have been raised, relocated, or rendered unusable due to siltation.
- FISH & WILDLIFE.
 - AGRICULTURAL LEASE. There is one lease unit in this area. LU32 consists of 35 acres (all beneficial) typically utilized for row crop production with negotiated set asides for wildlife benefits.

5) Resource Objectives:

- (a) To manage project natural resources for the benefit of wildlife.

- (b) To maintain scenic qualities.
- (c) To provide the public with quality hunting and fishing opportunities.
- (d) To provide unstructured recreation opportunity in a natural environment.

6) Development Needs

- (a) LAND ACCESS POINT. Renovate/modify existing facilities to maintain minimal roads and parking, and improve Baldwin Creek Road terminus with small parking lot to facilitate land access consistent with environmental stewardship goals.
- (b) REMOVAL OF LEGACY FACILITIES. Raise ramp, hilltop roads and parking, and restore area to native vegetation.
- (c) PRAIRIE RESTORATION. Implement aggressive cedar tree removal and management tools (including prescribed burning) to restore tall grass prairie on hilltop acreage.

7) Special Considerations

- (a) OLD BALDWIN PARK. This park was closed in 1980 due to low usage and sedimentation of the boat ramp. Remaining recreation activities are generally low-intensity consisting of walkers, shoreline fishing/access, and wildlife viewing.

Unit 26 - University Park

1) Classification: MRM: Low-Density Recreation

2) Management Agency: Corps

3) Location/Acreage: This unit contains 114.9 acres of land located some nine miles north of the dam on the western (Riley County) shoreline. The unit is generally bound by Baldwin Creek and Cove to the north, the lake to the east, scout cove to the south, and the fee boundary to the west.

4) Description and Use. Primary public access to the area is provided by Mound Ridge Drive via Hi-View Drive and University Park Road (all gravel), some four miles from US Highway 77. An additional access is provided at the terminus of Lakeside Drive, also via Hi-View Drive and University Park Road. Visitation is not recorded for this unit. This unit is comprised of steep hillsides which descent sharply to the lakeshore (25-40% grades). The lakeshore is typical of the western half of the lake; steep, exposed and rocky banks that have been heavily eroded by lake fluctuation. Baldwin and Scout coves bookend the unit in addition to four smaller coves, one of which is named University Park Cove. The shoreline in these coves is somewhat less rocky and steep due to natural topography and accumulation of sediment. Four watercourses, including Baldwin Creek, are located in the unit, along with 3.92 acres of freshwater emergent wetlands identified by FWS (concentrated in coves).

Hillsides are typical of the Flint hills region with shallow, highly erodible silty clay residuum. Bottomland alluvial soils are minimal and isolated to small coves, but are generally a well-drained mix of moderately deep silty and silty clay loams. Rock outcrops are located throughout the unit. Hillsides are dominated by oak-hickory forest, with highest elevations transitioning to mature cedar stands. Lowland areas are general bare soils and low value mono-forage of cocklebur.

Historical surveys have been conducted for this area and there are no sites identified in the unit. Additional surveys are not recommended by the HPMP.

This area is designated for Low Density Recreation; providing open space between developments and land which, by virtue of use, is incompatible with recreation development and would detract from the quality of public use. There are no lands in this allocation that do not aid in successful completion and operation of this authorized purpose. Improvements include:

- OPERATIONAL.
 - UTILITIES. Wells, sewer and waterlines providing utility to University Park residents are authorized under consents and easements within this unit.
- RECREATION.
 - UNIVERSITY PARK. University Park is one of the largest, most well-developed sub-divisions near the lake and completely adjoins the fee boundary of this unit. Since 1961, the University Park Improvement District has leased 0.79 acres at University Park Cove (located 9.6 miles upstream from the dam) for recreation. Improvements include a gravel road, a single-lane paved boat ramp (open to public), and parking area. A dock zone located in the cove is one of three remaining active and accessible dock zones on the lake. One community dock and one private mooring buoy are authorized by shoreline permits within the zone.
- FISH & WILDLIFE. None.

5) Resource Objectives:

- (a) To maintain project natural resources and public lands for future generations.
- (b) To provide the public with an unstructured recreation opportunity in a natural environment
- (c) To provide a buffer between housing subdivisions and parks.

6) Development Needs

- (a) None.

7) Special Considerations

- (a) LAKESIDE LEGACY ACCESS. In 2011, an additional recreation lease for an access road, ramp, and parking area was terminated due to lake erosion

rendering the access no longer safe. Closure of the roadway (Lakeshore Drive terminus) is maintained by the county.

(b) EASEMENT WATER ACCESS. Portions of the conservation pool intersect this unit and flow onto adjacent easement land at three locations in this unit.

(c) ADJACENT DEVELOPMENT. Heavy residential development on adjacent private lands surround this unit.

Unit 27 – Scout Lodge (27a) and Scout Camp (27b)

1) Classification: High Density Recreation (27a) and MRM: Low-Density Recreation (27b)

2) Management Agency: Riley County Fish and Game Association

3) Location/Acreage: This unit contains two sub-units, both located nine miles upstream of the dam on the western (Riley County) shoreline. Sub-unit 27a is 11.3 acres, bound by Scout Cove to the north, the lake to the east, Tanmangile Road and the historic mow line to the south, and fee boundary to the west. Sub-unit 27b is 61.8 acres, bound by sub-unit 27a to the north, the lake to the east, the second unnamed cove to the south, and fee boundary to the west.

4) Description and Use. This unit exclusively includes the Riley County Fish and Game Association lease in its entirety. Access is provided by Tanmangile Road via University Park Road (all gravel), some four miles from US Highway 77. This unit is comprised of two hilltops which descend steeply (20% grade) to the lakeshore. The lakeshore is typical of the western half of the lake: steep, exposed and rocky banks that have been heavily eroded by lake fluctuation. Scout Cove and an unnamed cove bookend the unit, in addition to a third small cove. The shoreline of these coves is somewhat less rocky and steep. Three watercourses are located in the unit, along with 2.61 acres of freshwater emergent wetland identified by FWS (concentrated in coves).

Hilltops and slopes are typical of the Flint hills region with shall, highly erodible silty clay residuum from weathered shale and limestone. Bottomland colluvium soils are isolated to the coves and are generally a well-drained mix of moderately deep silty and silty clay loams. Rock outcrops are located throughout the unit. Hillsides are dominated by oak-hickory forest, with highest elevations transitioning to mature cedar stands. Lowland acres are generally bare soils and low value mono-forage.

Historical surveys have been conducted for this area and there is one site located in the unit which is a historic property. Additional surveys are not recommended by the HPMP.

Sub-unit 27a is designated for Recreation-intensive use; providing a developed area for intensive recreation activities by the visiting public consistent with the authorized recreation mission. There are no lands in this allocation that do not aid in the successful completion of this authorized purpose. Sub-unit 27b is designated for low density recreation; providing open space between developments and land which, by virtue of use, is incompatible with recreation development and would detract from the quality of public use. Again, there are no lands in this allocation that do not aid in successful completion and operation of this authorized purpose. Improvements include:

- OPERATIONAL. None
- RECREATION. 2000 transition from Girl Scouts to RCFGA.
 - In 1961 the Kaw Valley Girl Scout Council assumed management of the entire unit under a recreational lease for overnight camp activities and facilities. The lease was transferred to the Riley County Fish and Game Association in 2000 who has operated the public facility ever since. Improvements include a quarter-mile gravel road, a 1,400 sf lodge, a 1,500 sf pavilion, two vault toilets, outdoor gathering space, a small shed, undesignated campsites, and several trails.
- FISH & WILDLIFE. None

5) Resource Objectives:

- (a) To maintain project natural resources and public lands for future generations (27a and 27b)
- (b) To provide overnight, group camping related facilities for transient and destination users and groups (27a and 27b)
- (c) To provide for an intensive, structured opportunity through a concentration of park facilities that can withstand the impact of heavy visitor use (27a)
- (d) To provide the public with an unstructured recreation opportunity in a natural environment (27b)
- (e) To provide a buffer between subdivisions and parks (27b)

6) Development Needs

- (a) None.

7) Special Considerations

- (a) None.

Unit 28 – Blue River Hills

1) Classification: MRM: Low-Density Recreation

2) Management Agency: Corps

3) Location/Acreage: This unit includes 171 acres located some 5-8 miles upstream from the dam on the western (Riley County) shoreline. The unit is bound by the second unnamed cove south of Scout Cove to the north, the lake to the east, Stockdale PUA to the south, and the fee boundary to the west.

4) Description and Use. This unit is accessible from Cunningham Drive via University Park (both gravel), some 9 miles from U.S. Highway 77; and from Shady Lane (gravel) via Blue Ridge and Blue River Hills Roads (paved), some 5.5 miles from U.S. Highway 77. This approximately four-mile long unit is a narrow band of land (averaging some 350

feet wide) comprised of steep hillsides which descent sharply (20-50% grades) to a steep, rocky, and exposed lakeshore. A handful of small, somewhat less steep coves and inlets intersect the band, but the overall shape of the unit remains narrow. Two coves are named: DeWyke at the terminus of Patterson Drive and Blue River Hills at the terminus of Shady Lane. Lakeshore within the coves is somewhat less rocky and shallower. Four watercourses narrowly intersect the unit (none named), and 15.06 acres of freshwater emergent wetlands have been identified by FWS (concentrated in coves).

Upland soils are typical of residuum hillslopes along the western lakeshore: shallow, rocky silty clay from weathered shale and limestone. Lowland colluvium soils are limited to the coves and comprised of somewhat deeper silty clay loams. The highest elevations are dominated by oak-hickory forest with a scattering of mature cedar stands, but the majority of the unit (composed of steep lakeshore) is bare soils with low value mono-forage isolated to the largest coves.

Historical surveys have been conducted for portions of this area and there are eight sites located in the unit, two of which are eligible for NRHP listing pending further evaluation. Additional surveys are not recommended by the HPMP.

This unit is designated for low density recreation; providing open space between developments and land which, by virtue of use, is incompatible with recreational development and would detract from the quality of public use. There are no lands in this allocation that do not aid in successful completion and operation of this authorized purpose. Improvements include:

- OPERATIONAL.
 - WATER SUPPLY. Wells, waterlines, and related infrastructure servicing the Blue River Hills Subdivision are authorized under a 1975 easement.
- RECREATION.
 - DEWYKE COVE. DeWyke Cove is a named cove located 7.8 miles upstream from the dam. A road, parking area, and stairs have been authorized by recreational lease since 1985. A dock zone is also established in the cove and has one active permit. Adjacent lands have moderate residential development as part of the Blue River Hills subdivisions. The access is landlocked by private property.
- FISH & WILDLIFE. None.

5) Resource Objectives:

- (a) To maintain natural and recreational resources for future generations.
- (b) To provide the public with an unstructured recreation opportunity in a natural environment.
- (c) To provide a buffer between housing subdivisions and parks.

6) Development Needs

(a) TRAFFIC CONTROL BARRIERS. Install physical barriers to control unauthorized vehicle traffic (shoreline riding) originating from current and legacy accesses.

7) Special Considerations

(a) LEGACY ACCESS. Numerous access roads, parking areas, and ramps were authorized by permit in this unit in the early 1960s, but were terminated and abandoned due to siltation and disrepair beginning in the late 1970s. Legacy accesses no longer authorized under an active real estate agreement include:

(1) GOLDEN SHORES: located at the terminus of Cunningham Drive in the Golden Shores Subdivision, along the northern shore of DeWyke Cove. Access road, parking area, and abandoned boat ramp remain a popular shoreline access.

(2) REDBUD: located off Clyde Drive in the Grandview Heights Subdivision. No public or vehicle access.

(3) WESTERN SHORES: located off Leedy Drive in the Western Shore Subdivision. No public or vehicle access.

(4) BLUE RIVER HILLS: located off Shady Lane in the Blue River Hills Subdivision, provides access to the named cove located 6.8 miles upstream from the dam. Access road and parking area remain a popular shoreline access for fishing.

(5) IDLE TIME: Located in first unnamed cove south of Blue River Hills legacy access. No public or vehicle access.

(6) HILLCREST ACRES: Located just north of Stockdale Park PUA. No public or vehicle access.

Unit 29 – Stockdale Park PUA

1) Classification: High Density Recreation

2) Management Agency: Corps

3) Location/Acreage: This unit contains 164.4 acres located some 4.5 miles upstream of the dam on the western (Riley County) shoreline. Stockdale is bound by the fee boundary to the north, the lake and Mill Cove to the east and south, and Mill Cove boat ramp to the west.

4) Description and Use. Dual access is provided from the south on Stockdale Park Road (partially gravel) via Blue River Hills Road, and from the north directly off Blue River Hills Road (paved). Lower Stockdale Park Road is frequently closed due to lake inundation. Two magnetic loop traffic counters record traffic for the area in addition to campground reservation data. The unit encompasses a hilltop to the east and foot slopes to the west, which descend to the Big Blue River and Mill Creek flood plains that

define a comparatively wide and gradual shoreline. Three watercourses narrowly transect the area along with 2.78 acres of wetlands identified by FWS.

Bottomland colluvium and alluvium soils are generally a well-drained mix of deep silty clay and silty loams. Uplands are typical of the Flint hills region with shallow, highly erodible silt-clay residuum from shale. Exposed rock outcrops are common throughout the unit. Mature cedar-oak-hickory communities dominate the upper hilltops and slopes. Foot slopes are a mixture of warm season grasses and woody first-succession species (locust, elm, and cedar). Bottomlands are frequently inundated and composed of bare soil and low-value mono forage (cocklebur). Landscape plantings are associated with the developed park area and include Oak, Elm, Eastern Pine, and other shade plantings alongside cool season grasses.

Historical surveys have been conducted for this area and there are no sites located in the unit. No additional surveys are recommended by the HPMP.

This area is designated for Recreation-intensive use; providing a developed area for intensive recreation activities by the visiting public consistent with the authorized recreation mission. There are no lands in this allocation that do not aid in the successful completion of this authorized purpose. Improvements include:

- OPERATIONAL.
 - PARK HOST SITES. Two park host sites (full hookups) are located near the shower house and are accompanied by small storage sheds. A minimum of one site is manned by volunteer labor during the summer season to reduce operation and maintenance costs (primarily mowing and janitorial services).
- RECREATION. Stockdale offers overnight and day use activities. Popular activities include camping, boating, fishing, and wildlife/bird watching.
 - SANITARY FACILITIES. Facilities include two vault toilets, one water-borne shower house with toilet, and a dump station. Waste water is managed through a gravity fed lagoon.
 - OVERNIGHT FACILITIES. The campground consists of 12 campsites (completely renovated in 2011) with water and electric hookups in a variety of layouts. Sites include separate camping and living pads, table, fire ring, pedestal grill, and lantern post. Payments and registration are managed exclusively through the national reservation service (no on-site payments).
 - BOATING FACILITIES. There are two ramps in the unit. The main ramp is a 3-lane concrete ramp located below the campground and offers access to the main channel. The Mill Cove ramp is a 2-lane concrete ramp (lanes separated by concrete pier), located in the cove just over a mile from the main channel.
 - UTILITIES. Utilities include buried and overhead electric lines, and underground water and sewer lines.

- ROADS & PARKING. Interior park roads include 0.89 lane miles of asphalt paved road and 0.1 lane mile of gravel road. Hardened parking can accommodate some 40 vehicles (20 trailered).
- CONSEQUENTIAL USE. Use patterns not accommodated by improved facilities include shoreline fishing, boat mooring/staging near the main ramp, and wildlife viewing at the Guy Smith Wetland.
- FISH & WILDLIFE.
 - GUY SMITH MEMORIAL WETLAND. This nearly three-acre artificial wetland was installed through a contribution from the family of Guy Smith. Water is fed by lake inundation and managed with a stand pipe control structure.

5) Resource Objectives:

- (a) To maintain natural and recreational resources for future generations.
- (b) To provide for an intensive, structured recreation opportunity through a concentration of park facilities that can withstand the impact of heavy visitor use.
- (c) To provide overnight camping related facilities for both transient and destination users and groups.
- (d) To provide day use facilities.
- (e) To provide boating and fishing access.
- (f) To provide a resource base for interpretive programs and facilities.

6) Development Needs

- (a) DAY USE AREA. Day use facilities are very limited for the park. Likewise, unmanaged use has a detrimental effect on natural resources. Project would include establishing access roads, parking, walkways, picnic sites, fishing piers, mooring posts, etc. in the vicinity of the current, undesignated vessel staging area.
- (b) PLAYGROUND. There are currently no facilities to attract young families to the park. Project would include installation of a universally accessible playground, fall protection, delineation, walkways, and seating.
- (c) TRAIL SYSTEM. A purpose-built trail system would provide more land-based recreation opportunities for the area. Project would include installation of a stacked loop non-motorized trail system providing one hour to full day hikes, connection to park facilities, and interpretive messages.
- (d) RENNOVATE GROUP CAMP. There are no camping facilities specifically designed for groups located on the lake. Likewise, the current campground is at capacity over half of the summer weekends. A group camp would provide multiple-use facilities to accommodate large groups and overflow camping when not otherwise reserved. Project would include renovation of hilltop camping loop

road, construction of new full-hookup campsites, vault toilet, picnic shelter, and parking areas.

(e) DEMOLISH LEGACY FACILITIES. Remove remaining roadways associated with YOC area and restore to native vegetation.

(f) RENNOVATE MILL COVE RAMP. The current ramp is poorly designed with a concrete pier that impairs use of the upstream launch lane due to prevailing wind/waves pushing vessels into the pier. It is recommended the pier be removed and launch lanes widened. Project would also include paving the entrance road and parking area.

(g) EVENTUAL REMOVAL & REMEDIATION OF MAIN RAMP. Continued use of the ramp will require extensive dredging and a jetty which are cost prohibitive. Given sedimentation rates, the usable lifespan of the ramp is 15-20 years. Project would include removal of ramp and excess parking, and remediation of the area.

7) Special Considerations

(a) PERMITS & FEES. Permits and fees are applicable to Stockdale Park, consistent with established Corps Recreation Use Fee regulations. Pertinent use activities include camping reservations.

(b) LEGACY FACILITIES. The park was overbuilt during original construction. Paved roads and associated parking lots located in old hilltop group camp and YOC day use area (along shoreline near Mill Cove ramp) are largely abandoned and remain in very poor to failed condition. All other facilities have been raised or relocated outside the unit.

(c) MAIN RAMP SILTATION. The main ramp has been dredged twice to maintain boating access. Siltation and loss is inevitable as the lake ages.

(d) VESSEL STAGING AREA. An unimproved, undesignated staging area is popular for boaters (especially personal watercraft) on the shoreline between the main ramp and wetland. Illegal parking, ground fires, littering, and alcohol-related violations are common.

Unit 30 – North Mill Cove

1) Classification: MRM: Wildlife Management

2) Management Agency: Corps

3) Location/Acreage: This unit includes 142 acres located along the northern shoreline and headwaters of Mill Cove. It is bound by the fee boundary to the north and west, Stockdale Park PUA to the east, and the lakeshore and mill creek to the south.

4) Description and Use. This unit is accessed by Blue River Hills Road to the west (paved), and Stockdale Park Road (partially gravel) which runs parallel and through the northern boundary of the unit. This unit is comprised primarily of the Mill Creek

floodplain, with the exception of a few foot slopes along the extreme northern border. The lakeshore is heavily silted, shallow, and virtually inaccessible. Five watercourses are located in the unit, including Mill Creek. Some 55 acres of freshwater emergent and forest/shrub wetlands are identified by FWS.

Bottomland alluvial soils are well-drained, deep silty clay and silty loams. The foot slopes are minimal in terms of acreage, but comprised of shallower colluvium soils. Bottomlands are frequently inundated and composed of bare soil and low-value mono forage. Slightly higher elevations are cultivable and maintained in rotations of corn, wheat, milo, and soybean. A few legacy tree rows of cottonwood, elm, and ash run throughout the area. Cedar and warm season grasses dot the foot slopes.

Historical surveys have been conducted for this area and there is one site located in the unit which is ineligible for NRHP listing. No additional surveys are recommended by the HPMP.

This area is designated for Wildlife Management; providing lands for fish and wildlife habitat or for the propagation of such species, consistent with the authorized fish and wildlife management mission. There are no lands in this allocation that do not aid in the successful completion and operation of this authorized purpose. Improvements include:

- OPERATIONAL. None
- RECREATION. None.
- FISH & WILDLIFE.
 - AGRICULTURAL LEASES. There are four agricultural lease units that comprise the majority of this area's acreage. LU 39, located north of Stockdale Park Road, consists of 12 acres (all beneficial) utilized exclusively for wildlife forage such as sunflowers, oats, and fruit trees. LU40, located south of Stockdale Park Road and east of the tree row, consists of 51 acres (33 beneficial), and is frequently inundated and left fallow; historic utilization has been limited, included some row crop production of corn, wheat, milo, and soybean. LU42, located south of Stockdale Park Road and west of the tree row, consists of 51 acres (31 beneficial) utilized for row crop production of corn, wheat, milo, and soybean with wildlife forage set asides and weed strips. LU41, located south of Stockdale Park Road and west of Blue River Hills Road, consists of 15 acres (6 beneficial), and utilized similar to LU42.
 - FOOD PLOT. A small, three-acre food plot is maintained in the northwest corner of LU40. A gravel pull-off is provided for parking.

5) Resource Objectives:

- (a) To maintain natural and recreational resources for future generations.
- (b) To provide the public with an unstructured recreation opportunity in a natural environment.

(c) To provide a buffer between housing subdivisions and parks.

6) Development Needs

(a) None.

7) Special Considerations

(a) BALD EAGLE NEST. Two bald eagle nests are located near this unit. Usually only one is active during breeding season which indicates they were constructed by the same eagle pairing.

(b) LOW WATER CROSSING. The Blue River Hills low water crossing at Mill Creek is subject to flash flooding

Unit 31 – South Mill Cove

1) Classification: MRM: Wildlife Management

2) Management Agency: Corps

3) Location/Acreage: This unit includes 103.3 acres located along the southern shoreline of Mill Cove and extending southward to Tuttle Cove (some 5-7 miles upstream from the dam on the western – Riley County – shoreline). It is bound by Mill Creek Cove to the north, the lake to the east, Blue Valley Yacht Club to the south, and the fee boundary to the west.

4) Description and Use. This unit is largely landlocked except from the extreme southern boundary accessible from West 59th Avenue (partial gravel), three miles from its intersection with U.S. Highway 24. This approximately two-mile long unit is a narrow band of land (averaging some 250 feet wide) comprised of steep hillsides which descent sharply (20-60% grades) to a steep, rocky, and exposed lakeshore. A handful of small coves intersect the band, but the overall shape of the unit remains narrow. The extreme southern cove is named North Tuttle Cove. Two watercourses narrowly intersect the unit (none named), and 1.05 acres of freshwater emergent wetlands identified by FWS (isolated to Mill Cove headwaters).

Soils are virtually all upland and typical of residuum hillslopes along the western lakeshore: shallow, rocky silty clay from weathered shale and limestone. The highest elevations are dominated by oak-hickory forest with a scattering of mature cedar stands, but a large majority of the unit (composed of steep lakeshore) is bare rocky outcrops and gravel.

Historical surveys have been conducted for portions of this area and there are no sites located in the unit. No additional surveys are recommended by the HPMP.

This unit is designated for Wildlife Management; providing lands for fish and wildlife habitat or for the propagation of such species, consistent with the authorized fish and wildlife management mission. Such lands are also available for low density recreation activities. There are no lands in this allocation that do not aid in the successful completion and operation of this authorized purpose. Improvements include:

- OPERATIONAL. None
- RECREATION.
 - NORTH TUTTLE COVE ACCESS. This named access is located 2.8 miles upstream from the dam at the terminus of West 59th Street. The access is maintained by the Corps. Improvements include a gravel access road and turn-around / parking area.
- FISH & WILDLIFE. None.

5) Resource Objectives:

- (a) To manage project natural resources for the benefit of wildlife.
- (b) To maintain scenic qualities.
- (c) To provide the public with quality hunting and fishing opportunities.

6) Development Needs

- (a) LAND ACCESS. Provide improvements to better define and control land access at the terminus of West 59th Street, not limited to: physical barriers, hardened parking area, and information board/signs.
- (b) LAKELAND REMEDIATION. Remove access road, parking, and ramp, and remediate.

7) Special Considerations

- (a) LEGACY ACCESS. The Lakeland Access located at the terminus of Lakeland Drive in the Lakeland Subdivision; included an access road, parking area and boat ramp authorized by permit in 1962. In 2001 the lease was terminated and the improvements abandoned. The legacy access road is extremely narrow, steep, and with sharp drop-offs.
- (b) EASMENT WATER ACCESS. Portions of the conservation pool intersect this unit and flow onto adjacent easement lands.
- (c) ADJACENT DEVELOPMENT. Moderate residential development in the Lakeland, Mill Cove, and Harbor View Subdivisions is located adjacent to the unit.

Unit 32 - Yacht Club

- 1) Classification: MRM: Low-Density Recreation
- 2) Management Agency: Blue Valley Yacht Club
- 3) Location/Acreage: 14.7 land acres
- 4) Description and Use. This unit exclusively includes the Blue Valley Yacht Club land acres in its entirety. Access to the area is provided via a gated, gravel road off West 59th

Street, two miles east of U.S. Highway 24. Terrain is a gradual side slope (<6% grades) to the shoreline of Tuttle Cove. The lakeshore is gradual and silted to the north, and steep (20% grade) and rocky to the south. There are no water courses nor wetlands identified in this unit by FWS.

The highest elevations are composed of a shallow silty-clay residuum soil which gives way to rocky outcrops along the hillside break. Lower elevations consist of colluvium foot slopes which are somewhat deeper, but similarly well drained and erodible. Native warm season grasses dominate the majority of the unit. An old fencerow of locust, oak, and hackberry define the southern boundary. Areas prone to inundation are either bare soil or low value mono-forage (cocklebur).

Historical surveys have been conducted for a portion of the area and there are no sites located in the unit. Additional surveys are recommended by the HPMP.

This area is designated for Low Density Recreation; providing open space between developments and land which, by virtue of use, is incompatible with recreation development and would detract from the quality of public use. There are no lands in this allocation that do not aid in successful completion and operation of this authorized purpose. Improvements include:

- OPERATIONAL. None.
- RECREATION.
 - BLUE VALLEY YACHT CLUB. The Yacht Club consists of a boat ramp, courtesy dock, mooring buoys, shelter, some 45,000 sf of storage yards, and several storage sheds authorized under recreational lease since in 1975.
 - UTILITIES. Yacht Club facilities are connected to rural water and buried electrical services. Waste is managed by a portable toilet that is routinely serviced.
 - ROADS & PARKING. An 800 foot, single lane gravel road provides access within the unit. Hardened gravel parking is also located within the unit.
 - NAVIGATION BOUYS. The Yacht Club maintains the navigation buoy at the mouth of Tuttle Cove and (at times) channel buoys to aid navigation through the submerged timber within the cove.
- FISH & WILDLIFE. None.

5) Resource Objectives:

- (a) To maintain natural and recreational resources for future generations.
- (b) To provide the public with an unstructured recreation opportunity in a natural environment.
- (c) To provide a buffer between housing subdivisions and parks.

6) Development Needs

- (a) DOCK IMPROVEMENTS. Renovate and expand courtesy dock.
- (b) SANITARY FACILITIES. Install water-borne restroom and/or shower house, inclusive waste management system.
- (c) EXPAND PARKING & STORAGE. Expand parking and storage facilities, to include paved surfacing.
- (d) CLUBHOUSE. Construct a multi-purpose club house inclusive of electrical, water, and sewer hookups.
- (e) CAMPSITES. Construct a small number of modern campsites to accommodate limited overnight use.

7) Special Considerations

- (a) ADJACENT DEVELOPMENT. Moderate residential development is located on adjacent private lands as part of the Harbor View Subdivision.

Unit 33 - Tuttle Creek

1) Classification: MRM: Wildlife Management

2) Management Agency: Corps

3) Location/Acreage: This unit includes 192.4 acres located at the headwaters of Tuttle Cove, some 2.5 miles upstream of the dam on the western (Riley County) shoreline. The unit is bound by the fee boundary and Blue Valley Yacht Club to the north, the lake and Tuttle Cove PUA to the east, and the fee boundary to the south and east.

4) Description and Use. This unit is accessed by West 59th Street, two miles east of its intersection with U.S. Highway 24 (all paved). Terrain consists of a hilltop in the northeast corner of the unit and foot slopes descending moderately (10-20% grade) to the upper reaches of the Tuttle Creek floodplain. The lakeshore is gradual and heavily silted, and becomes more rocky and exposed towards the steeply sided hilltop in the northeast corner of the unit. Four watercourses intersect the area, including Tuttle Creek. There are 7.52 acres of freshwater emergent wetlands identified by FWS (isolated to Tuttle Cove headwaters).

Upland soils are typical of the Flint hills; shallow silty clay residuum soils on top of calcareous shale transitioning to colluvium foot slopes of similar composition. Bottomland silty clay and silty loam soils are alluvial nature and deeper. Upland areas are dominated by Tall grass prairie with encroaching first succession species of locust, dogwood, sumac, and cedar. Lowlands provide a mixture of sedges and broadleaf species. Areas prone to frequent inundation are bare soil or low-value mono-forage of cocklebur.

Historical surveys have been conducted for the area and there are no sites located in the unit. No additional surveys are recommended by the HPMP.

This area is designated for Wildlife Management; providing lands for fish and wildlife habitat or for the propagation of such species, consistent with the authorized fish and wildlife management mission. Such lands are also available for low density recreation activities. There are no lands in this allocation that do not aid in the successful completion and operation of this authorized purpose. Improvements include:

- OPERATIONAL. None
- RECREATION. None.
- FISH & WILDLIFE.
 - AGRICULTURAL LEASES. There is one agricultural lease unit located in the northwest third of the unit. LU44 consists of 57 acres (22 beneficial) utilized for hay production to support the vigor of native warm season grasses.
 - FOOD PLOTS. Some 10 acres are co-managed exclusively for wildlife as food and cover plots by the Corps of Engineers and the Kansas State University Wildlife Outdoor Enterprise Management program.

5) Resource Objectives:

- (a) To manage project natural resources for the benefit of wildlife.
- (b) To maintain scenic qualities.
- (c) To provide the public with quality hunting and fishing opportunities.

6) Development Needs

- (a) GRASSLAND MANAGEMENT. Implement efforts to maintain native Tall grass Prairie stands through use of prescribed burning, and additional agricultural leases for haying and grazing.

7) Special Considerations

- (a) ADJACENT DEVELOPMENT. Moderate residential development is located on adjacent private lands as part of the Harbor Hills Subdivision.

Unit 34 - Tuttle Creek Cove PUA

1) Classification: High Density Recreation

2) Management Agency: Corps

3) Location/Acreage: This unit contains 117.7 acres located on the southern shore of Tuttle Cove, some two miles upstream of the dam on the western (Riley County) shoreline. The unit is bound by Tuttle Cove to the north, the lake to the east, fee boundary to the south, and unit 33 to the west.

4) Description and Use. Access is provided by Tuttle Cove Road (paved), 2.5 miles north of Highway K-13. A magnetic loop traffic counter records traffic for the area in

addition to campground reservation data. The unit encompasses a hilltop to the east which descends sharply (20% grade) to the lakeshore, and a lateral foot slope to the west that gradually transitions to the Tuttle Creek floodplain. The shoreline is dominated by towering limestone layers and rocky deposits left exposed by pool fluctuation along the lake and mouth of the cove and transitions to a shallow, heavily silted shore towards the cove headwaters. There is one watercourse through the area, along with 1.75 acres of wetland identified by FWS (isolated to back of cove).

Bottomland colluvium and alluvium soils are generally a well-drained mix of deep silty clay and silty clay loams. Uplands are typical of the Flint hills region with shallow, highly erodible silt-clay residuum from shale and limestone. Exposed rock outcrops are common throughout the unit. Ridge tops are dominated by tall grass prairie with moderate encroachment of cedar and first-successional wood species (sumac, dogwood, cedar). Hillslopes are primarily an oak-hickory forest type with isolated stands of cedar. Bottomlands exposed to frequent inundation are bare soil and weedy forbs. Cool season grasses and shade plantings of cottonwood, oak, elm, walnut and persimmon dominate the developed park areas.

Historical surveys have been conducted for this area and there is one site located in the unit which is eligible for NRHP listing pending further evaluation. Additional surveys are recommended by the HPMP.

This area is designated for Recreation-intensive use; providing a developed area for intensive recreation activity by the visiting public consistent with the authorized recreation mission. There are no lands in this allocation that do not aid in the successful completion of this authorized purpose. Improvements include:

- OPERATIONAL.
 - PARK HOST SITES. Two park host sites (full hookups) are located near the park entrance and are accompanied by small storage sheds. A minimum of one site is manned by contractors during the summer season to provide gate attendant and park custodial services. The additional site is utilized by a volunteer to augment contracted services (covers duties on off days).
- RECREATION. Tuttle Cove offers overnight and day use activities. Popular activities include camping, boating, picnicking, swimming, fishing, and wildlife/bird watching.
 - SANITARY FACILITIES. Facilities include five vault toilets, two water-borne shower houses with restrooms, and a centralized dump station. Waste water is managed by a two cell lagoon accompanied by two lift stations.
 - OVERNIGHT FACILITIES. The campground consists of five loops: Lakeshore, Point, Walnut Grove, Loop 1, Loop2, and Loop 3. In 2006, Lakeshore and Point loops were constructed from a low-value day use area and include 39 water and electric hook-up campsites. In addition there are 18 primitive sites in Walnut Grove and Loops 1 and 2. Loop 3 is

an open space with undesignated sites available for primitive camping groups. With the exception of Loop 3, sites include separate camping and living pads, table, fire ring, pedestal grill, and lantern post. Payments and registration are managed through partially-staffed gate house and self-pay station, in addition to the national reservation service.

- BOATING FACILITIES. There is one, two lane ramp in the unit offering access to Tuttle Cove and the lake beyond. A floating courtesy dock is also located at the ramp.
- PICNIC SHELTER & AREAS. Two picnic shelters are located within the unit. The Point shelter dates from original construction (1968) and is located in Point loop. This shelter is only available to campers. The second shelter is the modern Roadside shelter located between the beach and boat ramp, complete with concrete pad, pedestal grills, tables, trash cans, and universally accessible pathways.
- PLAYGROUNDS. Three (4) playgrounds are located in the area: two in Lakeshore, one in Point, and one at the beach. Electric service and lights are provided. A few stand-alone play structures (diggers, ride ons) are located near the shelter and not associated with a larger playground.
- SWIM BEACH. A ½ acre sand beach is located below Loop 1 and is the sole designated swim beach on the lake. No lifeguards monitor the area.
- BULLETIN BOARDS. Bulletin boards are provided a most comfort stations, the gate house, and the beach. A lifejacket loaner station is located at the park entrance to accommodate entering swimmers and boaters.
- UTILITIES. Utilities include buried and overhead electric lines, and underground water and sewer lines.
- ROADS & PARKING. Interior park roads include lane 2.9 miles of asphalt paved road. Hardened parking can accommodate some 150 vehicles (30 trailered).
- FISH & WILDLIFE.
 - FOOD PLOT. A 1.2-acre food plot is located at the extreme western edge of the unit to benefit wildlife.

5) Resource Objectives:

- (a) To maintain natural and recreational resources for future generations.
- (b) To provide for an intensive, structured recreation opportunity through a concentration of park facilities that can withstand the impact of heavy visitor use.
- (c) To provide overnight camping related facilities for both transient and destination users and groups.

- (d) To provide day use facilities.
- (e) To provide boating and fishing access.
- (f) To provide a resource base for interpretive programs and facilities.

6) Development Needs

(a) **SWIM BEACH RENOVATION.** The Tuttle Cove beach is the only designated swim beach on the lake. Use is minimal due to the degraded surface and lack of amenities. This project would include installation of submerged beach mat to retain sand quality, delineation to retain land-side beach surface, universally accessible walkways, and outdoor shower. Renovation would also include replacement of existing playground and addition of complementary visitor amenities such as picnic sites and shelter tops.

(b) **POINT SHELTER RENOVATION.** The point shelter is a remnant of the old day use area and does not meet modern design standards for layout and amenities. The shelter is seldom used and creates a conflict of user groups within the confined camping loop. This project would include removal of the shelter and construction of overflow parking and observation area for quiet reflection.

(c) **OVERFLOW PARKING.** Parking is limited within Lakeshore and Point Loops, and visitors are reluctant to utilize overflow parking at the beach and boat ramp. As a result, vehicles are illegally parked along the roadside and in the grass. This project would establish roadside overflow parking complete with anchors for securing trailers.

(d) **TRAIL SYSTEM.** A purpose-built trail system would provide more land-based recreation opportunities for the area and meet local demands for hiking opportunities. Project would include installation of a stacked loop, non-motorized trail system providing one hour to full day hikes, connection to park facilities, and interpretive messages.

(e) **PICNIC AREA RENOVATION.** The current shelter is underutilized due a lack of electrical and water utilities and a playground. This project would connect water and electric, and install a small playground to complement the existing shelter.

(f) **CAMPSITE RENOVATIONS.** Renovate Loops 1 and 2 with water/electric hookups, elevated and delineated site and living pads, and shelter tops. Designs will take into consideration exposure to cyclical flooding.

(g) **BOAT RAMP EXPANSION.** Expand existing ramp to three lanes to accommodate large boats and additional traffic associated with eventual siltation and loss of upstream launch points.

7) Special Considerations

(a) PERMITS & FEES. Permits and fees are applicable to Tuttle Cove, consistent with established Corps Recreation Use Fee regulations. Pertinent use activities include camping, shelter reservations, and specialized use.

(b) GATED ENTRANCE. Due to its proximity to a population center, Tuttle Cove is prone to overnight parties with frequent alcohol-related offenses. In 2010 an entrance gate and egress tire rippers were installed to enforce day-use park hours. Closure of the gate has dramatically reduced overnight violations.

(c) ADJACENT DEVELOPMENT. Extensive residential development is located on adjacent private lands as part of the Stony Brook Subdivision.

Unit 35 – Thompson Divisions

1) Classification: MRM: Low-Density Recreation

2) Management Agency: Corps

3) Location/Acreage: This unit includes 97.6 acres located ½-5 miles upstream from the dam on the western (Riley County) shoreline. It is bound by Tuttle Cove PUA to the north, the lake to the east, Observation Point PUA to the south, and the fee boundary to the west.

4) Description and Use. The unit is accessible from two points: the terminus of Vista Acres Drive (paved) and an unnamed road leading to Crappie Cove (partial gravel), both via Tuttle Cove Road one to two miles from Highway K-13. This approximately four-mile long unit is a narrow band of land (averaging some 250 feet wide) comprised of steep hillsides which descent sharply (20-40% grades) to a steep, rocky, and exposed lakeshore. A handful of small, somewhat less steep coves intersect the band, but the overall shape of the unit remains narrow. One named cove: Crappie Cove generally defines the north end of the unit. Lakeshore within these coves is somewhat less rocky and shallower. There are no watercourses within this unit, and 2.91 acres of freshwater emergent wetlands have been identified by FWS (concentrated in coves).

Upland soils are typical of residuum hillslopes along the western lakeshore: shallow, rocky silty clay from weathered shale and limestone. Lowland colluvium soils are limited to the coves and comprised of somewhat deeper silty clay loams. The highest elevations are dominated by oak-hickory forest with a scattering of mature cedar stands, but the majority of the unit (comprised of steep lakeshore) is bare soils with low value mono-forage isolated to the largest coves.

Historical surveys have been conducted for this area and there are no sites located in the unit. No additional surveys are recommended by the HPMP.

This unit is designated for low density recreation: providing open space between developments and land which, by virtue of use, is incompatible with recreational development and would detract from the quality of public use. There are no lands in this allocation that do not aid in successful completion and operation of this authorized purpose. Improvements include:

- OPERATIONAL. None.
- RECREATION.
 - CRAPPIE COVE. Crappie Cove is a named cove located 1.7 miles upstream from the dam. An 800 foot gravel road, pull-off / parking area and pipe gate are maintained by the Corps of Engineers. The area is very popular given its proximity to populated areas and ease of access. Popular activities include shoreline fishing and scenic/wildlife viewing.
- FISH & WILDLIFE. None.

5) Resource Objectives:

- (a) To maintain natural and recreational resources for future generations.
- (b) To provide the public with an unstructured recreation opportunity in a natural environment.
- (c) To provide a buffer between housing subdivisions and parks.

6) Development Needs

- (a) RENOVATE CRAPPIE COVE ACCESS. The current design provides an isolated road termination that is an attractive nuisance for frequent illegal activity related to alcohol/drugs, camping, littering, ground fires, amongst other violations. Project would include delineating a parking area at the entrance with robust physical barriers and maintaining the remaining acreage as walk-in only. Additionally work would include removal and remediation of legacy roadbed.

7) Special Considerations

- (a) ADJACENT DEVELOPMENT. Extensive residential development is located on adjacent private lands as part of numerous Subdivisions.
- (b) LEGACY ACCESS. Numerous access roads, parking areas, and ramps were authorized by permit in this unit in the early 1960s, but were terminated and abandoned due to siltation and disrepair beginning in the late 1970s. Legacy accesses no long authorized include:
 - (1) OAK SHORES. Located at the terminus of Hoyt Lane via Oak Shores road. No pubic or vehicle access.
 - (2) VISTA ACRES. Located at the terminus of Vista Acres Drive. Non-motorized public access remains via the original roadbed.

Unit 36 - Observation Point PUA

1) Classification: High Density Recreation

2) Management Agency: Corps

3) Location/Acreage: This unit includes 107.8 acres located immediately upstream of the dam on the western (Riley County) shoreline. The unit is generally bound by the fee boundary to the north, lake to east, Highway K-13 to the south, and Tuttle Cove Road to the west.

4) Description and Use. This unit exclusively includes the Observation Point PUA and Riley County Rural Fire Department lease in their entirety. Access is provided via Observation Point Drive via Tuttle Cove Road just off Highway K-13. One magnetic loop traffic counter records traffic for the area. This unit is comprised of two ridge tops which descend steeply (15-25% grades) to the lakeside shoreline and a gully along the backslope. The shoreline is steep, rocky and exposed. One unnamed watercourse runs between the ridge tops. There are no wetlands in this unit identified by FWS.

Uplands are typical of the Flint hills region with shallow, highly erodible silty-clay residuum from limestone and shale. Exposed rock outcrops are common along the hillside breaks. The ridges and hillsides are dominated by a Tall grass prairie stand with moderate encroachment of woody first-succession species (sumac, dogwood, cedar). The gully is a mature oak forest with minimal cedar. Landscape plantings are limited to a handful of ornamental shrubs and redbud trees.

Historic surveys have been conducted for portions of this area and there is one site identified in the unit which is a listed historic property. Additional surveys are recommended by the HPMP.

This area is designated for Recreation-intensive use; providing a developed area for intensive recreation activities by the visiting public consistent with the authorized recreation mission. There are no lands in this allocation that do not aid in the successful completion of this authorized purpose. Improvements include:

- OPERATIONAL.
 - TOWER. A communications tower, 3,440 sf fenced utility yard, storage buildings, and 325 foot gravel service road are located at the apex of the eastern ridge top to facilitate radio and cellular communications. In addition to Corps equipment, additional space is leased to various parties.
 - FIRE STATION. A three-acre fire station inclusive of a 6,600 sf fire station, access road and parking area is located just east of Highway K-13, and operated under a non-recreational out grant agreement with Riley County Rural Fire Department.
- RECREATION. Observation Point offers day use activities. Popular activities include scenic viewing, hiking, and bird/wildlife watching.
 - OVERLOOK. A 300 sf sheltered overlook dating from original construction circa 1662; accompanied by two interpretive way station panels, seating, and informational bulletin board provide visitors' opportunity to enjoy the lake and Flint hills view shed.

- PICNIC AREAS. A picnic shelter with a compliment of concrete pad, walkway and tables is the first recreational improvement to the lake and dates from 1956
- INTERPRETIVE TRAIL. A nearly one-mile long stacked loop trail is available to non-motorized use located behind the picnic shelter. The trail provides close-up views of the Tall grass Prairie as it traverses the hill slope. Wayside panels along the trail provide interpretive messages.
- ROADS & PARKING. Interior park roads include 0.59 miles of two-lane asphalt paved road (maintained by the Corps). Asphalt paved, unlined parking can accommodate some 80 vehicles.
- UTILITIES. Utilities include overhead power lines supporting the radio tower area.
- FISH & WILDLIFE. None.

5) Resource Objectives:

- (a) To maintain natural and recreational resources for future generations.
- (b) To provide for an intensive, structured recreation opportunity through a concentration of park facilities that can withstand the impact of heavy visitor use.
- (c) To provide overnight camping related facilities for both transient and destination users and groups.
- (d) To provide day use facilities.
- (e) To provide a resource base for interpretive programs and facilities.

6) Development Needs

- (a) TRAIL SYSTEM. Renovate existing trail to meet sustainable trail design requirements, and achieve interpretive objectives including new wayside panels. Expand trail to include stacked loops further exploring gully, ridge tops, and hillsides throughout unit. Consider link to City of Manhattan trail systems.
- (b) HABITAT DEMONSTRATION AREA. Establish test plots to study and interpret the use of prescribed fire as a management tool for the Tall grass Prairie. Incorporate area into trail system design.
- (c) RENOVATE PICNIC SHELTER. Renovate picnic shelter area to include larger, modern shelter with utilities, new tables, grill space, and landscape/shade plantings. Options to incorporate special event design elements (i.e. weddings and other ceremonies) should be considered.
- (d) RENOVATE OVERLOOK. Renovate overlook to include larger modern structure with integrated interpretive design features focusing on project history and missions. Methods to incorporate existing, historic masonry should be considered.

7) Special Considerations

(a) ADJACENT DEVELOPMENT. Extensive residential development is located on adjacent private lands as part of the Lakewood, Faith McIntyre, and Mobile Gardens Subdivisions.

(b) REGIONAL PLANNING. The City of Manhattan is projected to double in size by 2030. Development is bound by flood plains to the east and south, and Ft. Riley to the west; meaning much of this growth will continue to expand northward towards the project. As such, close coordination with City planners is recommended to evaluate and strategize complementary facilities and services.

(c) VIDEO SURVEILLANCE. The area is monitored remotely by cameras in support of dam safety and security programs.

Chapter 6 - Special Topics/Issues/Considerations

SEDIMENTATION

Sedimentation is the deposit and accumulation of sediments in a lake. It is a known process and considered in the design of all lake projects. At Tuttle Creek, as sediment is deposited a delta is formed along the northern end of the lake. As the lake ages, the delta extends southward towards the dam. Eventually sediment will fill the entire multipurpose pool (i.e. permanent or recreation pool) and the lake will become a dry lake with an intermittent flood pool. Original design projections and the actual location of the historic deltas are identified in Appendix B. It should be noted the actual delta is roughly 25 years behind the projected delta; meaning the lifespan of the multipurpose pool was underestimated and the lake is performing better than expected.

Sediment loading at Tuttle Creek is primarily the result of private land management practices across numerous geographic and political boundaries, and has proven difficult to systematically control and prevent. Once sediments reach the lake there are few options available. Dredging is prohibitively expensive and relocation of materials is ecologically impractical, not to mention impermanent. Pool manipulation (raising the multipurpose pool) is impossible due to design flood storage requirements. Other methods such as wetland settlement cells, and sediment bypass systems have been discussed and are under further review to determine feasibility, but will in the end only slow the progression of the delta.

Tuttle Creek has a reputation for being a very turbid (i.e. muddy) lake with a sedimentation rate of 3,600 acre feet per year, enough to fill a string of dump trucks bumper-to-bumper from the lake to Los Angeles, CA. This rate is much higher than neighboring lakes for several reasons. First, the upstream watershed is substantially larger than other lake project on the lower Kansas River (roughly the size of Vermont). Second, the watershed basin is comprised primarily of row-crop agriculture and prone to soil erosion. And third, no other lake projects are located upstream of Tuttle Creek in which to catch and filter sediment loads. These factors were known during the original design process and again taken into consideration.

Sedimentation has and will continue to impact recreation at Tuttle Creek. To date, three parks (Swede Creek, Garrison, and Baldwin) and numerous private/community docks and ramps have been closed as a direct impact of sedimentation, lost lake access, and decreased demand. Two parks (Fancy Creek and Randolph) have converted to primarily land-based recreation with the loss of boat ramps and a marina. As sediments continue to accumulate and the delta extends southward, the size of the multipurpose pool and the lake's recreational opportunities will continue to decrease. Mitigation of recreational impacts include small scale dredging of boat ramps and small coves (not sustainable), park closures, conversion of park areas to land-based recreation, and concentration of recreational development towards the southern lake area.

Sedimentation impacts to the natural resources are double sided. Suspended sediments carry nutrients and metals which accelerate eutrophication and limit fishery production for native and game fish species. However, sedimentation creates more land

base providing terrestrial and wildlife habitat (especially wetlands), and expanded opportunity for wildlife viewing and hunting. It should also be noted that as sedimentation decreases multipurpose pool water storage capacity, more frequent and longer drawdowns associated with downstream water supply demands will occur.

NUTRIENT ENRICHMENT

Nutrients (i.e. phosphorous and nitrogen) are essential for aquatic life and are the primary factor driving fish and aquatic plant growth rates and productivity. Excess nutrients from urban, agricultural or natural sources increases the natural aging or eutrophication process in lakes. This can alter plant and aquatic life in lakes, cause algal blooms, create low dissolved oxygen that affect fish survival, and lead to taste and odor issues in drinking water. Tuttle Creek frequently has the highest nutrient levels in the Kansas City District. However, the lack of sunlight penetration due to turbidity and suspended sediments in the lake limits plant/algae growth and other measures of productivity. Decreased turbidity resulting in improved sunlight penetration would likely result in significant harmful algae blooms necessitating water contact restrictions and land-based closures.

The Kansas Department of Health and the Environmental Protection Agency are working with water quality partners, landowners and an active Tuttle Creek Watershed Restoration and Protection Strategy (WRAPS) group. Together they provide recommended best management practices for target areas in the watershed to reduce siltation, improving long-term water quality goals and increasing the life span of the lake.

LAKE ELEVATION FLUCTUATION

Lake level fluctuations at Tuttle Creek, particularly above multipurpose pool, has and will continue to impact the recreation and natural resource missions. Very little can be done to prevent the flooding which is the result of downstream flood risk management operations; the project's primary mission. However, it should be noted the frequency and intensity of lake fluctuations at Tuttle Creek are much more extreme than other District Lakes due to watershed characteristics and project design thresholds.

The greatest influence on design and development is the design capacity of the dam which bears a 65-foot lake rise from multipurpose pool, far higher than any other lake in the District. Case in point: the high pool of record in 1993 when the lake reached 1137.77 MSL, nearly 63 feet above multipurpose pool elevation, causing extensive, lasting damage to parks, concessions, boat docks, and vegetation.

Table 6.1 summarizes annual high and low elevations and flood probability data from 1962 through 2017. By comparing the frequency data with the actual maximum annual elevations experienced, there is nearly a 50% probability that significant impacts (lost access to recreational facilities, inundated crops, transport of flood debris) can be anticipated in a given year. Although persistent, these impacts are typically brief and temporary. Efforts to mitigate impacts include concentrating development above the 2-year pool elevation, utilization of robust building materials (concrete vs. wood for example), and adaptable features (e.g. quick release sleeves for removing signs and bulletin boards).

Table 6.1
Annual Maximum and Minimum Lake Elevations and Flood Potential

YEAR	MAXIMUM (HIGH POOL)			MINIMUM (LOW POOL)	
	DATE	ELEVATION	FREQUENCY OF RECURRENT	DATE	MINIMUM ELEVATION
1962	31-Dec	1063.09	50%	30-Apr	1031.75
1963	29-Jun	1081.68	50%	25-Nov	1071.39
1964	26-Jun	1089.39	20%	24-Nov	1069.98
1965	7-Jul	1094.28	20%	1-Jan	1071.00
1966	16-Jan	1077.09	50%	30-Sep	1072.18
1967	22-Jun	1090.17	20%	4-Jan	1060.82
1968	21-Oct	1086.58	50%	23-Jul	1073.32
1969	25-Mar	1084.98	50%	5-Dec	1071.71
1970	12-May	1078.68	50%	1-Jan	1073.53
1971	25-May	1084.66	50%	27-Oct	1072.83
1972	8-Sep	1082.06	50%	12-Jun	1074.89
1973	18-Oct	1127.90	4%	25-Feb	1073.74
1974	28-Jun	1079.70	50%	4-Dec	1068.99
1975	28-Jun	1086.45	50%	8-Jan	1068.97
1976	27-Apr	1083.60	50%	31-Dec	1072.69
1977	16-Sep	1086.10	50%	8-Feb	1072.17
1978	23-Mar	1096.60	20%	20-Jan	1073.37
1979	26-Mar	1109.10	10%	26-Dec	1073.08
1980	6-Apr	1091.92	20%	3-Dec	1069.58
1981	29-Jul	1083.50	50%	14-Feb	1069.25
1982	3-Jun	1091.50	20%	21-Apr	1074.90
1983	3-Jul	1097.98	20%	24-Dec	1072.08
1984	25-Jun	1112.20	4%	24-Jan	1071.90
1985	13-Oct	1086.16	20%	1-Aug	1072.92
1986	16-Oct	1099.46	10%	18-Feb	1072.85
1987	17-Apr	1111.67	4%	9-Jun	1071.18
1988	16-Jul	1078.74	50%	31-Dec	1069.42
1989	11-Sep	1086.61	50%	17-Jan	1069.17
1990	20-Jun	1096.31	20%	20-Feb	1070.46
1991	3-Jun	1080.07	50%	14-Nov	1068.55
1992	31-Jul	1098.47	10%	1-Jan	1069.32
1993	23-Jul	1137.77*	2%	13-Dec	1071.68
1994	20-Oct	1079.31	50%	1-Mar	1071.34
1995	2-Jun	1105.02	10%	6-Jan	1071.72
1996	7-Jun	1096.64	20%	5-Feb	1071.71

1997	28-Jun	1080.02	50%	7-Mar	1072.05
1998	6-Nov	1088.92	20%	25-Feb	1072.03
1999	6-Jul	1091.18	20%	11-Jan	1072.00
2000	29-Jul	1086.37	50%	29-Dec	1069.02
2001	19-Mar	1092.74	20%	12-Jan	1068.36
2002	2-Jun	1081.85	50%	2-Oct	1068.75
2003	2-Jul	1086.37	50%	24-Jan	1068.69
2004	18-Jun	1083.78	50%	12-Jan	1071.56
2005	15-Jun	1084.12	50%	17-Mar	1071.85
2006	9-Jun	1076.62	50%	3-Nov	1067.54
2007	30-May	1100.72	10%	16-Feb	1068.55
2008	16-Jun	1097.98	20%	26-Mar	1072.17
2009	4-May	1083.73	50%	25-Feb	1071.68
2010	9-Jul	1106.53	10%	22-Jan	1071.69
2011	4-Sep	1092.42	20%	7-Mar	1071.88
2012	13-Apr	1080.33	50%	31-Dec	1062.57
2013	3-Jun	1089.02	20%	15-Jan	1062.33
2014	10-Jun	1083.81	50%	18-Feb	1072.47
2015	19-Jun	1111.17	4%	1-Apr	1072.45
2016	3-Jun	1097.93	20%	20-Dec	1072.40
2017	26-May	1092.09	20%	31-Jan	1071.87

* high pool of record

ZEBRA MUSSELS

Zebra Mussels were detected within Tuttle Creek Lake in 2017. This invasive species poses significant management challenges throughout the three major business lines of Recreation, Natural Resource, and Flood Risk Management. Impacts include terrestrial hazards from accumulated shells with sharp edges, malodor for decomposing mussels, and accumulation of mussels on submerged structures (intake pipes, service gates, pumps, docks, etc.). Treatment methods have focused on public outreach and education to prevent of transport between water bodies, and retrofitting of submerged structures.

POPULATION GROWTH

Regional economic growth is very strong as compared to the rest of the state and the Midwest as indicated by high rates of employment and earnings. Not surprisingly both Pottawatomie and Riley counties are ranked second and third in the state for highest growth rates (6.0% and 5.7%, respectively). Additionally, demographics skew much younger than the rest of the state (between 24 and 25) due in large part to the transient Kansas State University and Fort Riley populations. As a result, the Manhattan area is projected to double in size over the next two decades, but essentially boxed in

by the Blue and Kansas River floodplains to the south and east, and Fort Riley to the west.

Impacts to the lake will include more urban interface as the city expands northward into the southern lake area (downstream public property is already identified in urban planning zones). Changing visitor demands are also likely as younger, more affluent users seek outdoor recreation opportunities in the area. Management efforts should include close coordination with city planners to evaluate and strategize complementary facilities and services, and modification and addition of facilities to meet new demands.

LIMITED LAND BASE

A combination of original land acquisition methods and terrain has resulted in a minimal public land base surrounding the lake. The majority of the shoreline is steep and unsuitable for recreation development. Likewise access for land and habitat management is limited to non-existent. In those areas where land is suitable/accessible, it is generally only so for a short distance and prone to inundation. An alternative to small, confined development along the lakeshore would be to place developments (campgrounds, picnic areas) along the bluffs overlooking the lake, but this type of development has historically been unpopular with the public due to poor access to the water. As a result, these higher elevations are typically maintained in wildlife habitat (where accessible).

Chapter 7 - Agency and Public Coordination

On December 5, 2017, a public scoping meeting was held at the lake visitor center in order to identify any issues, concerns, comments of the lake stakeholders. The meeting consisted of a power point presentation on the lake's operation and management, as well as an overview of the master planning process. Approximately 29 people attended this meeting, excluding Corps employees.

On December 5, 2017, a meeting was held with KDWPT staff. The purpose of the meeting was to discuss future activities on the leased wildlife-management lands. Two members of the KDWPT staff were present at the meeting.

Chapter 8 - Summary of Recommendations

The Master Plan for Tuttle Creek Lake was last approved in 1984. Over the past 34 years population demographics as well as the economy have undergone changes. These changes can affect patterns of recreation and usage and require a frequent examination of project management objectives and facilities

This Master Plan conceptually establishes and guides the orderly development, administration, maintenance, preservation, enhancement and management of all natural, cultural, and recreational resources at Tuttle Creek Lake. The Master Plan is a land-use management document and does not address water-management operations and associated prime facilities (dam, spillway, etc.), as those operations are outlined in separate documents. The Master Plan is stewardship driven and seeks to balance recreational development and use with protection and conservation of natural and cultural resources.

Facility Modernization

It is the goal of the Tuttle Creek Lake to continue to modernize current facilities within existing footprints of recreation areas, bringing them up to modern standards.

Recreational Amenities

Additional amenities should be added as demand warrants and recreation trends dictate the types of facilities that be added, consistent with the Corps' recreation policy.

Reclamation of Legacy Facilities

Removal and/or reclamation of abandoned and little used facilities and amenities allows for restoration of previously used places to native vegetation. This decreases habitat fragmentation while also increasing habitat quantity and value.

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