

CARLYLE LAKE

KASKASKIA RIVER, ILLINOIS

THE MASTER PLAN



**US Army Corps
of Engineers**
St. Louis District®

Revised 1974
Updated 1979, 1986, 1997, 2016

PREFACE

Construction of Carlyle Lake began in 1958 and was completed in June 1967. The original Master Plan was approved in 1962, then revised in 1974 and updated in 1979, 1986 and 1997. The Master Plan serves as a guide for the orderly development of land and water resources within the boundaries of the Carlyle Lake Project.

The most significant difference between this updated plan and the 1997 Master Plan is this plan is more consolidated, more graphic and easier to understand. The map plates have all been revised using modern technology and satellite imagery. All natural, cultural, environmental and recreation resources have been reevaluated using the most current data and visitor use trends.

This update, Carlyle Lake Master Plan - 2016, was developed in accordance with current U.S. Army Corps of Engineers regulations and guidance and meets all Federal requirements contained in the National Environmental Protection Act (NEPA). All but two of the proposed actions within the plan were determined to be Categorically Excluded from further NEPA review. The two proposed actions that may require further NEPA action are development of a primitive trail in the East Spillway Area and a potential land classification change at South Shore State Park

Throughout the update process, input was obtained from stakeholders, such as the Illinois Department of Natural Resources, marina concessionaires, watershed associations and environmental groups. In addition, input obtained from lake users, local civic groups and members of the general public was taken into consideration in developing this plan.

Recent scientific studies and reports related to outdoor recreation, natural, cultural and environmental resources were reviewed, evaluated and incorporated appropriately in this Master Plan update. All recreation area site plans were revised to reflect existing and proposed development.

Upon approval of this updated Master Plan, funding to accomplish proposed activities must still be obtained through the U.S. Army Corps of Engineers budget formulation process.

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CARLYLE LAKE POOL ELEVATION – DURATION CURVE (1962-2015)	N/A	N/A	2A
CARLYLE LAKE – FREQUENCY CURVE (1962-2015)	N/A	N/A	2B
LAND ALLOCATION	N/A	N/A	3
LAND CLASSIFICATION	N/A	N/A	4
LAND CLASSIFICATION – PROJECT OPERATIONS	N/A	PO	5
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Master Plan Plate Name	Managing Entity	Type of Area Classification <i>(See Page xvii)</i>	Master Plan Plate #
BOULDER RECREATION AREA	USACE	HDR	14
COLES CREEK RECREATION AREA	USACE	HDR	15
DAM WEST SPILLWAY	USACE	HDR	16
DAM EAST SPILLWAY	USACE	HDR	17
MCNAIR RECREATION AREA	USACE	HDR	18
DAM EAST RECREATION AREA	USACE	HDR	19
GENERAL DEAN RECREATION AREA	USACE	HDR	20
HUNTER/FISHERMEN ACCESS AREAS	USACE	MRM-LDR	21
JAMES W. HAWN ACCESS	USACE	MRM-VM	22
BOULDER FLATS – NORTH FORK	USACE	MRM-VM	23
BOULDER FLATS – EAST FORK	USACE	MRM-VM	24
SADDLE DAM 3	USACE	MRM-VM	25
IDNR HAZLET STATE PARK	IDNR	HDR	26
IDNR SOUTH SHORE STATE PARK	IDNR	HDR	27
IDNR WILDLIFE MANAGEMENT AREA	IDNR	MRM-WM	28
WEST ACCESS MARINA	Commercial Marina	HDR	29
TRADEWINDS MARINA	Commercial Marina	HDR	30
BOULDER MARINA	Commercial Marina	HDR	31

**TYPE OF AREA CLASSIFICATION ABBREVIATIONS
LIST OF PLATES**

Abbreviation	Description/Classification
ESA	Environmentally Sensitive Area
FE	Flowage Easement
HDR	High Density Recreation
IDNR	Illinois Department of Natural Resources
MRM-LDR	Multiple Resource Management – Low Density Recreation
MRM-VM	Multiple Resource Management – Vegetative Management
MRM-WM	Multiple Resource Management – Wildlife Management
N/A	Not Applicable
PO	Project Operations
USACE	US Army Corps of Engineers
WS-FWS	Water Surface – Fish & Wildlife Sanctuary
WS-NW	Water Surface – No Wake
WS-OR	Water Surface – Open Recreation
WS-R	Water Surface – Restricted

COMMONLY USED ACRONYMS AND ABBREVIATIONS

ABA	Architectural Barriers Act
ACRCC	Asian Carp Regional Coordinating Committee
ADA	Americans with Disabilities Act
AR	Army Regulation
BAOT	Boats At One Time
B&N	Burlington and Northern
CFR	Code of Federal Regulations
CFS	Cubic Feet per Second
CLA	Carlyle Lake Association
CSA	Carlyle Sailing Association
DM	Design Memorandum
E	Electric
EA	Environmental Assessment
EC	Engineer Circular
EIS	Environmental Impact Statement
EM	Engineer Manual
EO	Executive Order
EOP	Environmental Operating Principles
EP	Engineer Pamphlet
ER	Engineer Regulation
ERGO	Environmental Review Guide for Operations
ESA	Environmentally Sensitive Area
FY	Fiscal Year
GIS	Geographical Information System
IDNR	Illinois Department of Natural Resources
HPMP	Historic Properties Management Plan
ISOP	Interpretive Services and Outreach Program
KRW	Kaskaskia River Watershed
KWA	Kaskaskia Watershed Association
LEED	Leadership in Energy and Environmental Design
LKSI	Lower Kaskaskia Stakeholders, Inc.
LMVD	Lower Mississippi Valley Division
LR	Letter Report
LSDA	Lake Shelbyville Development Association
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MP	Master Plan

MSL	Mean Sea Level
N	New
NAGPRA	Native American Graves Protection and Repatriation Act
NCA	National Center on Accessibility
NEPA	National Environmental Policy Act
NGRREC	National Great Rivers Research and Education Center
NGVD	National Geodetic Vertical Datum
NOAA	National Oceanic & Atmospheric Administration
NPS	National Park Service
NRRS	National Recreation Reservation Service
O&M	Operations and Maintenance
OKAWI	Original Kaskaskia Area Wilderness, Inc.
OMBIL	Operations and Maintenance Business Information Link
OMP	Operational Management Plan
ORBC	Okaw River Basin Coalition
ORP	Oxidation-reduction Potential
PA	Previously Approved
PDT	Project Delivery Team
PL	Public Law
PS	Project Site
PSA	Project Site Area
R	Replacement
S	Sewer
SCORP	State Comprehensive Outdoor Recreation Plan
SF	Square Feet
SHPO	State Historic Preservation Office
SMSA	Standard Metropolitan Statistical Area
SPCCP	Spill Prevention, Coordination and Countermeasure Plan
SSSP	South Shore State Park
STP	Sewage Treatment Plant
SWCD	Soil and Water Conservation District
T&E	Threatened and Endangered
TOC	Total Organic Carbon
TSS	Total Suspended Solids
TVSS	Total Volatile Suspended Solids
UA	Universal Accessibility
USACE	US Army Corps of Engineers
USC	United States Code
USFS	United States Forest Service

USFWS	US Fish and Wildlife Service
V	Vault
VERS	Visitor Estimating and Reporting System
W	Water
WB	Waterborne
WMA	Wildlife Management Area
WQ	Water Quality
WRDA	Water Resources Development Act

CARLYLE LAKE

MASTER PLAN - 2016

Kaskaskia River Watershed Carlyle, Illinois

CHAPTER 1

INTRODUCTION

1.1. Project Authorization

Carlyle Lake was authorized by Congress through the Flood Control Act of 1938 and modified by the Flood Control Act of 1958, House Document No. 232, Eighty-fifth Congress, 1st session.

1.2. Project Purposes

The Authorized Project Purposes for Carlyle Lake are:

- A. **Flood Risk Management.** Authorized by Public Law (PL) 75-761, June 28, 1938, Flood Control Act of 1938 and PL 85-500, July 3, 1958, Flood Control Act of 1958 (Title II). The primary mission of Flood Risk Management is to save lives and reduce property damage associated with storms and floods.
- B. **Navigation.** Authorized by PL 85-500, July 3, 1958, River and Harbor Act of 1958 (Title I). The primary mission of Navigation is to provide safe, reliable and efficient waterborne transportation systems for the movement of commerce, national security needs and recreation.
- C. **Water Supply.** Authorized by PL 85-500, July 3, 1958, Water Supply Act of 1958 (Title III). The primary mission of water supply is to develop, control, maintain, and conserve the Nation's water resources.
- D. **Water Quality.** Authorized by PL 78-534, December 22, 1944, Flood Control Act of 1944. The primary mission of water quality is silt control, soil erosion

prevention, pollution abatement, improving water quality for municipal water supplies, recreation and fish and wildlife conservation.

- E. **Fish & Wildlife Conservation.** Authorized by PL 85-500, July 3, 1958. The primary mission of fish & wildlife conservation is to manage and conserve natural resources, consistent with ecosystem management principles, while providing quality public outdoor recreation experiences to serve the needs of the present and future generations.
- F. **Recreation.** Authorized by PL 78-534, December 2, 1944, Flood Control Act of 1944 and PL 85-500, July 3, 1958, River and Harbor Act, Title 1 The primary mission of recreation is to provide a sustainable level of high quality water-oriented outdoor recreation opportunities within a safe and healthful environment that meets the needs of present and future generations

A complete list of Legislative Acts and Public Laws associated with the authorized project purposes for Carlyle Lake can be found in **Chapter 2.15**.

1.3. Purpose and Scope of Master Plan

This Master Plan update was developed in accordance with guidance contained in Engineering Regulation (ER) 1130-2-550, Recreation Operations and Maintenance Policies and Engineering Pamphlet (EP) 1130-2-550, Recreation Operations and Maintenance Guidance and Procedures, Chapter 3, both dated 30 Jan 2013.

The Master Plan is the strategic land use management document that guides the comprehensive management and development of all recreational, natural, and cultural resources located on fee and easement lands and waters at Carlyle Lake.

The Master Plan guides and articulates US Army Corps of Engineers (USACE) responsibilities pursuant to Federal Laws to preserve, conserve, restore, maintain, manage and develop 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 implements the concepts of the Master Plan into operational actions.

USACE Environmental Operating Principals were used as an overarching guide in developing this Master Plan update. The Environmental Operating Principals¹ are:

¹ USACE Environmental Operating Principals, 2012

- Foster sustainability as a way of life throughout the organization.
- Proactively consider environmental consequences of all USACE 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 USACE, 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 UACE actions in a collaborative manner.
- Employ an open, transparent process that respects views of individuals and groups interested in USACE activities.

A Master Plan is developed and kept current for all Civil Works projects operated and maintained by the USACE and includes all land and water (fee, easement, or other interests) originally acquired for the project and any subsequent land and water (fee, easement, or other interests) acquired to support the operations and authorized purposes of the project.

The Master Plan is not intended to address the specifics of regional water quality, shoreline management, or water level management. These activities are covered in other project plans. However, specific issues identified through the Master Plan update process can still be communicated and coordinated with the appropriate internal USACE entities or external resource agencies such as the Illinois Department of Natural Resources.

This Master Plan (2016) replaces all previous Master Plans and Master Plan updates for Carlyle Lake. The original Master Plan was approved in 1962 and updated in 1974, 1986, 1992 and 1997. **Table 1-1**, provides a summary of previous Master Plans, Supplements and Letter Reports for Carlyle Lake.

Table 1-1 Prior Master Plans, Supplement, Letter Reports and Approval Dates

Master Plan Year	Supplement/ Letter Report Number	Title & Brief Description	Date Approved
1962	1	Revisions to Patoka & Tamalco Access & Boat Dock Areas	4 Sep 1964
1962	2	Upgrade Surfacing for all Access Roads & Parking Areas	13 Aug 1964
1962	3	Upgrade Sanitary Facilities at Spillway, Dam West and Dam East Recreation Areas	21 Apr 1967
1962	4	Upgrade Sanitary Facilities at Coles Creek Recreation Area	27 Jul 1967
1962	LR 1	Change Concession Boundary, West Access Area	16 Jan 1968
1962	LR 2	Change Land Use from Future Camping Area to Future Commercial Concession at Coles Creek Recreation Area	12 Nov 1968
1962	5	Land Use Change	Not Approved
1962	LR 3	Approval of Commercial Concession Location, Coles Creek Recreation Area	22 May 1969
1962	6	Excavation of Boat Harbors & Construction of Breakwaters at Keyesport, Boulder, Coles Creek, and Dam West Recreation Areas	9 Mar 1970
1962	7	Provide Electrical Hookups for Campsites in Coles Creek Recreation Area	26 Feb 1971
1962	8	Multi-purpose Forest Management Plan	Not Approved
1962	9	Upgrade Sanitary and Recreational Facilities at Boulder Recreation Area	9 Mar 1972
1974	1	Upgrade Beach Sanitary Facilities at Dam West and Coles Creek Recreation Areas	19 Nov 1974
1974	2	Development of Commercial Marina Concessions	7 Jun 1976
1974	3	Updated Plans from the Illinois Department of Natural Resources for Recreation Resource Development	25 Feb 1977

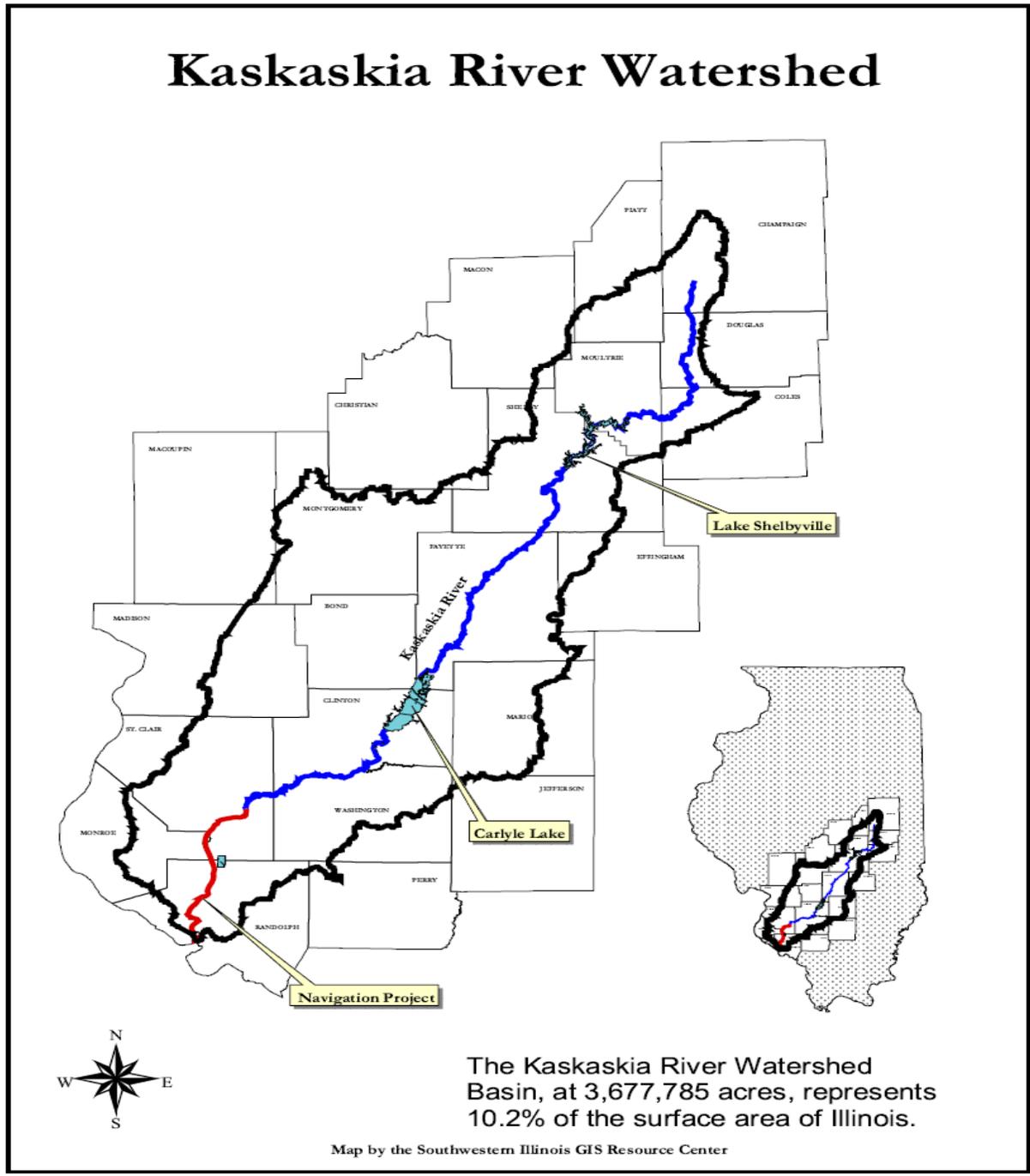
Continued on Next Page

Master Plan Year	Supplement/ Letter Report Number	Title & Brief Description	Date Approved
1974	4	Land Use Reallocations and Updated all Site Plans to Reflect As-Built Condition	14 Dec 1979
1986	5	Update Obsolete Material in Master Plan Text & Revise Site Plan Drawings to Reflect Current As-Built Condition	10 Sep 1987
1986	6	Provide Shower Facilities, Remove Three Vault Toilets, and Construct two Water-Borne Comfort Stations in Dam West and Coles Creek recreation areas	7 Nov 1989
1986	7	Proposed Construction of Resort Lodge and Golf Course Adjacent to Dam West Recreation Area Including Environmental Assessment and Land Exchange with South Shore State Park	10 Aug 1992
1997	1	Water/Sewer hook-ups Coles Creek & Update of Maintenance Compound	19 Apr 1999
1997	2	High water access facilities	30 May 2006
1997	3	Updates to recreation facilities based on updated use patterns	17 Apr 2009
1997	4	Replacement of existing facilities	13 Feb 2014
1997	5	Approval of lease area Dam East Recreation Area	6 Apr 2014

1.4. Watershed and Project Description

1.4.1. Watershed Description. There are three USACE Civil Works Projects located within the Kaskaskia River Watershed: 1) Lake Shelbyville, 2) Carlyle Lake and 3) Kaskaskia River Project. **Figure 1-1** is a map depicting the Kaskaskia River Watershed.

Figure 1.1 Kaskaskia River Watershed Map



1.4.1.1. Kaskaskia River Watershed. The Kaskaskia River Watershed is comprised of more than 5,700 square miles of land, which includes all or parts of 22 counties within the state of Illinois. This represents approximately 10.2% of the total surface area of the State. The watershed

is situated in a northeasterly to southwesterly direction, beginning in Champaign County to the north and ending in Randolph County to the south, along the Mississippi River.

Prior to settlement, the northern third of the watershed was predominately comprised of prairies, while the southern two-thirds contained more forests. Today however, forests cover only about 13% of the watershed. This includes a 7,000 acre tract of floodplain forest, which is the largest contiguous block of this type of forest remaining in the state of Illinois.

Agriculture is the predominant land use within the watershed. Currently, 82% of the land is used for agricultural purposes, while the state average is 78%. Of that 82%, most is cropland, (63%), with other significant land utilized as grassland, (19%). Since 1978, the number of farms has decreased by 25% and the acreage tilled has decreased by only 6%. Corn and soybeans are important to the region, but producers also grow 25% of the entire state's crop of wheat. Livestock production, including dairy, swine, poultry and beef cattle is a significant industry, especially in Clinton, Randolph and Washington Counties.²

1.4.1.2. Carlyle Lake Watershed. The Carlyle Lake watershed encompasses approximately 1,663 square miles and includes all or portions of Bond, Clinton, Effingham, Fayette, Marion, Shelby and Montgomery counties. The watershed includes the Kaskaskia River between Carlyle Lake Dam and Lake Shelbyville Dam and major tributaries of the Kaskaskia River, including: Big Creek, Richland Creek, Robinson Creek, Becks Creek, Ramsey Creek, Old Hickory Creek, Hurricane Creek and the East Fork Kaskaskia River.³ Ninety-seven percent of the watershed is in private ownership, while only 3% is in public ownership. There are approximately 71,517 acres of wetlands within the watershed.

Other attributes of the watershed are consistent with those described in Section 1.4.1.1. Kaskaskia River Watershed.

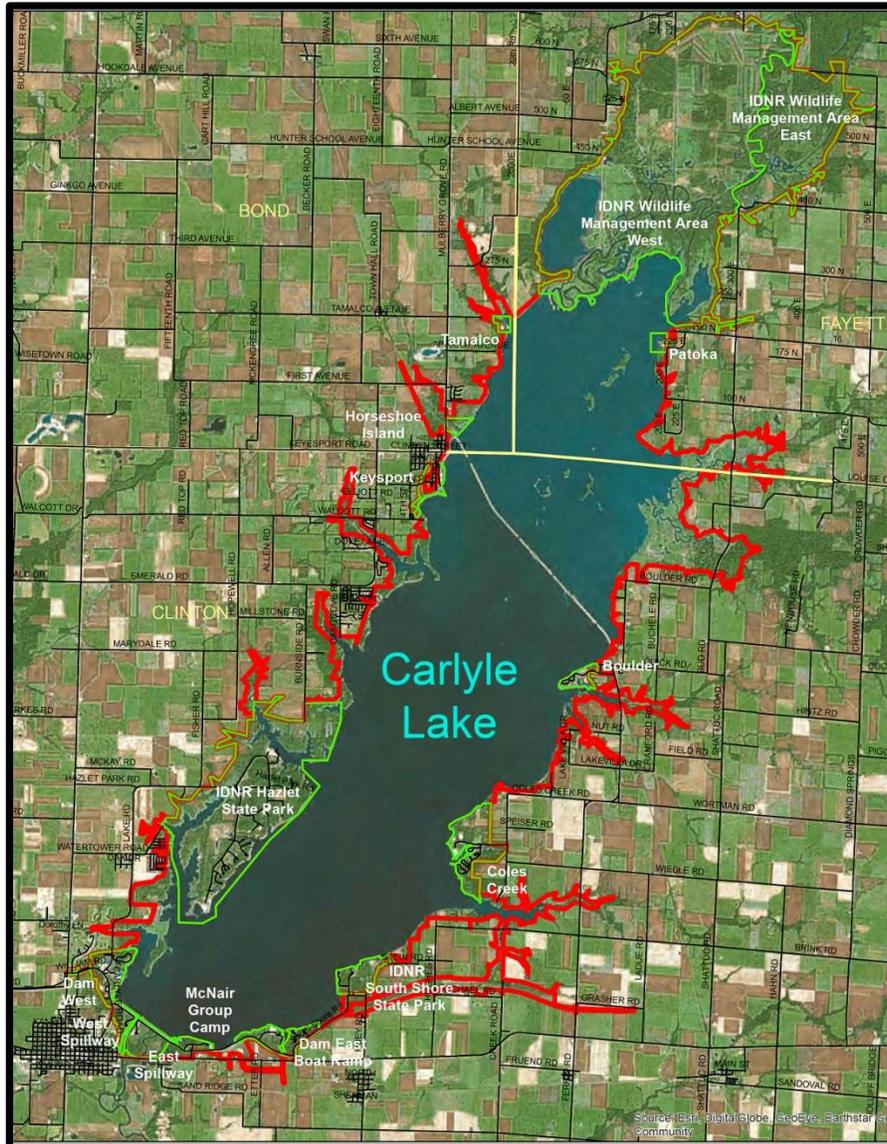
1.4.2. Project Description. Carlyle Lake is located in south central Illinois at river mile 94.2 on the Kaskaskia River, upstream from its confluence with the Mississippi River and about one-half mile upstream from the town of Carlyle,

² The Kaskaskia River Watershed - An Ecosystem Approach to Issues and Opportunities

³ Carlyle Lake Watershed Plan

Illinois. Carlyle is located in Clinton County, approximately 50 miles east of St. Louis, Missouri. Carlyle Lake is the largest man-made lake in the state and is approximately 12 miles long and 1-3 miles wide and has approximately 24,710 acres of water surface at summer pool elevation 445.0 feet NGVD (National Geodetic Vertical Datum). There are 88 miles of shoreline and approximately 12,800 acres of public land associated with the project. **Figure 1-2** is a map of Carlyle Lake.

Figure 1-2 Map of Carlyle Lake



The lake is situated in gently rolling land with alluvial valleys with moderately low relief. The lake provides outdoor recreation opportunities for over 2.5 million visitors annually, which generates over \$80 million in visitor spending within 30-

miles of the Lake. There are 41 recreation areas that include: 424 picnic sites, 726 campsites, 670 marina slips, 24 boat ramps, and 25 miles of hiking trails.

1.5. Listing of Prior Design Memorandums

A summary of prior Design Memorandums is provided in **Appendix A**, and with approval of this Master Plan, are considered incorporated into this document.

1.6. Listing of Pertinent Project Information

Table 1-2 provides a summary of pertinent project information for Carlyle Lake.

Table 1-2 Carlyle Lake Pertinent Project Information

Construction	
Began	July 1958
Completed	June 1967
Location of Dam	
River Name	Kaskaskia River, Illinois
River Mile Above Mouth	94.2
County	Clinton
Nearest Town	Carlyle, Illinois
Location of Lake	
River Mile Above Mouth	94.2
Counties	Clinton, Bond, Fayette, and Marion
Drainage Area	
Upstream From Dam	2,717 Square Miles
Upstream From Mouth	5,840 Square Miles
Lake	
Inactive Pool (Minimum Pool)	
Elevation (feet)	429.5 ft. NGVD
Area (water surface acres)	6,672 Acres
Shoreline Miles (excluding arms)	25 Miles
Water Depth (Maximum)	25 feet
Joint-Use Pool (Normal Pool)	
Elevation (feet)	445.0 ft. NGVD
Area (water surface acres)	24,710 Acres
Shoreline Miles (excluding arms)	55 Miles
Water Depth (Maximum)	40 feet
Flood Control Pool (Maximum Pool)	
Elevation (feet)	462.5 ft. NGVD
Area (water surface acres)	58,447 Acres
Shoreline Miles (excluding arms)	135 Miles
<i>Continued on next page</i>	

Water Depth (Maximum)	58 feet
Public Land Area at Normal Pool	12,833 Acres
Main Dam	
Type	Earth-fill dam with gated spillway
Elevation of Dam Crest	472.5 ft. NGVD
Height of Riverbed	67.5 Feet
Length of Crest	6,610 Feet
Main Spillway	
Width	179 Feet
Elevation of Spillway Crest	152 Feet
Crest Gates	
Number	4
Size	38' wide x 39' high
Type	Tainter
Elevation, top of gates (closed)	463.5 ft. NGVD
Tailwater Elevation for Discharge	
Minimum Release, 50 cfs (cubic feet per second)*	412.0 ft. NGVD
Maximum Release, 10,000 cfs (cubic feet per second)*	427.0 ft. NGVD
Outlet Sluices	
Number	1
Size Intake & Intake Elevation	30" at 417.0 ft. NGVD
Size Outlet & Outlet Elevation	24" at 404.0 ft. NGVD
Saddle Dams	
Elevation of Crests	472.5 ft. NGVD
Saddle Dam #2	
Maximum Height	44 Feet
Length of Crest	8,100 Feet
Saddle Dam #3	
Maximum Height	34 Feet
Length of Crest	23,400 Feet
Keyesport Levee	
Elevation of Crests	469.0 ft. NGVD
Maximum Height	33 Feet
Length of Crest	9,945 Feet
Total Fee Lands & Water	37,543 Acres
Total Flowage Easement Lands	24,972 Acres
Total Fee Lands, Water & Flowage Easement	62,515 Acres

* 1 cubic feet per second = 7.48 gallons of water per second

CHAPTER 2

SETTING AND FACTORS INFLUENCING MANAGEMENT AND DEVELOPMENT

2.1. Description of Reservoir

Carlyle Lake is located in south central Illinois at river mile 94.2 on the Kaskaskia River, upstream from its confluence with the Mississippi River and about one-half mile upstream from the town of Carlyle, Illinois. The majority of the lake is located in Clinton County, which is approximately 50 miles east of St. Louis, Missouri. Carlyle Lake is the largest man-made lake in the state and is approximately 12 miles long and 1-3 miles wide and has approximately 24,710 acres of water surface at summer pool elevation 445.0 feet NGVD. There are 88 miles of shoreline and approximately 12,000 acres of public land associated with the project.

Approximately 8 miles upstream from the dam, the lake is intersected by the Burlington and Northern Railroad crossing. Generally, south of the railroad crossing the lake is deep enough to accommodate most types of watercraft for general recreational use. However, north of the railroad crossing the lake is very shallow and only suitable for use by smaller recreational watercraft, used for fishing and hunting.

2.2. Hydrology

Except along the river, the geology over much of the Kaskaskia River Watershed is largely unfavorable for the development of groundwater systems that supply water for more than a few households. The major source of groundwater in the area is within the sand and gravel deposits of the alluvial valleys and the sand bodies contained in the glacial drift. Alluvial aquifers are primarily limited to areas within the flood plain of the Kaskaskia River. Glacial drift aquifers fill buried bedrock valleys created by the advances and retreats of the Pleistocene ice sheets approximately 2.6 million years ago. **Figure 2-1** shows the extent of major sand and gravel aquifers and the location of active public water supply wells in the Kaskaskia River Watershed.

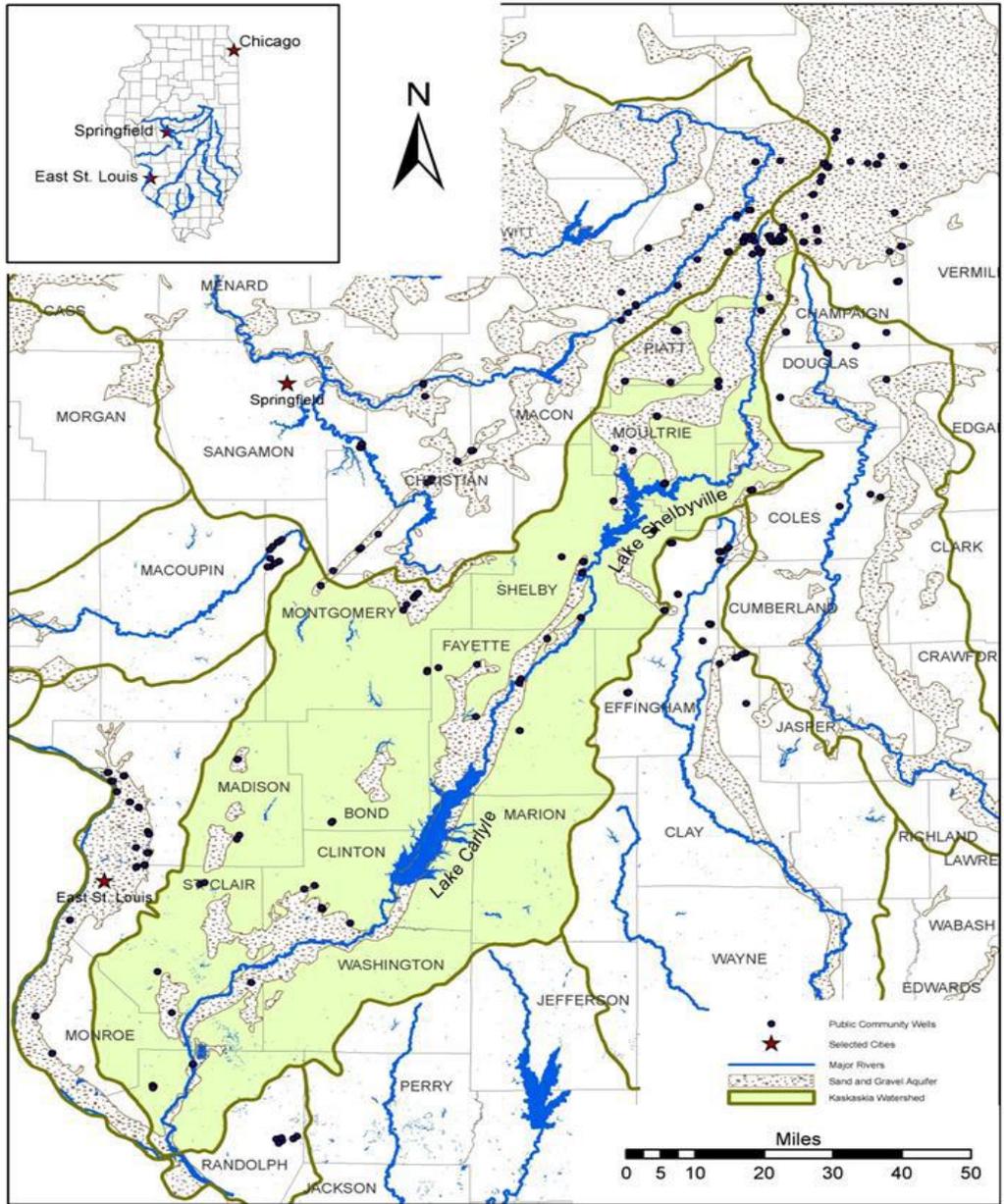
Primary surface streams, tributaries and rivers that flow into the lake include:

Kaskaskia River	Brewster Creek
Hurricane Creek	Coles Creek
East Fork of the Kaskaskia River	Peppenhorst Branch
Hickory Creek	Allen Creek
North Fork of the Kaskaskia River	Gibbes Creek

Cassar Creek

Spring Branch

Figure 2-1 Location of Major Sand & Gravel Aquifers and Public Water Supply Wells in the Kaskaskia River Watershed



2.3. Sedimentation and Shoreline Erosion

There is often a direct correlation between shoreline erosion and sedimentation. At Carlyle Lake most of the sedimentation occurs at the north end of the lake as a result of inflow. While the lower lake is more susceptible to shoreline erosion caused by wind and wave action.

2.3.1. Sedimentation. According to a study completed in 1998,⁴ between 1938 and 1966 the average widening rate of the Kaskaskia River in the reach between Lake Shelbyville and Carlyle Lake was approximately 0.7 feet per year and between 1966 and 1998 it was approximately 0.9 feet per year. This rate of widening is expected to continue into the future.

Most bend channels were actively eroding, contained vertical banks, large sandbars, and thousands of downed trees and channel blockages. In 1998 the average river channel width was approximately 49 feet, which is 54% wider than it was in 1938.

According to the *Report of Sedimentation, 1999 Resurvey Carlyle Reservoir*, the computed rate of sedimentation in Carlyle Lake between 1967 and 1999 was approximately 682 acre-feet per year. Based on the results of the 1999 resurvey, by the year 2019, the inactive pool will have lost about 80 percent of its original capacity and the joint-use pool will have lost only about 5.7 percent of its original capacity.

Sedimentation ranges are established throughout the pool area as well as retrogression ranges downstream. According to EM 1110-2-4000, *Sedimentation of Rivers and Reservoirs*, 15 December 1989, sedimentation surveys are to be conducted every five to ten years. However, because of limited funding, surveys will most likely only be accomplished every 15 to 20 years.

According to the 1999 survey for Carlyle Lake, out of the 232,800 acre feet of storage available in Carlyle Lake, only 8,214 acre-feet of storage had been depleted, which represents a storage capacity reduction of approximately 3.5%, which is less than original predictions.

2.3.2. Shoreline Erosion

Shoreline erosion at Carlyle Lake is caused by a combination of factors:

- a. High water
- b. Normal and occasional high wind
- c. Glacial clay till soils that are easily eroded by wave action

⁴ Bank Erosion and Historical River Morphology Study of the Kaskaskia River: Lake Shelbyville Spillway to Upper End of Carlyle Lake

When the lake elevation is at or above 450 feet NGVD combines with wind fetch reaches of up to 8 miles, the resulting wave action causes severe shoreline caving and erosion to both fee and easement land. An ongoing program to identify and monitor shoreline erosion is critical in helping to minimize the impacts of shoreline erosion.

The primary methods used to control and stabilize land and minimize shoreline erosion include:

- a. Promoting woody and herbaceous vegetative growth
- b. Manipulation of water run-off
- c. Placement of revetment along streams, ditches and shoreline areas that are highly susceptible to wind and water erosion
- d. Establish stabilizing vegetation along the shoreline
- e. Allowing the formation of natural beaches

In some cases, acquisition of additional lands outside the current fee boundary is required in order to mitigate damages already caused to large scale erosion sites at Carlyle Lake. Lands acquired for erosion control will extend project boundaries and limit the impacts of shoreline erosion to Federally-owned property, which will protect future project Operation and Maintenance requirements.

Analysis of lake elevation data from 1968 to 2015 reveal the pool elevation exceeds 450 feet NGVD approximately 10 percent of the time and the maximum pool elevation to date is 459.88 feet NGVD. During periods of high water, serious shoreline erosion occurs as a result of extreme wave action.

In 1973, authorization was granted to acquire 26 tracts of easement land totaling 310 acres. In addition, many miles of shoreline were rip-rapped to help stabilize severely eroded shoreline areas.

In 1980, additional shoreline erosion problems were identified and studied. This investigation resulted in a plan that authorized further revetment and acquisition of eroded easement lands totaling approximately 39 acres at four locations around the lake, including:

- a. North Boulder
- b. South Boulder
- c. Lakeside Camping Area

d. Lake Villa Subdivision

In 1989, further studies and analysis determined that nine additional areas were endangered by continued shoreline erosion. So, the St. Louis District submitted a Letter Report to the Lower Mississippi Valley Division (LMVD), which outlined the extent of erosion in these nine areas. In six of these areas, the shoreline had eroded past the existing Federal property boundary.

In March 1991, Supplement No. 9 to Real Estate Design Memorandum 38 was approved, which recommended acquisition of 22 tracts of land, encompassing approximately 60 acres. To determine the most appropriate course of action an economic feasibility analysis was conducted which considered the extent of the erosion in relationship to the existing fee boundary to determine whether to conduct shoreline revetment or purchase additional land. To date, the majority of these tracts have been purchased.

These remedial measures were intended to resolve all future erosion problems for the remainder of the project's life. However, erosion continues to be a problem along the shoreline at Dam West, Coles Creek, Boulder, and McNair Recreation areas, as well as the eastern shoreline of Peppenhorst Branch. Bank stabilization will be required in these locations to prevent loss of recreation facilities.

High water events over the last two decades have caused severe erosion on the east side of the Lake. To address this ongoing problem a variety of actions have been accomplished, including:

- Completion of engineering surveys to identify and prioritize erosion-prone shoreline areas
- Completion of a Letter Report that includes potential solutions, such as acquisition of additional land and/or shoreline revetment

Additional information on Shoreline Erosion can be found in Chapter 6.1.5.

2.4. Water Quality

The water quality in Carlyle Lake and the downstream river channel is generally good and is of suitable quality for uses, such as:

- a. Water Supply
- b. Primary and secondary water contact recreation

c. Support for desirable biological communities

The *Illinois Integrated Water Quality Report and Section 303(d) List, 2016* provides water resource assessment information and list of impaired waters within the state of Illinois. The report can be accessed at this website:

<http://www.epa.illinois.gov/topics/water-quality/watershed-management/tmdls/303d-list/>

A routine water quality monitoring and investigation program is in place and managed by the St. Louis District, U.S. Army Corps of Engineers. Because the lake is very shallow and susceptible to high winds, it often prevents the lake from stratifying permanently during the summer months. During extended periods with little wind and high air temperatures the likelihood of undesirable algae blooms greatly increases. Upon subsequent algae die off, the dissolved oxygen in the lake as well as the downstream discharge can become severely depressed. This condition, combined with minimum downstream discharge, can cause minor fish kills in the lake as well as below the dam. When this occurs, operational modifications such as, changing the release source from the sluice gate to the spillway, are implemented in order to improve downstream water quality. In addition, the minimum release is increased from 50 cubic feet per second (cfs) to 100 cfs. Using these management techniques will help ensure the lake continues to provide a suitable source for drinking water with the exception of potential taste and odor issues sometimes associated with algae blooms.

Generally, the water collected at all sampling sites in the lake, tributaries and tailwater meet or exceed State water quality standards for primary and secondary water contact recreation, which include swimming, boating, fishing and water skiing.

Even though phosphorous levels routinely exceed State water quality standards, discharge from the lake generally has lower concentrations of phosphorous than the incoming tributary flows. Also on a few occasions, the tailwater has not met the minimum dissolved oxygen standards established by the State of Illinois.

There are several potential pollution sources, but at present time, no major water quality degradation to the lake or streams is apparent. Continued water quality monitoring will ensure the potential for water quality degradation is kept to a minimum.

Additional Information on Water Quality can be found in Chapter 6.

2.5. Project Access

Access to Carlyle Lake is facilitated by network of Interstate roadways, U.S. Highways, State Highways and county roads located in Clinton, Bond and Fayette Counties.

2.5.1. Major Highways. Carlyle Lake is bordered on the north by Interstate 70 (I-70), on the east by U.S. Highway 51, on the south by U.S. Highway 50 and

Interstate 64 (I-64) and on the west by State Highway 127. These major highways provide adequate and safe public access to all areas of the project. U.S. Highway 50 runs east and west between Lebanon, Illinois and Carlyle, Illinois. This highway terminates at State Highway 127, 1/4 mile south of the Dam West Recreation Area and provides a quick, safe access to Carlyle Lake from the St. Louis metropolitan area and other areas to the west.

2.5.2. County Roads. The roads leading from major highways to recreation areas at Carlyle Lake are maintained by county authorities. In general, the condition of these roads is good. **Table 2-1** provides a list and general location of all county roads that provide access from major highways to recreation areas around the lake.

Table 2.1 Primary Routes of Access

Name of Road	General Location of Road	Provides Access to
Keyesport, Mulberry Grove and Emery Road's	North of City of Carlyle, located in Clinton, Bond & Fayette Counties	Dam West Recreation Area, Hazlet State Park, Keyesport Recreation Area, Tamalco Access Area, and Carlyle Lake State Fish & Wildlife Management Area
Eldon Hazlet State Park Road from Highway 127	Leads to Lake Road in Clinton County	Eldon Hazlet State Park and Carlyle Lake Sailing Association
Keyesport Road from Highway 127	Leads to the village of Keyesport	Keyesport Recreation Area and Tradewinds Marina
Huey Road	Leads to east end of South Shore State Park to Highway 50, Clinton County	South Shore State Park
Boulder, Ferrin Road	Leads from Highway 50 to Coles Creek Road	Boulder and Patoka Recreation Areas
Coles Creek Road and Wiedle Road	Leads from Boulder Road	Coles Creek Recreation Area
Boat Dock Road	Leads from Highway 51	Patoka Boat Access Area
Tamalco Road	Leads from Highway 127	Tamalco Boat Access Area

2.6. Climate⁵

The overall climate in the region is relatively moderate. During summer days, the sun shines about 65% of the time and during the winter, about 48%. See **Figure 2.2 Average Temperatures and Precipitation - Carlyle Lake**

2.6.1. Temperature. Summers are generally mild with temperatures occasionally reaching 100° F or higher. The winters are short and moderate with temperatures occasionally reaching below zero. The overall average temperature at Carlyle Lake is 54.5° F. The average annual high temperature is 64.3° F and the average low temperature is 44.7 ° F. The average high temperature occurs in July (87° F) and the average low temperature occurs in January (20° F).

According to the National Centers for Environmental Information, between 1960 and 2015, the average annual number of days where the maximum temperature was greater than or equal to 90 degrees F, has increased by 11%. At the same time, the average annual number of days where the maximum temperature was less than or equal to 32 degrees F, increased by 9%. In addition, for the same time period, the average annual number of days where the minimum temperature was less than or equal to 32 degrees F, increased by 12%.

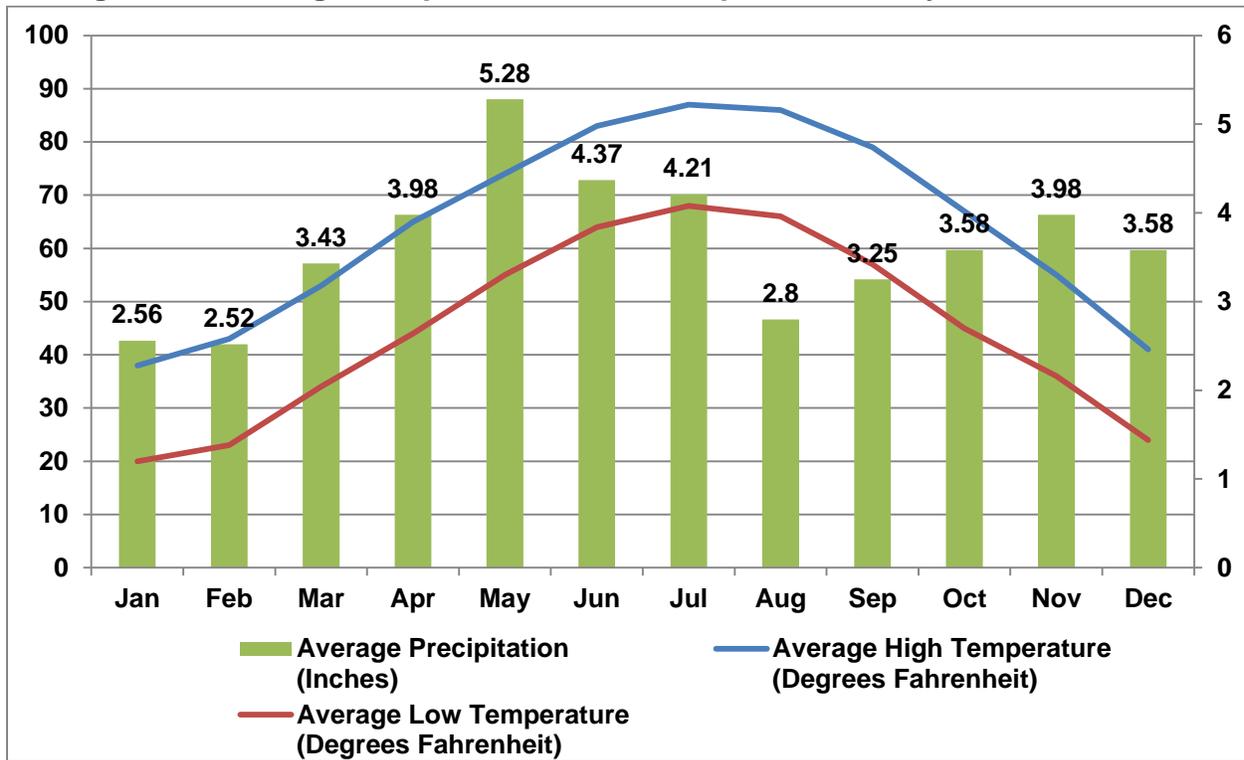
2.6.2. Wind. Wind blows daily across Carlyle Lake. The strongest winds typically occur in March and the mildest winds in August. The overall average wind speed at the lake is approximately 10.3 miles per hour and the prevailing winds are typically from the south to southwest.

2.6.3. Precipitation & Humidity. The average relative humidity in mid-afternoon is approximately 65%. Humidity is typically higher at night, and the average at dawn is about 85%. The average annual precipitation is 43.44 inches, of which 41% occurs during April, May, June, and July. Although rainstorms are frequent in the spring, cellular storms also occur in July and August. Snowfall is usually limited to the period from October through April and seldom covers the ground for more than a few days at a time. The average annual snowfall is about 10.3 inches.

According to the National Centers for Environmental Information between 1960 and 2015, the average annual precipitation has increased by 12%, from 38.3" to 43.4".

⁵ Source: National Weather Service

Figure 2.2 Average Temperatures and Precipitation - Carlyle Lake



2.7. Topography, Geology and Soils

2.7.1. Topography. The topography of the land around the lake is one of moderately low relief with gently rolling hills and alluvial valleys. The highest elevation in the area is about four miles southwest of Carlyle, Illinois and is approximately 580 feet (NGVD).

The lower portions of the Kaskaskia River Watershed have elevations near 400 feet (NGVD). The uplands are generally flat, except where interrupted by occasional drift hills, where elevations range between 450 and 550 feet (NGVD).

More than seventy percent of the land in the area has a slope of less than 2 percent. Of the remainder, slightly less than 20 percent of the land is gently sloping and only about 10 percent has a slope of 5 percent or more.

2.7.2. Geology. Bedrock is seldom exposed to view in the Carlyle Lake area because it is buried by younger glacial age materials. The youngest bedrock is from the Pennsylvanian period, which is 286 to 320 million years ago. This is where major deposits of coal are found in this part of Illinois. Herrin #6 Coal is the major seam of coal found in this area and it is located about 500 feet below Carlyle Lake and the surrounding region. Deeper and older rock formations yield minor amounts of oil and natural gas.

The youngest materials found at the surface consist of glacial derived materials such as till and loess. During the Illinoian period, about 130,000 to 191,000 years ago, the region was covered in ice, which eroded the upland and covered the area with glacial materials. This activity created the smooth plain and shallow valley topography we see within the region today. This glacial till can be seen along the wave-cut banks of the lake and is called Vandalia till. It is generally composed of silt with some small pebbles.

Another form of till found in the area is called Hagerstown till. This till is usually found in the “hills” which surround the lake and is composed of sands and gravels. The numerous sand and gravel pits around the city of Keyesport are good examples from the Hagerstown formation. These glacial-aged terrace deposits have been largely eroded away in the Kaskaskia River Valley or inundated by the lake. The islands located in the lake east of Keyesport and west of Boulder are good examples of this type of glacial till deposit.

Oil is the most significant geologic resource in the region, which continues to be extracted within the Carlyle Lake Project boundary.

2.7.3. Soils. The soils found in the Carlyle Lake region are generally of two types:

- a. The “bottomland” soils, deposited by the Kaskaskia River, which are mostly covered by the lake
- b. The “upland” soils, derived from silt-sized, wind-blown dust from the Kaskaskia and Mississippi River valleys, which is generally composed of glacial-derived material called till and loess. Loess-derived soils within the region are considered to be among the richest agricultural-producing soils in the world.

2.8. Resource Analysis (Level 1 Inventory Data)

2.8.1. Wildlife and Aquatic Resources

2.8.1.1. Wildlife Resources. There are numerous species of wildlife located on the Carlyle Lake Project that are native to this part of Illinois. They include several types of rodents, small game birds and mammals, waterfowl, shorebirds, songbirds, reptiles, amphibians, furbearers, white-tailed deer, and predatory mammals and birds.

The wildlife management and environmental stewardship activities conducted on project lands and water have created an exceptional, well diversified

ecological setting that has benefitted and attracted a wide variety of wildlife species, especially waterfowl.

At one time, the flooded timber area north of the Burlington-Northern railroad tracks provided numerous nesting trees for woodpeckers, wood ducks, herons and egrets. However, over the past 50 years this standing timber has deteriorated and no longer exists. Bald Eagles, Osprey and Cormorants routinely nest in wooded areas around the lake.

Carlyle Lake is an important mid-migration stopping point for waterfowl, song birds and shorebirds, in both the fall and spring migrations.

A variety of land management practices are conducted on project lands that are beneficial to songbirds, game birds, and mammals. Even though the amount of Federally-owned land is limited, areas not utilized for high density recreation are being managed for wildlife habitat, including:

- a. Trees are planted to provide shelter from weather and predation and to provide nesting cover and food.
- b. Wildlife food plots of varying shapes, sizes and species composition are planted in areas where additional food for wildlife is desirable.
- c. Succession control, in the form of mowing, eliminates woody plant species while providing diversity among herbaceous species of plants, which is in stark contrast with adjacent un-mowed areas.
- d. Nest boxes are constructed and placed to provide additional nesting spaces for wood ducks, purple martins, bluebirds, house wrens, kestrels, tree swallows and squirrels.

These activities combined with those conducted on adjacent private farms create the proper balance for providing adequate food and cover for wildlife within the area.

The Illinois Department of Natural Resources (IDNR) manages the area north of the line between the Tamalco Boat Ramp on the west side of the lake to the Patoka Boat Ramp on the east side. The area is primarily managed for migratory bird species by planting agricultural crops, establishing moist soil plants communities during the growing season and then flooding these areas during the fall.

Civic and private organizations, working in conjunction with the USACE and the IDNR also help by constructing and placing wood duck nesting boxes,

mallard tunnels, and Canada goose nesting platforms at selected locations on the project.

In the past 20 years several wetland cost-share projects have restored valuable wetland habitat at several locations around the lake. Also, the Carlyle Lake project provides crucial habitat for several endangered and threatened species.

2.8.1.2. Aquatic Resources. The fish of Carlyle Lake and the downstream spillway are typical of Midwestern waters. Major sport, commercial, and forage species include:

- a. bluegill
- b. bowfin
- c. brook silversides
- d. carp
- e. channel and flathead catfish
- f. freshwater drum
- g. gizzard shad
- h. golden shiner
- i. green sunfish
- j. largemouth bass
- k. long ear sunfish
- l. red shiner bullhead minnow
- m. sauger
- n. three species of buffalo fishes
- o. three species of carp suckers
- p. three species of gar
- q. walleye
- r. western mosquito fish
- s. white and black crappie
- t. white and yellow bass
- u. yellow and black bullhead

All totaled, there are approximately 50 species of fish and several hybrid fish found in Carlyle Lake.

The waters of the lake and tailwater also have diverse forms of phytoplankton, zooplankton, aquatic insects, crustaceans, amphibians, reptiles and mollusks. All, in one life stage or another, are an integral part of the food chain, necessary to sustain life of lake organisms. The food supply of

the fishes is also supplemented by numerous terrestrial organisms, particularly during periods of rainfall or strong winds.

Maintenance of good water quality (relatively free of inorganic or organic pollutants) is also necessary for the well-being of the diverse aquatic populations. While presently not abundant, several species of semi-aquatic plants (smartweed, arrowhead, willow, buttonbush, reed grass, lotus, and cattail) are established and contribute to the aquatic communities as a source of nesting, feeding, and protective cover.

Largemouth bass and white crappie populations are supplemented from nursery ponds managed by the IDNR and the USACE. Additional stocking of fingerlings is also done by both the USACE and the IDNR.

Although sport fishing, as a whole, has increased substantially in the area since the completion of the lake, water level fluctuations, and fishing pressure have reduced some fish species to low population levels. To help mitigate for this loss, USACE and IDNR managed brood ponds are utilized to raise largemouth bass and crappie to supplement fish populations in the Lake. Additional stocking of sauger/walleye fingerlings and hybrid striped bass has also been accomplished.

Nearly 1,000 recycled Christmas trees are bundled together and placed in the lake each March to provide valuable nesting habitat, cover and food sources for fish in Carlyle Lake. Also, artificial habitat structures have been submerged in the lake to provide valuable fish habitat.

Partnerships are invaluable in accomplishing this habitat work. Carlyle High School student's along with local sportsmen groups provide the needed manpower to assist USACE and IDNR staff's in creating this valuable fish habit. In addition, Also USACE and IDNR staff members are investigating potential supplemental funding sources to improve fisheries habitat in Carlyle Lake.

2.8.2. Vegetative Resources

Prior to construction, the lake basin was dominated with a pin oak, cottonwood, pignut hickory, and soft maple forest. The undergrowth was largely young pin oak and pignut hickory, while the ground cover was composed of sedges and minor associations of grasses and forbs. Remnants of this forest-type can still be found along un-cleared stream channels, the upper reaches of the lake, sub-impoundments and below the main dam.

Along the upper portions of the Kaskaskia River watershed, oak-hickory is the climax forest type. The understory consists primarily of oak-hickory saplings with minor herbaceous and woody associations. The upper portions of the watershed also contain numerous old field sites. These occur in various stages of succession. Plant associations vary from almost pure stands of grasses and forbs to intermediate-aged oak-hickory forests. Vegetative management practices vary from tree planting in recreation areas and some old fields maintaining wildlife clearings in other old fields and restoring wetland habitat. A natural ecological setting is being maintained by using minimal management practices on existing woodlands and many old fields and by planting tree and shrub species that are native or indigenous to the area.

Wetland habitat restoration has become a primary objective at appropriate locations around Carlyle Lake, including James Hawn Access, Boulder Flats and the Saddle Dam 3 area.

2.8.3. Candidate, Threatened and Endangered Species

“Endangered” means a species is in danger of extinction throughout all or a significant portion of its range. “Threatened” means a species is likely to become endangered within the foreseeable future. "Candidate Species" are species being considered for listing as a Threatened or Endangered. All species of plants and animals, except pest insects, are eligible for listing as a Candidate, Endangered or Threatened Species.

There are numerous threatened and endangered species located within the Carlyle Lake region. **Table 2-2** provides a list of species found in the counties which are on the Federal Threatened and Endangered Species list and **Table 2-3** provides a list of species found in the counties which are on the State of Illinois Threatened and Endangered Species list.

2.8.3.1. Federal Species⁶

Table 2-2 Federal Species List

Common Name	Scientific Name	Status
eastern massasauga rattlesnake	<i>Sisterus catenatus</i>	Threatened
eastern prairie fringed orchid	<i>Platanthera leucophaea</i>	Threatened
indiana bat	<i>Myotis sodalis</i>	Endangered
lakeside daisy	<i>Hymenoxys herbacea</i>	Threatened
<i>Continued on Next Page</i>		

⁶ Reference USFWS Consultation Code: 03E18100-2017-SLI-0011

Common Name	Scientific Name	Status
northern long-eared bat	<i>Myotis septentrionalis</i>	Threatened
piping plover	<i>Charadrius melodus</i>	Endangered
prairie bush-clover	<i>Lespedeza leptostachya</i>	Threatened
rattlesnake-master borer moth	<i>Papaipema eryngii</i>	Candidate

2.8.3.2. State Species

Table 2-3 State Species List

Common Name	Scientific Name	Status
barn owl	<i>Tyto alba</i>	Endangered
black rail	<i>Laterallus jamaicensis</i>	Endangered
black-billed cuckoo	<i>Coccyzus erythrophthalmus</i>	Threatened
black-crowned night-heron	<i>Nycticorax nycticorax</i>	Endangered
blazing star	<i>Liatris scariosa</i> var. <i>nieuwlandii</i>	Threatened
bunchflower	<i>Melanthium virginicum</i>	Threatened
cerulean warbler	<i>Dendroica cerulea</i>	Threatened
drooping sedge	<i>Carex prasina</i>	Threatened
ear-leafed foxglove	<i>Tomanthera auriculata</i>	Threatened
eastern massasauga	<i>Sistrurus catenatus</i>	Endangered
eryngium stem borer	<i>Papaipema eryngii</i>	Endangered
fibrous-rooted sedge	<i>Carex communis</i>	Threatened
grass-leaved lily	<i>Stenanthium gramineum</i>	Endangered
greater prairie-chicken	<i>Tympanuchus cupido</i>	Endangered
heart-leaved plantain	<i>Plantago cordata</i>	Endangered
indiana bat	<i>Myotis sodalist</i>	Endangered
king rail	<i>Rallus elegans</i>	Endangered
kirtland's snake	<i>Clonophis kirtlandi</i>	Threatened
least bittern	<i>Ixobrychus exilis</i>	Threatened
loggerhead shrike	<i>Lanius ludovicianus</i>	Endangered
mudpuppy	<i>Necturus maculosus</i>	Threatened
northern harrier	<i>Circus cyaneus</i>	Endangered
ornate box turtle	<i>Terrapene ornate</i>	Threatened
osprey	<i>Pandion haliaetus</i>	Endangered
prairie rose gentian	<i>Sabatia campestris</i>	Endangered
royal catchfly	<i>Silene regia</i>	Endangered
sedge	<i>Carex bromoides</i>	Threatened

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Common Name	Scientific Name	Status
sheepnose	<i>Plethobasus cyphus</i>	Endangered
short-eared owl	<i>Asio flammeus</i>	Endangered
smooth softshell	Smooth Softshell	Endangered
spring ladies' tresses	<i>Spiranthes vernalis</i>	Endangered
spike	<i>Elliptio dilatata</i>	Endangered
tube beard tongue	<i>Penstemon tubaeflorus</i>	Endangered
upland sandpiper	<i>Bartramia longicauda</i>	Endangered
western sand darter	<i>Ammocrypta clarum</i>	Endangered
yellow-crowned night-heron	<i>Nyctanassa violacea</i>	Endangered

2.8.4. Invasive Species

Invasive species continue to pose a significant threat to the project. An invasive species is a plant, fungus, or animal species that is not native to a specific location (an introduced species), and which has a tendency to spread to a degree believed to cause damage to the environment, human economy or human health.

The most common Invasive vegetative species found around Carlyle Lake include:

- a. Autumn Olive
- b. Bush Honeysuckle
- c. Common Reed
- d. Crown Vetch
- e. Multi-flora Rose,
- f. Japanese Honeysuckle
- g. Johnson Grass

Another invasive species of concern is the Asian Carp, which is found in the spillway area and the Kaskaskia River below the dam.

The USACE is an active member of the Asian Carp Regional Coordinating Committee (ACRCC), which was established in 2009 to execute an aggressive multi-tiered strategy to prevent an Asian Carp invasion into the Great Lakes and to ensure monitoring for necessary response actions. The ACRCC does not dictate management of fishery issues to individual states or provincial authorities and does not discourage or reject management principles, techniques or actions. While the ACRCC does not directly implement activities, it develops the overall, coordinated strategy for control and management of Asian carp with input from each member and relies on each member agency to implement actions.

In June 2015, the ACRCC developed the “Asian Carp Control Strategy Framework”, which is available at:

<http://www.asiancarp.us/documents/2015Framework.pdf>

The list of invasive species at Carlyle Lake will most likely increase in the future, which makes it incumbent on land managers to communicate with each other in order to provide early identification of invasive species and coordinate efforts to control and eliminate invasive species.

2.8.5. Ecological Setting

See Wildlife and Aquatic Resources (2.8.1.) and Vegetative Resources (2.8.2.)

2.8.6. Wetlands

Four wetland sub-impoundments have also been developed on the North end of Carlyle Lake to facilitate waterfowl management activities. The IDNR periodically manipulates water levels in the impoundments in order to provide resting and feeding areas for migratory waterfowl. In addition, the USACE manages three smaller wetland areas in the Boulder Flats Area for the purpose of providing seasonal wetland habitat for migratory birds and waterfowl. Other locations used for wetland management include James Hawn, Steins and Saddle Dam 3.

2.9. Cultural Resources

Prior to impoundment of Carlyle Lake, personnel from the University Museum of Southern Illinois University at Carbondale conducted a limited archaeological survey of the area to be inundated by the lake. Between 1958 and 1966, eighty-four archaeological sites were identified and eight were excavated. The sites ranged from the Archaic through the Mississippian period (roughly from 8000 BC to 1500 AD). Some of the investigations were nationally recognized for setting new standards in archaeological methods and theory.

In accordance with Federal legislation, particularly the National Historic Preservation Act of 1966, the St. Louis District, U.S. Army Corps of Engineers, instituted a program to identify, evaluate and manage archaeological sites on operational lands located above the normal pool elevation. Surveys of the shoreline documented many new sites and the effects of shoreline erosion on those sites. Now, over 300 prehistoric and historic sites have been reported.

In 1986, the Carlyle Lake Historic Properties Management Plan was developed, which established procedures and priorities for archaeological compliance activities. In 1989, the "Data Synthesis of Carlyle Lake Archaeology" was completed, which summarizes all known archaeological information, including descriptions of each site and identifies gaps in our knowledge about the lake's archeology. Most of the artifacts and records from both pre and post impoundment investigations was transferred to the Illinois State Museum in Springfield, Illinois for proper curation, as required by law.

In 1825, Charles Slade erected a toll bridge across the Kaskaskia River to replace the ferry which had been the only means of crossing the river. The bridge served the travelers on the Vincennes - St. Louis road until 1860 when a suspension bridge, one of the earliest in the Midwest, was constructed at a cost of \$45,000. In 1946, the Carlyle

Suspension Bridge Restoration Association was formed to restore this picturesque structure, which was deteriorating rapidly. Twenty-thousand dollars was appropriated in 1951 by the State Legislature for the restoration of the bridge because of its historical importance. When the restoration was completed, it was decided to name the bridge in honor of General William Dean, a native of Carlyle and a hero of the Korean War. On November 11, 1953, General Dean came to Carlyle to dedicate the bridge. In June 1973, the bridge was selected for inclusion in the National Register of Historic Places. The City of Carlyle renovated the bridge in 1992 at a cost of \$250,000. In 1995, the City of Carlyle contracted repair of the suspension bridge for \$200,000.

Elsewhere around the lake are sites containing remains of former homesteads and farm sites. These are included in the archaeological inventory and are similarly managed.

2.10. Demographics⁷

Carlyle Lake is located in portions of Bond, Clinton, Fayette and Marion Counties in Illinois. The four-county area is 2,143 square miles in size with an average of 57 people per square mile while the state average is 231.1 people per square mile and the national average is 87.4.

2.10.1. Population. Population in this region increased by approximately 18% between 1960 and 2010, compared to the national population increase for the same time period of 72%. Between 2000 and 2010 the population increase in the four-county region was negligible. Historically, Marion County claims the largest population of the four counties. However, between 2000 and 2010 the population of Clinton County increased by 6%, while Marion County saw a 5% decrease. If this trend continues, Clinton County will become the most populated of the four counties within the next ten years. **Table 2-4** identifies the population for each of the four counties from 1960-2010.

⁷ U.S. Census Bureau

Table 2-4 Four-County Population 1960-2010

County	1960	1970	1980	1990	2000	2010
Bond	14,060	14,012	16,224	14,991	17,633	17,768
Clinton	24,029	28,315	32,617	33,944	35,535	37,762
Fayette	21,946	20,752	22,167	20,893	21,802	22,140
Marion	39,349	38,986	43,523	41,561	41,691	39,437
Totals	99,384	102,065	114,531	111,389	116,661	117,107

Source: US Census Bureau 2015

Table 2-5 Compares demographic data for the four-county region (Bond, Clinton, Fayette and Marion Counties), State of Illinois Data and National Data.

Table 2-5 Demographic Facts for the Four-County Region Compared to State and National Data

Demographic	Four-County Average	State Average	National Average
Percent of Population Living in Poverty	15.6%	14.4%	14.5%
Median Household Income	\$49,228	\$57,166	\$51,939
Percentage White	92.8%	71.5%	72.4%
Percentage Black or African American	4.5%	14.5%	12.6%
Percentage Foreign Born	1.5%	13.9%	13.1%
Percentage Hispanic or Latino	2.2%	15.8%	16.3%
Median Gross Monthly Rent	\$635	\$903	\$920
Owner-Occupied Housing Unit Rate	78.5%	66.9%	64.4%

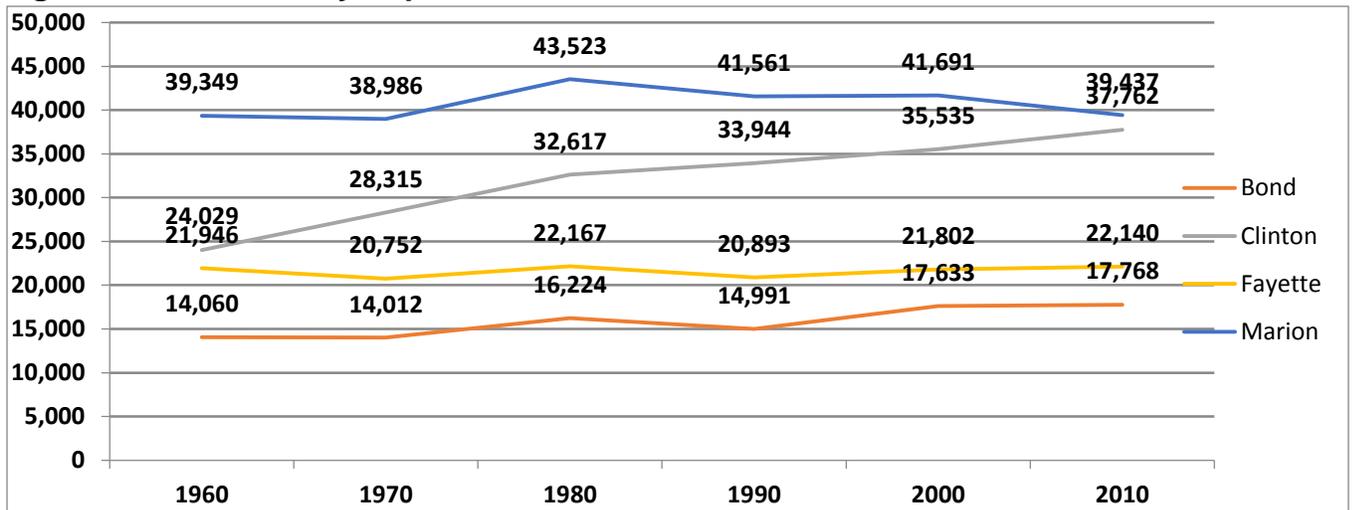
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Demographic	Four-County Average	State Average	National Average
Percent with Bachelor's Degree or Higher	16.2%	31.9%	29.3%
Percent of People, Under Age 65, With A Disability	10.7%	7%	8.5%
Percent of People, 16 Years and Older, in the Civilian Working Pool	60%	65.9%	63.5%

Source: US Census Bureau

Figure 2-3 provides a graphical representation of the population within the four-county region from 1960-2010.

Figure 2-3 Four-County Population 1960-2010



Source: US Census Bureau

The above data reveals that population growth is significantly slower than the rest of the nation and the area is significantly less crowded than the rest of the State and country. Also, minority populations are significantly under-represented within the region, compared to the rest of the State and nation. The same holds true for the percentage of foreign-born people. In addition, the percentage of people with a Bachelor Degree or higher, is significantly lower than the rest of the State and nation.

2.11. Economics ⁸

Natural and recreation resources at Carlyle Lake provide social, economic and environmental benefits for all Americans. Recreation promotes economic as well as personal and social well-being by providing jobs and income stability for local communities.

Recreation at Carlyle Lake is an economic engine for local communities and the region. Resorts, marinas and grocery stores provide goods and services to lake visitors. Nearby establishments provide visitors with gas, food and lodging while they visit. Visitor use also contributes to sales of recreation equipment, such as boats, campers, tents and fishing gear.

In an average year Carlyle Lake visitors spend approximately \$80,830,000 within 30 miles of the lake for things like gas, food and lodging. An additional \$36,153,000 in sales is generated for durable goods, such as boats and camping equipment. This spending supports approximately 639 jobs resulting in labor income of about \$12,122,000 within 30 miles of the lake.

With multiplier effects, Carlyle Lake visitor trip spending results in:

- \$49,502,000 in Total Sales
- 765 jobs
- \$15,605,000 in labor income
- \$29,260,000 in value added (wages & salaries, payroll benefits, profits, rents, and indirect business taxes)

The money spent by visitors to Carlyle Lake 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 communities around the lake.

Other benefits provided by recreation opportunities at the lake help combat one of the most significant of the nation's health problems: lack of physical activity. Recreational programs and activities at the Lake also help strengthen family ties and friendships; provide opportunities for children to develop personal skills, social values and self-esteem; and increase water safety. Recreation experiences increase motivation to learn more about the environment; understanding and awareness of environmental issues; and sensitivity to the environment.

⁸ Source: USACE Value to the Nation – Fast Facts

2.12. Recreation Facilities, Activities and Needs

2.12.1. Recreation Facilities. There are a variety of outdoor recreation areas and facilities located at Carlyle Lake. There are ten major recreation areas on the Lake; eight managed by the USACE and two by the Illinois Department of Natural Resources (IDNR). In addition there are four marinas, a visitor information center, several wildlife management areas as well as numerous small recreation access areas located on the project. **Table 2-6** provides a summary of recreation areas and facilities located at Carlyle Lake. A complete list of recreation areas and facilities is provided in **Appendix B**.

Table2-6 Carlyle Lake Recreation Area and Facility Summary

Type of Recreation Area/Facility	Managed by USACE	Managed by Others	Total
# of Campgrounds/ # of Campsites	5 / 399	1 / 327	6 / 726
# of Day-Use Areas/ # of Picnic Sites	8 / 234	2 / 190	10 / 424
# of Boat Ramps/ # of Launch Lanes	15 / 33	7 / 13	22 / 46
# of Marinas/ # of Wet Slips/ # of Dry Slips	0 / 0 / 0	4 / 670 / 645	4 / 670 / 645
Miles of Trails	18	13	31
Vegetative and Wildlife Management Acres	1,791	5,653	7,444
# of Swimming Beaches	5	0	5
# of Hunter/Fishermen Access Areas	25	12	37

The operation and maintenance of recreation facilities has minimal impact to the environment or scenic qualities of the lake. Structural and landscape designs are blended with the surrounding area as much as possible.

The USACE also manages four wetland restoration areas, while the State of Illinois manages a waterfowl sub-impoundment area, which includes waterfowl resting areas used extensively by waterfowl during their spring and fall migrations.

2.12.2. Recreation Activities. The outdoor recreation opportunities provided at Carlyle Lake are designed to support a wide range of recreational activities and interests. Major activities include:

- a. Bike Riding
- b. Boating/Water Sports
- c. Camping
- d. Fishing
- e. Hiking/Walking for Pleasure and Fitness
- f. Hunting
- g. Picnicking
- h. Sight-Seeing
- i. Swimming
- j. Wildlife Viewing/Nature Photography

Information about the most prominent outdoor recreation activities occurring at Carlyle Lake are presented in the following sections.

.2.12.2.1. Fishing. The State of Illinois Division of Fisheries manages all waters at Carlyle Lake to assure conservation and the enhancement of the fishery resource and the equity of the fishing public, while providing the maximum enjoyment. Carlyle Lake offers good fishing opportunities for crappie, white bass, largemouth bass, sauger, bluegill, channel and flathead catfish, freshwater drum and carp.

The lake is divided between the Upper and Lower Lake by the Burlington Northern Railroad tracks, which span the lake between the towns of Keyesport and Boulder.

There are seven public access areas located in the upper lake:

- a. Cox Bridge Access
- b. East Fork Access
- c. Hitogi Access
- d. Horseshoe Island Access
- e. North Fork Access
- f. Patoka Access
- g. Tamalco Access

Access areas located in the lower lake include:

- a. Boulder Recreation Area
- b. Coles Creek Recreation Area

- c. Dam East Recreation Area
- d. Dam West Recreation Area
- e. Eldon Hazlet State Park
- f. Keyesport Recreation Area
- g. South Shore State Park

The primary fishing bays located on the lower lake include:

- a. Allen Branch
- b. Bond Branch
- c. Brewster Creek
- d. Burnside Bay
- e. Coles Creek
- f. Gibbs Creek
- g. Peppenhorst Branch
- h. West Branch

Located below the Carlyle Lake Dam are the East and West Spillway Access Areas. Here, anglers have caught 32 different species of fishes. The major species caught are:

- a. Asian carp (considered an invasive species)
- b. bluegill
- c. buffalo
- d. carp
- e. channel catfish
- f. crappie
- g. drum
- h. sauger
- i. white bass

Other species taken with some regularity include:

- a. bowfin
- b. bullhead
- c. carp sucker
- d. gar
- e. largemouth bass
- f. paddlefish
- g. sucker
- h. walleye
- i. yellow bass

The loss of habitat caused from shoreline erosion and the decay of flooded timber has been detrimental to fish species, especially largemouth bass, crappie and bluegill. Future fisheries habitat improvements are essential, especially at targeted fish spawning locations, in order to maintain a viable fishery within the lake. This includes placement of strategically placed manmade habitat structures in the lake as well as performing additional shoreline protection around the lake.

Another critical component for maintaining a viable fishery is to operate the on-project brood ponds, managed by the State and USACE, to their full potential. In addition, a robust fish stocking program, using State and local hatcheries, will be required.

The USACE will continue to pursue development of an updated Fishery Management Plan for Carlyle Lake with the appropriate State entities.

2.12.2.2. Hunting. Part of the wildlife management program at Carlyle Lake includes development of food plots that include planting sunflowers, corn, beans, winter wheat, clover, milo, and millet. These food plots are essential in providing a quality wildlife habitat. Other land management techniques such as, conducting prescribed burns, restoring native prairies, wetland restoration, and reforestation also provide benefits to a wide variety of wildlife populations.

Carlyle Lake is one of the most popular waterfowl hunting areas in the state because it serves as a mid-migration resting area for waterfowl and other migrating birds. The USACE manages five wetland restoration projects around the lake where a variety of management techniques are employed. They are located at:

- a. **Boulder Flats.** This area consists of Whitetail Access, Wood Duck Access, North Fork Access and Thomas M. Pigg Access. Habitat management activities consist of planting crops and promoting growth of natural wetland vegetation (moist soil management). Manipulation of water levels within the levees located here are an integral part in management of the area.

- b. **Saddle Dam III.** This area is a moist soil management area consisting of agricultural fields and pin oaks . This is the location of a duck blind, built for sportsmen with disabilities.
- c. **Steins Field.** This area is a moist soil management area managed specifically for sportsmen with disabilities. It contains an accessible blind for duck hunting.
- d. **Grasher Creek Access.** This area is a moist soil management area.
- e. **James W. Hawn Access.** This area provides public hunting land and includes waterfowl impoundments. There are six duck hunting blinds in the area that are provided on a first come, first serve basis.

The lake also provides quality hunting opportunities for white-tail deer, turkey, rabbits, squirrels, doves, bobwhite quail, and pheasants.

State-managed wildlife areas at Carlyle Lake include:

- a. **Eldon Hazlet State Park.** Eldon Hazlet State Park is a 3,000 acre park on the west side of Carlyle Lake. The site is leased by the Illinois Department of Natural Resources from the U.S. Army Corps of Engineers. The park has more than 300 acres specifically designated for public hunting. Included is an area for controlled pheasant hunting, fields designated for dove hunting and a large area north of Allen Branch, managed for upland game, archery deer hunting, and waterfowl hunting. In addition three hunting blinds for sportsmen with disabilities are located here and are used for deer and turkey hunting.
- b. **South Shore State Park.** This Park is approximately three miles long and contains 305 acres. It is located on Carlyle Lake's southeast side, approximately 3 miles east of the City of Carlyle adjacent to State Highway 50. The park provides recreational opportunities and habitat that supports archery deer hunting and wild turkey hunting. A deer hunting blind for sportsmen with disabilities is also located here. Observing wildlife, especially white-tailed deer and turkey, is another popular activity.

c. **State Fish and Wildlife Area.** This area is located at the northern end of Carlyle Lake and is managed for a variety of habitat improvement activities targeted at increasing food, shelter, and nesting areas for numerous wildlife species. The State Fish and Wildlife Area offers approximately 2,000 acres of woodland, 5,800 acres of open water and wetlands, 200 acres of grassland, and 1,500 acres of cropland planted for food and cover. The area is divided into the following management areas:

- 1) Westside Management Area and includes Sub-impoundments 1, 2, 3, and 4, managed for waterfowl
- 2) Eastside Management Area
- 3) Flooded Dead Timber Area
- 4) Open Water Area

Fluctuating water levels hinder the proper management of the State and Federal wetland management areas. As Carlyle Lake continues to endure frequent high water levels, wetland management areas will remain vulnerable to damage and maintaining these areas continues to be a challenge.

The loss of upland habitat continues to occur on State, Federal and private property adjacent to Carlyle Lake. Autumn olive and bush honeysuckle are invasive species and continue to spread throughout upland areas. Bush honeysuckle invades a wide variety of native habitats and natural communities. The most susceptible areas include: lake and creek banks, floodplains and uplands.

2.12.2.3. Trapping. Trapping is permitted on public lands except where posted. Trapping helps manage the density of wildlife populations and helps prevent disease. Trapping is also allowed within the Carlyle Lake Wildlife Management Area sub-impoundments after waterfowl season ends and requires a permit from the IDNR. The James W. Hawn Access area offers a Youth Trapping Area, designed to educate youth on the skills of trapping.

2.12.2.4. Camping. Campgrounds at Carlyle Lake provide a variety of camping opportunities and types of facilities. There are five campgrounds managed by the USACE and one campground managed by the IDNR. They are:

- a. Boulder (USACE)
- b. Coles Creek (USACE)
- c. Dam West (USACE)
- d. East Spillway (USACE)
- e. McNair (USACE)
- f. Illini (located in Eldon Hazlet State Park operated by the IDNR)

A total of 726 campsites are available for public use. Campgrounds offer a blend of amenities such as fire rings/grills, playgrounds, open play areas, basketball courts, 50-amp electrical services, sewer hook-ups, drinking water, comfort stations, shower buildings, Wi-Fi and laundry facilities. Group camping is also available at several campground locations.

As camping equipment and recreation vehicles continue to change, upgrades and modifications to campgrounds and campsites will also be required. Recreational vehicles continue to increase in size. So, campsites will need to be modified and redesigned in order to keep pace with market trends.

Other overnight accommodations located on Federal property include rental cottages in Eldon Hazlet State Park and the Mariners Village Inn and Suites, located within the Dam West Recreation Area, which offers hotel rooms and cabin rentals.

In addition to the public campgrounds managed by the USACE and IDNR, there are several private campgrounds and resorts located near the lake that offer camping and lodging facilities.

2.12.2.5. Boating. Carlyle Lake is the largest man-made lake in Illinois and is capable of accommodating all types of water recreation activities including; fishing, sailing, kayaking, canoeing, water skiing, wake boarding, tubing and parasailing. As the most popular sailing lake in the Midwest, many regional, national and international sailing regattas take place on the lake. Eleven paddle trails designed for kayaks have been developed in the lake. The upper part of the lake is well suited for smaller vessels and associated activities, while the lower part of the lake is ideal for all types of water related recreation activities.

An accessible boat loading platform is available at Dam West Boat Ramp. A proposed action is to construct additional accessible boat loading platforms at Keyesport, Dam East, Coles Creek and Boulder boat ramps. In addition, designated kayak launching areas, consisting of placing sand along the shoreline, will be constructed at all Kayak trail heads.

2.12.2.6. Trail Activities. The use of recreational trails has become one of the most popular outdoor recreation activities at Carlyle Lake. The wide variety of recreation activities that trails support, contributes to their popularity. The majority of trails at Carlyle Lake are classified as multi-use trails and can be used for walking, running, jogging, hiking, and bicycling. As previously stated, the USACE offers approximately 18 miles of multi-use trails which connect to City routes and South Shore State Park.

Also available is a 65-mile trail which uses county and township roads that encircle the entire Carlyle Lake project. The USACE also offers 2 hiking trails:

- a. ½ mile Chipmunk Nature Trail, located near McNair Recreation Area
- b. ½ mile Little Prairie Nature Trail, located in the West Spillway Recreation Area.

The State of Illinois also offers over 9 miles of hiking trails within Eldon Hazlet State Park.

In 2010, the Carlyle Lake Trail Plan was developed and is included as **Appendix C**. The USACE will facilitate efforts to connect as many of the existing trail systems as possible.

2.12.2.7. Picnicking. Most recreation areas have picnic sites consisting of a picnic table and pedestal grill. Also available are picnic sites with covered shelters located at Keyesport Recreation Area, West Spillway Recreation Area, East Spillway Recreation Area, Dam East Recreation Area, Coles Creek Recreation Area and Boulder Recreation Area.

Over the past few years the USACE has reduced the number of picnic sites in some recreation areas because of low use. However, the picnic facilities located in Dam West Recreation Area continue to receive

extremely heavy use. A proposed action is to further reduce the number of picnic sites at some locations. This will also help reduce annual O&M costs.

2.12.2.8. Swimming. Designated swimming areas, marked with buoys and depth markers, are located in several of the high-density recreation areas. There are four public swimming beaches located at Carlyle Lake. They are located at:

- a. Coles Creek Recreation Area
- b. Dam West Recreation Area
- c. Keyesport Recreation Area
- d. McNair Recreation Area

Due to Carlyle Lake's fluctuating water levels, maintaining beaches in accordance with customer service standards is a challenging endeavor. Water quality is always a concern, and is monitored regularly to assure public health and safety. All beaches are tested for water quality on a weekly basis: Swimming at locations other than designated swimming areas is not encouraged. In addition, Eldon Hazlet State Park and Mariners Village Resort offer in-ground swimming pools

2.12.2.9. Sightseeing. Sightseeing at Carlyle Lake continues to be a popular activity. Activities such as wildlife watching, birding and nature photography are rapidly increasing. Carlyle Lake offers some of the region's most distinctive and diverse natural environments, with unique wildlife and landscapes. Five wildlife viewing towers are located around Carlyle Lake, enabling visitors the opportunity to view migratory waterfowl, shorebirds, bald eagles and other types of wildlife. The viewing towers are located at:

- a. Catfish Cove Access
- b. Parking Lot #1 located in the State Fish and Wildlife Area
- c. Peppenhorst Branch Access
- d. Tamalco Access
- e. Whitetail Access

Also, Saddle Dam #3 offers a scenic multi-use trail that overlooks a variety of grasslands, hardwoods and manmade wetlands.

2.12.3. Recreation Needs

2.12.3.1. Accessibility. In 1968 Congress passed the Architectural Barriers Act (ABA) which requires any building or facility that is constructed, altered, or leased with Federal funds to be accessible to and usable by people with disabilities. As a Federal entity the USACE is responsible for ensuring all recreation facilities and opportunities are accessible to everyone.

A cooperative partnership with the National Center on Accessibility (NCA) and the USACE - Carlyle Lake, led to the development of an accessibility transition plan that identifies all architectural barriers that restrict access or use at USACE operated recreation areas. An Inventory was conducted at all recreational areas, facilities, and opportunities available at Carlyle Lake. All issues identified were documented along with required corrective actions. This plan is included as **Appendix D**.

One of the primary proposed actions in this Master Plan is to ensure all facilities meet the requirements of the Americans with Disabilities Act (ADA), as well as the standards required by the ABA. Accomplishing this will improve public health, safety, and customer service.

2.12.3.2. The 2015 Illinois Statewide Comprehensive Outdoor Recreation Plan (SCORP)⁹. According to the most recent SCORP, trails are among the most popular and requested outdoor recreation facility in the state. Trails are integral connectivity routes, linking communities and park visitors to neighborhoods, schools, recreation areas and shopping opportunities. As a result, many communities are doing more than simply adding sidewalks; multi-use trails have been built to provide a variety of recreation opportunities. Nearly 3,000 miles of trails have been built by communities throughout the state. Accordingly, the Carlyle Lake Trail Plan was developed in September 2010 and is included as **Appendix C**. The 2013-2014 Illinois Outdoor Recreation Survey¹⁰ revealed the following information:

- a. 85.4% of respondents indicated that outdoor recreation was of some importance in their everyday lives

⁹ 2015 Illinois Statewide Comprehensive Outdoor Recreation Plan

¹⁰ 2013 Illinois Outdoor Recreation Survey

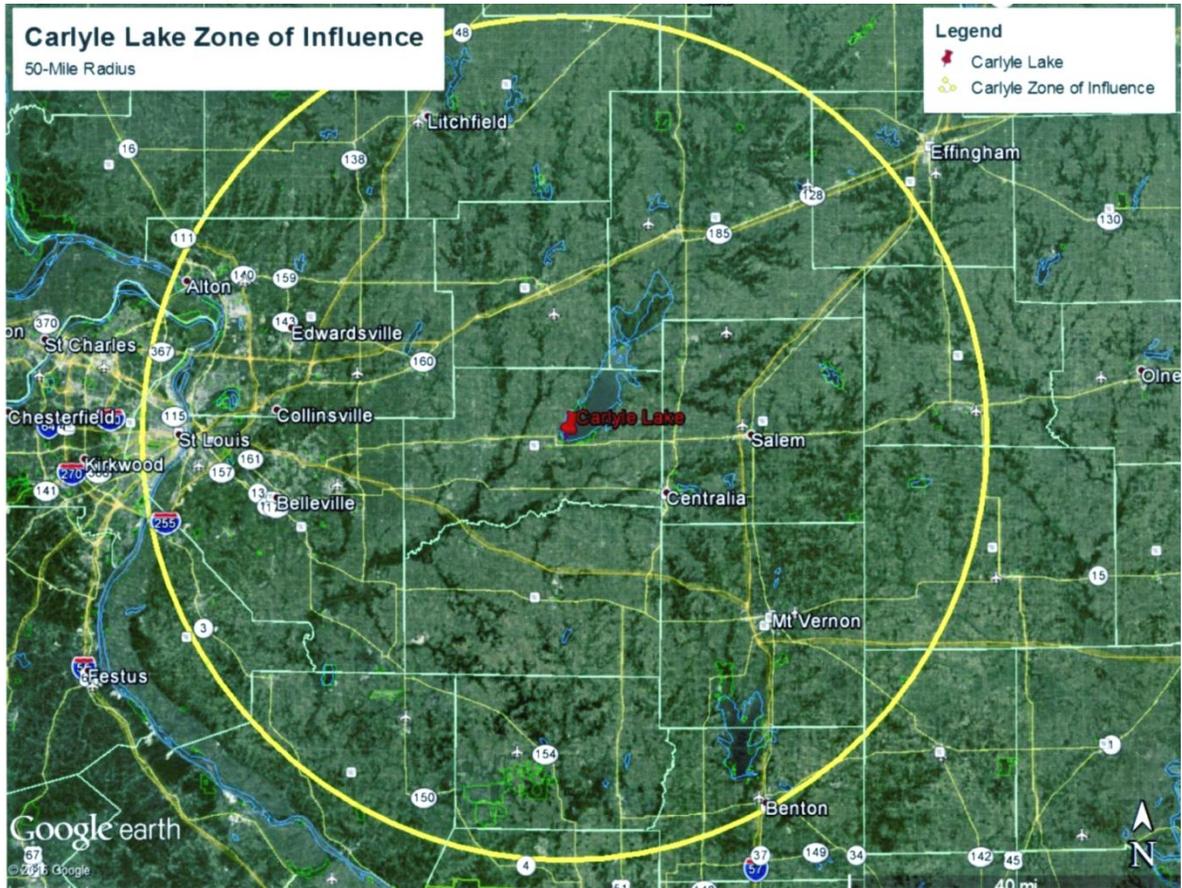
- b. 80.7% of respondents reported pleasure walking as the most popular outdoor activity in the state
- c. Pleasure walking and observing wildlife/bird watching, were the two activities with the highest participation rate.
- d. Half of the respondents engage in pleasure walking over 30 times per year
- e. Half of the respondents engage in nature observation and bird watching over 10 times per year.

Other information identified in the 2013-2014 Illinois Outdoor Recreation Survey, indicate that over eight out of ten respondents felt that spending time with family and friends, exposing children to nature, and escaping their daily routines were important contributing factors affecting their decision to engage in outdoor recreation activities. Respondents were asked to provide their opinions about outdoor recreation resource issues in general and were asked to indicate agreement or disagreement regarding a variety of issues. Well over nine out of ten respondents consider outdoor recreation areas to be important for general health and fitness (96.1%). Further, respondents indicated that recreation areas should serve the needs of all people, regardless of their physical ability, ethnic background, or economic means (93.4%); and that community recreation areas make a valuable contribution to the quality of life and economic vitality of communities

2.12.4. Zone of Influence

The Zone of Influence is the geographic area surrounding the lake where impacts may occur as a result of actions within the boundary of the project site. The recreation zone of influence for Carlyle Lake has been determined to be a 50-mile radius from the boundary line of the Carlyle Lake Project Site (**Figure 2-4**). This area is where the majority of overnight and day-use visitors originate from, when visiting the lake. This is the most common distance used by the USACE in all recreation related studies and master plan documents.

Figure 2-4 Carlyle Lake Zone of Influence



For Carlyle Lake this area comprises parts of Illinois and Missouri, including the majority of Southwestern Illinois and the metropolitan St. Louis area. Counties within the Zone of Influence include all or portions of the following counties in Illinois:

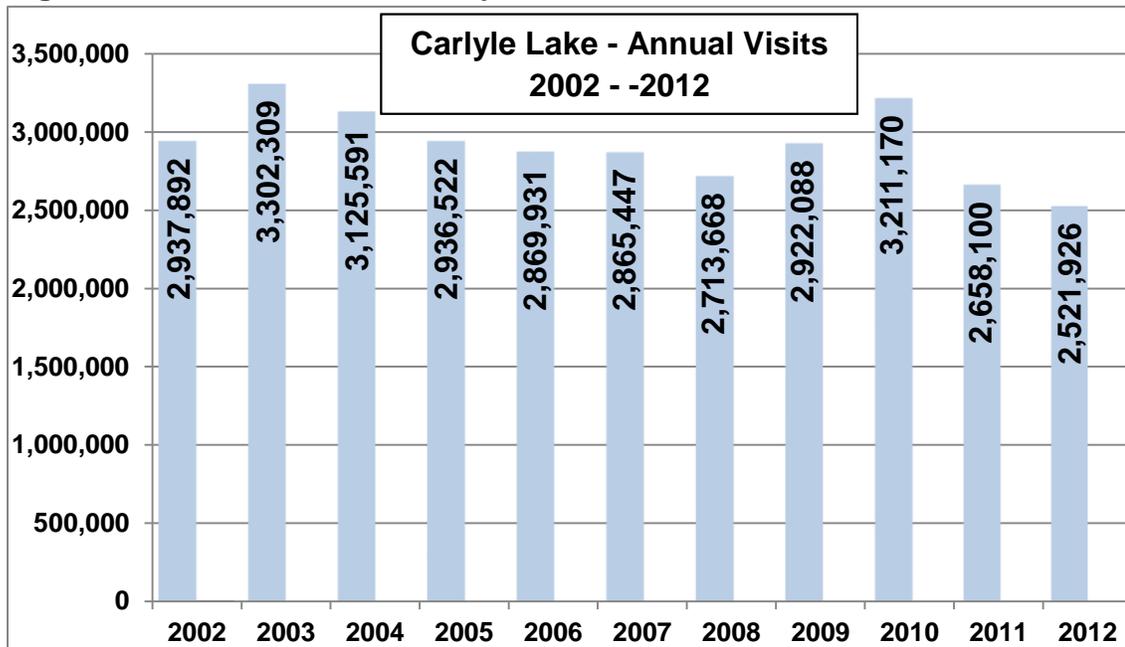
- | | | | |
|-----------|-----------|------------|------------|
| Bond | Fayette | Monroe | St. Clair |
| Christian | Franklin | Montgomery | Washington |
| Clay | Jasper | Perry | Wayne |
| Clinton | Jefferson | Randolph | |
| Effingham | Madison | Shelby | |

Counties in Missouri include St. Louis County

2.12.5. Visitation Profile

Carlyle Lake averages 2,914,968 Visits annually. A “Visit” is defined as one person participating in recreation activities within a developed recreation area for any period of time. For instance, one person picnicking for 30 minutes is one visit; likewise one person camping for 2, 5 or any number of consecutive days is also one visit. **Figure 2-5** depicts the annual visits to Carlyle Lake between 2002 and 2012.

Figure 2-5 Annual Visits to Carlyle Lake from 2002 - 2012



Source: OMBIL (please note: visitation data for 2013-2015 is currently not available)

2.12.6. Recreation Analysis

2.12.6.1. Land-Based Recreation

There are a variety of land-based recreation opportunities, activities, areas, and facilities located at Carlyle Lake and within the region. These activities include camping, hiking, hunting, picnicking, wildlife/bird viewing, and sightseeing.

2.12.6.1.1. Land-Based Recreation Areas in the Region

In order to have a better understanding of the current recreation conditions at Carlyle Lake, a desktop inventory of recreation areas

and facilities located within a 50-mile radius of Carlyle Lake was conducted. This area was established based on studies conducted by USACE, which establish the camping market area for USACE lake projects to be approximately 50 miles and the day-use market area to be approximately 30 miles. These mileage limits are used as a standard in the majority of USACE studies and reports. Also, a survey conducted by the Outdoor Foundation, “*A Special Report on Camping – 2011*,” found that not more than 64 percent of people who participate in outdoor recreation activities will travel further than 100 miles from their home to participate in those activities. Since land-based recreation activities are comprised of overnight and day-use visitors, a 50-mile radius from Carlyle Lake was considered adequate, and is used to define the region for this analysis.

Regional recreation facilities were divided into two main categories. These categories include recreation facilities managed by USACE, and those managed by others. For facilities managed by entities other than USACE, some information about the types of recreation facilities and visitation was not available. For example, the number of picnic sites at state, county, or city recreation areas was not available. Therefore, comparisons about recreational facilities and activities were sometimes difficult to establish on a regional basis. Recreation areas where data was not sufficiently complete were not included in regional comparative analyses. The most reliable and consistent data and information was provided by USACE. Therefore, in many cases, comparative analyses only include USACE Projects within the region.

2.12.6.1.2. Regional Recreation Areas and Facilities Managed by USACE

There are three other USACE Projects within 50 miles of Carlyle Lake. They are:

- a. Kaskaskia River Project
- b. Lake Shelbyville
- c. Rend Lake

Each of these projects has a variety of land-based recreation areas and facilities. **Table 2-7** depicts the number and type of land-based

recreation features, visitation and acreage data for these projects, including Carlyle Lake. **Figure 2-6** depicts the location of these projects.

Table 2-7 Regional USACE-Managed Projects with Land-based Recreation Facilities

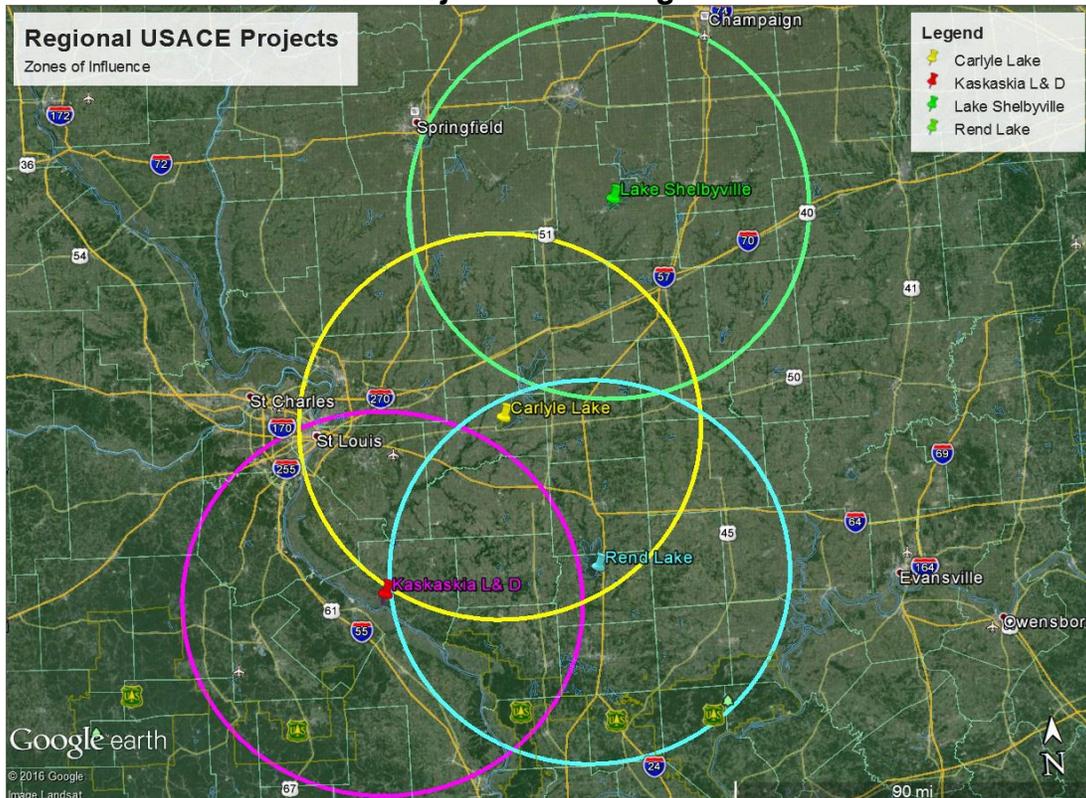
Lake Name	Recreation Areas	Picnic Sites	Camp Sites	Trail Miles	Annual Visits	Land Acres	Water Surface Acres	Shoreline Miles	Total Acres
Carlyle Lake	41	424	726	25	2,521,926	12,833*	24,710*	88*	37,543*
Kaskaskia River Project	2	8	15	0	357,100	2,898	0**	0**	2,898
Lake Shelbyville	72	129	764	48	3,816,460	23,241	11,100	172	34,341
Rend Lake	53	104	756	34	3,672,181	21,329	18,900	162	40,229
Total	168	665	2,261	107	10,367,667	60,301	54,710	422	115,011

Source: USACE 2013. "Value to the Nation" report data from 2012 and OMBIL

* Please note: In order to make meaningful comparisons with other regional lakes, it was important to use the same data source. Therefore, these numbers may be different than those found in other sections of this Master Plan

** Because the land underlying the water surface at Kaskaskia River Project is owned by the State of Illinois, the water surface acres and shoreline miles show up as "0" in the OMBIL system.

Figure 2-6 Location of USACE Projects in the Region



2.12.6.1.3. Regional Recreation Areas and Facilities Managed by Others

There are about 23 State, County and City Parks within the region. Campsites and trails are the primary land-based recreation facilities provided at these parks. **Table 2-8** identifies a few of these parks, their managing entity and the number of campsites and/or miles of trails. These areas and facilities were selected because they are the largest and most significant areas managed by others within the region.

Table 2-8 Campgrounds and Trails within the Region Managed by Others

Recreation Area Name	Managing Entity	# of Campsites	Miles of Trails	Acres
Lou Yaeger Lake	City of Litchfield	44	1	1,205
Ramsey Lake SP	IDNR	154	14	1,815
Stephen A Forbes SP	IDNR	115	3	3,103
Horseshoe Lake SP	IDNR	48	4	2,960
Total		317	22	12,330

Source: Websites of Managing Entity

2.12.6.1.4. Regional Comparison of Land-based Recreation at USACE Projects

Table 2-9 provides a summary of data from USACE Projects within 50 miles of Carlyle Lake, which includes: Kaskaskia River Project, Lake Shelbyville, and Rend Lake. The data provides a comparison of physical attributes and identifies the percentage of the regional total, located at Carlyle Lake.

Table 2-9 Regional Recreation Areas, Facilities, and Physical Attributes Compared to Carlyle Lake

Physical Attribute	Regional Average	Regional Total	Carlyle Lake Total	Carlyle Lake % of Regional Total
Water Surface Acres	18,236*	54,710	24,710	45%
Land Acres	15,075	60,301	12,833	21%
# of Recreation Areas	42	168	41	24%
# of Campsites	322	2,578	726	28%
# of Picnic Sites	166	665	424	64%
Miles of Trails	27	107	25	23%

Source: USACE 2013. "Value to the Nation" report data from 2012 and OMBIL

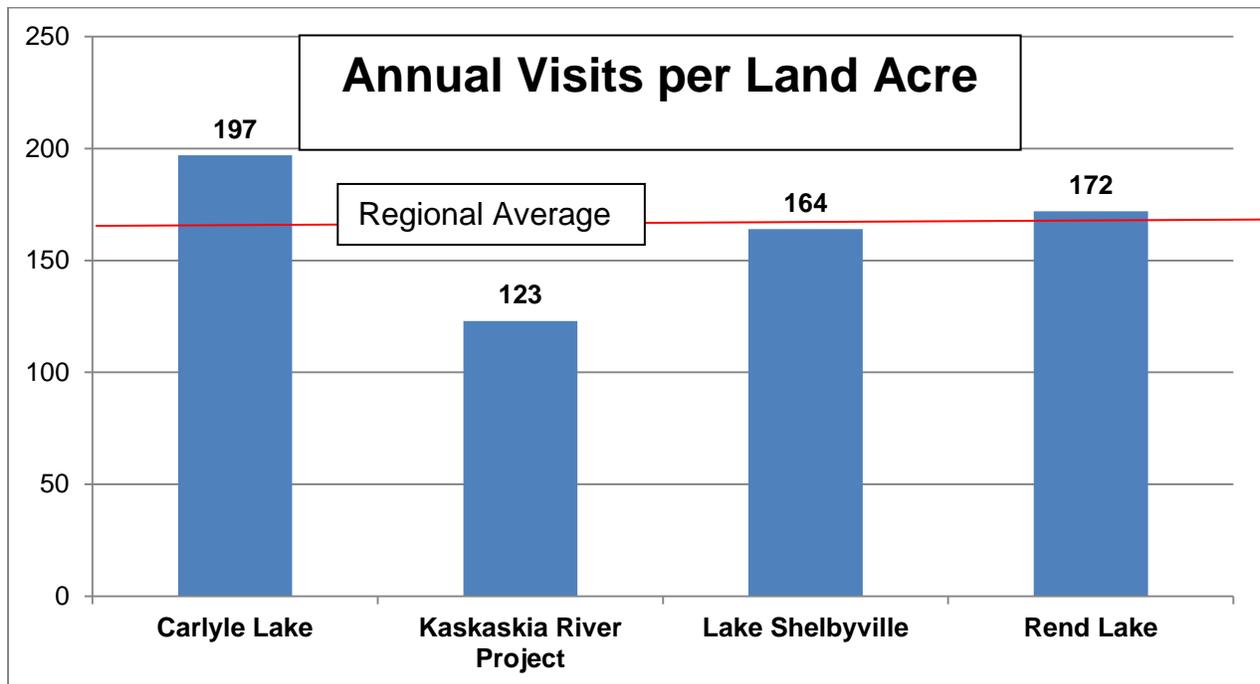
* Because the water surface acres for the Kaskaskia River Project are "0", it was not included when calculating the regional average water surface acres.

2.12.6.1.5. Annual Visits per Land Acre

Figure 2-7 depicts annual visits per land acre. The number of visits per land acre is a measure of density and intensity of use. Within the region there is an average of 172 annual visits per land acre. Carlyle Lake has the highest annual visits per land acre within the region.

The data indicates the intensity and density of use is greater at Carlyle Lake than at other projects within the region. Since this data represents the overall average for the project, there may be some recreation areas or project lands where annual visits are higher or lower than the number identified.

Figure 2-7 Annual Visits per Land Acre for USACE Projects within the Region

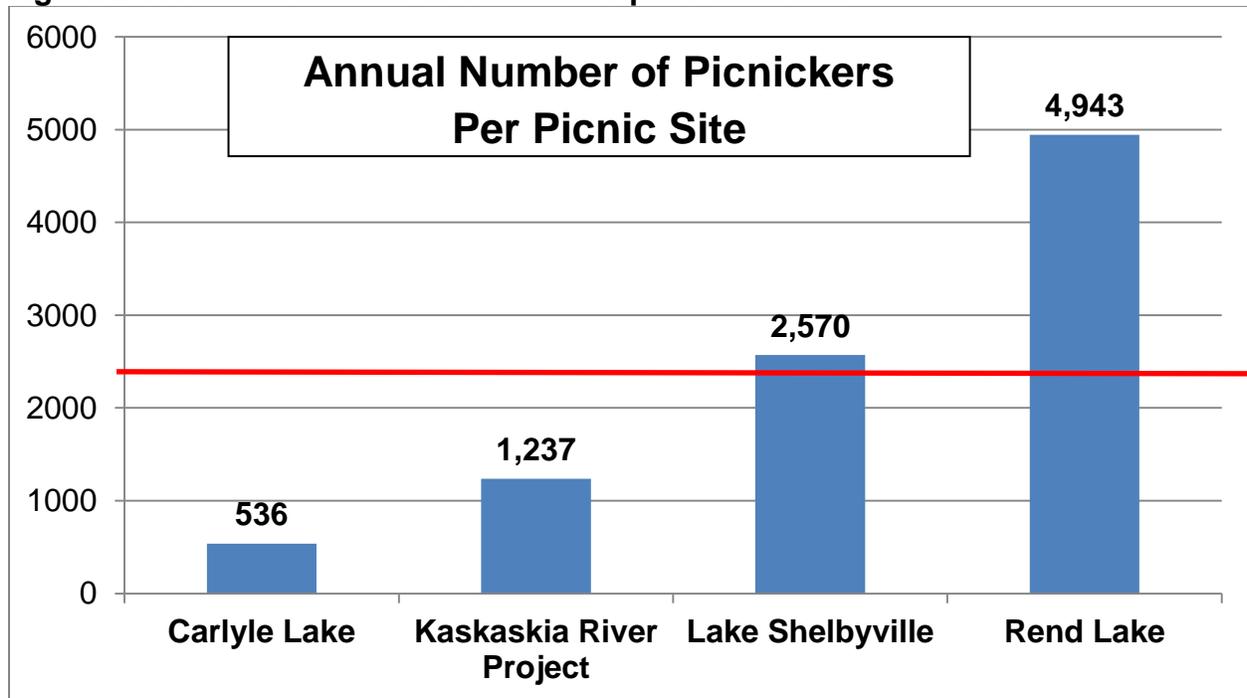


Source: USACE 2013. "Value to the Nation" report data from 2012 and OMBIL

2.12.6.1.6. Annual Number of Picnickers per Picnic Site

Figure 2-8 depicts the annual number of picnickers per picnic site. Within the region there is an average of 2,322 annual picnickers per picnic site (depicted by red line). The data shows there is an abundance of picnic sites at Carlyle Lake and the number of picnic sites could be reduced without impacting current and projected use. Reducing the number of picnic sites will also help reduce annual O&M costs.

Figure 2-8: Annual Number of Picnickers per Picnic Site

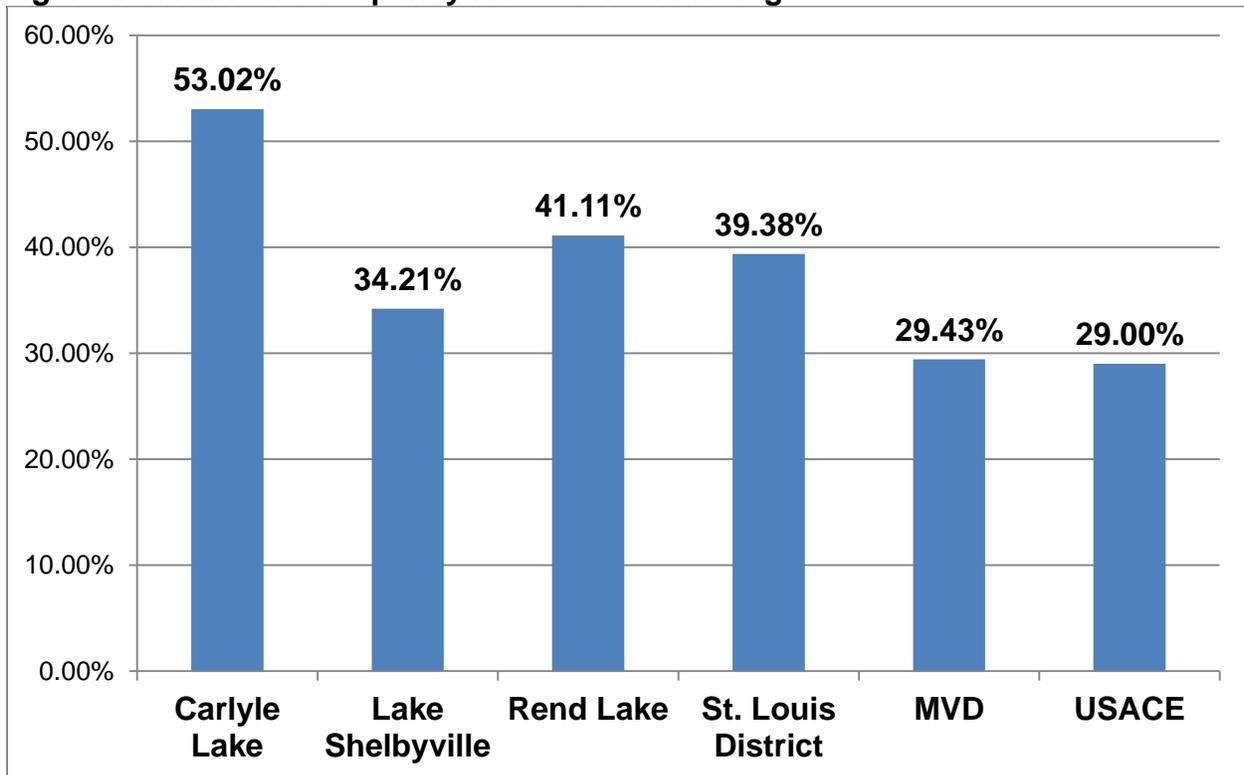


Source: USACE 2013. "Value to the Nation" report data from 2012 and OMBIL

2.12.6.1.7. Camping - Annual Occupancy Rate Comparison

Within the region there are 2,873 campsites and 726 of those are located at Carlyle Lake. The 5-Year Average Annual Occupancy Rate for recreation facilities (mostly campgrounds) at Carlyle Lake is significantly higher than that of other lakes within the region. To provide a more comprehensive analysis for this measure, occupancy rates for all lakes within the St. Louis District, the Mississippi Valley Division and USACE lakes nation-wide are also identified. **Figure 2-9** depicts the 5-Year Average Annual Occupancy Rate for USACE-managed facilities. The data indicates there is high demand for campsites at Carlyle Lake and that additional camping opportunities would most likely be used if provided.

Figure 2-9: Annual Occupancy Rate - 5-Year Average

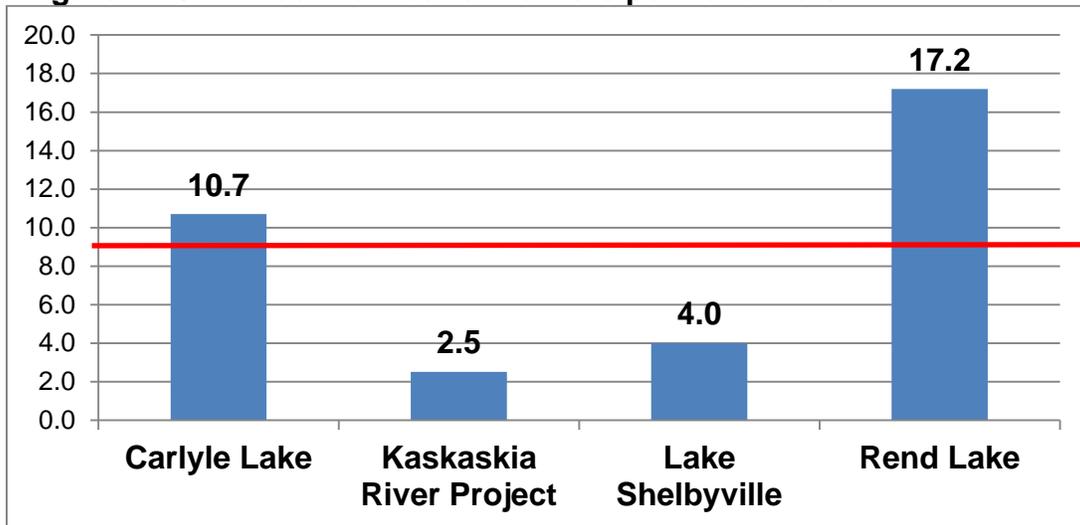


Source: NRRS

2.12.6.1.8. Hunting

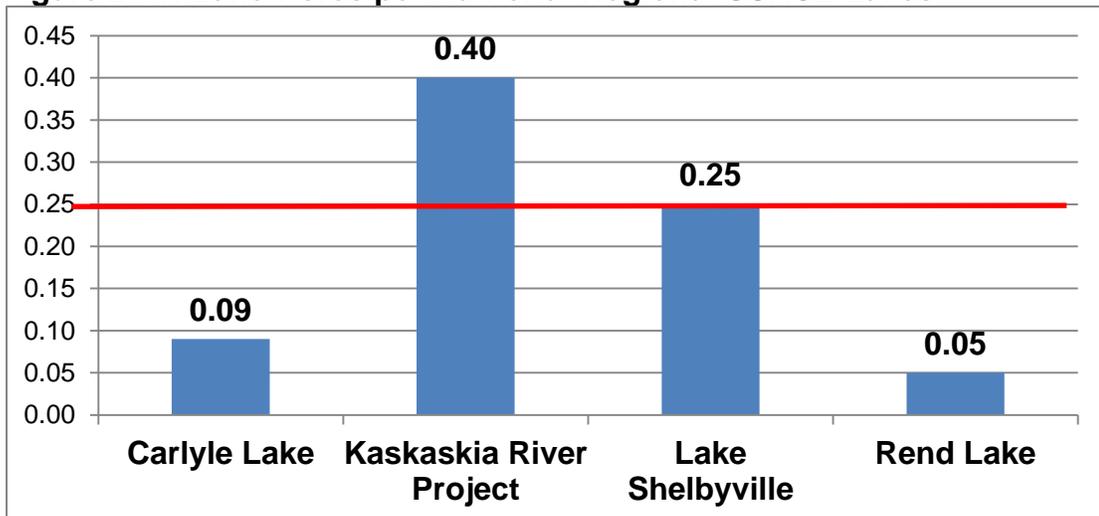
Review of hunting-related data and information indicate there is an average of 8.6 hunters per acre of land within the region and on average, there is .20 acres of land available per hunter. **Figure 2-10** depicts the annual number of hunters per land acre at USACE-managed lakes in the region, while **Figure 2-11** depicts the number of land acres per hunter within the region. The red line depicts the regional average. This data reveals there is greater and denser hunting activity at Carlyle Lake and Rend Lake.

Figure 2-10: Annual Number of Hunters per Land Acre



Source: USACE 2013. "Value to the Nation" report data from 2012 and OMBIL

Figure 2-11: Land Acres per Hunter at Regional USACE Lakes

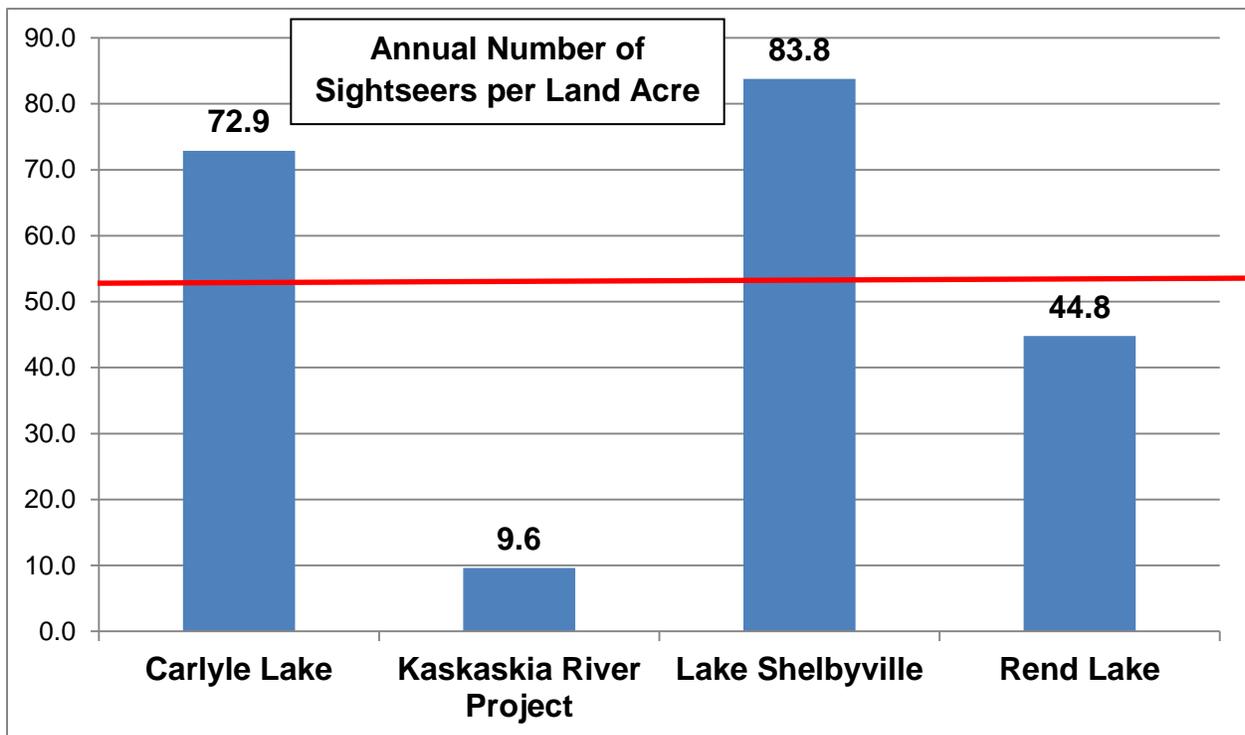


Source: USACE 2013. "Value to the Nation" report data from 2012 and OMBIL

2.12.6.1.9. Sightseeing

Figure 2-12 depicts the annual number of sightseers per land acre for USACE-managed project in the region. Carlyle Lake and Lake Shelbyville have a significantly higher number of sightseers than other projects in the region. Carlyle Lake has significantly more annual sightseers per land acre than the regional average of 52.8 (depicted by red line). The reason for this is most likely because Carlyle Lake and Lake Shelbyville are in closer proximity to populated places than other projects in the region.

Figure 2-12 Annual Number of Sightseers per Land Acre



Source: USACE 2013. "Value to the Nation" report data from 2012 and OMBIL

2.12.6.2. Water-Based Recreation and Land/Water Interface Recreation Facilities

There are a variety of water-based recreation opportunities/activities and land/water interface recreation facilities located within the region and at Carlyle Lake. This section of the recreation analysis focuses on recreational activities that typically occur on water, such as swimming,

boating, fishing, and water skiing/tubing, as well as the land/water interface recreation facilities that enable those opportunities and activities. According to the National Recreation and Park Association, water is the number one recreation attraction in America. Swimming in lakes, streams and waters is ranked among the top ten recreational activities. Lakes and oceans remain the top vacation destinations in America. Whether one uses aquatic resources to swim, boat, ski, or fish or simply to take advantage of surrounding resources such as bicycle paths, walkways, and hiking trails, water is a recreation resource that offers rest, relaxation, fun, and fitness.

2.12.6.2.1. Regional Land/Water Interface Recreation Facilities

This analysis is limited to Carlyle Lake and the three other USACE projects within the region; Kaskaskia River Project, Lake Shelbyville and Rend Lake. Water-based recreational opportunities are basically determined and limited by the quantity of land/water interface recreation facilities that provide access to the water, such as boat ramps, marinas, swim beaches, and community docks. A desktop inventory of these facilities was conducted in order to quantify the water-based recreational opportunities available within the region.

Table 2-10 depicts the number and type of land/water interface recreation facilities at USACE projects within the region. The percentage of regional land/water interface facilities located at Carlyle Lake is:

- a. Water Surface Acres – 45%
- b. Public Boat Ramps – 24%
- c. Car/Trailer Spaces – 38%
- d. Marina Slips – 53%
- e. Community Boat Docks – 100%
- f. Boats served by Community Boat Docks – 100%
- g. Swim Beaches – 38%

Note: Recreation facilities at the Kaskaskia River Project were not included in calculating the above percentages. Also, Recreation facilities from that project are not included in Table 2-10.

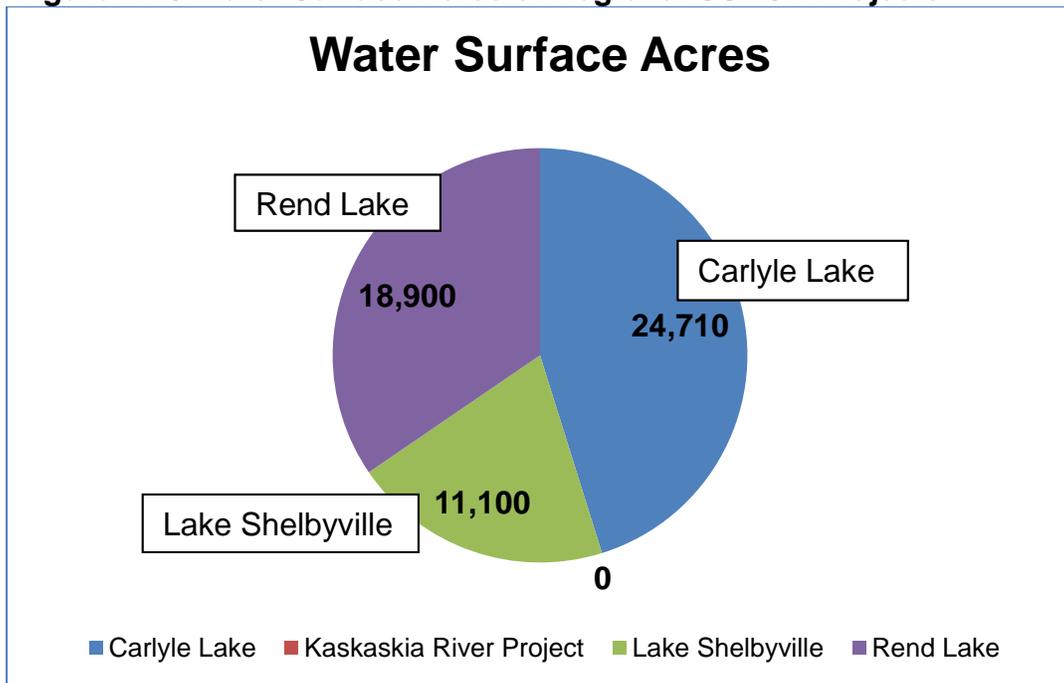
Table 2-10 Land/Water-Based Recreation Facilities at USACE Regional Projects

Project Name	Water Surface Acres	Boat Ramps/ Launch Lanes	Car-Trailer Spaces	Marina Slips (wet & Dry)	# Community Docks/Boats Served	Swim Beaches	Car Parking Spaces at Beaches
Carlyle Lake	24,710	24/45	1,286	1,745*	5/170	6	1,235
Lake Shelbyville	11,100	32/55	1,362	915	0/0	7	1,338
Rend Lake	18,900	43/57	704	316	0/0	3	420
Total	54,710	99/157	3,352	2,976	5/170	16	2,993

Source: USACE 2013. "Value to the Nation" report data from 2012 and OMBIL
 *Includes 65 transient wet slips at marina's and 365 dry storage spaces at Carlyle Sailing Association (CSA)

Even though Carlyle Lake comprises nearly half (45%) of all the water surface acres available within the region, only 24% of the boat ramps and 28% of the launch lanes within the region are located here. See **Figure 2-13** and **Figure 2-14**.

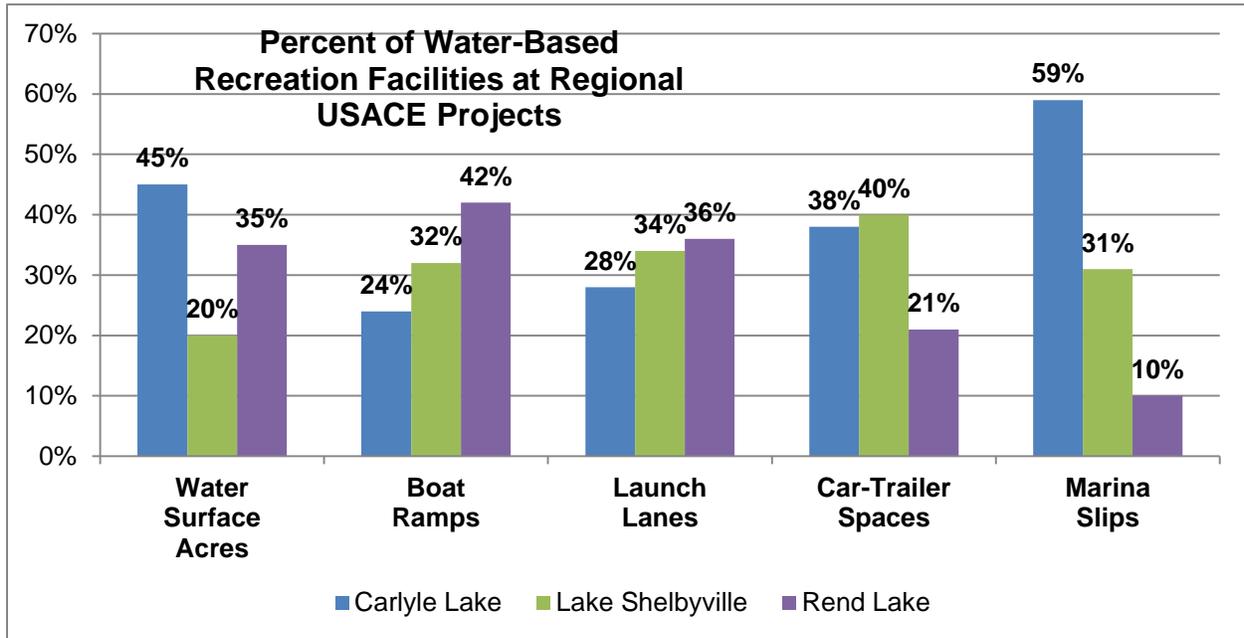
Figure 2-13 Water Surface Acres of Regional USACE Projects



Source: OMBIL

Note: Because the land underlying the water surface at the Kaskaskia River Project is not owned in fee, the water surface shows up as "0" in the OMBIL system.

Figure 2-14 Percent of Water-Based Recreation Facilities at Regional USACE Projects



Source: OMBIL

Note: Kaskaskia River Project facilities are not included

2.12.6.2.2. Regional Water-based Recreation Opportunities

Land/water interface recreation facilities are the critical links that allow water-based recreation opportunities to be provided and activities to occur. Land/water interface recreation facilities include boat ramps, swimming beaches, marinas and community docks. Water-based recreation opportunities would not exist if not for the land/water interface recreation facilities. Recreational boating activities cannot occur without a marina, boat ramp, or boat dock to provide access to the water surface. Likewise, swimming at designated locations cannot occur, if not for the swimming beach. This is true for all types of water-based recreation activities.

2.12.6.2.2.1. Boating

Recreational boating opportunities are largely dependent upon and limited by the quantity of land/water interface recreational facilities such as, boat ramps, marinas, and boat docks, which provide access to the water.

Regional recreation boating opportunities were calculated by adding the following facility numbers together for USACE projects within the region:

- Number of Car/Trailer Parking Spaces at public boat ramp parking lots
- Number of Marina Slips (wet & dry)
- Number of boats served by community docks

Using data from **Table 2-10**, the following formula was used to estimate regional recreational boating opportunities:

$$\begin{aligned}
 & 3,397 \text{ (car/trailer spaces at public boat ramps)} \\
 & + 2,976 \text{ (marina slips)} \\
 & + \underline{170} \text{ (boats served by community docks)} \\
 & = 6,542 \text{ (Regional Recreational Boating Opportunity} \\
 & \quad \text{Coefficient)}
 \end{aligned}$$

According to U.S. Coast Guard statistics, 2002 National Recreational Boating Survey Report, the average number of people on-board a recreational boat when underway is three. Therefore, regional boating opportunities can be calculated by multiplying the regional boating opportunity coefficient (6,542) by 3 ($6,542 \times 3 = 19,626$). Therefore, within the region, there are **19,626** opportunities for people to go boating and participate in boating recreation-related activities at any given point in time.

2.12.6.2.2.2. Swimming

For the purposes of this analysis, swimming opportunities and activities were limited to swimming that occurs at designated swimming beaches at USACE lakes within the region.

Standards for the design and operation of swimming beaches at USACE lakes are contained in EM 1110-1-400, Recreation Facility and Customer Service Standards, 1 Nov 2004. Paragraph 5.4.4.1 indicates: "Swim area sizing should be based on the assumption that approximately 60% of the total number of beach users will be on the beach at one time, with 30% in the water and 10% elsewhere. As a rule of

thumb, a turnover factor of 3 will be used for design purposes. Ideally, 50 square feet of sand and turf and 30 square feet of swimming area inside the buoyed safety area should be provided for each person. Swim area capacities will vary according to the attendance, supervision, size of swim area, anticipated usage, and type of swim area experience desired. Any space standard used to compute swim area capacity should be flexible enough to accommodate these factors. Parking areas should be sized to prevent overcrowding of swim areas.”

In addition, **Table 2-4** of EM 1110-1-400 indicates there should be one car parking space for every three swimmers, which is the same load factor used in the USACE – Visitor Estimating and Reporting System (VERS), which is used for calculating recreation visitation at USACE lakes.

Table 2-11 provides a regional summary of car parking spaces for recreation areas that contain a designated swimming beach.

Table 2-11 Car Parking Spaces at Designated Swimming Beaches within the Region

Lake Name	Recreation Area	Car Parking Spaces
Carlyle Lake	Dam West	594
Carlyle Lake	Coles Creek	286
Carlyle Lake	Dam East	217
Carlyle Lake	Keyesport	138
Carlyle Lake	Total	1,235
Lake Shelbyville	Coon Creek	42
Lake Shelbyville	Dam West	481
Lake Shelbyville	Lithia Springs	5
Lake Shelbyville	Sullivan Beach	244
Lake Shelbyville	Wilborn Creek	294
Lake Shelbyville	Wolf Creek SP	272
Lake Shelbyville	Total	1,338
Rend Lake	Dale Miller	39
Rend Lake	South Sandusky	381
Rend Lake	Total	420
Grand Total		2,993

Data Source: OMBIL

2.12.6.2.2.3. Regional Swimming Opportunities

Using the information in **Table 2-11**, we can estimate the swimming opportunities available at USACE lakes within the region. The formula used to estimate swimming opportunities is:

Swimming Opportunities = (Number of Car Parking Spaces at Recreation areas with designated swim beaches) X 3 (VERS load factor and parking space requirement of Swim Beaches)

$$\begin{aligned} &2,993 \text{ (Parking Spaces)} \\ &\underline{\quad \times 3 \text{ (Load Factor)}} \\ &= 8,979 \text{ (Regional Swimming Opportunities)} \end{aligned}$$

Within the region, there are:

- 16 Swimming Beaches
- 2,993 car parking spaces located within recreation areas where swimming beaches are located
- 8,979 Recreational Swimming Opportunities
- 41% of the Swimming Opportunities available within the region are provided at Carlyle Lake

USACE Recreation and Facility Customer Services Standards (EM 110-1-400) assume that 60% of potential swimmers will be on the beach, 30% will actually be swimming and 10% will be elsewhere. By applying the recommended 30 square feet of swimming area inside the buoyed safety area for each person, we can estimate the regional requirement for the water component for designated swim beaches.

The following formula is used to calculate the square feet of water area needed for designated swim beaches within the region:

$$\begin{aligned} &8,979 \text{ (Regional Swimming Opportunities)} \\ &\underline{\times 0.30} \text{ (Estimated percentage of people in water)} \\ &= 2,694 \text{ (Maximum Estimated number of people in} \\ &\quad \text{water swimming)} \end{aligned}$$

$$\begin{aligned} & \underline{\quad} \times 30 \text{ (Square feet per person)} \\ & = 80,811 \text{ SF (Regional Square Feet of swimming area} \\ & \quad \text{needed inside buoyed safety areas)} \end{aligned}$$

2.12.6.2.2.4. Swimming Opportunities and Swim Beach Carrying Capacity – Carlyle Lake

While the square footage inside the buoyed swim areas is not known for other Regional Lakes, at Carlyle Lake there is 125,714 square feet of water surface area inside of buoyed swim areas at lake elevation 445.0 feet NGVD. Therefore the carrying capacity for swim beaches located at Carlyle Lake is 4,190 swimmers. The calculation used to determine swim beach carrying capacity is: (125,714 SF divided by 30 SF per person = 4,190 beach users).

The carrying capacity for swim beaches at Carlyle Lake is just about right for the number of swimming opportunities provided.

- Swim Beach Carrying Capacity = 4,190 people
- Existing Swimming Opportunities = 3,705 people

2.12.7. Recreation Carrying Capacity

2.12.7.1. Boating Opportunities and Capacity

Carlyle Lake provides a wide variety of boating opportunities for all types of vessels, both powered and un-powered. The lake is one of the most popular sailing lakes in the Midwest. The gently rolling terrain creates excellent conditions for all types of wind powered vessels and sailing craft.

2.12.7.1.1. Boating Opportunities

A boating opportunity is defined as the ability to access the water surface of the lake to participate in any type of boating-related outdoor recreation activity, through the use of an authorized land/water interface facility, such as a boat ramp, marina or boat dock.

At Carlyle Lake boating opportunities are provided through the following land/water interface facilities¹¹:

¹¹ OMBIL

- a. Wet Storage slips at commercial marinas – 670
- b. Dry storage slips at commercial marinas – 646
- c. Transient slips located at commercial marinas – 65
- d. Car/Trailer spaces at outgranted recreation areas – 458
- e. Car/Trailer spaces at USACE recreation areas – 825
- f. Boat slips provided through community docks - 170

The combined total of these facilities (2,834) is equal to the number of boating opportunities currently available at Carlyle Lake, which equates to 2,834.

2.12.7.1.2. Boating Capacity

A variety of boating capacity studies have been conducted for a wide range of lakes throughout the United States. No two studies or outcomes from those studies are the same and there are no agreed-upon scientific standards, processes or procedures for establishing a definitive boating capacity for a particular body of water. For the purposes of this Master Plan update, a nationwide literature review was conducted, which identified previously conducted studies of a similar nature. These studies were screened for similarities and differences with the existing conditions at Carlyle Lake. These studies were then used as a resource in order to identify the most appropriate methods for determining the boating capacity at Carlyle Lake. Each of the studies included as part of this review are cited in Chapter 9, Bibliography.

2.12.7.1.3. Lake Use Rate

Lake use rate is a measure of the estimated number of boats on the lake at any given time from all land/water interface facilities, such as marinas, boat ramps and community docks. This is also known as the Boats At One Time (BAOT) coefficient. In the studies reviewed, lake use rates ranged from 10% to 50%, with the most commonly recommended range between 10% and 35%. Based on a review of similar studies it was determined the appropriate lake use rate for Carlyle Lake to be 15%. Therefore, the BAOT coefficient for Carlyle Lake is approximately 425, which is calculated by multiplying the boating opportunities by 15% ($2,834 \times .15 = 425.1$)

2.12.7.1.4. Useable Lake Area (“Open Recreation” Water Surface Classification)

There are 15,888 water surface acres classified as “Open Recreation” for Carlyle Lake. Generally, these water surface acres are those not classified as Fish & Wildlife Sanctuary, Restricted, or designated “No-Wake”.

With this amount of “Open Recreation” water classification, it is highly improbable the boating capacity of the lake will ever be exceeded, since this would require the number of boating opportunities to be greater than 10,000, where currently they are 2,834. Based on this information, the lake can easily accommodate all boating activities for the foreseeable future.

2.13. Related Recreational, Historical and Cultural Areas

Carlyle Lake is the primary source of outdoor recreational activities in the area. Stephen A. Forbes State Park, Ramsey Lake State Park, and Washington County Conservation Area managed by the Illinois Department of Natural Resources are the closest recreation areas to Carlyle Lake. These lakes are very small and offer fishing, hunting, camping, picnicking and boating opportunities. However, they do not compete nor compare to the opportunities offered at Carlyle Lake. The Kaskaskia River upstream and downstream from Carlyle Lake also provides the public with numerous outdoor recreational opportunities on a small river environment. St. Louis, Missouri is located 50 miles west of Carlyle Lake giving suburban residents the opportunity to enjoy outdoor recreation opportunities less than an hour from home.

2.14. Real Estate Acquisition Policy

Land acquisition for Carlyle Lake was initiated in 1958 under the Joint Land Acquisition Policy of the Department of the Interior and Department of the Army (Eisenhower Policy). This policy provided for only minimal land acquisition around the shoreline up to an elevation of 450.0 feet NGVD. Land with elevations less than this were purchased in fee title and account for 37,543 acres.

Flowage easements were purchased for land lying between elevations 450.0 feet NGVD and 465.5 feet NGVD. Flowage easements allow the Federal government the legal right to store water on private lands when necessary for the operation of Carlyle Lake. Flowage easement lands account for 24,972 acres.

In total the project consists of 62,515 acres.

Flowage easements contain two conditions that must be met:

- a. No structure for human habitation can be constructed or maintained on flowage easement land unless the structure is located above an elevation of 462.5 feet NGVD
- b. Also, the first floor elevation must be greater than 467.2 feet NGVD.

An exemption may be granted for structures required for mineral, oil and gas exploration, development, and recovery.

2.15. Pertinent Public Laws

Development and management of authorized USACE reservoir projects is provided through the enactment of several public laws. These laws direct the USACE to provide recreation opportunities and facilities, maintain and enhance fish and wildlife habitat and protect natural resources.

2.15.1. Recreation. Development and management of recreation opportunities and facilities by the USACE, other governmental agencies, local groups, or individuals is authorized through the following public laws:

- a. **Section 4 of the Flood Control Act (PL 78-534)**, 22 December 1944, authorizes providing facilities for public use, including recreation, and conservation of fish and wildlife.
- b. **The River and Harbors Act (PL 79-14)**, 2 March 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.
- c. **Section 209 of the Flood Control Act of 1954 (PL 83-780)**, 3 September 1954, amended the Flood Control Act of 1944. 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 recreation purposes when in the public interest.
- d. **The Land and Water Conservation Fund Act of 1965 (PL 88-578)**, 1 September 1964 as amended, contains provisions by which the USACE may charge for admission and use of its recreation areas under prescribed conditions.
- e. **The Federal Water Project Recreation Act (PL 89-72)**, 9 July 1965, contains cost sharing provisions for acquisition of lands and development of recreation facilities for water resource projects authorized after 1965. It

also provides for cost sharing development of new areas that were not part of initial project construction.

f. **The Architectural Barriers Act of 1968 (PL 90-480 as amended)**, provides information and guidance regarding universal accessibility for USACE recreation facilities and programs for persons with disabilities.

g. **The Rehabilitation Act of 1973 (PL 93-112) and the Rehabilitation Act Amendments of 1974 (PL 93-516)**, (see Architectural Barriers Act above).

h. **The Rehabilitation, Comprehensive Services, and Developmental Disabilities Amendments of 1978 (PL 95-602)**, (see Architectural Barriers Act above).

i. **The Americans with Disabilities Act of 1990 (PL 101-336)**, (see Architectural Barriers Act above).

j. **Architectural Barriers Act (ABA)**, 2010, Standards and Guidelines for Accessible Design.

k. **Accessibility Guidelines for Outdoor Developed Areas**, 26 September 2013, provides guidance published by the Architectural and Transportation Barriers Compliance Board for outdoor recreation areas and facilities.

l. **The Water Resources Development Act of 1992 (PL 102-580)**, 31 October 1992, authorizes the Challenge Cost Sharing Program (Section 225) that permits the USACE to develop and implement a program to accept contributions of funds, materials and services from non-Federal public and private entities for use in managing recreation facilities and natural resources. This is known as the Challenge Partnership Program.

m. **The Omnibus Budget Reconciliation Act - Day Use Fees (PL 103-66)**, 10 August 1993, contains provisions by which the USACE may collect fees for use of developed recreation sites and facilities, including campsites, swimming beaches, and boat launching ramps. However, it excludes assessing fees for boat launching ramps in undeveloped or lightly developed areas where only minimum security and illumination is provided.

n. **The Water Resources Development Act of 1996**, 12 October 1996. Section 208 (Recreation Policy and User Fees) (PL 104-303) directed that increased emphasis be placed on recreation opportunities at USACE projects and specifies that a portion of recreation fees collected at USACE projects remain for use at the project where they are collected. Section 519 (Recreation Partnership Initiative) directed the USACE to promote Federal, non-Federal, and private sector cooperation in creating public recreation opportunities at USACE projects.

2.15.2. Fish and Wildlife. Fish and wildlife resources are maintained and protected in compliance with the following public laws:

- a. **The Fish and Wildlife Coordination Act**, 10 March 1934, as amended, 14 August 1946 (PL 79-732), 1958 (PL 85-624), provides authority for making project lands available for management by interested Federal and state wildlife agencies, for wildlife management purposes. It further provides for more effective integration of fish and wildlife conservation programs at Federal Water Resource projects.
- b. **The National Environmental Policy Act of 1969**, as amended (42 USC 4321 et seq), declares a national environmental policy and requires that all Federal agencies shall, to the fullest extent possible, use a systematic, interdisciplinary approach which integrates natural and social sciences and environmental design in their planning and decision making processes.
- c. **The Endangered Species Act of 1973**, as amended (16 USC 1531 and 1536) requires that Federal agencies shall, in consultation with the U.S. Fish and Wildlife Service (USFWS) (or the National Marine Fisheries Service), use their authorities in furtherance of conserving endangered and threatened species and take such action as necessary to assure that their actions are not likely to jeopardize such species or destroy or modify their critical habitat.
- d. **The Water Resource Development Act of 1986**, (PL 99-662) Section 1135, provides for modification to structures or operations of a project, consistent with authorized project purposes, to improve the quality of the environment, i.e. restoration of fish and wildlife habitat. WRDA 1996 amended Section 103 of WRDA 1986 by specifying that the non-

Federal share of environmental restoration and protection projects shall be 35 percent.

e. **Executive Order 12962**, 7 June 1995, as amended, Recreational Fisheries, directs Federal agencies to improve the quantity, function, sustainable productivity, and distribution of U.S. aquatic resources for increased recreational fishing opportunities. In addition, it establishes a National Recreational Fisheries Coordination Council consisting of seven members (including one designated by the Secretary of Defense). The “Coordination Council” is charged with developing a comprehensive Recreational Fishery Resources Conservation Plan. This EO also directs all Federal agencies to identify and minimize conflicts between recreational fisheries and their responsibilities under the Endangered Species Act of 1973 and expands the role of the Sport Fishing and Boating Partnership Council.

2.15.3. Forest Resources

Protection and improvement of natural resources are maintained and protected through the following public laws:

The Forest Conservation Act (PL 86-717), 6 September 1960, provides for the protection of forest cover in reservoir areas, and specifies that reservoir areas of projects for flood control, navigation, hydroelectric power development, and other related purposes, owned in fee and under the jurisdiction of the Secretary of the Army and the Chief of Engineers, shall be developed and maintained so as to encourage, promote and assure fully adequate and dependable future resources of readily available timber through sustained yield programs, reforestation, and accepted conservation practices, and to increase the value of such areas for conservation, recreation and other beneficial uses; provided, that such development and management is accomplished to the extent practicable and compatible with other authorized project purposes. The law further provides in order to carry out the national policy declared in the first section of this Act, the Chief of Engineers, under the supervision of the Secretary of the Army, shall provide for the protection and development of forest or other vegetative cover and the establishment and maintenance of other conservation measures on reservoir areas under his jurisdiction, so as to yield the maximum benefit and otherwise improve such areas. Programs and policies developed pursuant to this act are to be

coordinated with the Secretary of Agriculture, and appropriate state conservation agencies.

2.15.14. Other Incidental Uses

- a. **Title 10, United States Code, Section 2667**, authorizes the lease of land and water areas at Civil Works projects for any commercial or private purpose, not inconsistent with authorized project purposes and subject to specific restrictions thereupon, as set out in regulations, policy, and Delegations of Authority. The use of project lands for easements and licenses is authorized in various Congressional Acts and codified in Titles 10, 16, 30, 32 and 43 of the United States Code.
- b. **Title 16, United States Code, Section 460d**, authorizes use of public lands for any public purpose, including fish and wildlife management, if it is in the public interest. .
- c. **Uniform Real Property Acquisition and Relocation Assistance Act of 1970, (PL 91-646)**, as amended, requires lands and rights-of-way to be acquired pursuant to provisions of the act.

2.15.5. Cultural and Historical Resource Considerations. A variety of public laws mandating the protection of cultural resources on public lands have been enacted. They include:

- a. **The National Historic Preservation Act of 1966 (PL 89-665)**, 15 October 1966, as amended through 2014 (PL 91-243, PL 93-54, PL 94-422, PL 94-458, PL96-1999, PL 96-244, PL 96-515, PL98-483, PL 99-514, PL 100-127, PL 102-575, PL 103-437, PL 104-333, PL 106-113, PL 106-176, PL 106-208, PL 113-287 and PL 106-355), states a policy of preserving, restoring, and maintaining cultural resources and requires Federal agencies to take into account the impacts their activities may have on sites potentially eligible for inclusion in the National Register of Historic Places.
- b. **The Archaeological and Historic Preservation Act of 1974**, as amended (54 USC 312501, et seq.) the 1960 Reservoir Salvage Act (PL 86-523), provides for the preservation of historical and archaeological data that might otherwise be lost or destroyed as the result of flooding or any alteration of the terrain caused as a result of any Federal construction projects.

- c. **American Indian Religious Freedom Act of 1978 (PL 95-341)**, 11 August 1978, protects the rights of Native Americans to exercise their traditional religions by ensuring access to sites, use and possession of sacred objects, and the freedom to worship through ceremonials and traditional rites.
- d. **The Archeological Resources Protection Act of 1979 (PL 96-95)**, (16 USC 470aa, et seq.), 96th Congress Revision and update of 1906 Antiquities Act protects archaeological resources and sites that are on public lands and Indian land, and fosters increased cooperation and exchange of information between governmental authorities, the professional community, and private individuals.
- e. **The Native American Graves Protection and Repatriation Act (PL 101-601)**, 16 November 1990, requires Federal agencies and museums to inventory and summarize human remains, funerary objects, sacred objects, and objects of cultural patrimony and to provide this information to potentially affiliated Native American Tribes. The Act requires repatriation of these items, upon request and following the guidelines in 43 CFR Part 10, to the cultural affiliated tribe(s) and establishes a grant program within the Department of the Interior to assist tribes with repatriation and museums in preparing the inventories and collection summaries. The act also outlines the procedures that Federal agencies must follow in the event of an inadvertent discovery or unintentional excavation of human remains and funerary objects from Federal or tribal lands.
- f. **Indian Sacred Site, Executive Order 13007**, 24 May 1996, directs Federal land-managing agencies to accommodate Native American use of sacred sites for religious purposes and to avoid adversely affecting the physical integrity of sacred sites. Agencies are required to develop procedures for reasonable notice to tribes of a proposed action or land management policy that may restrict access to, or ceremonial use of, a sacred site or adversely affect its physical integrity.
- g. **The Water Resources Development Act of 2000**, (PL 106-541), Section 208, authorizes the Army to rebury Native American human remains that were discovered on Civil Works project lands and have been rightfully claimed by a tribe on those lands.

2.16. Management Plans

A variety of management plans are used to guide the Operation and Maintenance activities at Carlyle Lake. The name of the plan, a brief description about the plan and the year the plan was approved is presented in **Table 2-12**.

Table 2-12 Summary of Management Plans at Carlyle Lake

Name of Plan	Plan Description	Year Approved/ Updated
Carlyle Lake Bike Trail Plan	Provides a detailed plan for implementing the development of a bicycle trail that circumvents the lake. This plan is included in Appendix C	2010
Carlyle Lake Safety Plan	This plan identifies known and potential health and safety hazards for employees, contractors and members of the public.	2016
Emergency Action Plan	This plan identifies actions to be implemented during emergency situations.	2014
eastern massasauga (Sistrurus c. catenatus) Management Plan, Carlyle Lake, Illinois	Provides detailed management activities and requirements to ensure protection and habitat enhancement for the eastern Massasauga Rattlesnake, an endangered and threatened species.	2007
Environmental Compliance Policy	This plan requires the Operation of Carlyle Lake to be accomplished in a manner to achieve the greatest benefit for all authorized project purposes.	2016
Flood Emergency Plan, Carlyle Dam & Lake, Kaskaskia River, Illinois	The plan identifies responsibilities and procedures to be implemented if there is evidence of potential failure of Carlyle Lake Dam or if discharge from the spillway begins to approach its design capacity.	2016
Standard Operating Procedures for High Water Events	This plan identifies the procedures that are implemented when the pool elevation exceeds 445.0 ft. NGVD, which is the normal recreation pool elevation. The plan identifies each of the facilities impacted at various lake elevations.	2016
Historic Properties Data Synthesis: Compliance Document, Carlyle Lake, Illinois	This document provides a summary of the lake’s archaeological history. It provides information on the lake environment, previous archaeological investigations, historic properties and cultural history. Priorities for future investigations are identified.	1989
Operational Management Plan (OMP)	The OMP provides a detailed description of facilities and specific actions required to meet the requirements identified in the Master Plan. Once the updated Master Plan – 2016 is approved, this plan will be updated.	1989

Continued on Next Page

Name of Plan	Plan Description	Year Approved/ Updated
Physical Security Plan	This plan prescribes policies, procedures and responsibilities to ensure the physical security of all public property and facilities located at Carlyle Lake.	2016
St. Louis District Cultural Resources Management Policy	Provides policy guidance for the protection of cultural resources located on projects within the St. Louis District.	1982
St. Louis District Historic Properties Management Plan (HPMP), Carlyle Lake	Serves as a guide to ensure laws and regulations related to historic properties management are implemented at all projects within the St. Louis District.	1986
St. Louis District Policy for the Management of Flowage Easement Lands	Provides guidance and policy for management of flowage easement lands. The construction permit approval process is identified.	2011
Shoreline Management Plan	This plan governs the management of the shoreline at Carlyle Lake and prohibits the placement of private facilities on public lands and waters at Carlyle Lake.	1976
Site Specific Security Plan	This plan works in concert with the Emergency Action Plan and provides guidance for assessing risks and identifying vulnerabilities for facilities located at Carlyle Lake.	2016
Spill Prevention, Control and Countermeasure Plan (SPCCP)	Provides a detailed plan for the prevention and containment of hazardous substances resulting from USACE activities.	2006
Water Control Manual – Appendix B to the Master Reservoir Regulation Manual	Provides a detailed water control plan for managing releases from Carlyle Lake.	2007

CHAPTER 3

RESOURCE OBJECTIVES

3.1. Carlyle Lake Master Plan Vision Statement

The Carlyle Lake Master Plan Update 2016 vision statement was developed to help guide the process of updating the Carlyle Lake Master Plan:

“Conserve the natural, cultural, and community resources in a sustainable manner to provide benefits for current and future generations.”

3.2. Resource Goals and Objectives

3.2.1. Resource Goals

The terms “goal” and “objective” are often defined as synonymous, but in the context of this Master Plan, goals express the overall desired end state of the Master Plan, whereas resource objectives are the specific task-oriented actions necessary to achieve the overall Master Plan goals.

The goals for the Carlyle Lake Master Plan are:

- a. **Goal A.** Provide the best management practices to respond to regional needs, resource capabilities and suitability, and expressed public interests consistent with authorized project purposes.
- b. **Goal B.** Protect and manage project natural and cultural resources through sustainable environmental stewardship programs.
- c. **Goal C.** Provide public outdoor recreation opportunities that support project purposes and public demands created by the project itself while sustaining project natural resources.
- d. **Goal D.** Recognize the particular qualities, characteristics, and potentials of the project.
- e. **Goal E.** Provide consistency and compatibility with national objectives and other State and regional goals and programs.

3.2.2. Resource Objectives

Resource objectives are defined as clearly written statements that respond to identified issues and that specify measurable and attainable activities for resource development and/or management of the lands and waters under the jurisdiction of the St. Louis District, Carlyle Lake Project Office. The objectives stated in this Master Plan support the goals of the Master Plan, Environmental Operating Principles (EOPs), and applicable national performance measures. They are consistent with authorized project purposes, Federal laws and directives, regional needs, resource capabilities, and take public input into consideration. Recreational and natural resources carrying capacities were also accounted for during development of the objectives found in this Master Plan.

The Illinois State Comprehensive Outdoor Recreation Plan (SCORP) was considered as well. The objectives in this Master Plan, to the best extent possible, aim to maximize project benefits, meet public needs, and foster environmental sustainability for Carlyle Lake.

3.2.2.1 Recreational Objectives

- Evaluate the demand for improved recreation facilities and increased public access on USACE-managed public lands and water for recreational activities (i.e. camping, walking, hiking, biking, boating, hunting, fishing, wildlife viewing, etc.) and facilities (i.e. campsites, picnic facilities, overlooks, all types of trails, boat ramps, courtesy docks, interpretive signs/exhibits, and parking lots). Goal A, C
- Monitor current public use levels and evaluate impacts from overuse and crowding. Take action to prevent overuse, conflict, and public safety concerns. Goal A, C
- Provide a unique natural resource and aesthetic-based recreation experience within the Kaskaskia River watershed projects. Goal A, B, C, D
- Evaluate recreational use zoning and regulations for natural resource protection, quality recreational opportunities, and public safety concerns. Goal A

- Follow the Environmental Operating Principles associated with recreational use of waterways for all water-based management activities and plans. Goal B, C, E
- Increase universally accessible facilities at Carlyle Lake. Goal A, C, E
- Consider high water events and the impact they have on recreation facilities and the local economy, even though water level management is not within the scope of the Master Plan. Goal A, B, C, D
- Ensure consistency with the USACE Recreation Strategic Plan. Goal E
- Reference the Illinois Statewide Comprehensive Outdoor Recreation Plan (SCORP) to ensure consistency in achieving recreation goals. Goal E

3.2.2.2. Natural Resource Management Objectives

- Actively manage and conserve forest, fish, and wildlife resources, special status species, by implementing ecosystem management principles and best management practices to ensure sustainability and enhance biodiversity. Goal A, B, D, E
- Consider watershed approach during decision-making process. Goal E
- Optimize resources, labor, funds, and partnerships for protection and restoration of fish and wildlife habitats. Goal B, E
- Optimize resources, labor, funds, and partnerships for the management and prevention of invasive species. Goal B.
- Minimize development on Federal lands to preserve the scenic beauty and aesthetics of the project. Goal A, B, C, D
- Continually evaluate erosion control and sedimentation issues at Carlyle Lake. Goal A, B, E

- Identify and protect unique or sensitive habitat areas. Goal A, B, D, E
- Promote forest health through tree replacement and timber resource management actions to create a diverse and sustainable forest habitat. Goal A, B, D
- Enhance aquatic habitat and associated fisheries management improvement projects. Goal A, B, C, D

3.2.2.3. Environmental Compliance Objectives

- Manage project lands and water to sustain healthy fish and wildlife populations and habitat conditions and avoid negative effects to public water supply, ensuring public health and safety. Goal A, B, C, D, E
- Consider both point and non-point sources of water quality problems during decision making. Goal A, B, D, E
- Improve coordination, communication, and cooperation between regulating agencies and non-governmental organizations to resolve and/or mitigate environmental issues. Goal A, B, D, E
- Ensure compliance with Environmental Review Guide for Operations (ERGO) at all Carlyle Lake facilities. Goal A, B, E

3.2.2.4. Visitor Information, Education and Outreach Objectives

- Provide opportunities (i.e. town hall meetings) for communication between agencies, special interest groups, and the general public. Goal A, D, E
- Implement educational and outreach programs on the lake. Topics to include Project operations, water quality, history, cultural resources, water safety, recreation, nature, and ecology. Goal A, B, C, D, E
- Establish a network among local, state, and federal agencies concerning the exchange of lake-related information for public education and management purposes. Goal A, D, E

- Capture trends concerning boating accidents, drowning's and other incidents on public lands and waters and coordinate data collection with other public safety officials. Goal A, C, D, E
- Promote the USACE Water Safety messages. Goal A, C, D, E
- Educate adjacent landowners on public land and shoreline use policies. Goal A, B, C, D, E
- Continue to educate public on Kaskaskia River Water Control Plan and associated impacts to the surrounding communities. Goal A, C, D, E

3.2.2.5. Economic Impact Objectives

- Balance economic and environmental interests involving Carlyle Lake. Goal A, B, C, D, E
- Work with local communities to promote tourism and recreational use of the lake. Goal A, B, C, D, E

3.2.2.6. General Management Objectives

- Secure sustainable funding for the Recreation and Environmental Stewardship programs. Goal A, B, C, D, E.
- Ensure consistency with USACE Campaign Plan (national level), Implementation Plan (regional level), Operations Plan (District level). Goal E
- Adapt to funding level changes in future years. Goal E
- Foster the development of partnerships and look for ways to leverage dollars with organizations with common interests and objectives. Goal A, C, D.
- Ensure consistency with Executive Order 13693, 'Greening the Government Through Leadership in Environmental Management' (19 March 2015). Goal E

- Evaluate non-recreation outgrant requests, such as utility easements, in accordance with national guidance set forth in ER 1130-2-550. Manage and administer outgrant's in accordance with national guidance set forth in ER 405-1-12. Goal A, B, D, E

3.2.2.7. Cultural Resources Management Objectives

- Monitor and better coordinate lake development and the protection of cultural resources with State Historic Preservation Offices and federally recognized Tribes. Goal A, B, D, E
- Inventory cultural resources on the project. Goal A, B, D, E
- Increase public awareness and education of regional history. Goal B, D, E
- Maintain compliance with Section 106 and 110 of the National Historic Preservation Act; the Archeological Resources Protection Act; and the Native American Graves Protection and Repatriation Act on public lands surrounding the lake. Goal B, D, E
- Prevent unauthorized or illegal excavation and removal of cultural resources on project lands. Goal B, D, E

CHAPTER 4

LAND ALLOCATION, LAND CLASSIFICATION, WATER SURFACE & EASEMENT LANDS

4.1. Land Allocation (See Plate 3)

Land Allocation refers to the congressionally authorized purpose for which the project lands were acquired. All lands at Carlyle Lake were purchased under the Eisenhower Administration Directive for public works projects. Only land needed for project operation and adequate public access for estimated future public visitation was purchased in fee title.

Because land for the project was purchased before implementation of Public Law 89-72, The Federal Water Project Recreation Act, 9 July 1965, no separable recreation lands were identified. All lands at Carlyle Lake were allocated to operations or project required lands according to authorized project purposes. Only one land allocation category exists for Carlyle Lake:

4.1.1. Operations. This allocation includes lands acquired according to the authorizing documents for operation of the project, which include:

- Flood Risk Management
- Water Supply
- Navigation
- Recreation
- Fish & Wildlife Conservation
- Water Quality

4.2. Land Classification (See Plate 4)

Land Classification further refines the Land Allocation categories by identifying the primary use for which project lands are managed. Project lands are classified for development and resource management consistent with authorized project purposes and the provisions of the National Environmental Policy Act and other Federal laws.

4.2.1. Project Operations (See Plate 5) (590 Acres)

This category includes those lands required for the dam, spillway, levees, offices, maintenance facilities and other areas that are used solely for the operation of the project. There are 590 acres with this classification.

4.2.2. High Density Recreation (See Plate 6) (3,279 Acres)

This category includes lands developed for intensive recreational activities for the visiting public including; day-use areas, campgrounds, commercial concessions, marinas, resorts and quasi-public development.

Activities and facilities that interfere with the public recreational use of these lands is prohibited. Other types of use such as low-density recreation activities and wildlife management activities are acceptable, especially on an interim basis. Agricultural activities are not permitted on these lands. There are 3,279 acres of land with this classification.

4.2.3. Mitigation (0 Acres)

There are no lands with this classification located at Carlyle Lake.

4.2.4. Environmentally Sensitive Areas (0 Acres)

This classification is used in areas where scientific, ecological, cultural or aesthetic features exist. 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. Any activities or uses proposed for these lands must be carefully evaluated to ensure these lands are not adversely impacted. Typically, development of any kind is not allowed on these lands. No agricultural or grazing is permitted on these lands unless necessary for a specific resource management benefit, such as prairie restoration. There are no lands with this classification located at Carlyle Lake.

4.2.5. Multiple Resource Management Lands (See Plate 7) (8,964 Acres)

This classification allows for designating lands using one or more of the following classifications:

4.2.5.1. Low Density Recreation (1,510 Acres)

This classification is used for lands with minimal development or infrastructure. These lands support passive types of recreational use (e.g. primitive camping, fishing, hunting, hiking, walking, wildlife viewing, etc.). Facilities may include boat ramps, trails, small parking areas or vault toilets. Activities or facilities may be permitted for such things as; erosion control, scenic quality improvement and wildlife management. Hunting and fishing are typically allowed in accordance with state fish and wildlife regulations and where the activity or facility does not create a safety issue.

4.2.5.2. Wildlife Management (5,663 Acres)

This classification is used for stewardship of fish and wildlife resources. The USACE conducts fish and wildlife management activities which seek to maintain populations of targeted wildlife species through the manipulation and management of habitat. These activities are normally accomplished in conjunction with the IDNR, using a variety of techniques including the placement of artificial structures and other practices. In addition the USACE conducts fish and wildlife management activities on all project lands and waters which are identified by land classification and/or resource objective for fish and wildlife management purposes. Priority is given to those species identified as special status species, specified by law and national focus plans and agreements such as the Endangered Species Act and the North American Waterfowl Management Plan.

4.2.5.3. Vegetative Management (1,791 Acres)

This classification is used for stewardship of forest, prairie and other native vegetative resources. Vegetative management activities are applied to develop, maintain, protect and/or improve vegetation conditions for timber, fish, soils, recreation, water quality and other beneficial uses.

4.2.5.4. Future or Inactive Recreation Areas (0 Acres)

There are no lands with this classification located at Carlyle Lake.

4.2.6. Water Surface Classification (See Plate's 9 & 10)

All water surfaces of Carlyle Lake are zoned using one of the following classifications:

4.2.6.1. Restricted. This classification is used for water areas restricted for project operations, safety and security purposes. Public access to these areas is not permitted. These areas are marked with buoys that physically prevent access. These areas include the water areas immediately upstream and downstream of the dam, water intake structures, pump stations and any other areas determined to be a public safety or security concern. There are 2 acres of water with this classification.

4.2.6.2. Designated No-Wake. This classification is used to protect environmentally sensitive shoreline areas and recreational water access areas from disturbance, and/or for public safety. Generally, all areas

marked as “no-wake” are located at boat ramps, entrances to coves, the railroad trestle boating pass-through, and adjacent to beaches. There are 7,153 acres of water with this classification.

4.2.6.3. Fish and Wildlife Sanctuary. This classification is used to identify areas where annual or seasonal restrictions are in place to protect fish and wildlife species during periods of migration, resting, feeding, nesting and/or spawning. These areas are marked with a combination of signs and/or buoys. There are 1,540 acres of water with this classification.

Some portions of the area north of the Burlington-Northern Railroad tracks contain this classification as well as the large inlet east of the Dam West Campground. Occasionally, these locations are changed in order to accommodate food sources/availability, species habits, nesting and resting locations as well as hunting season differences for a variety of species. .

The USACE and IDNR closely coordinate location and seasonal change requirements for waters with this classification. When changes are made the public is informed through news and media releases.

4.2.6.4. Open Recreation. This classification is used for water areas available for year-round or seasonal water-based recreational use. Generally, these waters can be used by most types of vessels for all types of water-based recreational activities. There are 16,015 acres of water with this classification.

4.3. Easement Lands (See Plate 8)

4.3.1. Operations Easement Lands

There are no Operations Easement Lands located at Carlyle Lake.

4.3.2. Flowage Easement Lands (See Plate 8) (24,972 Acres)

There are 24,972 acres of flowage easement land located at Carlyle Lake. These are privately owned lands where a flowage easement estate was purchased by the Federal Government, which allows for the land to be occasionally flooded and inundated during high water events. Generally, these lands are located between elevation 450.0 feet NGVD and 465.5 feet NGVD and are directly adjacent to the land owned in fee title by the USACE.

Construction of structures on flowage easement lands is carefully regulated and monitored by the USACE through an established permitting program. Structures for human habitation are subject to certain elevation restrictions while other types of structures may have specific conditions that must be met before a permit is issued to authorize construction.

It is important to note that no structure may be constructed on flowage easement land until a permit is obtained from the USACE, which specifically authorizes construction of the proposed structure.

Structures approved for construction are designated in one of the following categories:

- a. Structure for human habitation
- b. Structure for non-human habitation
- c. Structure for wetland development

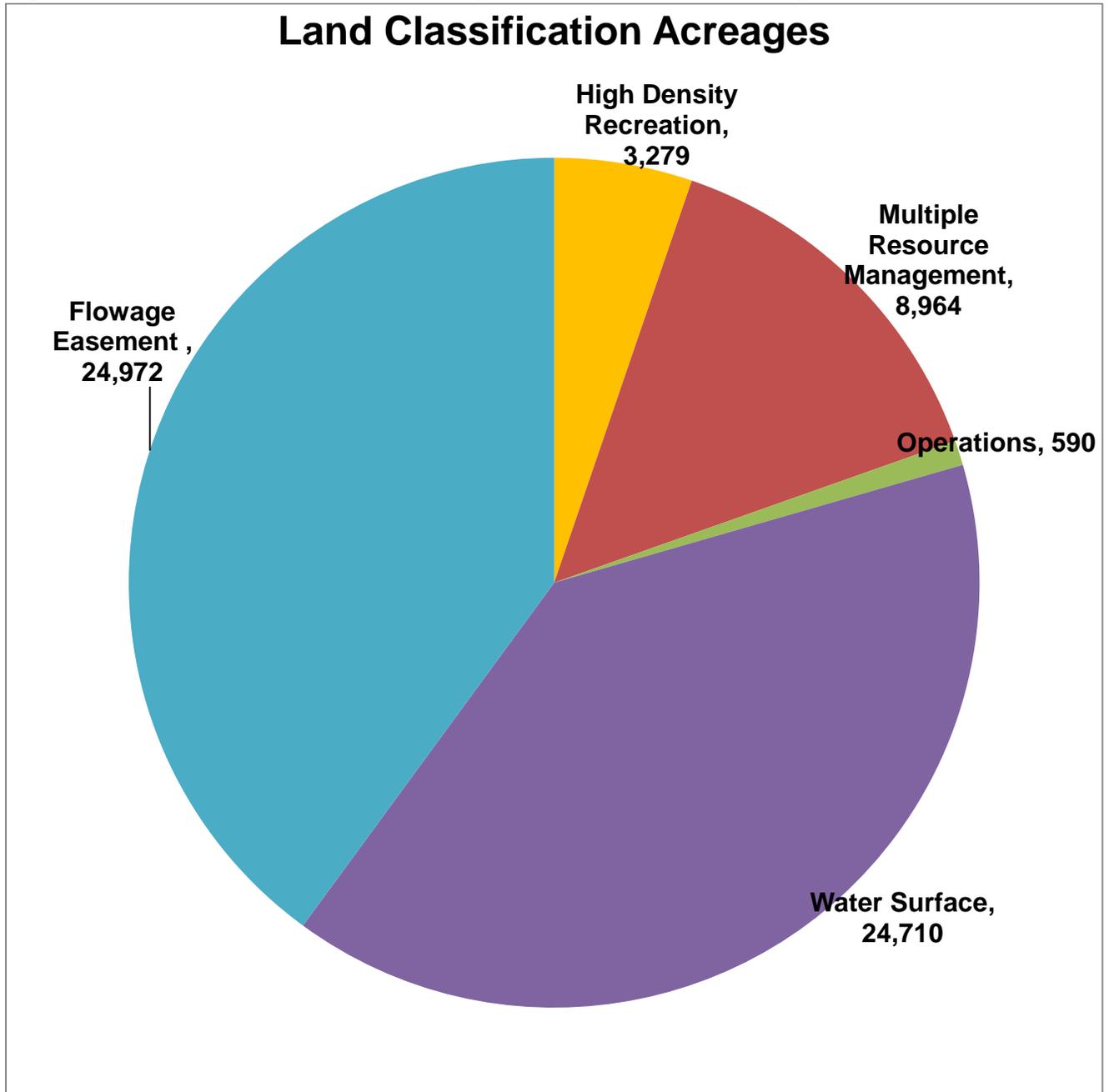
Exploration, development and recovery of oil and gas on Flowage Easement Lands are exempt from permitting requirements.

4.3.3. Conservation Easement Lands

There are no Conservation Easement Lands located at Carlyle Lake.

Figure 4-1 provides a graphical representation of the land and water classification acreages for Carlyle Lake.

Figure 4-1 Land Classifications – Carlyle Lake (See Plate's 4-10)



Note: Water surface acres are calculated at pool elevation 445.0 feet NGVD

CHAPTER 5

RESOURCE PLAN

5.1. Introduction

The Carlyle Lake Master Plan provides guidance for the orderly development, use and management of Project resources. Resource planning takes into consideration:

- a. Authorized Project Purposes
- b. Public Input and Interests
- c. Regional Needs, Opportunities and Constraints

All proposed development is designed to be compatible with the project's natural and cultural resources. Project planning and land classification takes into consideration several factors:

- a. Seasonal Flooding
- b. Soils
- c. Ecological Conditions
- d. Existing and Projected Recreation Demand
- e. State and Local Interests
- f. Applicable Laws, Regulations and Policies

Most of the Proposed Actions in this plan were determined to be categorically excluded from further NEPA action. However, when implemented, some may require additional documentation in order to ensure compliance.

5.2. Resource Plans - General

Implementation of resource management objectives is dependent upon land classification, anticipated concurrent use, and other environmental, geologic, and topographic variables. The Operational Management Plan (OMP) subdivides land and water classifications into management units based upon land use objectives, natural and man-made resources, and environmental sustainability. The OMP establishes achievable goals to maintain and improve ecological conditions and outdoor recreation opportunities.

This section of the Master Plan provides basic information and data about each Project Site Area at Carlyle Lake and includes:

- a. Area Name
- b. Basic information & data about the area
- c. Listing of Existing Facilities and a brief discussion
- d. Listing of Proposed Actions and a brief discussion

Proposed Actions are actions being proposed in this Master Plan and are intended to be implemented within approximately ten years or by the next Master Plan update.

The Land Classifications for Carlyle Lake are:

- a. Project Operations
- b. High Density Recreation
- c. Environmentally Sensitive Areas (ESA)
- d. Multiple Resource Management
- e. Water Surface
- f. Flowage Easement Lands

These land classifications are described fully in Chapter 4, Paragraph 4.2. - Land Classification. **Table 5-1** provides a summary of land classification acreages for Carlyle Lake.

Table 5-1 Land Classification Acreages (See Plate's 4-10)

Land Classification	Acres	Total Acres
Project Operations		590
High Density Recreation		3,279
Multiple Resource Management		8,964
Low Density Recreation	1,510	
Vegetative Management	1,791	
Wildlife Management	5,663	
Environmentally Sensitive Areas	0	0
Water Surface		24,710
Restricted	2	
No Wake	7,153	
Fish & Wildlife Sanctuary	1,540	
Open Recreation	16,015	
Easement Lands		24,972
Flowage Easement	24,972	
TOTAL		62,515

Note: Water Surface Acres are calculated at pool elevation 445.0 feet NGVD

5.2.1. Project Operations

This classification includes those lands required for the dam, spillway, levees, offices, maintenance facilities, visitor center and other areas that are used solely for the operation of the project. There are eight Project Site Areas with this land classification, totaling 590 acres. **Table 5-2** provides a summary of lands classified as Project Operations and the Master Plan Plate Number that depicts each area.

Table 5-2 Summary of Project Operations Lands

Area Name	Acres	Plate Number
Main Dam & Spillway	49	5
USACE Management & Maintenance Complex	40	5 & 12
Saddle Dam #2	92	25
Saddle Dam #3	330	25
Keyesport Levee & Drainage Area	53	13
Coles Creek Land Treatment System	10	15
Boulder Sewage Treatment System	1	14
IDNR Management & Maintenance Complex	15	26
TOTAL	590	

5.2.1.1. Main Dam & Spillway

The main dam consists of a compacted earth fill embankment and a concrete spillway section with tainter gates and sluice, located midway on the dam embankment. The crest of the dam embankment is at elevation 472.5 feet NGVD and the crest of the spillway is at elevation 425 feet NGVD. The dam and spillway are about 6,610 feet in length and comprise approximately 49 acres.

The service road on the main dam offers an excellent view of the lake and is heavily used by the general public for walking and biking. Interpretive dam tours and some bank fishing also occur here.

Existing facilities include two park benches that are located along the main dam service road. Service road gates allow easy access for pedestrian and bicycle traffic.

Proposed Actions: Waste water lines from Dam East will be removed from the dam (concrete spillway section) and rerouted to allow for winter use of the East Spillway.

5.2.1.2. USACE Management & Maintenance Complex

This 40-acre area is located adjacent to the Dam West Recreation Area and is the administrative center for the Carlyle Lake project. **(See Plate 5 & 12)**. *Please note that proposed actions for the Visitor Center are included with the Dam West Recreation Area information.*

Existing Facilities include a fenced maintenance compound with offices, workshops, a storage yard and buildings, a weather station, employee and visitor parking areas, project management office and Visitor Center.

Proposed Actions: Provide a 1 acre Leash Free Dog Area. Just south of the administration building is a cleared open field that is well suited for a leash free dog area. There is adequate space for parking. There is also existing parking in the Dam West Recreation Area. The area is located immediately adjacent to an existing multipurpose trail system that is extensively used by city residents as well as lake visitors. Fencing, benches, waste receptacles and water hydrant will be provided. This action will be extremely popular with local residents and lake visitors. Although this is a recreation facility action, no conflicts with administrative activities are anticipated. **(See Plate 5 & 12)**.

5.2.1.3. Saddle Dams #2 and #3 (See Plate 25)

Two earth-filled saddle dams are located along the southeast rim of the lake extending in an east-west direction. The purpose of these saddle dams is to contain flood waters that will flood low elevation land areas east of the lake if the maximum flood control pool level were achieved. The total length of these two embankments is approximately 31,560 feet (6 miles), encompassing 422 acres. The elevation of the crest of each dam is 472.5 ft., the same as the Main Dam. Adequate lands were purchased on the land and water sides of the dams and include drainage structures and collection ditches for wetland creation. **(See Plate 25)**

Saddle Dam 2, the smaller of the two dams, encompasses an area of approximately 92 acres. A paved public roadway is maintained on the crest of the dam, which serves as a transportation link and multipurpose trail between Dam East recreation areas and South Shore State Park. The dam extends from the entrance of the McNair Group Camp Area to the western entrance road to South Shore State Park. All fee lands between the dam and U.S. Route 50 and south of U.S. Highway 50 are included in the Saddle Dam 2 management unit.

Saddle Dam 3 encompasses approximately 330 acres. A controlled access gravel service road is maintained along the crest of the dam. The dam corridor extends eastward almost 4 miles from the eastern portion of South Shore State Park. All fee lands directly adjacent to the earthen dam are included in the Saddle Dam 3 management unit. Four access points are located along the saddle dam.

Existing Facilities include a paved road that runs the length of Saddle Dam 2 and a gravel service road that runs the length of Saddle Dam 3. A 1.5 mile portion of the service road on the western end of Saddle Dam 3 has an oil and chip surface. Bicycle and pedestrian traffic use this service road which is a critical link in the Carlyle Lake Trail Plan (**See Appendix C**). A pump station is located at each saddle dam drainage impoundment. Gates with pedestrian and bicycle access are located at road crossings on saddle Dam 3. The narrow strip of land located adjacent to Saddle Dam 3 is managed as a diversified wetland unit. Small berms with water control structures, and several ponds provide wetland habitat. Three access points and an accessible hunting site are located along Saddle Dam 3.

Proposed Actions:

- a. Install Watchable Wildlife interpretive signs and a wildlife viewing site along Saddle Dam 3 to increase visitor understanding of the area. (Previously Approved in 1997 Master Plan)
- b. Provide improved & safer access from US Hwy 50 to Dam East Concession Area between Dam East Boat Access & SSSP (Previously Approved in 1997 Master Plan)
- c. Saddle Dam #2 Repair road base and resurface road.
- d. Repair base and resurface road. (Saddle Dam 2)

5.2.1.4. Keyesport Levee & Drainage Area (See Plate 13)

An earthen levee and drainage system covers approximately 53 acres of fee land within and adjacent to the Village of Keyesport. The net grade elevation of the levee is 469 feet NGVD and is 9,945 feet in length. The levee extends in a north-south direction from the B&N railroad to where it intersects 2250 E just south of Keyesport. The Keyesport Recreation Area is located primarily on the lake side of the levee and the Village of Keyesport is on the land side. Low elevation fee land was acquired as a natural drainage area and extends into the south central portion of Keyesport. A pump station carries the inflow from the impoundment area,

feeding it back into the reservoir. Walking and biking are popular activities taking place on the gravel service road on top of the levee. The levee serves as a critical link in the Carlyle Lake Trail Plan (**See Appendix C**).

Existing Facilities include a pump station and a gravel service road.

Proposed Actions: None

5.2.1.5. Coles Creek Land Treatment System (See Plate 15)

A land treatment system for wastewater disposal is located in the Coles Creek Recreation Area. This facility occupies 10 acres on the eastern portion of the recreation area, south of the entrance road and west of 2400E. This facility was designed to accommodate sewage from Boulder Recreation Area.

Existing Facilities include a land wastewater treatment system.

Proposed Actions: A connection to wastewater from Boulder Recreation Area is proposed. (Previously Approved in 1997 Master Plan)

5.2.1.6. Boulder Sewage Treatment System (See Plate 14)

This package treatment plant is located on one acre in the northern portion of Boulder Recreation Area.

Existing Facilities include one package treatment plant.

Proposed Actions: The treatment facility is nearing the end of its useful life and is proposed to be decommissioned and removed. Removal of wastewater from Boulder Recreation Area will be accomplished by connecting the area to the Coles Creek Land Treatment facility, which was designed to accommodate sewage from Boulder Recreation Area. (Previously Approved in 1997 Master Plan)

5.2.1.7. IDNR Management & Maintenance Complex (See Plate 26)

Within the confines of Eldon Hazlet State Park, the Illinois Department of Natural Resources maintains a 15 acre area for its administration building, maintenance buildings, vehicle and equipment compounds and visitor parking. The office building is the main headquarters for all daily operations at Eldon Hazlet and South Shore State Parks and is administered through the IDNR's Region IV office in Alton, Illinois.

Existing Facilities include a site office and service area complex containing a 3-bay service building with employee support facilities, two 3-sided pole storage buildings, small tool shed, gravel service yard, gasoline facilities, and visitor/employee parking areas.

Proposed Actions: Proposed actions are included on page 108.

5.3.1. High Density Recreation (See Plate 6)

This classification includes lands developed for intensive recreational activities for the visiting public including; day-use areas, campgrounds, commercial concessions, marinas, resorts and quasi-public development. There are 10 Project Site Areas with this classification and include a total of 3,279 acres.

Table 5-3 provides a summary of lands classified as High Density Recreation and the Master Plan Plate Number that depicts each area.

Table 5-3 Summary of High Density Recreation Areas

Area Name	Acres	Plate Number
Boulder Recreation Area	67	14
Coles Creek Recreation Area	87	15
Dam East Recreation Area (McNair Recreation Area)	136	18 & 19
Dam East Spillway	103	17
Dam West Recreation Area	154	11
Dam West Spillway	57	16
General Dean Bridge Recreation Area	5	20
Eldon Hazlet State Park	2,335	26
South Shore State Park	305	27
Keyesport Recreation Area	30	13
TOTAL	3,279	

5.3.1.1 Boulder Recreation Area (See Plate 14)

Area Name: Boulder Recreation Area

Type of Area: Multipurpose

Land Classification: High Density Recreation

Managing Entity: USACE & Commercial Marina

Acres: 67 **Developed Acres:** 49

Avg. Annual Visits: 82,187 **Avg. Annual Revenue:** \$79,610

Density of Use: 1,667 (Lake average = 9,832)
(Average Annual Visits per developed acre)

Average Annual Occupancy Rate: 44%

Narrative Description of Area: Boulder Recreation Area is located on the east side of the lake, just south of the Burlington-Northern Railroad crossing. The area features a campground, day-use area and full service marina.

Existing Facilities:

Day Use Facilities		Camping Facilities		Outgranted Facilities		Operational Facilities	
Picnic Sites	30	Entrance Station	1	Wet Slips	275	STP*	1
Picnic Shelters	1	Campsites (E/W/S)*	82/8/8	Dry Slips	200	Visitor Center	
Boat Ramp/Lanes	2/5	Gate Attendant Sites	2	Boat Ramp/Lanes	1/1	Administration Bldg	
Car Parking	209	Dump Station	1	Restaurant			
Trailer Parking	163	Playgrounds	1	Gas Sales	1		
Courtesy Dock	1	Rest Rooms	5	Store	1		
Fish Cleaning Station	1	Shower Buildings	1	Building, Activity Center	1		
Swimming Area	0	Laundry	1	Cabins			
Trails/Trail Miles	1/6	Amphitheater	1	Marine sanitary pump-out	1		
Water Fountains	1	Water Hydrants	6	Picnic Sites/Shelter			
Rest Rooms	1	Multipurpose Court/Play Field		Admin. Bldg.			
Beach Change House	0			Trails/Trail Miles			
Playground	1			Playground			
Fishing Pier	0			Restrooms (V/WB)*	0/1		
				Amphitheater			
				Car Parking	100		
				Trailer Parking	50		

*(E = Electric, W = Water, S = Sewer, V = Vault, WB = Waterborne, STP = Sewage Treatment Plant)

Existing Facility Discussion: Although the campground has a good occupancy rate, many of the campsites do not meet the Campsite Design Guidelines contained in EM 1110-1-400. Vehicle spurs are too narrow and impact areas are too small to accommodate recreational vehicles and camping equipment. Improper spur alignment creates extensive maintenance and repair to adjacent grounds and vegetation. Because there are only eight campsites with water hookups, other campers must fill their fresh water tanks from one of the six hydrants located in the campground. On weekends, exit from the campground is hindered by campers using the single dump station. Many of the trees in the area are reaching the end of their life expectancy. The ADA/ABA transition plan approved on 13 February 2014 needs to be fully implemented. The existing STP is nearing the end of its life expectancy and an alternative plan for disposing of sewage must be implemented. The high water boat ramp is too steep and does not meet design standards. Another launching lane and courtesy dock should be added to the high water ramp. The picnic sites in the day-use area receive moderate use. The number of picnic sites can be reduced.

Proposed Actions:

Proposed Action	Type of Action (R/N/PA)*	Description
Renovate campground access and entrance station	R	The entrance station and access road will be renovated to meet design guidelines and be ADA compliant.
Provide water hookups to campsites	N	Provide one dual outlet water hookup for every two campsites
Provide sewer hookups	N	Provide sewer hookups to 60% of campsites
Renovate campsites to meet Customer Service Standards	R	Renovate campsites to meet all customer service standards contained in EM 1110-1-400
Implement tree replacement plan	R	Plant replacement trees throughout campground and day-use area
Install and connect sewage system to Coles Creek system	R	Decommission Boulder STP and connect all sewage facilities to Coles Creek system
Implement ADA/ABA transition plan for entire area	PA	Supplement No.4, to 1997 Carlyle Lake Master Plan, Approved 13 February 2014. (See Appendix D)
Provide WI-Fi service in campground	N	Install properly sized outdoor Wi-Fi service for use by campground guests
Replace Fish Cleaning Station	R	Replace Fish Cleaning Station with ADA compliant facility
Reduce number of picnic sites	N	The picnic sites near the STP can be eliminated and the area can be removed from further mowing
Provide leash-free dog area	N	Provide small appropriately located leash-free dog area
Renovate High Water Boat Ramp	R	Renovate ramp to meet design standards to include additional lane and courtesy dock
Construct Boat Loading Platform	N	Provide ADA/ABA compliant boat loading platform
Replace Courtesy Dock	R	Replace existing courtesy dock
Resurface boat ramp and apron	R	The boat ramp and apron will be resurfaced
Replace Shower Laundry Building	R	The shower laundry building will be replaced with an ADA compliant facility.

* (R = Replacement, N = New, PA = Previously Approved)

Proposed Action Discussion: Data analysis indicates that occupancy rates for sites with water and sewer hookups are 25% to 40% higher than those without. The goal is to provide full service hookups to 60% of the campsites. This will also facilitate and expedite entry and exit from the campground. Campsites will be renovated to meet Campsite Design Guidelines contained in EM 1110-1-400. Improperly sized spurs and impact sites are creating degradation to adjacent soil and vegetation. Providing sites that meet Customer Service Standards will improve customer satisfaction, attract new users and help minimize annual O&M costs. Renovation activities should be accomplished to ensure protection of existing vegetation. A tree replacement plan will be implemented to ensure environmental sustainability of the area is attained. The entrance station and access to the campground will be renovated to ensure compliance with design standards and ADA/ABA requirements. The addition of a leash-free dog area and outdoor Wi-Fi will greatly improve customer satisfaction. Construct ADA/ABA boat loading platform

5.3.1.2. Coles Creek Recreation Area (See Plate 15)

Area Name: Coles Creek Recreation Area

Type of Area: Multipurpose

Land Classification: High Density Recreation

Managing Entity: USACE

Acres: 87 **Developed Acres:** 60

Avg. Annual Visits: 90,905

Avg. Annual Revenue: \$117,974

Density of Use: 1,515 (Lake Average = 9,832)
(Average Annual Visits per developed acre)

Average Annual Occupancy Rate: 45%

Narrative Description of Area: Coles Creek Recreation Area is located on the east side of the lake, south of Boulder Recreation Area. The area features a large campground, day-use area with beach and a group camp area.

Existing Facilities:

Day Use Facilities		Camping Facilities		Outgranted Facilities		Operational Facilities	
Picnic Sites	42	Entrance Station	1	Wet Slips		STP*	
Picnic Shelters	1	Campsites (E/W/S)*	146/25/25	Dry Slips		Visitor Center	
Boat Ramp/Lanes	2/5	Gate Attendant Sites	2	Boat Ramp/Lanes		Administration Bldg	
Car Parking	286	Dump Station	1	Restaurant		Land Treatment System	1
Trailer Parking	175	Playgrounds	2	Gas Sales			
Courtesy Dock	1	Rest Rooms	5 WB 1V	Store			
Fish Cleaning Station	1	Shower Buildings	2	Lodge/Hotel/Rooms		Environmental Stewardship Facilities	
Swimming Area	1	Laundry	1	Cabins		Brood Pond	1
Trails/Trail Miles	1/5	Amphitheater	1	Golf Course			
Water Fountains	3	Water Hydrants	7	Picnic Sites/Shelter			
Rest Rooms	1	Multipurpose Court/Play Field	1	Admin. Bldg.			
Beach Change House	1	Enclosed mini-shelter	5	Trails/Trail Miles			
Playground	1	Group Camp Area/Sites	3/32	Playground			
Fishing Pier		Group Camp Shelter	1	Restrooms (V/WB)*			
				Fish Cleaning Station			

* (E = Electric, W = Water, S = Sewer, V = Vault, WB = Waterborne, STP = Sewage Treatment Plant)

Existing Facility Discussion: Although the campground has a good occupancy rate, many of the campsites do not meet the Campsite Design Guidelines contained in EM 1110-1-400. Vehicle spurs are too narrow and impact sites are too small to accommodate recreational vehicles and camping equipment. Improper spur alignment creates extensive maintenance and repair to adjacent grounds and vegetation. The two group camping loops receive minimal use, as is the case with the Lotus Group Camp area. Except for the 25 sites that provide full service hookups, other campers must fill their fresh water tanks from one of the seven water hydrants located in the campground. On weekends, exit from the campground is hindered by campers using the single dump station, which is too small and does not meet design standards. The day use facilities and swimming beach receive moderate use and the number of picnic sites is excessive. The land treatment facility is functioning well and was designed and capable of accommodating additional capacity. Many of the trees in the area have been damaged by high water events and storms.

Proposed Actions:

Proposed Action	Type of Action (R/N/PA)*	Description
Provide water hookups to campsites	N	Provide one dual outlet water hookup for every two campsites
Provide sewer hookups	N	Provide sewer hookups to 60% of campsites
Renovate campsites to meet Customer Service Standards	R	Renovate campsites to meet Campsite Design Guidelines contained in EM 1110-1-400
Implement Tree Replacement Plan	R	Plant replacement trees throughout campground and day-use area
Implement ADA/ABA transition plan for entire area	PA	Supplement No. 4, to 1997 Carlyle Lake Master Plan, Approved 13 February 2014. (See Appendix D)
Provide Wi-Fi service in campground	N	Install properly sized outdoor Wi-Fi service for use by campground guests
Replace Fish Cleaning Station	R	Replace Fish Cleaning Station with ADA compliant facility
Renovate Dump Station	R	Renovate and resize dump station to meet design standards
Resurface boat ramp and apron	R	Resurface the boat ramp and apron
Construct Boat Loading Platform	N	Provide ADA/ABA compliant boat loading platform
Convert Swimming Beach to boat-in picnic area	R	Remove swimming beach and convert area to boat-in picnic facility. Convert Bath Change House to Restroom
Relocate picnic shelter and Playground equipment	R	Relocate picnic shelter and playground equipment closer to existing beach for use by boat-in picnickers
Replace shower/laundry building	R	Replace the shower laundry building with ADA compliant facility.
Provide leash-free dog area	N	Provide small appropriately sized leash-free dog area
Convert Group Areas A & B to individual full hookup campsite units	R	The current occupancy rate for these areas is about 12%. Converting these sites to individual campsites with full hookups will greatly improve efficiency and improve customer satisfaction
Convert Lotus Group Area to Group Camp Area	R/PA	Remove cabins and convert area to group camping area with full hookup sites and add previously approved waterborne restroom with showers
Establish Volunteer Village	N	Convert area near laundry facility to Volunteer Village

* (R = Replacement, N = New, PA = Previously Approved)

Proposed Action Discussion: Data analysis indicates that occupancy rates for sites with water and sewer hookups are 25% to 40% higher than those without. The goal is to provide full service hookups to 60% of the campsites. This will also facilitate and expedite entry and exit from the campground. Campsites will be renovated to meet Campsite Design Guidelines contained in EM 1110-1-400. Improperly sized spurs and impact sites are creating degradation to adjacent soil and vegetation. Providing sites that meet Customer Service Standards will improve customer satisfaction, attract new users and help minimize annual O&M costs. Renovation activities should be accomplished to ensure protection of existing vegetation. A tree replacement plan will be implemented to ensure environmental sustainability of the area is attained. The addition of a leash-free dog area and outdoor Wi-Fi will greatly improve customer satisfaction. The dump

station will be resized and redesigned to meet Customer Service Standards contained in EM 1110-1-400. The swimming beach will be converted to a boat-in picnic facility and the bath change house converted to a waterborne restroom. The group shelter will be relocated to this area along with the playground equipment. The Lotus Group area will be converted to a group camping area which will be designed in accordance with Customer Service Standards and ADA/ABA requirements. More work is being accomplished by volunteers. In order to accommodate the increased demand for volunteer services, an area designed and devoted to the people providing these essential services needs to be provided. This will help promote the volunteerism ethic and encourage additional volunteers to participate in the program. The value of services provided by volunteers continues to increase annually. It is important we continue to provide quality volunteer opportunities along with top notch facilities in order to retain and attract quality volunteers. Provide ADA/ABA boat loading platform.

5.3.1.3. Dam East Recreation Area (McNair) (See Plate 18 & 19)

Area Name: Dam East Recreation Area

Type of Area: Multipurpose

Land Classification: High Density Recreation

Managing Entity: USACE & Outgrant

Acres: 136 **Developed Acres:** 34

Avg. Annual Visits: 129,472 **Avg. Annual Revenue:** \$54,456

Density of Use: 3,808 (Lake Average = 9,832)
(Average Annual Visits per developed acre)

Average Annual Occupancy Rate: 64%

Narrative Description of Area: Dam East Recreation Area is located on the east side of the lake and is comprised of a day-use area, McNair Campground, a group camp area and a private concession that includes a restaurant, bicycle and kayak rentals.

Existing Facilities:

Day Use Facilities		Camping Facilities		Outgranted Facilities		Operational Facilities	
Picnic Sites	12	Entrance Station		Wet Slips		STP*	
Picnic Shelters	1	Campsites (E/W/S)*	47 (37/20/0)	Dry Slips		Visitor Center	
Boat Ramp/Lanes	2/6	Gate Attendant Sites	1	Boat Ramp/Lanes		Administration Bldg	
Car Parking	217	Dump Station	1	Restaurant	1		
Trailer Parking	100	Playgrounds	1	Courtesy Dock	1		
Courtesy Dock	2	Rest Rooms		Store			
Fish Cleaning Station		Shower Buildings	1	Lodge/Hotel/Rooms			
Swimming Area	1	Laundry		Cabins			
Trails/Trail Miles	2/3	Amphitheater		Golf Course			
Water Fountains	1	Water Hydrants	13	Picnic Sites/Shelter			
Rest Rooms	2V/2WB	Multipurpose Court/Play Field		Admin. Bldg.			
Beach Change House		Group Camp Area/Sites	1/15	Trails/Trail Miles			
Playground	1	Group Camp Shelter	1	Playground			
Fishing Pier	1			Restrooms (V/WB)*	(0/1)		
				Car Spaces			
				Trailer Spaces			

* (E = Electric, W = Water, S = Sewer, V = Vault, WB = Waterborne, STP = Sewage Treatment Plant)

Existing Facility Discussion: This area provides a variety of facilities that intermingles camping and day-use activities. To access the swimming beach, beach users must travel through the campground. However, because the beach is small, this does not create any user conflicts. The campground is a mixture of individual sites with impact areas, primitive tent sites and a group camping area. Many of the sites do not meet the Campsite Design Guidelines contained in EM 1110-1-400. The newer individual campsites have adequate hard surface impact areas and double water hook-ups (one for every two campsites), which are popular. There is a small parking area with fishing pier located northwest of the campground. The Saddle Dam 2 roadway provides access to the concession area, which includes a restaurant and bicycle and kayak rentals. Also at this location is a high water boat ramp, which is the only high water ramp on the southeast side of the lake. In addition, the Saddle Dam 2 roadway contains a marked bicycle travel lane, which is also used by hikers.

Proposed Actions:

Proposed Action	Type of Action (R/N/PA)*	Description
Implement ADA/ABA transition plan	PA	Supplement No. 4, to 1997 Carlyle Lake Master Plan Approved 13 February 2014. (See Appendix D)
Construct Boat Loading Platform	N	Provide ADA/ABA compliant boat loading platform
Modify High Water Ramp & Breakwater	PA	Add additional launch lane and increase elevation of ramp and breakwater
Replace combination shelter/restroom	R	Replace the combination shelter/restroom with a restroom/shower facility
Provide sewer hookups	N	Provide sewer hookups to 60% of campsites
Provide water hookups to campsites	N	Provide one dual outlet water hookup for every two campsites (sites 21-31)
Reduce number of picnic sites	R	Remove picnic sites south of the restroom

* (R = Replacement, N = New, PA = Previously Approved)

Proposed Action Discussion: The combination picnic shelter/restroom will be replaced with a restroom/shower facility to support the Group Camping area. Providing sewer hookups to 60% of the campsites will improve customer satisfaction, occupancy rate and help facilitate and expedite exit from the area. Particularly since the campers using the Dam East Spillway campground also use the dump station in this area. Provide ADA/ABA compliant boat loading platform.

5.3.1.4. Dam East Spillway (See Plate 17)

Area Name: Dam East Spillway

Type of Area: Multipurpose

Land Classification: High Density Recreation

Managing Entity: USACE

Acres: 103 **Developed Acres:** 9

Avg. Annual Visits: 100,251 **Avg. Annual Revenue:** \$20,956

Density of Use: 11,139 (Lake Average = 9,832)
(Average Annual Visits per developed acre)

Average Annual Occupancy Rate: 56%

Narrative Description of Area: The Dam East Spillway is located below the dam on the east side of the spillway. The area features a small campground, picnic sites and bank fishing.

Existing Facilities:

Day Use Facilities		Camping Facilities		Outgranted Facilities		Operational Facilities	
Picnic Sites	20	Entrance Station		Wet Slips		STP*	
Picnic Shelters	1	Campsites (E/W/S)*	(15/0/0)	Dry Slips		Visitor Center	
Boat Ramp/Lanes		Gate Attendant Sites		Boat Ramp/Lanes		Administration Bldg	
Car Parking	195	Dump Station		Restaurant			
Trailer Parking		Playgrounds	1	Gas Sales			
Courtesy Dock		Rest Rooms		Store			
Fish Cleaning Station	1	Shower Buildings		Lodge/Hotel/ Rooms			
Swimming Area		Laundry		Cabins			
Trails/Trail Miles	1/2	Amphitheater		Golf Course			
Water Fountains		Water Hydrants	2	Picnic Sites/Shelter			
Rest Rooms	1 V 1 WB	Multipurpose Court/Play Field		Admin. Bldg.			
Beach Change House				Trails/Trail Miles			
Playground				Playground			
Fishing Pier				Restrooms (V/WB)*			
				Amphitheater			
				Swim Pool			
				Fish Cleaning Station			

* (E = Electric, W = Water, S = Sewer, V = Vault, WB = Waterborne, STP = Sewage Treatment Plant)

Existing Facility Discussion: Only a small portion of this area is developed because much of the area is managed for endangered species, which limits the amount of development that can occur. The existing facilities are in relatively good condition.

Proposed Actions:

Proposed Action	Type of Action (R/N/PA)*	Description
Implement ADA/ABA Transition Plan	PA	Supplement No. 4, to 1997 Carlyle Lake Master Plan, approved 13 February 2014. (See Appendix D)
Replace Fish Cleaning Station with ADA/ABA compliant facility	R	Replace the existing Fish Cleaning Station with one that is ADA/ABA compliant.
Develop primitive trail	N	Develop a meandering primitive trail that connects the trail system from General Dean Bridge through the East Spillway and connects with the trail system in Dam East Recreation Area.
Provide water hookups	N	Provide one dual outlet water hydrant for every two campsites.
Provide steps on the river bank	N	Provide steps along the rip-rap to facilitate fishing and provide safe access to the water
Connect sewer system to west side of river	N	Bore under the river and provide sewer connection to the west side of the river
Provide dump station	N	Provide dump station

**(R = Replacement, N = New, PA = Previously Approved)*

Proposed Action Discussion: Except for adding water hookups, adding a dump station, developing a primitive trail, and modifying facilities to be ADA/ABA compliant there are very few proposed actions for this area. The primitive trail will help implement an important segment of the trail system for Carlyle Lake. Care will be taken to protect existing vegetation. Adding a new trail from the Dam East Spillway Area, through Dam East and connecting with the Saddle Dam trail, will provide connectivity to existing trail system. This will greatly improve visitor safety and will provide one of the missing links in the overall Carlyle Lake Trail System. This link will provide a continuous dedicated trail between Dam West Recreation Area, the town of Carlyle and the northern end of South Shore State Park. The Carlyle Lake Trail System is included as **Appendix C**. In addition, providing steps in the rip-rap will provide safe fishing access to the water. A dump station is needed for the campground.

5.3.1.5. Dam West Recreation Area (See Plate 11)

Area Name: Dam West Recreation Area

Type of Area: Multipurpose

Land Classification: High Density Recreation

Managing Entity: USACE & Private Concessions

Acres: 154 **Developed Acres:** 99

Avg. Annual Visits: 1,137,331 **Avg. Annual Revenue:** \$205,510

Density of Use: 11,488 (Lake Average = 9,832)
(Average Annual Visits per developed acre)

Average Annual Occupancy Rate: 69%

Narrative Description of Area: The Dam West Recreation Area is highly developed and includes a campground, day-use area with picnic sites and swimming beach, visitor center, marina, hotel, cabins, and restaurant. This area is the most highly visited recreation area on the project and is immediately adjacent to the project Administration and Maintenance Complex

Existing Facilities:

Day Use Facilities		Camping Facilities		Outgranted Facilities		Outgranted Facilities	
Picnic Sites	83	Entrance Station	1	Wet Slips Transient slips	250 25	Dump Station	1
Picnic Shelters/Tables	2/93	Campsites (E/W/S)*	109/25/25	Dry Slips	95	Activity Center	1
Boat Ramp/Lanes	2/6	Gate Attendant Sites	4	Boat Ramp/Lanes	1/2	Boat Rentals	1
Car Parking	594	Dump Station	1	Restaurant	1	Courtesy Dock	1
Trailer Parking	204	Playgrounds	2	Gas Sales	1		
Courtesy Dock	2	Rest Rooms	1	Lodge/Hotel/ Rooms	1/63		
Fish Cleaning Station	1	Shower Buildings	3	Cabins	4		
Swimming Area	1	Laundry	1	Shower Building	1		
Trails/Trail Miles	3/6	Amphitheater	1	Picnic Sites/Shelter		Operational Facilities	
Water Fountains		Water Hydrants	8	Admin. Bldg.		STP*	
Rest Rooms	1	Multipurpose Court/Play Field	1	Trails/Trail Miles	1/1	Visitor Center	1
Beach Change House	1			Playground		Administration/Maint Bldg	4
Playground	2			Restrooms (V/WB)*	2 WB		
Fishing Pier	1			Swim Pool	1		
Handicap Boat Loading Facility	1			Car Parking	150		
				Trailer Parking	125		

* (E = Electric, W = Water, S = Sewer, V = Vault, WB = Waterborne, STP = Sewage Treatment Plant)

Existing Facility Discussion: Although the campground has an excellent occupancy rate, most of the campsites do not meet the Campsite Design Guidelines contained in EM 1110-1-400. Vehicle spurs are too narrow and impact sites are too small to accommodate recreational vehicles and camping equipment. Improper spur alignment creates extensive maintenance and repair to adjacent grounds and vegetation. Except for the 25 sites that provide full service hookups, other campers must fill their fresh water tanks when they enter the campground. On weekends, entry to and exit from the campground is hindered by campers filling their fresh water tanks and using the single dump station, which is too small and does not meet design standards. Many of the trees in the area have been damaged by high water events and storms. There are significant water drainage problems in the campground and day use area. Also, the amphitheater and playground equipment in the campground are in need of replacement. The Visitor Center is not capable of accommodating groups larger than 50 people.

Proposed Actions:

Proposed Action	Type of Action (R/N/PA)*	Description
Develop addition to the Visitor Center	PA	Develop 875 square foot addition to the Visitor Center
Develop outdoor amphitheater for Visitor Center	PA	Develop outdoor amphitheater south of Visitor Center
Replace beach shower house	PA	Replace beach shower house with ADA/ABA compliant facility
Implement Tree Replacement Plan	R	Plant replacement trees throughout campground and day-use area
Implement ADA/ABA transition plan for entire area	PA	Supplement No. 4, to 1997 Carlyle Lake Master Plan, Approved 13 February 2014. (See Appendix D)
Provide water hookups to campsites	N	Provide one dual outlet water hookup for every two campsites
Provide sewer hookups	N	Provide sewer hookups to 60% of campsites
Renovate campsites to meet Customer Service Standards	R	Renovate campsites to meet Campsite Design Guidelines contained in EM 1110-1-400
Correct drainage problems in campground	R	Correct drainage issues in campground
Renovate campground entrance access to meet design guidelines	R	The entrance access to the campground needs to be replaced in accordance with Design Guidelines and Customer Service Standards
Provide leash-free dog area in campground	N	Provide small leash-free dog area in the campground
Provide two buddy campsites (4 sites) in north side camping loop	N	Provide two buddy campsites (4 total sites) in the north side camping loop
Renovate picnic shelters in day-use area	R	Renovate picnic shelters in day-use area
Renovate day use area and correct drainage problems	R	The day use facilities are used extensively and will be renovated and drainage problems will be corrected
Replace Fish Cleaning Station	PA	Replace fish cleaning station with ADA/ABA compliant facility
Provide extension to breakwater	PA	Extend breakwater as approved in 1997 Master Plan

* (R = Replacement, N = New, PA = Previously Approved)

Proposed Action Discussion: Data analysis indicates that occupancy rates for sites with water and sewer hookups are 25% to 40% higher than those without. The goal is to provide full service hookups to 60% of the campsites. This will also facilitate and expedite entry and exit from the campground. All campsites will be renovated to meet Campsite Design Guidelines contained in EM 1110-1-400. Improperly sized spurs and impact sites are creating degradation to adjacent soil and vegetation. Providing sites that meet Customer Service Standards will improve customer satisfaction, attract new users and help minimize annual O&M costs. Renovation activities will be accomplished to ensure protection of existing vegetation. A tree replacement plan will be implemented to ensure environmental sustainability of the area is attained. Renovating the campground entrance access combined with adding water to campsites and additional sewer

hookups to campsites will eliminate the traffic backup that occurs on weekends for people entering and exiting the campground. Also, during renovation activities in the campground, storm drainage and water run-off problems should be corrected. A small leash-free dog area in the campground will improve customer satisfaction. Unlike many other recreation areas at the lake, picnicking and use of the group shelters in Dam West, continues to be a very popular activity with high demand. Renovating the day use area and picnic shelters in this area will greatly improve customer satisfaction.

5.3.1.6. Dam West Spillway (See Plate 16)

Area Name: Dam West Spillway

Type of Area: Day-Use

Land Classification: High Density Recreation

Managing Entity: USACE

Acres: 57 **Developed Acres:** 7

Avg. Annual Visits: 217,381 **Avg. Annual Revenue:**

Density of Use: 31,054 (Lake Average =9,832)
(Average Annual Visits per developed acre)

Average Annual Occupancy Rate: N/A

Narrative Description of Area: The Dam West Spillway is located on the west side of the spillway just below the dam. The area is an extremely popular fishing location.

Existing Facilities:

Day Use Facilities		Camping Facilities		Outgranted Facilities		Operational Facilities	
Picnic Sites	20	Entrance Station		Wet Slips		STP*	
Picnic Shelters	1	Campsites (E/W/S)*		Dry Slips		Visitor Center	
Boat Ramp/Lanes		Gate Attendant Sites		Boat Ramp/Lanes		Administration Bldg	
Car Parking	155	Dump Station		Restaurant			
Trailer Parking		Playgrounds		Gas Sales			
Courtesy Dock	1	Rest Rooms		Store			
Fish Cleaning Station	1	Shower Buildings		Lodge/Hotel/Rooms			
Swimming Area		Laundry		Cabins			
Trails/Trail Miles	1/2	Amphitheater		Golf Course			
Water Fountains		Water Hydrants		Picnic Sites/Shelter			
Rest Rooms	2 V 1 WB	Multipurpose Court/Play Field		Admin. Bldg.			
Beach Change House				Trails/Trail Miles			
Playground	1			Playground			
Fishing Pier	1			Restrooms (V/WB)*			
				Amphitheater			
				Swim Pool			
				Fish Cleaning Station			

* (E = Electric, W = Water, S = Sewer, V = Vault, WB = Waterborne, STP = Sewage Treatment Plant)

Existing Facility Discussion: The picnic sites in this area receive moderate use. Access to the water is rather difficult, since the entire river bank is covered with rip-rap. This recreation area is one of the most densely used recreation areas at the project. Every developed acre in this area receives an average of over 31,000 visits annually. Compared to the Lake average of 9,832, this is extremely high. The majority of the use in the area is for bank fishing.

Proposed Actions:

Proposed Action	Type of Action (R/N/PA)*	Description
Replace fish cleaning station	PA	Replace fish cleaning station with ADA/ABA compliant facility
Implement ADA/ABA transition plan for entire area	PA	Supplement No. 4, to 1997 Carlyle Lake Master Plan, Approved 13 February 2014. (See Appendix D)
Implement tree replacement plan	R	Plant replacement trees throughout the day use area.
Provide additional steps on the river bank	N	Provide additional steps along the rip-rap to facilitate fishing and access to the water.

**(R = Replacement, N = New, PA = Previously Approved)*

Proposed Action Discussion: Providing an additional set of steps from the top of the river bank to the water will greatly enhance visitor safety and customer satisfaction. Correcting the ADA/ABA compliance issues will also make the area more user friendly.

5.3.1.7. General Dean Bridge Recreation Area (See Plate 20)

Area Name: General Dean Bridge

Type of Area: Day-Use

Land Classification: High Density Recreation

Managing Entity: USACE

Acres: 5 **Developed Acres:** 2

Avg. Annual Visits: 42,051 **Avg. Annual Revenue:**

Density of Use: 21,025 (Lake Average = 9,832)
(Average Annual Visits per developed acre)

Average Annual Occupancy Rate: N/A

Narrative Description of Area: The area is located downstream from the main dam and includes the historic General Dean Suspension Bridge, picnic sites and a small boat ramp.

Existing Facilities:

Day Use Facilities		Camping Facilities		Outgranted Facilities		Operational Facilities	
Picnic Sites	8	Entrance Station		Wet Slips		STP*	
Picnic Shelters		Campsites (E/W/S)*		Dry Slips		Visitor Center	
Boat Ramp/Lanes	1/1	Gate Attendant Sites		Boat Ramp/Lanes		Administration Bldg	
Car Parking	44	Dump Station		Restaurant			
Trailer Parking	25	Playgrounds		Gas Sales			
Courtesy Dock		Rest Rooms		Store			
Fish Cleaning Station		Shower Buildings		Lodge/Hotel/Rooms			
Swimming Area		Laundry		Cabins			
Trails/Trail Miles	2/3	Amphitheater		Golf Course			
Water Fountains		Water Hydrants		Picnic Sites/Shelter			
Rest Rooms	1 V	Multipurpose Court/Play Field		Admin. Bldg.			
Beach Change House				Trails/Trail Miles			
Playground				Playground			
Fishing Pier				Restrooms (V/WB)*			
				Amphitheater			
				Swim Pool			
				Fish Cleaning Station			

* (E = Electric, W = Water, S = Sewer, V = Vault, WB = Waterborne, STP = Sewage Treatment Plant)

Existing Facility Discussion: This area is very small but heavily used. The facilities are extremely cramped. The area contains a critical trail link between the west and east side of the lake, spillway and river.

Proposed Actions:

Proposed Action	Type of Action (R/N/PA)*	Description
Replace vault toilet	PA	Replace vault toilet with waterborne, ADA/ABA compliant facility (Appendix D)
Renovate Boat Ramp	R	Renovate boat ramp to meet Design Criteria and Customer Service Standards
Expand Parking Area	N	Expand parking area to accommodate boat trailer parking
Hookup to city sewer system	N	The new waterborne restroom will be tied into the city sewer system
Add Steps to the water	N	Construct steps to the water to provide for safety while fishing
Provide Courtesy Dock	N	Provide courtesy dock to meet Customer Service Standards
Water Quality Improvements to old river channel	N	A PDT has been developed to address water quality issues in the old river channel. The team is close to determining what measures need to be taken to improve water quality in the old river channel. These may include structural or other physical attributes. The PDT recommendations should be implemented.

* (R = Replacement, N = New, PA = Previously Approved)

Proposed Action Discussion: The boat ramp will be renovated to meet design guidelines including placement of a courtesy dock. The existing trailer parking area will be expanded to accommodate existing demand and facilitate safe use of the area. Replacing the vault toilet with an ADA/ABA compliant facility will greatly improve customer satisfaction and meet accessibility requirements. This will require hook-up to the city sewer system. The area is heavily used for fishing. Providing stairs to the water surface will provide safety for fishermen.

5.3.1.8. Eldon Hazlet State Park (See Plate 26)

Area Name: Eldon Hazlet State Park

Type of Area: Multipurpose

Land Classification: High Density Recreation

Managing Entity: IDNR

Acres: 2,335 **Developed Acres:** 166

Avg. Annual Visits: 430,425

Avg. Annual Revenue: \$414,017

Density of Use: 2,593 (Lake Average = 9,832)
(Average Annual Visits per developed acre)

Average Annual Occupancy Rate: 64%

Narrative Description of Area: The area is located on the west side of the lake about 4 miles north of Carlyle, IL, and includes the Carlyle Sailing Association facilities.

Existing Facilities:

Day Use Facilities Outgranted		Camping Facilities Outgranted		Outgranted Facilities		Outgranted Facilities	
Picnic Sites	140	Entrance Station	1	Wet Slips	45	STP*	
Picnic Shelters		Campsites (E/W/S)*	327 (35/0/0)	Dry Slips	300	Visitor Center	
Boat Ramp/Lanes	4/9	Gate Attendant Sites	6	Boat Ramp/Lanes		Brood Pond	3
Car Parking	475	Dump Station	2	Restaurant	1	Fishing Pond	1
Trailer Parking	200	Playgrounds	5	Gas Sales			
Courtesy Dock	2	Rest Rooms		Store	1		
Fish Cleaning Station	2	Shower Buildings	3	Lodge/Hotel/Rooms			
Swimming Area		Laundry	1	Cabins	22		
Trails/Trail Miles	7/9.5	Amphitheater	1	Golf Course			
Water Fountains		Water Hydrants	45	Admin. Bldg./Maint.	2		
Rest Rooms (V/WB)*	24/4	Multipurpose Court/Play Field	2	Playground	6		
Beach Change House		Group Camp/Sites	1/10	Snack Bar	1		
Playground	6			Restrooms (V/WB)*			
Fishing Pier	2			Amphitheater	1		
Sailboat Hoists	3			Swim Pool	1		
				Fish Cleaning Station	2		
				Car/Trailer Parking	475/200		

* (E = Electric, W = Water, S = Sewer, V = Vault, WB = Waterborne, STP = Sewage Treatment Plant)

Existing Facility Discussion: As a result of the budget and funding issue with the State of Illinois, many of the facilities in the park are deteriorating. Most of the facilities in the park are in poor condition. Roads are not being maintained and routine services are not being provided. Existing facilities are in need of replacement or repair.

The **Carlyle Sailing Association (CSA)** manages a 34-acre sailboat venue within Eldon Hazlet State Park. The CSA is a non-profit organization dedicated to the sport of sailing and provides its members with a variety of sailing-oriented services, facilities and activities, including:

- a. Three elevator hoists for launching and retrieving sailboats
- b. 850 feet of floating boat docks
- c. Dry slip rental
- d. Picnic area with pavilion and playground
- e. Pole storage building
- f. Climate controlled activity building with kitchen facilities
- g. Security fencing
- h. Organized sailing activities, such as regattas, learn to sail and water safety programs and charity events

CSA is a nationally recognized championship regatta venue, which frequently hosts U.S. Sailing competitions and junior Olympic training events.

Proposed Actions: (This information was obtained from the latest 5-year development plan (2013))

Proposed Action	Type of Action (R/N/PA)*	Description
Provide Shelter at Illini Pond Area	N	Construct shelter at Illini Pond
Provide Trail Improvements - Cherokee Trail	R	Make improvements to the Cherokee hiking trail
Renovate Shower Building	R	Renovate shower building
Renovate Sewage Treatment Plant	R	Renovate STP
Elevate Entrance Road	PA	Raise the 1.75 mile entrance road to the park from 456.0 ft. NGVD to 460.0 ft. NGVD
Renovate Service Area	R	Renovate the maintenance service area
Construct Bike Trail	N	Construct 9-mile bike trail with amenities
Vault Toilet Replacement	R	Replace vault toilets
CSA High Water Improvements	PA	Provide improvements to CSA lease area to help minimize the impacts of high water events
Renovate Peppenhorst Boat Ramp	R	Renovate boat ramp

* (R = Replacement, N = New, PA = Previously Approved)

Proposed Action Discussion: The park has been without a budget for nearly a year and without a budget none of the proposed actions will be accomplished. The items listed above are the top priority actions for the park, as identified in their latest development plan (2013).

5.3.1.9. South Shore State Park (See Plate 27)

Area Name: South Shore State Park

Type of Area: Multipurpose

Land Classification: High Density Recreation

Managing Entity: IDNR

Acres: 305 **Developed Acres:** 14

Avg. Annual Visits: 65,104

Avg. Annual Revenue: N/A

Density of Use: 4,650 (Lake Average = 9,832)
(Average Annual Visits per developed acre)

Average Annual Occupancy Rate: N/A

Narrative Description of Area: The area is located on the southeast side of the lake, approximately 3 miles east of Carlyle, IL.

Existing Facilities:

Day Use Facilities Outgranted		Camping Facilities Outgranted		Outgranted Facilities		Operational Facilities	
Picnic Sites		Entrance Station		Wet Slips		STP*	
Picnic Shelters		Campsites (E/W/S)*		Dry Slips		Visitor Center	
Boat Ramp/Lanes		Gate Attendant Sites		Boat Ramp/Lanes		Administration Bldg	
Car Parking		Dump Station		Restaurant			
Trailer Parking		Playgrounds		Gas Sales		Other Outgranted Facilities	
Courtesy Dock		Rest Rooms		Store		Biological Field Station Trailers	2
Fish Cleaning Station		Shower Buildings		Lodge/Hotel/Rooms			
Swimming Area		Laundry		Cabins			
Trails/Trail Miles		Amphitheater		Golf Course			
Water Fountains		Water Hydrants		Picnic Sites/Shelter	7/1		
Rest Rooms		Multipurpose Court/Play Field		Admin. Bldg.			
Beach Change House				Trails/Trail Miles	1/1		
Playground				Playground			
Fishing Pier				Restrooms (V/WB)*	3 V		
				Dump Station	1		
				Car Parking	125		
				Trailer Parking			

* (E = Electric, W = Water, S = Sewer, V = Vault, WB = Waterborne, STP = Sewage Treatment Plant)

Existing Facility Discussion: The area is run down and minimal usable recreation facilities are available. There are only seven picnic tables (some of which are not usable), one useable shelter, seven signs and three sets of vault comfort stations (that are not considered usable by most visitor's standards). All existing facilities are in various stages of deterioration. This has led to very limited public use providing the opportunity for unacceptable and lewd behavior to occur. These activities further reduce public use.

Proposed Actions: None

5.3.1.10. Keyesport Recreation Area (See Plate 13)

Area Name: Keyesport Recreation Area

Type of Area: Day-Use & Commercial Marina

Land Classification: High Density Recreation

Managing Entity: USACE & Commercial Concession

Acres: 30 **Developed Acres:** 19

Avg. Annual Visits: 178,103 **Avg. Annual Revenue:**

Density of Use: 9,374 (Lake Average = 9,832)
(Average Annual Visits per developed acre)

Average Annual Occupancy Rate: N/A

Narrative Description of Area: The Keyesport Recreation Area is located on the west side of the lake just below the Burlington-Northern Railroad tracks. The area includes a day-use area with swimming beach and a commercial marina.

Existing Facilities:

Day Use Facilities		Camping Facilities		Outgranted Facilities		Operational Facilities	
Picnic Sites	18	Entrance Station		Wet Slips	135	STP*	
Picnic Shelters	1	Campsites (E/W/S)*		Dry Slips	50	Visitor Center	
Boat Ramp/Lanes	1/4	Gate Attendant Sites		Boat Ramp/Lanes		Administration Bldg	
Car Parking	138	Dump Station		Restaurant			
Trailer Parking	75	Playgrounds		Gas Sales	1		
Courtesy Dock	2	Rest Rooms		Store			
Fish Cleaning Station	1	Shower Buildings		Marine sanitary pump-out	1		
Swimming Area	1	Laundry		Cabins			
Trails/Trail Miles		Amphitheater		Golf Course			
Water Fountains		Water Hydrants		Picnic Sites/Shelter	5/0		
Rest Rooms	1	Multipurpose Court/Play Field		Admin. Bldg.	1		
Beach Change House				Trails/Trail Miles			
Playground	1			Playground			
Fishing Pier	1			Restrooms (V/WB)*	1 WB		
Multipurpose Court	1			Amphitheater			
				Car Parking	75		
				Trailer Parking	50		

* (E = Electric, W = Water, S = Sewer, V = Vault, WB = Waterborne, STP = Sewage Treatment Plant)

Existing Facility Discussion: The existing facilities in the area appear to be adequate for the amount and type of use they receive. Because the levee runs through the area, recreation facilities are rather limited.

Proposed Actions:

Proposed Action	Type of Action (R/N/PA)*	Description
Extend breakwater	PA	Extend breakwater
Construct Boat Loading Platform	N	Provide ADA/ABA compliant boat loading platform
Replace Fish Cleaning Station	PA	Replace fish cleaning station with ADA/ABA compliant facility
Implement ADA/ABA transition plan for entire area	PA	Supplement No. 4, to 1997 Carlyle Lake Master Plan, Approved 13 February 2014. (See Appendix D)

* (R = Replacement, N = New, PA = Previously Approved)

Proposed Action Discussion: The extension of the breakwater will allow for increased capacity at the marina as well as provide protection for public and private facilities. Correcting the ADA/ABA compliance issues will increase customer satisfaction. Provide ADA/ABA compliant boat loading platform.

5.3.2. Multiple Resource Management – Low Density Recreation (See Plate’s 7 & 21)

This classification is used for lands with minimal development or infrastructure. These lands support passive types of recreational use (e.g. fishing, hunting, hiking, walking, wildlife viewing, etc.). There are seven areas with this classification and include a total of 1,510 acres. **Table 5-4** provides a summary of lands classified as Low Density Recreation.

Table 5-4 Summary of Low Density Recreation Areas

Area Name	Acres	Plate Number
Allen Branch – Hazlet Northwest	139	7 & 21
Irishtown	306	7 & 21
McNair Branch	318	7 & 21
Keyesport – Tamalco	112	7 & 21
Brewster & Gibbs Creek	221	7 & 21
Lotus Cove	155	7 & 21
Coles Creek Cove – Sandy Shores	259	7 & 21
TOTAL	1,510	

5.3.3. Multiple Resource Management – Vegetative Management (See Plate 8)

This classification is used for stewardship of forest, prairie and other native vegetative resources. There are three areas with this classification and include a total of 1,791 acres. **Table 5-5** provides a summary of lands classified as Vegetative Management.

Table 5-5 Summary of Vegetative Management Areas

Area Name	Acres	Plate Number
James W. Hawn Access	299	7 & 22
Keyesport North	191	7
Boulder Flats	1,341	7, 23 & 24
TOTAL	1,791	

5.3.4. Multiple Resource Management – Wildlife Management Areas (See Plate 7 and 28)

This classification is used for stewardship of fish and wildlife resources. There is one area with this classification and includes a total of 5,663 acres. The name of the area is Carlyle Lake State Fish & Wildlife Area and is depicted on **Plate Number 28**.

5.3.5. Environmentally Sensitive Areas

This classification is used in areas where scientific, ecological, cultural or aesthetic features exist. There are no Environmentally Sensitive Areas at Carlyle Lake.

5.3.6. Water Surface Classification (See Plates 9 & 10)

There are four water surface classifications at Carlyle Lake:

- a. **Restricted.** This classification is used for water areas restricted for project operations, safety and security purposes. Public access to these areas is not permitted. These areas are marked with buoys that physically prevent access. These areas include the water areas immediately upstream and downstream of the dam, water intake structures, pump stations and any other areas determined to be a public safety or security concern.
- b. **No-Wake.** This classification is used to protect environmentally sensitive shoreline areas and recreational water access areas from disturbance, and/or for public safety. Generally, all areas marked as “no-wake” are located at boat ramps, entrances to coves, the railroad trestle boating pass-through, and adjacent to beaches
- c. **Fish & Wildlife Sanctuary.** This classification is used to identify areas where annual or seasonal restriction are in place to protect fish and wildlife species during periods of migration, resting, feeding, nesting and/or spawning. These areas are marked with a combination of signs and/or buoys.
- d. **Open Recreation.** This classification is used for water areas available for year-round or seasonal water-based recreational use. Generally, these waters can be used by most types of vessels for all types of water-based recreational activities.

5.3.7. Easement Lands (See Plate 8)

All 24,972 acres of easement lands at Carlyle Lake are Flowage Easement Lands. These are privately owned lands and generally located between elevation 450.0 feet NGVD and 465.5 feet NGVD.

CHAPTER 6

Special Topics/Issues/Considerations

This chapter focuses on special topics, issues and considerations that warrant additional attention in the Master Plan. The following sections provide additional information about these items.

6.1. High Water Issues and Impacts

6.1.1. Pool Elevation Management History

The subject most commented on during the public review process for this Master Plan was the need for more consistent pool elevation management. Even though the Master Plan is not the management document used to direct water control activities, the Master Planning process can identify issues related to water control management activities. There is significant public concern at Carlyle Lake about water control management activities.

Carlyle Lake was authorized by the Flood Control Act of 1938 and modified by the Flood Control Act of 1958 based on the Chief of Engineer's recommendation presented in House Document No. 232, Eighty-fifth Congress, 1st Session. Applicable public laws concerning recreation, fish and wildlife, forest resources, other incidental uses and cultural and historical considerations can be found in Section 2.15.

The original plan of regulation called for releases of 7,000 cfs any time inflows caused the pool to rise above the top of the joint-use pool (445.0 feet NGVD). In May, 1967, releases of 6,700 cfs were found to cause downstream flooding and damage. Releases were then modified to a maximum of 4,000 cfs when the pool elevation was less than 450.0 feet NGVD.

A new plan of regulation was approved in 1968 calling for variable releases up to 10,000 cfs depending on the month and the pool elevation.

Later that year, two additional plans of regulation were submitted and approved for the joint regulation of Carlyle and Shelbyville reservoirs. These plans called for releases up to 10,000 cfs from Carlyle Lake to be determined by pool elevation and the time of year. Elevation 445.0 feet NGVD was selected as the rule curve (now called guide curve) elevation for the summer months. Once the Kaskaskia River Project began operations, 443.0 feet NGVD became winter drawdown elevation.

In October 1974, the plan of regulation was modified for passing winter storm runoff up to the limit of 10,000 cfs without regard to pool elevation. The winter drawdown period was extended from April 1st to May 1st, thus permitting the passage of more of the spring runoff and lowering of late spring and early summer pool elevations.

In 1983, the plan of regulation was modified for pool elevation increase from winter pool to summer pool. The new plan called for the pool elevation to go from 443.0 feet NGVD to 444.0 feet NGVD on April 1st. The May 1st target of 445.0 feet NGVD remained the same. In mid-1984, LMVD approved the 1983 regulation adjustments for a one year evaluation period. Due to erratic weather in 1984, an extension period through the end of fiscal year 1987 was granted. In the late 1980's, part of the 1983 plan was accepted as a permanent change. The incremental elevation step on April 1st was approved.

In April of 2007 the plan of regulation was modified to include the following:

- a. All dates contained within the water control plan will have an allowable variance of plus or minus 14 days.
- b. All elevations that pertain to regulation guidelines have a variance of plus or minus 0.5 ft. with two exceptions. The variance does not apply to:
 - 1) elevations below winter guide curve (443.0 feet NGVD)
 - 2) elevations above the top of the flood control pool (462.5 feet NGVD).

Growing season shall be considered to exist from May 1st to November 1st and dormant season shall be considered to exist from November 1st to May 1st, but may vary depending on seasonal conditions. A release of 10,000 cfs regardless of pool elevation will apply to the dormant season and a limit of 4,000 cfs up to elevation 450.0 feet NGVD will apply to the growing season.

As in previous plans, the releases are limited to a maximum of 5,000 cfs when the pool elevation is below 455.6 feet NGVD and flooding is eminent on the Mississippi River between Chester and Cairo, Illinois. Release restrictions will not apply when:

- a. the hydrograph on the Mississippi River between Chester and Cairo, Illinois is on the recession side, and
- b. travel time may be taken into account when activating this constraint.

Carlyle Lake's fluctuating pool elevation will continue to affect project operations. The original plan of regulation had a 5 year flood frequency of 450.0 feet NGVD. Upstream recreation facilities including boat ramps, beaches, comfort stations, campsites, roads and electrical service were built to coincide with the original plan. Over the years, changes in the Carlyle Lake Water Control Plan have caused higher pool elevations to occur more frequently than when the recreation facilities were designed, thus causing negative impacts on upstream recreational facilities. The Carlyle Lake Elevation Frequency Curve from 1975-2005 indicates a 2 year flood frequency of 451.0 feet NGVD and a 5 year flood frequency of feet 454.1 feet NGVD. High water events continue to degrade natural and man-made resources, recreation opportunities, activities and facilities, a common occurrence at multi-purpose projects.

6.1.2. Recreation Facilities

High water events at Carlyle Lake continue to present significant impacts to recreation facilities. To attempt to minimize the impacts to recreation facilities, a variety of actions have been completed. They include:

- a. Shoreline revetment
- b. Raising the elevation of campsites, where feasible
- c. Raising low areas on access and circulation roads
- d. Raising the elevation of electrical service
- e. Constructing impact sites to facilitate flood damage clean-up
- f. Raising and constructing breakwaters for increased recreation facility protection
- g. Construction of several "High Water" boat ramps

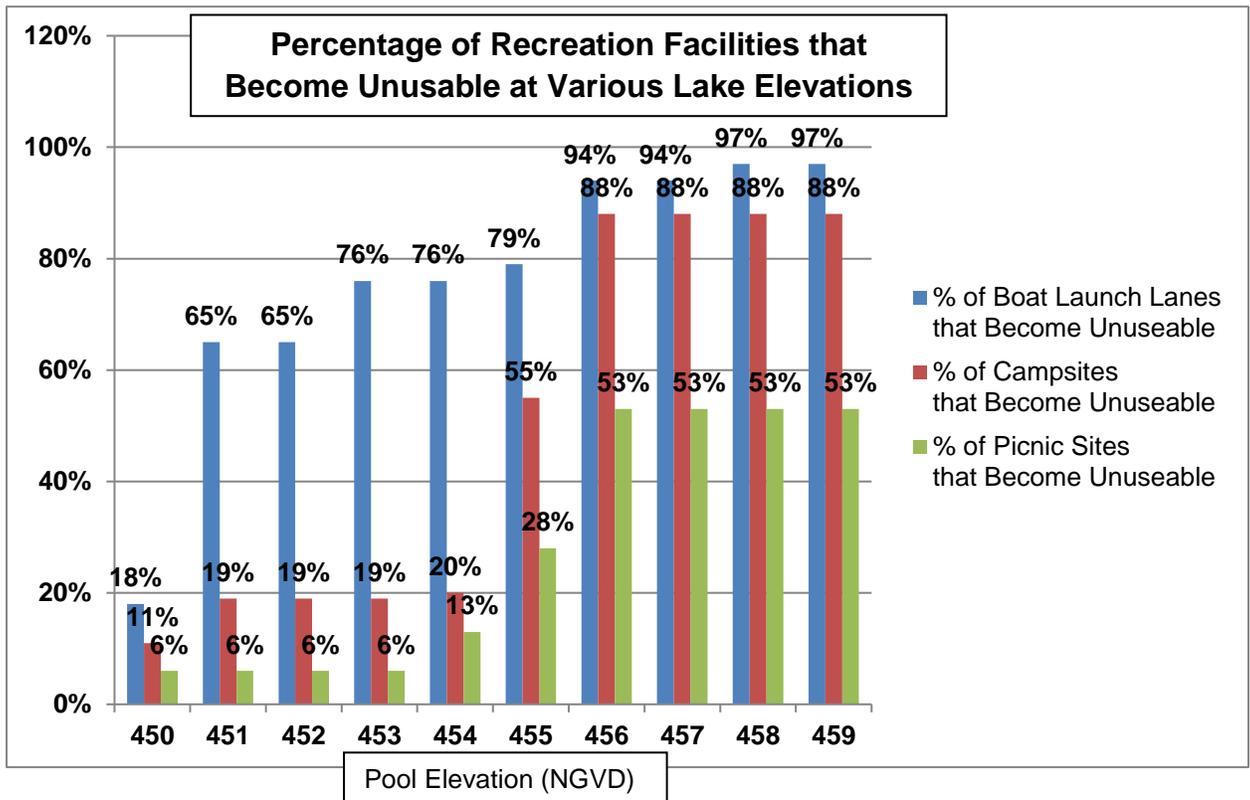
In May 2006, Supplement #2 to the 1997 Carlyle Lake Master Plan was approved. This supplement focused primarily on the design and construction of water access recreation facilities, such as boat ramps, associated parking facilities and breakwaters, that would help reduce some of the impacts associated with high water events. The supplement included extensive analysis about the physical and economic impacts caused by high water and provided several alternatives to help reduce the adverse impacts. Here are some of the findings from that analysis:

- a. There are significant impacts to recreation facilities when the lake elevation is 450 feet NGVD and higher.
- b. Most lake visitors would continue to use recreation facilities when the lake elevation exceeds 450 feet NGVD, if those facilities were available for use.

- c. Most recreation facilities on the lake are effectively closed when the lake elevation exceeds 455 feet NGVD.
- d. Since 1996, water inflow into the lake has increased by over 30% potentially as a result of increased hard surface runoff, increased precipitation and other factors.
- e. There are increased O&M labor and material costs associated with repair and clean-up from high water events.
- f. The number of days where the lake elevation was equal to or greater than 452 feet NGVD increased from 461 days between 1965 & 1984 to 599 days between 1985 and 2004, which is a 30% increase.

Even though the majority of the approved alternatives contained in Supplement #2 have now been completed, there continue to be significant impacts to recreation facilities caused by high water events. **Figure 6-1** depicts the percentage of recreation facilities that become unusable at various high pool elevations.

Figure 6-1 Percentage of Recreation Facilities that Become Unusable at Various Lake Elevations



Review and analysis of lake elevation data between 1995 and 2014 revealed that during the primary recreation season (March – September) the lake elevation was greater than 445 feet NGVD – 62% of the time, and greater than 450 feet

NGVD 12% of the time. High water events continue to degrade natural and man-made resources, recreation opportunities, activities and facilities.

6.1.3. Economic Impacts

According to studies conducted by U.S. Army Institute for Water Resources, visitors to Carlyle Lake spend approximately \$80.8 million dollars annually in communities and businesses located within 30 miles of the lake. An additional \$36.2 million in sales is generated for durable goods, such as boats and camping equipment. This spending supports about 639 jobs, resulting in labor income of about \$12.1 million, within 30 miles of the lake.

According to the Carlyle Lake Watershed Plan, local businesses experience a 20% to 40% reduction in revenue during months when lake elevations exceed 450 feet NGVD. Since the majority of this economic activity occurs between March and September, it is safe to assume that at least \$10 million dollars of economic impact is generated every month during the primary recreation season (March – September), assuming the lake elevation is at or below 445 feet NGVD.

Review and analysis of pool elevation data was conducted and found there were 19 months between 1995 and 2008 when the lake elevation was greater than 450.0 feet NGVD. This equates to approximately \$57 million dollars in potentially lost economic activity, as a result of high water events.

When lake visitors are not able to access recreation facilities because of high water, campground and day use revenues also decrease proportionately to the severity and duration of the high water event. Also, the cost to repair recreation facilities, damaged by high water events continues to increase. Funds to accomplish these repairs often come from regular O&M funds, which means other funded and important work items have to be deferred and reintroduced into the funding process, which can take years to obtain approval and funding again. Every high water event creates a chain reaction in this regard.

Innovative solutions to help resolve this long standing and continuing problem will continue to be explored and when feasible, implemented.

6.1.4. Wetland Habitat

Seasonal flooding and high water issues during the spring and summer months (April – August) have significantly impacted vegetative type, growth, and management practices on the upper end of Carlyle Lake. Only 10% of the original State wetlands exist today in Illinois, making wetland habitat at Carlyle Lake vitally important for spring and fall migrating birds. Carlyle Lake is a significant mid-migration resting area for waterfowl, shorebirds, and songbirds

that migrate along the Mississippi Valley Flyway during the late summer/fall and spring timeframe's each year. Since this high quality wetland habitat holds thousands of migrating birds each year, waterfowl hunters, as well as, bird watchers flock to Carlyle Lake each year to witness this event. This makes Carlyle Lake one of the most important wildlife viewing areas in the State of Illinois, as well as, the Mississippi Valley region.

In 2014, snow goose populations soared to an estimated 1.1 million birds during the month of February, which brought many tourists to the local area. Carlyle Lake consistently ranks in the top 5 for waterfowl harvests in the State of Illinois and is considered one of the most influential areas for attracting migratory birds. Each year eagles migrate to the area during the winter months, in part, due to large waterfowl populations.

Without crucial food sources provided by moist soil wetlands, bottomland hardwood mast producing trees, and flooded agricultural fields, the area is void of valuable food that sustains migratory birds during the crucial cold weather months. If no available food sources are present, the migratory birds will not be present, thus creating significant impacts on the birds as well as the local economy and businesses that depend on revenue from hunters and bird watchers. These users will go to areas other than Carlyle Lake to hunt or view migratory birds.

The frequency of flooding and the duration of high water events over the last several years have slowly changed the vegetation types and species on all USACE and IDNR-managed lands below elevation 455.0 feet NGVD. Bottomland hardwood mast producing tree species are being replaced with willow, maple, and cottonwood species that are undesirable as a natural food source for wildlife. Many wetland tree species that once existed on lower elevation areas are being lost. Also, desirable wetland plant species, such as smartweed, sedges, and millets are being replaced with other less desirable species like button bush and cocklebur that do not yield adequate sources of food.

Even though not all high water events can be managed to provide optimal water levels for the proper management of wetland habitats, it is important to follow the Master Water Control Plan to balance all project purposes.

6.1.5. Shoreline Erosion

Shoreline erosion at Carlyle Lake is caused by a combination of factors:

- a. Fluctuating lake levels

- b. Prolonged high water events
- c. Waves created by wind
- d. Soil composition (predominately glacial sandy clay till soil, which has little resistance to erosion)

When the lake elevation exceeds 450.0 feet NGVD and winds are strong, it creates wind fetch up to 8 miles. The resulting wave action causes shoreline erosion and bank caving on both fee and private lands.

In 1989, an Engineering Letter Report was approved which proposed a combination of land acquisition and revetment to solve the ongoing shoreline erosion issues at nine (9) locations around the lake. Due to funding constraints and unwilling sellers, the land acquisition proceeded very slowly. However, to date only one area remains unresolved from this Letter Report.

In 2012, the Carlyle Lake staff initiated another study to address ongoing erosion problems, resulting from frequent and long-lasting flood events. Surveys were completed for approximately 30 identified sites. In 2014, work began on ten of the sites determined to be the most critical. Each of the sites were evaluated to establish the most cost effective solution for each location. The two solutions considered were revetment or acquisition of additional land. In 2015 work was completed by developing a revetment design for each erosion location. This allowed for the development of an accurate cost estimate to determine the most cost effective solution for each of the ten erosion sites.

Upon approval of the Engineering Letter Report in 2016, it was agreed to incorporate the next tier of erosion sites into the report. Once these sites are included in the report, an Environmental Assessment will be initiated.

Figure 6-2 depicts a typical example of shoreline erosion. Even though the solutions may be costly, it is critical the shoreline erosion problem be resolved for Carlyle Lake, if the project is to continue to function as intended.

Figure 6-2 Typical Example of Shoreline Erosion

6.1.6. Forest Destruction/Tree Planting Plan

The frequency of flooding and the duration of high water events over the last 15 years have seriously impacted forested lands at Carlyle Lake. Bottomland hardwood trees can survive periodic flooding, but the long spring flood duration that extends over most of the active growing season will cause tree mortality. Trees that survive the flood event are stressed, thus affecting the health and vigor of the tree, making it more susceptible to insect and disease infestations. It may take 3-5 years for a tree to succumb to these adverse conditions.

High density recreation areas contain upland tree species that are more susceptible to flooding. In the last decade hundreds of trees have died due to insect or disease damage, but tree replacement efforts have not kept up with tree mortality, due to limited funding. Carlyle Lake's authorizing document (1957) and the Environmental Impact Statement (1973) assume a 5 year flood frequency of

elevation 450.0 feet NGVD, but the actual 5 year flood frequency has been approximately 454.0 feet NGVD. The flood frequency along with the duration of several high water events that have occurred has impacted on forested lands at Carlyle Lake. Re-establishment of bottomland hardwood trees at elevations below 450.0 feet NGVD have proven unsuccessful.

A ten year tree planting plan to attempt to replace dead and dying trees will be implemented, but will be contingent upon available funding. Upland trees in high density recreation areas will be replaced with more flood tolerant bottomland hardwood trees. The tree species composition will be more diverse, while still providing shade in the recreation areas. Also, mast producing bottomland hardwood trees will be planted in an effort to provide more wildlife food sources. Reintroduction of the native pecan tree may be planted at the edge of the recreation areas. A more diverse tree species composition prevent a large-scale disease or insect outbreak from occurring in the future.

6.1.7. Management Issues North of Burlington-Northern Railroad Tracks

The area north of the Burlington railroad tracks is approximately 8,000 acres in size and has been primarily used for recreational purposes such as hunting and fishing during the lifespan of the lake. As with all aging ecosystems some undesirable changes to the area have taken place. Flood control operations over the life of the project have led to some silt and sedimentation issues on the confluences of the Kaskaskia River, the East Fork Kaskaskia River, and North Fork Kaskaskia River. Also, the existing islands which provided valuable habitat to many migratory birds are eroding away and disappearing from the landscape. These islands once provided a safe isolated protective habitat for migratory birds to rest. During high water events, the islands see major shoreline erosion leading to the loss of many mature trees. The current Kaskaskia River Basin Feasibility Study is evaluating future projects which may lessen the impacts and improve habitat in this area.

6.2. Fisheries Issues

6.2.1. Strategic Fisheries Management Plan

Sport fishing is an enormous contributor to water-based recreation activities on Carlyle Lake. Over the past 15 years, the Illinois Department of Natural Resources (IDNR) has seen drastic cuts to their budget and manpower allocations. This downsizing led to the elimination of a dedicated IDNR Reservoir Fisheries Biologist to manage the fisheries at Carlyle Lake, Rend Lake and Lake Shelbyville. As a result, there has not been a strategic fisheries management

plan for Carlyle Lake since the early 2000's. Development of a 5-year or 10-year Strategic Fisheries Management Plan for Carlyle Lake is critical, in order to meet the current and future needs of sports fishermen in the state of Illinois. A dedicated IDNR Fisheries Biologist is a critical position, needed to manage fisheries on Carlyle Lake, Illinois' largest manmade lake.

6.2.2. Brood Pond Management

Carlyle Lake has very few areas of suitable habitat to support natural spawning and reproduction of game fish species (largemouth bass, and black and white crappie). Uncontrollable fluctuating pool levels also have also frequently inhibited successful spawns.

Loss of habitat and unfavorable pool fluctuations can be somewhat mitigated through the production of fish in five fish rearing ponds (2 USACE & 3 IDNR) located adjacent to the lake. When optimally used, these fish rearing ponds can supplement the fisheries populations of largemouth bass and/or crappie in Carlyle Lake. The largest of these fish rearing ponds is a 30-acre complex managed by the IDNR Fisheries Division located in Eldon Hazlet State Park. However, as a result of budget and manpower reductions by the IDNR, the brood ponds have not been utilized to their full potential. In order for the fishery of the lake to perform at its full potential, these fish rearing ponds should be in operation every year.

6.3. Multipurpose Trails – Connectivity

Hiking, biking, kayaking and walking have become very popular activities at Carlyle Lake and elsewhere across the county. Over half of the visitors to Carlyle Lake use the trails on public lands. An existing multipurpose trail is approximately 12 miles long, connecting the City of Carlyle to USACE and IDNR recreation areas on the south and east side of the lake.

A proposed action is for the USACE to engage potential stakeholders and facilitate actions to implement the Carlyle Lake Trail Plan, included as **Appendix C**. One of the primary links for this trail is the development of a multipurpose trail to connect Eldon Hazlet State Park to the Dam West Recreation Area. This will provide a safer route that connects two large recreation areas and provide access to the City of Carlyle, as well as, recreation areas on the east side of the lake.

Another proposed action is for the USACE to develop a primitive trail between General Dean Bridge Recreation Area and recreation areas on the east side of the lake, which will provide connectivity to existing trail systems.

6.4. Invasive Species

6.4.1. Vegetative Species

Several vegetative invasive species inhabit the Carlyle Lake area. They are costly to eliminate, contribute to environmental degradation, loss of recreational opportunities, and are harmful to native plants and animals. Some of the most common invasive species are:

- a. Autumn olive
- b. Bush honeysuckle
- c. Common reed
- d. Garlic mustard
- e. Johnson grass

Each year a portion of the budget is spent on clearing areas that have been overrun by invasive species. Due to budget constraints, small manageable areas are targeted for removal, each year. Budget requests will continue to be submitted each year to fund removal of larger areas of invasive species.

6.4.2. Aquatic Species-Asian Carp

Currently there are no species of Asian carp (Bighead, Silver, Grass, Black) known to exist in Carlyle Lake. Asian carp are found in the Kaskaskia River below the Carlyle Lake Dam. They have voyaged up the Kaskaskia River from the Mississippi River and are found in great numbers next to the dam. The IDNR has permitted commercial fishing to occur in the spillway in order to remove excess Asian carp. In recent years a lack of commercial demand and low fish prices for this species has caused commercial fishermen to show little interest in harvesting Asian carp in the Kaskaskia River.

Bow fishing for the species is becoming more popular and is permitted by boat in the spillway. This alone will not reduce the growth of the Asian carp population. IDNR and USACE fisheries biologists are working together to investigate alternative solutions for removing more Asian carp from the spillway. Some possible alternatives include promoting more bow fishing activities in the spillway, a special event (Carpfest) emphasizing the palatability of Asian carp, and working with commercial fishermen to increase marketability of the Asian carp in Illinois.

6.5. Eastern Massasauga Rattlesnake

The objective of the Eastern Massasauga Management Plan at Carlyle Lake is to locate, protect, enhance, and where appropriate, expand habitat suitable for hibernation, seasonal movements, foraging and reproduction of the eastern massasauga (*Sistrurus c. catenatus*). The plan outlines conservation measures, data

collection, education, outreach, and habitat restoration for the eastern massasauga snake. There are several areas around Carlyle Lake that have been determined to be environmentally suitable areas where management practices will benefit snake habitat. **Figure 6-3** is a photo of the eastern massasauga snake.

Figure 6-3 Eastern Massasauga Snake



The U.S. Fish and Wildlife Service published a final rule in the *Federal Register* on September 30, 2016, that adds the eastern massasauga to the list of threatened species. The final rule has an effective date of October 31, 2016.

The current Carlyle Lake Eastern Massasauga Management Plan will serve as the primary document for future management activities at Carlyle Lake. A copy of the plan is included as **Appendix E**.

Future years will bring greater threats to the Eastern Massasauga as land development projects increase around the lake. If the Eastern Massasauga is to survive in the Carlyle Lake area, adequate habitat must be provided.

6.6. Water Quality Issues

A variety of water quality tests are performed throughout the year to ensure water in the lake meets State water quality standards. Lake water is routinely tested for:

- Total Organic Carbon (TOC)
- Total Suspended Solids (TSS)
- Oxidation-reduction potential (ORP)
- Iron

- Manganese
- Ammonia-nitrogen
- Nitrate-nitrogen
- Orthophosphate
- Total phosphate
- E. Coli
- Total Volatile Suspended Solids (TVSS)
- pH
- Temperature
- Dissolved oxygen
- Specific conductance
- Chlorophyll
- Pheophytin-a
- Atrazine
- Alachlor
- Phosphorous

These water quality tests help to provide early detection of water quality issues in the lake.

In general, the water quality of Carlyle Lake and the downstream river channel is good. Water samples taken from sampling sites on the lake generally meet state water quality standards. Although, occasionally samples from some monitoring sites exceed state water quality standards for phosphorous (<http://pubs.usgs.gov/wri/wri994007/pdf/wri99-4007.pdf>) and atrazine (<http://www.atsdr.cdc.gov/toxprofiles/tp153-c1-b.pdf>). The hyper-linked documents discuss the issues associated with these substances.

Agricultural nutrient runoff is the major source of water quality issues in the lake. Better land management practices on private agricultural land is one way to reduce contaminants from entering the lake. It should be noted that water samples taken at swimming beaches consistently meet State water quality standards

During periods of low discharge from the spillway and in the heat of the summer, fish kills have occurred in the old river channel below the dam, due to the low dissolved oxygen. To help prevent this from occurring, a remote sensor was installed on the spillway wall to remotely monitor water temperature and dissolved oxygen levels. When conditions exist that could cause fish kills, the Carlyle Lake staff is notified and water discharge rates are changed in order to increase the amount of dissolved oxygen. This helps prevent fish kills from occurring. A PDT, consisting of Carlyle Lake staff, St. Louis District Water Control and Water Quality staff and IDNR Fisheries Biologists has been established to develop possible solutions to address the dissolved oxygen issue in the old river channel in the spillway area. Several potential solutions are currently being investigated. Once the best alternative is determined, funding for implementation will be requested.

The USACE and the National Great Rivers Research and Education Center (NGRREC) have entered into a Challenge Partnership Agreement to provide a floating water monitoring station to monitor water quality data for Carlyle Lake. Also, graduate

students from St. Louis University conduct additional water quality testing and take sediment samples to determine if some tributaries that drain into Carlyle Lake, carry high amounts of phosphorous or other harmful nutrients.

As Carlyle Lake ages, some water quality issues will, most likely continue to occur. Measures that promote soil conservation and nutrient retention on adjacent private farmlands, will go far in helping keep good water quality in Carlyle Lake.

6.7. Create a Recreation Facility Bank

A proposed action is to create a Recreation Facility Bank for Carlyle Lake. The Facility Bank serves as a "holding vault" for recreation facilities that are removed from service. Recreation facilities can be placed in the Facility Bank at any time and for any length of time. Likewise, recreation facilities can be removed from the Facility Bank and placed back into service whenever needed.

A single database will be developed to keep track of facilities placed into or removed from the Facility Bank. Facilities removed from the facility bank don't necessarily have to be placed back into service in the same area they came from. They can be used anywhere on the project they are needed. The Operations Manager will authorize all actions to place recreation facilities in the Facility Bank or remove them from the Facility Bank.

This action is being implemented for several reasons:

- a. **O&M Cost Savings.** There are instances when the temporary reduction of recreation facilities is warranted, such as lack of use, insufficient user demand, and other types of recreational uses for the area where the facilities are removed. In any case, whenever facilities are removed from service there is typically a cost savings associated with their removal. Recreation facilities removed from service and placed in the Facility Bank no longer require routine maintenance for such things as mowing, cleaning and repair.
- b. **Facility Accountability.** When Master Plans are updated and facilities are authorized for removal or new facilities are added, it is extremely difficult to keep an accurate accounting of facilities. Also, when Master Plan supplements are approved in between Master Plan updates, the same situation occurs. The Facility Bank will be a way of monitoring, tracking and accounting for recreation facilities when they are removed or added.
- c. **Encourage Cost Savings.** Often time management is hesitant to remove facilities from service, because of uncertainty about being able to return them to service when needed. The Facility Bank will provide a process for accomplishing

this. In addition, placing facilities in the Facility Bank for use sometime in the future may encourage a more objective analysis for determining whether or not to remove facilities from service.

- d. **Flexibility.** The types of outdoor recreationists and recreation activities continue to change and expand at very fast pace. The Facility Bank will provide the flexibility to add or remove recreation facilities based on user demand, changes in users, as well as changes in outdoor recreation trends.

6.8. Inmate Labor Program

The Inmate Labor program was established in 1997 through a Memorandum of Agreement (MOA) with the Federal Correctional Institution (FCI), Greenville, Illinois and the USACE. The FCI Greenville, is a medium security federal correctional institution with an adjacent minimum security satellite work camp, located outside the barbed wire enclosure of the prison. The work camp, which resembles a college campus, is a transitional facility used to house inmates who have served time and are transitioning to life outside the prison system.

Authority for the inmate labor program is provided through AR 210-35, Civilian Inmate Labor Program, 14 January 2005. The regulation allows local projects to enter in work agreements with State and Federal prisons to accomplish unfunded work at the project. Inmates accomplish work items typically not performed by the Carlyle Lake staff or through routine contracts. Examples of work performed by inmate labor include:

- a. Landscaping
- b. Beautification projects
- c. Painting
- d. Clearing vegetation, such as invasive species
- e. Flood damage repair and cleanup
- f. Shoreline cleanup and debris removal
- g. Trail maintenance and litter pickup

Selection of inmates is the responsibility of FCI Greenville. Inmates are selected from the minimum security work labor camp and cannot include:

- a. A principal organized crime figure
- b. A person in whom there is significant public interest
- c. An inmate convicted of a sex offense
- d. An escape risk
- e. An inmate convicted of a violent crime
- f. An inmate convicted of arson

- g. An inmate convicted of the sale or intent to distribute illegal drugs
- h. An inmate declared as mentally unstable

The Inmate Labor Program is an extremely successful program at Carlyle Lake. Since its inception in 1997, the value of labor provided by inmates exceeds \$6 million dollars. The inmate labor work crew provides a flexible, adaptable and rapid deployment workforce able to accomplish work at a moment’s notice. Their support is invaluable in responding to flood cleanup, storm damage cleanup, and late winter campground preparations.

Table 6-1 is a summary of information included in the 2015 annual report to HQUSACE, as required in the MOA.

Table 6-1 Inmate Labor Program Summary - 2015

Item Description	Data
Number of Inmates Participating in Program	32
Average Number of Inmates Participating in Program	9
Total Hours Worked for the Year	17,984
Labor Type Equivalency	WG-5 Maintenance Worker
Labor Rate Equivalency	\$27.36 per hour
Value of Labor	\$492,042
Material & Supply Cost	- \$3,500
Transportation Cost	- \$7,656
Annual Net Value of Program	\$480,886

6.9. Interpretive Services and Outreach Program

The goal of the Interpretive Services and Outreach Program (ISOP) is to interact and make effective, meaningful contacts with lake visitors, community organizations and local residents.

The staff at Carlyle Lake make an average of 40,000 interpretive contacts annually. These contacts are made through campground programs, beach water safety programs, outreach programs, and special events. (Approximately 20,000 of these contacts are targeted at water safety initiatives.)

Outreach objectives include:

- a. Implement an intensive Water Safety program, designed to reach as many visitors (all ages) as possible about the importance of water safety and wearing life jackets. This includes implementing the “I got caught” campaign, which rewards lake users for wearing their life jackets while recreating on Carlyle Lake.

This campaign is made possible through partnering efforts with local businesses throughout the region. The partnership is valued at over \$100K annually.

- b. Facilitate and promote effective partnerships by leveraging resources with stakeholders, community organizations, local residents, lake visitors and volunteers.
- c. Actively partner with local and regional groups and organizations in coordinating special events and activities throughout the year and ensure public safety for all that attend. These events include:
 - 1) Illinois High School Association (IHSA) State Bass Fishing Finals
 - 2) Fireworks Spectacular
 - 3) Kaskaskia River Duck Race
 - 4) Crusin' the Dam Car Show
 - 5) Haunted Trail
 - 6) Annual Earth Day Celebration

The Interpretive Services and Outreach Program will continue to increase utilization of social media tools as an effective ways to communicate with the public. This will include the use of websites, phone applications, Facebook, Instagram and Twitter.

Expanding educational programming, day camps, and interactive programming to increase public opportunities and educate the maximum number of individuals is key to the future success of the program.

6.10. Partnerships & Stakeholder Involvement

The Kaskaskia River system is the second largest river system in Illinois that lies entirely within the state. The watershed encompasses parts of 22 counties and covers 5,746 square miles. The health of Carlyle Lake and the Kaskaskia River is related to the overall quality of the watershed and the streams that feed into the mid Kaskaskia basin.

There are a diversity of interests, stakeholders, and partners within the watershed that are dedicated to improving natural resources, economy, and quality of life for all residents within the region

The Kaskaskia Watershed Association, Inc. (KWA) was created to represent the entire watershed while recognizing the uniqueness and diversity along the Kaskaskia River. The KWA is active in the everyday operations that occur in the watershed, and have a successful working partnership with all USACE Projects therein. The group has been recognized nationally as a "role model" for stakeholder organizations.

The goal of the KWA is to develop, enhance, and protect the ecological and socio-ecological values of the natural resources within the Kaskaskia River Watershed. Each reach of the River has coalition groups within the watershed working together under the KWA to coordinate and invest resources to address watershed concerns, issues, and opportunities.

Key organizations by river reach are as follows:

Reach I – Champaign to Lake Shelbyville Dam

- Lake Shelbyville Development Association (LSDA)

Reach II – Lake Shelbyville Dam to Carlyle Lake Dam

- Carlyle Lake Association (CLA)
- Mid Kaskaskia River Basin Coalition

Reach III – Carlyle Lake Dam to Fayetteville

- Okaw River Basin Coalition (ORBC)
- Original Kaskaskia Area Wilderness, Inc. (OKAW)

Reach IV – Fayetteville to Confluence of Mississippi River

- Lower Kaskaskia Stakeholders, Inc. (LKSI)
- Lower Kaskaskia/Silver Creek Ecosystem Partnership

The Carlyle Lake staff is actively involved in and participates in community development and planning meetings throughout the year. These meetings bring a diverse group of local business representatives, and state, county and city officials together to create and provide opportunities to showcase the communities and generate additional economic stimulus within the region.

Groups of involvement include: the Carlyle Lake Chamber of Commerce, the City of Breese Chamber of Commerce, the Carlyle Economic Development Committee, and the Clinton County Economic Development Committee.

The staff at Carlyle Lake consider stakeholder involvement and effective working relationships as critical to the future of Carlyle Lake and the Kaskaskia River Watershed. Through these strong working relationships and involvement, Carlyle Lake stakeholders will continue to play a vital role in current and future management decisions.

6.11. Geographic Information System

One item that became very obvious during the update of this Master Plan was the need to move from a paper map and data repository to a digital based repository. The Carlyle Lake Project will establish a plan to develop a digital based repository. Geospatial data will be acquired through relatively inexpensive GPS data collection systems. This will provide the project with invaluable information for current and future use. Further processing of this data will render a database of invaluable information for all features associated with the project.

Use of these data to map the current location of all features associated with the project will allow a quick reference digital mapping system with the capability to create paper maps as necessary. Further, these maps are much easier to manage, and much cheaper to edit and upgrade. The associated database will store limitless information about every feature of the project, such as length, depth, diameter, material type, maintenance schedule, part number, etc.

It will provide measurement and analysis capabilities for all mapped features. For instance, these data can be used for quick and accurate calculation of any distance from one point to another, the length of a road, or the aerial extent of any given area, the surface area of the lake at X elevation, etc., and then stored in the database for future reference. The flexibility found in the Geographic Information System will prove to be a great benefit to every aspect of project management.

6.12. South Shore State Park Issues

Currently the USACE is coordinating with the IDNR to address safety issues and the deplorable condition of the recreation facilities in the area. Most recreation facilities have degraded to the point they are not useable and have become a public safety hazard. This situation must be corrected and the USACE is evaluating a variety of options to correct this situation.

6.13. Future Marina and Resort Development

Marinas on Carlyle Lake are currently not at peak capacity with ample space available in the four marinas; Boulder Marina, Carlyle Sailing Association, Tradewinds and West Access, to accommodate additional demand for the foreseeable future. The marina site proposed for Allen Branch in the previous Master Plan is no longer designated as a potential site, due to the significant fisheries habitat the site provides and the low elevation of the land to support the on water facilities. The marina site at Dam East is still designated for possible future development, however there are negatives due to the cost of infrastructure and the small size of the harbor site. Before a new marina would be proposed, the existing marinas need to be near capacity, including expansion of docks or boat storage facilities at their present harbor sites. A market study will be done to determine future demand for boat storage and how best to meet the demand,

which could include expansion of the capacity at existing marina/harbor sites or development of a new marina site.

Currently there are overnight accommodations at Eldon Hazlet State Park and Dam West Recreation Area. Overnight accommodations on the lake are not at peak capacity year round and the resort site at Dam West has struggled to continue operations. Resort development was proposed previously for South Shore State Park, however the park is no longer identified for resort development. The primary issue at Carlyle Lake and other nearby lakes is the relatively short summer season and relative mild winters that are not conducive to outdoor winter recreation activities. Expansion of overnight accommodations at the Dam West site and Eldon Hazlet State Park is possible, if use increases in the future. However, no additional sites are proposed in this Master Plan for future resort development

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CHAPTER 7

AGENCY AND PUBLIC COORDINATION

7.1. Agency and Public Coordination - Overview

All materials and information used for Agency and Public Coordination activities are included as **Appendix F**.

Obtaining public input and coordinating with stakeholders, affected agencies and organizations was an important part in updating the Carlyle Lake Master Plan. Throughout the Master Plan update process every effort was made to involve the public, and coordinate with appropriate Federal, state, and local agencies.

On November 5, 2015 letters were sent to affected agency officials and congressional interests, informing them about the Master Plan update process and timeline.

On November 12, 2015 letters were sent to stakeholders and partners, informing them about the Master Plan update process and timeline.

In November 2015, news releases were sent to local and state newspapers, television and radio stations, to inform the public about the Master Plan update, including dates, times and locations of public workshops, designed to provide information and obtain input for the updated Master Plan.

A web page was developed that included information about the Master Plan update process, public meeting dates, times and locations, as well as a way to provide input electronically through the website. A copy of the existing Carlyle Lake Master Plan was also accessible through the website.

In December of 2015 and January 2016, five public workshops were conducted at the following locations, dates and times:

- Carlyle, IL: December 3, 2015, 2:30-5:50 pm at the Mariners Village Resort Conference Center, 1 Resort Drive
- Vandalia, IL: December 8, 2015, 5-7 pm at the Americas Best Value Inn, 1920 N. Kennedy Blvd.
- Germantown, IL: January 12, 2016, 5-7 pm at the Germantown American Legion, 1105 Sycamore St.

- Red Bud, IL: January 13, 2016, 5-7 pm at the Kaskaskia Regional Port District Office, 336 N. Main St.
- Chester, IL: January 14, 2016, 5-7 pm at the Chester Public Library, 733 State St.

Each of the workshops were well attended. Fact sheets about the Master Plan update process and a PowerPoint presentation was provided along with blank comment cards and an invitation to provide input concerning the Carlyle Lake Master Plan update.

In January and February 2016, coordination meetings were held with other Federal, State and Local agencies to discuss issues and identify areas of concern for the Master Plan update.

Written comments on the plan were received through 29 February 2016. A summary of all comments received can be found in **Appendix F**.

On April 8, 2016, a letter was sent to everyone that provided input, thanking them for their involvement and included a schedule for review of the updated Carlyle Lake Master Plan - 2016.

The initial draft of the updated Carlyle Lake Master Plan was completed by the end of September 2016 and sent to the St. Louis District Office for internal review and Quality Assurance and Quality Control evaluation.

In October 2016 a news release was sent to appropriate media outlets to inform the public about the availability to review the updated Master Plan and to identify the dates, times and locations for a second round of public information meetings to present highlights and significant changes to the Carlyle Lake Master Plan - 2016. In addition the updated Master Plan was made available for viewing on the website.

<http://www.mvs.usace.army.mil>

CHAPTER 8

SUMMARY OF RECOMMENDATIONS

This chapter provides a summary of all the Proposed Actions contained in this Master Plan. Proposed Actions are intended to be accomplished during the next 10 to 15 years and were developed using the most current data available at the time this plan was developed. They take into consideration existing conditions, public and agency input, as well as future trends in outdoor recreation. Each of the proposed actions will require funding through the USACE budget formulation process and may require additional coordination with stakeholders and partners upon implementation. Even though most of the Proposed Actions were determined to be categorically excluded from further NEPA action, when implemented, some may require additional documentation in order to ensure compliance.

Table 8-1 identifies each Proposed Action, its location, type of action, brief description and reference page within this document.

Table 8-1 Summary of Proposed Actions *(Replacement/New/Previously Approved)

Proposed Action	Location	Type of Action (R/ N/ PA)*	Description	Page
Construct accessible boat loading platforms	Keyesport, Dam East, Coles Creek and Boulder boat ramps	N	Construct ADA/ABA compliant boat loading platforms	40
Develop designated kayak launching areas	Kayak Trail Heads	N	Place sand along the shoreline	40
Reduce picnic sites	Multiple Recreation Areas	R	Reduce the number of picnic sites at multiple recreation areas	44/60
Implement ADA/ABA transition plan for entire area	Entire Project	PA	Supplement No.4, to 1997 Carlyle Lake Master Plan, Approved 13 February 2014. (See Appendix D)	
Replace Fish Cleaning Stations	Entire Project	R	Replace Fish Cleaning Stations with ADA compliant facility	
<i>Continued on Next Page</i>				

Proposed Action	Location	Type of Action (R/ N/ PA)*	Description	Page
Provide water hookups to campsites	All USACE Campgrounds	N	Provide one dual outlet water hookup for every two campsites	
Provide sewer hookups	All USACE Campgrounds	N	Provide sewer hookups to 60% of campsites	
Renovate campsites to meet Customer Service Standards	All USACE Campgrounds	R	Renovate campsites to meet all customer service standards contained in EM 1110-1-400	
Remove waste water line	Main Dam	PA	Remove waste water lines from dam (concrete spillway section)	86
Provide a 1 acre Leash Free Dog Area	USACE Management & Maintenance Complex	N	Develop a fenced-in leash free dog area, including water hydrant, benches, waste receptacles and shade	88
Provide well & Pump or water line	Saddle Dams 2 & 3	PA	Provide well & pump or water line to facilitate management of the wetland.	88
Install Interpretive Signage	Saddle Dam 3	PA	Install Watchable Wildlife interpretive signs and a wildlife viewing site along Saddle Dam 3 to increase visitor understanding of the area.	88
Base & Road Repair	Saddle Dam 2	N	Repair base and resurface road	88
Provide Improved and Safe Access	Saddle Dams 2 & 3	PA	Provide improved & safer access from US Hwy 50 to Dam East Concession Area between Dam East Boat Access & SSSP	88
Connect sewage system from Boulder Recreation Area	Coles Creek Land Treatment System & Boulder STP	PA	Connect Boulder Recreation Area sewage to Coles Creek Land Treatment System	89
Install and connect sewage system to Coles Creek system	Boulder Recreation Area	R	Decommission Boulder STP and connect all sewage facilities to Coles Creek system	89
<i>Continued on Next Page</i>				

Proposed Action	Location	Type of Action (R/ N/ PA)*	Description	Page
Boat Ramp & Apron Repair	Boulder Recreation Area	R	Repair and resurface boat ramp and apron	92
Provide WI-Fi service in campground	Boulder Recreation Area	N	Install properly sized outdoor Wi-Fi service for use by campground guests	92
Provide leash-free dog area	Boulder Recreation Area	N	Provide small appropriately located leash-free dog area	92
Renovate High Water Boat Ramp	Boulder Recreation Area	R	Renovate ramp to meet design standards to include additional lane and courtesy dock	92
Replace Courtesy Dock	Boulder Recreation Area	R	Replace existing courtesy dock	92
Renovate campground access and Replace Entrance Station	Boulder Recreation Area	R	Replace entrance station and access to meet design standards and ADA/ABA requirements	92
Replace Laundry/Shower Building	Boulder Recreation Area	R	Replace Laundry/Shower building with ADA/ABA compliant facility	92
Boat Ramp & Apron Repair	Coles Creek Recreation Area	R	Repair and resurface boat ramp and apron	94
Replace Laundry/Shower Building	Coles Creek Recreation Area	R	Replace Laundry/Shower building with ADA/ABA compliant facility	94
Provide Wi-Fi service in campground	Coles Creek Recreation Area	N	Install properly sized outdoor Wi-Fi service for use by campground guests	94
Renovate Dump Station	Coles Creek Recreation Area	R	Renovate and resize dump station to meet design standards	94
Remove Swimming Beach	Coles Creek Recreation Area	R	Remove swimming beach and convert area to boat-in picnic facility. Convert Bath Change House to Restroom	94

Continued on Next Page

Proposed Action	Location	Type of Action (R/ N/ PA)*	Description	Page
Relocate picnic shelter and Playground equipment	Coles Creek Recreation Area	R	Relocate picnic shelter and playground equipment closer to existing beach for use by boat-in picnickers	94
Provide leash-free dog area	Coles Creek Recreation Area	N	Provide small appropriately sized leash-free dog area	94
Convert Group Areas A & B to individual full hookup campsite units	Coles Creek Recreation Area	R	The current occupancy rate for these areas is about 12%. Converting these sites to individual campsites with full hookups will greatly improve efficiency and improve customer satisfaction	94
Convert Lotus Group Area to Group Camp Area	Coles Creek Recreation Area	R/PA	Remove cabins and convert area to group camping area with full hookup sites and add previously approved waterborne restroom with showers	94
Establish Volunteer Village	Coles Creek Recreation Area	N	Convert area near laundry facility to Volunteer Village	94
Modify High Water Ramp & Breakwater	Dam East Recreation Area	PA	This action was previously approved in Supplement No. 4 to the 1997 Master Plan	97
Replace combination shelter/restroom	Dam East Recreation Area	R	Replace the combination shelter/restroom with a restroom/shower facility	97
Provide steps on the river bank	Dam East Spillway	N	Provide steps along the rip-rap to facilitate fishing and provide safe access to the water	99
Develop Dump Station	Dam East Spillway	N	Provide dump station	99
Connect sewer system to west side of river	Dam East Spillway	N	Connect Sewer System	99

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Proposed Action	Location	Type of Action (R/ N/ PA)*	Description	Page
Develop primitive trail	Dam East Spillway	N	Develop a meandering primitive trail that connects the trail system from General Dean Bridge through the East Spillway and connects with the trail system in Dam East Recreation Area.	99
Develop addition to the Visitor Center	Dam West Recreation Area	PA	Develop 875 square foot addition to the Visitor Center	101
Develop outdoor amphitheater for Visitor Center	Dam West Recreation Area	PA	Develop outdoor amphitheater south of Visitor Center	101
Extend Breakwater	Dam West Recreation Area	PA	Extend breakwater as previously approved in Master Plan Supplement	101
Replace beach shower house	Dam West Recreation Area	PA	Replace beach shower house with ADA/ABA compliant facility	101
Renovate Day Use Area	Dam West Recreation Area	R	Renovate day use area and correct drainage problems	101
Provide leash-free dog area in campground	Dam West Recreation Area	N	Provide small leash-free dog area in the campground	101
Renovate campground entrance access to meet design guidelines	Dam West Recreation Area	R	The entrance access to the campground needs to be replaced in accordance with Design Guidelines and Customer Service Standards	101
Provide two buddy campsites (4 sites) in north side camping loop	Dam West Recreation Area	N	Provide two buddy campsites (4 total sites) in the north side camping loop	101
Renovate picnic shelters in day-use area	Dam West Recreation Area	R	Renovate picnic shelters in day-use area	101

Continued on Next Page

Proposed Action	Location	Type of Action (R/ N/ PA)*	Description	Page
Provide additional steps on the river bank	Dam West Spillway	N	Provide additional steps along the rip-rap to facilitate fishing and access to the water.	104
Replace vault toilet	General Dean Bridge	PA	Replace vault toilet with waterborne, ADA/ABA compliant facility (Appendix D)	106
Provide steps on the river bank	General Dean Bridge	N	Provide steps along the rip-rap to facilitate fishing and provide safe access to the water	106
Connect to city sewer system	General Dean Bridge	N	Connect to city sewer system	106
Expand Parking Area	General Dean Bridge	N	Expand parking area to accommodate boat trailer parking	106
Provide Courtesy Dock	General Dean Bridge	N	Provide courtesy dock to meet Customer Service Standards	106
Renovate Boat Ramp	General Dean Bridge	R	Renovate boat ramp to meet Design Criteria and Customer Service Standards	106
Improve water quality	General Dean Bridge	N	Implement recommendations from Water Quality PDT	106
Provide Shelter at Illini Pond Area	Eldon Hazlet State Park	N	Construct shelter at Illini Pond	108
Provide Trail Improvements - Cherokee Trail	Eldon Hazlet State Park	R	Make improvements to the Cherokee hiking trail	108
Renovate Shower Building	Eldon Hazlet State Park	R	Renovate shower building	108
Renovate Sewage Treatment Plant	Eldon Hazlet State Park	R	Renovate STP	108
Elevate Entrance Road	Eldon Hazlet State Park	R	Raise the 1.75 mile entrance road to the park from 456.0 ft. NGVD to 460.0 ft. NGVD	108
Renovate Service Area	Eldon Hazlet State Park	R	Renovate the maintenance service area	108
Construct Bike Trail	Eldon Hazlet State Park	N	Construct 9-mile bike trail with amenities	108
Vault Toilet Replacement	Eldon Hazlet State Park	R	Replace vault toilets	108

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Proposed Action	Location	Type of Action (R/ N/ PA)*	Description	Page
CSA High Water Improvements	Eldon Hazlet State Park	R	Provide improvements to CSA lease area to help minimize the impacts of high water events	108
Renovate Peppenhorst Boat Ramp	Eldon Hazlet State Park	R	Renovate boat ramp	108
Realign a portion of existing roadway	South Shore State Park	N	A section of the main entrance road, beginning near the center of the park will be rerouted and moved closer to the shoreline. It will connect to the existing road leading to the Steins Access Area.	110
Extend breakwater	Keyesport Recreation Area	PA	Extend existing breakwater	112
Facilitate actions to implement the Carlyle Lake Trail Plan	Entire Project	N	USACE will engage potential stakeholders and facilitate actions to implement the Carlyle Lake Trail Plan, included as Appendix C	124
Implement Tree Planting Replacement Plan	Entire Project	N	Develop and implement a Tree Replacement Plan and Program	123
Create Recreation Facility Bank	Entire Project	N	Create recreation facility bank through development of a database to monitor and keep track of recreation facilities	128
GIS	Entire Project	N	Procure the necessary equipment and data sets to convert all paper maps and project data into a Geographical Information System	133

CHAPTER 9

BIBLIOGRAPHY

This Master Plan was developed using the following USACE guidance:

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