

**DRAFT**  
**Martins Fork Master Plan**

## List of Abbreviations

ADD – Area Development District	GPS – Global Positioning System
ARPA – Archeological Resources Protection Act	H&H – Hydrology and Hydraulics
cfs – Cubic Feet per Second	HABS – Harmful Algal Blooms
COL – Colonel	HQUSACE – Headquarters, U. S. Army Corps of Engineers
CRM – Cumberland River Mile	LRN – Nashville District
CW – Civil Works	LTC – Lieutenant Colonel
CWA – Clean Water Act, 1977	MFR – Memorandum for Record
DA – Department of Army	MOU – Memorandum of Understanding
DE – District Engineer/ Division Engineer	MP – Master Plan
DM – Design Manual	MR – Multiple Resource Management Lands
DO – Dissolved Oxygen	MRLC – Multi-Resolution Land Characteristics Consortium
DoD – Department of Defense	MSD – Marine Sanitation Device
DQC – District Quality Control	<b>msl</b> – Mean Sea Level (based on the National Geodetic Vertical Datum of 1929)
dsf- Day Second Feet	MW – Megawatt
EA – Environmental Assessment	NAGPRA – Native American Graves and Repatriation Act
EAB – Emerald Ash Borer	NEPA – National Environmental Policy Act
EC – Engineering Circular	NHPA – National Historic Preservation Act
EDW – Enterprise Data Warehouse	NRHP – National Register of Historic Places
EIS – Environmental Impact Statement	NRRS – National Recreation Reservation System
EM – Engineering Memorandum	NTE – Not to Exceed
EO – Executive Order	NVCS – National Vegetation Classification Standard
EOPs – Environmental Operating Principles	NWI – National Wetlands Inventory
EP – Engineering Pamphlet	NWS – National Weather Service
EPA – Environmental Protection Agency	O&M – Operations and Maintenance
EQ – Environmental Quality	OC – Office of Counsel
ER – Engineering Regulation	OMBIL – Operations & Maintenance Business Information Link
ERDC – Engineering Research & Design Center	
ESA – Endangered Species Act/ Environmentally Sensitive Area	
FONSI - Finding of No Significant Impact	
FY – Fiscal Year	
GIS - Geographic Information Systems	

OMP – Operational Management Plan  
PAC – Primary Area Counties  
PDT – Project Delivery Team  
PL – Public Law  
PM – Project Manager/Management  
PMP – Project Management Plan  
POC – Point of Contact  
Project – The lands and waters  
administered by the Corps of Engineers  
QA/QC – Quality Assurance / Quality  
Control  
REAL – Recreation Excellence at Army Lakes  
REAS – Recreation Economics Assessment  
System  
REC – Recreation  
REMIS – Real Estate Management  
Information System  
SCORP – State Comprehensive Outdoor  
Recreation Plan

SHPO – State Historic Preservation Office  
SME – Subject Matter Expert  
SMP – Shoreline Management Plan  
SOP – Standard Operating Procedure  
SOW – Scope of Work  
T&ES – Threatened and Endangered Species  
TDEC – Tennessee Department of  
Environment and Conservation  
TDNA – Tennessee Department of Natural  
Areas  
TVA – Tennessee Valley Authority  
UAS – Unmanned Aerial Systems  
USACE – U. S. Army Corps of Engineers  
USC – United States Code  
USFWS – United States Fish and Wildlife  
Service  
WMA – Wildlife Management Area  
WQ – Water Quality WRDA/WRRDA– Water  
Resources Development Act

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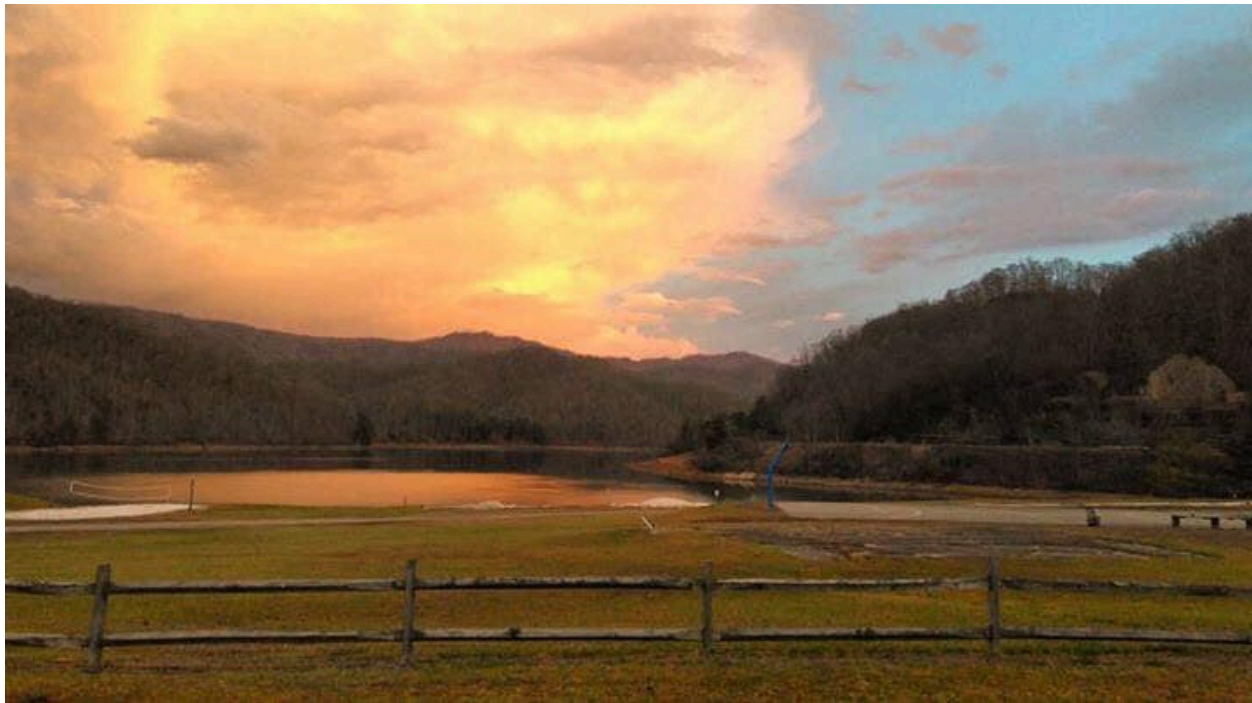
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# Chapter 1 Introduction



*Figure 1.1 - Martins Fork Lake*

## 1-01. Project Authorization

The multi-purpose Martins Fork Project was authorized by the Flood Control Act of October 1965, Public Law 89-298, in accordance with the recommendations of House Document 244, 89<sup>th</sup> Congress, 1<sup>st</sup> Session, to provide flood control, recreation, and water quality control.

The project authorization further required a local partner to prevent encroachment on downstream channels, hold the United States harmless from damages due to water-rights claims resulting from the project, contribute to pollution and water supply control, and to comply with the concurrently enacted Public Law 89-72, the Federal Water Project Recreation Act. Martins Fork is unique among the Nashville District lakes, as recreation and fish and wildlife enhancement and all operations and maintenance costs for recreation facilities at the project must be provided by a local partner, the Harlan County Fiscal Court. Additional information on P.L. 89-72 and how it is applied at Martins Fork, see Chapter 2-15(a).

## 1-02. Project Purpose

Martins Fork Dam and Reservoir is part of a comprehensive plan for the development of the Cumberland River Basin. Eastern Kentucky is especially flood prone as its topography consists of steep hillsides and communities created largely in valleys. Martins Fork Dam was authorized in 1965 with the authorized project purposes of flood control, recreation, and water quality. Construction on the dam started in 1973, but was only 35% complete in 1977 when the flood of record for the region occurred in April of that year. This catastrophic regional flood reinforced the need for the Martins Fork project and continued the momentum for that project until completion in late 1978. The April 1977 flood also spurred the creation or improvement of many flood control structures in the area including levees and flood walls constructed through the 1980s and 1990s.

Martins Fork Dam is located two miles from Cranks Creek Dam, which was built by the State of Kentucky, but currently maintained and operated by the Harlan County Fiscal Court. The site and design of Martins Fork Dam were selected with enough storage to safely maintain a total failure of Cranks Creek Dam.

Martins Fork Dam and Lake are operated for the purposes of flood control, recreation, water quality, and fish and wildlife conservation.

## 1-03. Purpose and Scope of the Master Plan

The Master Plan provides direction for development and use of project lands. It is a vital tool for the responsible stewardship of project resources for the benefit of present and future generations. The Master Plan is programmatic and identifies conceptual types and levels of activities, not designs, project sites, or estimated costs. Actions by USACE, Kentucky, and other management partners must be consistent with the Master Plan. Therefore, the Master Plan must be kept current in order to provide effective guidance in decision-making at Martins Fork Lake. The previous Martins Fork Master Plan was approved in 1980. Since the publication of the 1980 Master Plan, USACE has updated its policies directing the development and implementation of Master Plans. Specific Master Plan requirements by which this document was created are contained in Engineer Regulation (ER) and Engineer Pamphlet (EP) 1130-2-550, which was last updated on January 30, 2013.

The Master Plan is based on responses to regional and local needs, resource capabilities and suitabilities, and expressed public interests that are consistent with authorized project purposes and pertinent legislation and regulations. The plan is distinct from the project level implementation emphasis of the Operational Management Plan (OMP). Policies in the Master Plan are guidelines implemented through provisions of the OMP, specific Design Memoranda (DMs), and the Annual Work Plans. The broad intent of this Master Plan is to accomplish the following:

- Determine appropriate uses and levels of development of project resources;
- Provide a framework within which the OMP and Annual Management Plans can be developed and implemented; and
- Establish a basis on which out-grants and recreational development proposals can be evaluated.

### 1-03(a). Master Plan Scope

The USACE mission at reservoir projects includes managing, conserving, and improving environmental and cultural resources while providing quality public recreational experiences to serve the needs of present and future generations. This Master Plan includes guidance for appropriate uses, protection, and conservation of the natural, cultural, and man-made resources at Martins Fork Lake. The Master Plan includes:

- A comprehensive description of the project resources, as well as factors influencing resource management and development (Chapter 2);
- Resource Objectives and goals from the Headquarters, Division, District and Local levels (Chapter 3);
- Land Allocation and Classifications (Chapter 4);
- Resource Plan with detailed descriptions of classified areas (Chapter 5);
- Special topics relevant to Martins Fork Lake (Chapter 6)
- A synopsis of public involvement and input in the master planning process (Chapter 7);
- Conclusions and Recommendations (Chapter 8); and
- The associated compliance with the National Environmental Policy Act of 1969, as amended (NEPA), and other related data (Appendices).

## 1-04. Brief Watershed and Project Description

### 1-04(a). The Cumberland River Basin

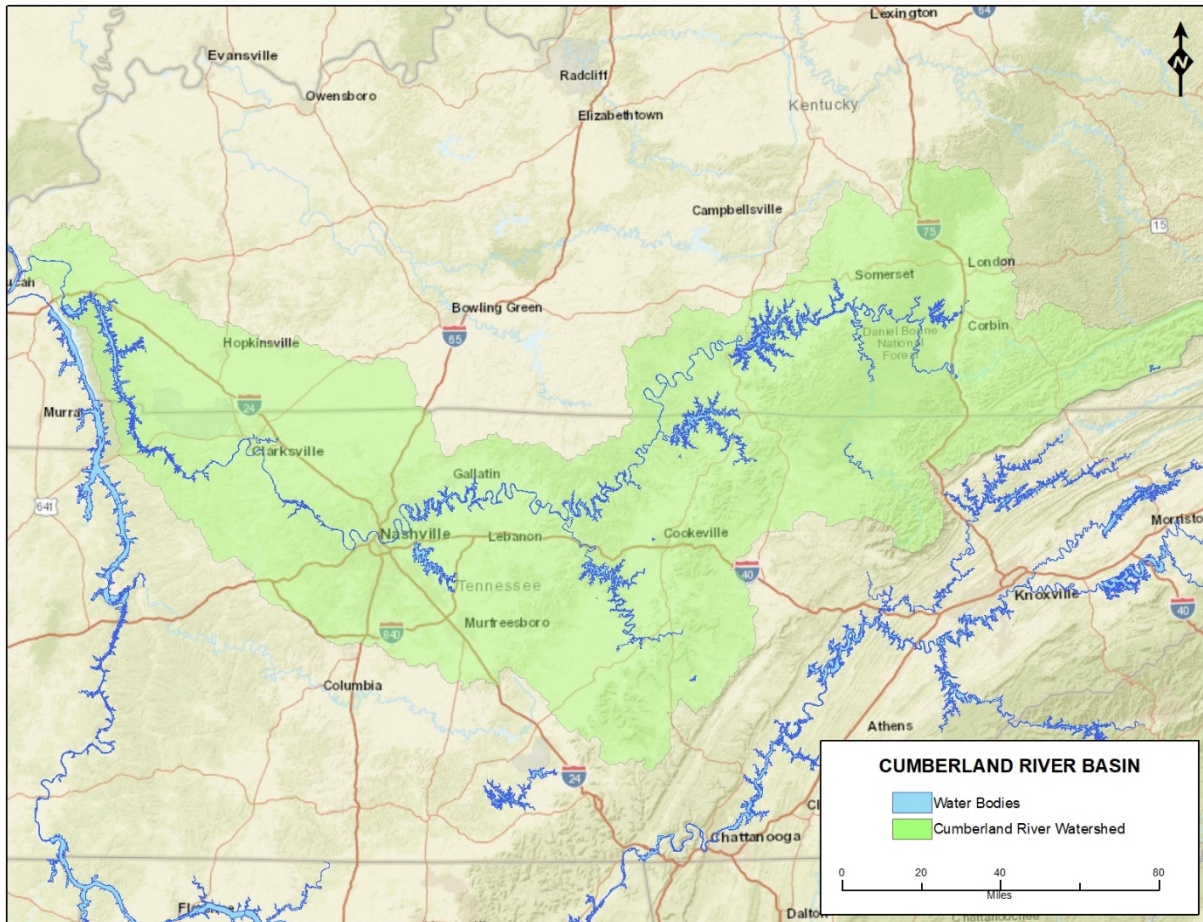


Figure 1.2 - The Cumberland River Basin

The Cumberland River is one of the major tributaries of the Ohio River. The source of the Cumberland River is located at the junction of the Poor, Martins Fork, and Clover Fork Rivers near the City of Harlan, Kentucky. From Harlan, the Cumberland River meanders southwesterly through the City of Nashville, Tennessee. From Nashville, the river flows in a northwesterly direction to Smithland, Kentucky where it joins the Ohio River.

The Cumberland River Basin, depicted in Figure 1.2, contains 17,598 square miles of land and water area. The Cumberland River drops more than 800 vertical feet in its course from Harlan,

Kentucky, to the Ohio River. There are five existing multipurpose Projects on the main stem of the Cumberland River which include Barkley, Cheatham, Old Hickory, Cordell Hull, and Wolf Creek (Lake Cumberland). The tributary projects of the Cumberland River System are Martins Fork, Laurel River, Dale Hollow, Center Hill and J. Percy Priest.

### 1-04(b). Upper Cumberland Watershed

The Upper Cumberland River Basin is important to distinguish from the larger Cumberland River Basin as this watershed contains the origins of the Cumberland River, where the Poor Fork, Clover Fork, and Martins Fork converge near Harlan, KY and water flows through the steep terrain of the Kentucky Mountains and adding other tributaries to the point where the Cumberland meets the Rockcastle River at the border of Pulaski County, KY. This watershed contains 150 miles of the main Cumberland River and nearly another 3,000 miles of smaller streams and tributaries. The Upper Cumberland Watershed is also home to Martins Fork Lake and Laurel River Lake. The hilly topography creates beautiful water features and habitat for unique creatures found only in the basin, but it is also susceptible to agricultural and mining practices that impact water health (Cumberland River Compact, 2019).



Figure 1.3 - Map of The Upper Cumberland Watershed within the larger Cumberland River System

## 1-04(c). Martins Fork Lake

The Martins Fork Lake Project, is located in southeastern Kentucky, near the Virginia state line. It is located entirely in Harlan County. The damsite is located at Mile 15.6 on the Martins Fork tributary, approximately 13 miles south of Harlan. The largest community in the immediate vicinity is Cawood, located four miles northeast of the dam. Martins Fork Lake extends approximately four miles upstream of the dam and is approximately two miles from the Kentucky-Virginia border along the Cumberland mountains.

Martins Fork Lake is fed from two primary sources: Martins Fork and Cranks Creek. Below the dam, Martins Fork flows in a northerly direction to Harlan, where it joins the Clover Fork which then joins the Pook Fork to form the Cumberland River. Martins Fork is located within the Upper Cumberland Watershed.

## 1-05. Listing of Prior Master Plans and Design Memorandums

- Design Memorandum No. 2B, General, July 1971, approved 30 December 1971.
- Design Memorandum No. 6A, Appendix 6 to Design Memorandum No. 2B, Land Requirements Plan – Public Use, September 1971, approved 18 February 1972.
- Master Plan for Minimum Public Use and Administrative Facilities, 1 November 1976, approved 20 April 1977.
- Design Memorandum No. 6B, Master Plan, February 1980, approved 24 March 1980.

## 1-06. Listing of Pertinent Project Information

Table 1.1 - Martins Fork Project Statistics

<b>Land Base</b>	
Total Fee Property	1,394 acres
Total Easement Property	52 acres
Shoreline Miles	10 miles
Drainage Area for the Lake	55.7 Sq Miles
<b>Pool</b>	

Backwater Length (Martins Fork Dam to the end of navigable water on the Martins Fork)	4 miles
Maximum Pool Elevation (1341 feet MSL)	578 acres
Minimum Pool Elevation (1300 feet MSL)	274 acres
Normal Pool Elevation (1310 feet MSL)	340 acres
Total Normal Pool Storage Capacity (1310 feet MSL)	6,023 acre-feet
Total Maximum Pool Storage Capacity (1341 feet MSL)	20,424 acre-feet
<b>Martins Fork Dam</b>	
Type	Concrete-gravity
Height (above lowest foundation)	97 feet
Total Length	504 feet
Spillway Section	200 feet
Gates	3 Sluice Gates
Gate Size (width X height)	4 feet X 4 feet
Normal Discharge Capacity	800 cfs
Maximum Discharge Capacity at Max Pool (1341 feet MSL)	1,200 cfs

## Chapter 2 Project Setting and Factors Influencing Development

### 2-01. Description of the Reservoir

Martins Fork Lake is part of the comprehensive plan for the development of the Cumberland River Basin. Martins Fork Lake was authorized by the Flood Control Act of October 27, 1965 (Public Law 89-298, 89th Congress) in accordance with the recommendation contained in House Document 244, 89th Congress, 1st Session. Authorized project purposes include flood control, water quality, and recreation.

Subsequent Congressional authorizations have expanded project purposes to include water supply and fish and wildlife conservation. Water quality was added as an authorized purpose by the Federal Water Pollution Control Act Amendments of 1972 (PL 92-500). The Act affirms the Federal objective to “restore and maintain the chemical, physical, and biological integrity of the Nation’s waters”. The Fish and Wildlife Coordination Act (FWCA) of 1959 (PL 85-624) and Public Law 86-717 of September 1960 authorize specific project authority to evaluate, protect, and enhance fish and wildlife resources. Section 661 of the FWCA provides that fish and wildlife conservation shall receive equal consideration with other project purposes.

An elevation of 1,310 will be maintained during the summer to enhance recreation and provide water for low flow (5 cfs minimum) augmentation to insure downstream water quality. Water levels will be lowered to elevation 1,300 during the winter and early spring to increase flood control storage. Figure 2.1 shows the Martins Fork guide curve.

From April through October, the normal operation of Martins Fork will entail maintaining a desired water temperature range in the tailwater as shown in Figure 2.2. Since the lake is expected to be destratified during the winter months, downstream water temperatures are not an operating criteria during the period November through March.

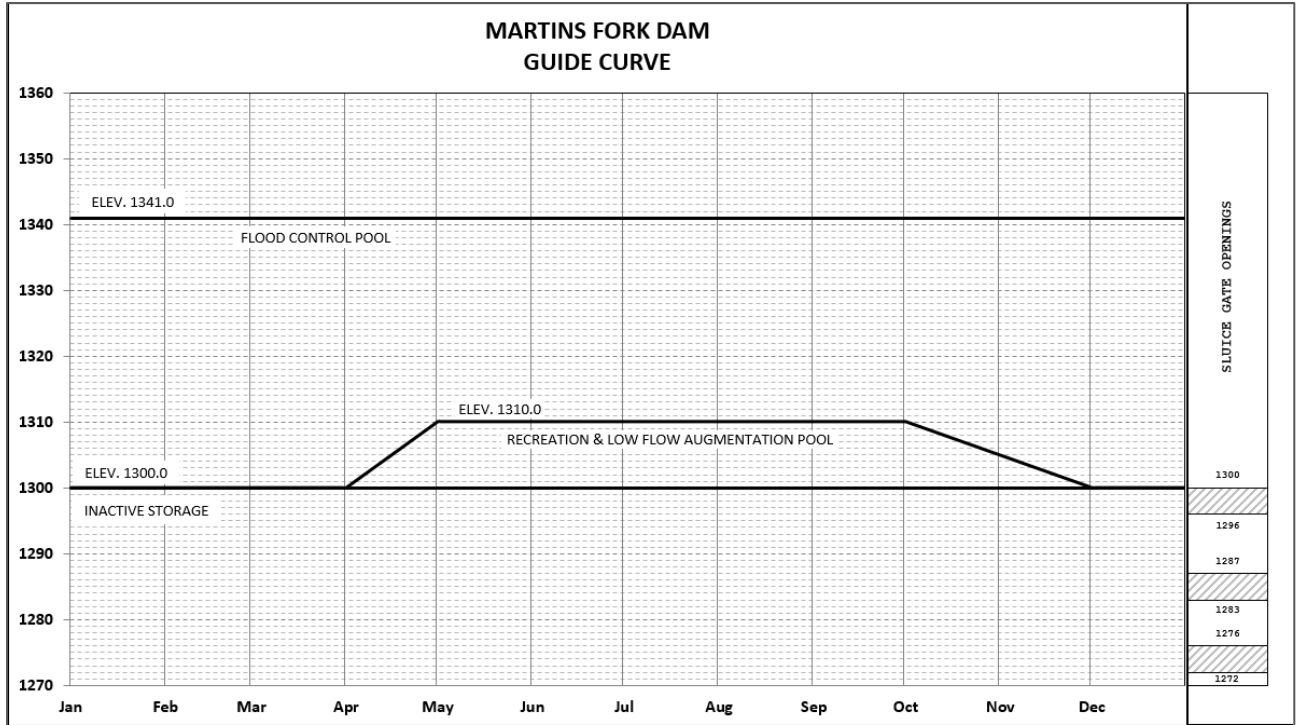
Martins Fork is fed from two primary sources, Martins Fork and Cranks Creek. Below the dam, Martins Fork flows in a northerly direction to Harlan, where it joins the Clover Fork, which then joins the Poor Fork to form the Cumberland River. Martins Fork is located within the Upper Cumberland Watershed and is located entirely within Harlan County, Kentucky.



The 55.7 mi<sup>2</sup> drainage basin of Martins Fork is characterized by wooded and mountainous terrain. Cranks Creek Lake comprises 24.8 mi<sup>2</sup> of the total drainage basin. No major damage centers are affected by high pool or backwater.

Martins Fork Dam is comprised of a 504 feet long concrete gravity structure with a top of dam elevation of 1,360. The uncontrolled spillway is 200 feet long with a crest at elevation 1,341 and has a design flood capacity of 57,000 cubic feet per second. The left side non-overflow section is 160 feet long and the right side non-overflow section is 144 feet long. The outlet works consist of three 4'x4' sluice gates and three 10" diameter bypass valves. Elevations of sluice inverters are 1,296; 1,283; and 1,272. Center line elevations of bypass valves are 1,298; 1,285; and 1,274.

Martins Fork Reservoir has a surface area of 340 acres at summer pool elevation and a total volume of 6,758 ac-ft. At winter pool elevation 1,300, the reservoir has a surface area of 274 acres and a total volume of 3,674 ac-ft. Real estate fee holdings total 1,394.2 acres and easement holdings total 32.7 acres. The guide line for acquisition is elevation 1,346; however, additional acreage above elevation 1,346 was acquired by securing full parcels around the lake thereby avoiding loss of access to shoreline.



*Figure 2.1 - Martins Fork Guide Curve*

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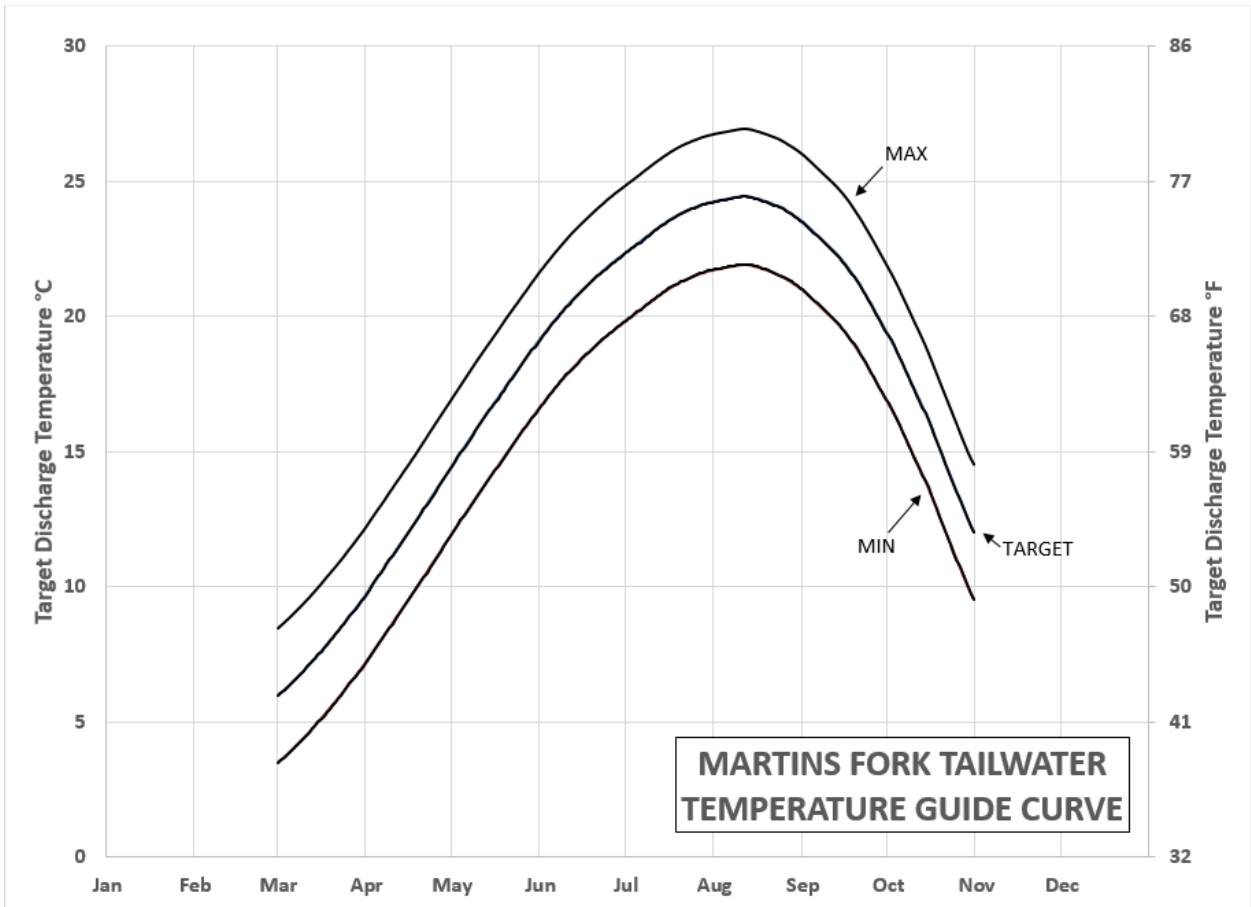


Figure 2.2 - Martins Fork Tailwater Temperature Guide Curve

## 2-02. Hydrology

The Martins Fork drainage area lies within the Cumberland Mountains section of the Appalachian Plateau Physiographic Province that extends northeast-southwest through portions of Kentucky, Tennessee, and Virginia and is located within a sub-area of this province known as the Eastern Coalfield Physiographic Region. The region is characterized by sharply rising mountain ridges and peaks with narrow valleys. The entire drainage area of Martins Fork Dam is 55.7 square miles, of which the upstream dam Cranks Creek comprises 24.8 square miles. Due to the steep terrain and small drainage area, the time to peak of inflows from storm events is very short, typically less than one day. Table 2.1 below shows the six hour inflow values for the surface runoff unit hydrograph.

Table 2.1 - Six Hour Surface Runoff Unit Hydrograph

Time	Flow (cfs)	Time	Flow (cfs)	Time	Flow (cfs)
06	350	42	365	78	69
12	865	48	273	84	50
18	1180	54	208	90	32
24	925	60	158	96	19
30	692	66	122	102	10
36	505	72	92	108	0

Table 2.2 below shows the six hour baseflow unit hydrograph.

Table 2.2 - Six Hour Baseflow Unit Hydrograph

Time	Flow (cfs)	Time	Flow (cfs)
06	20	30	99
12	40	36	119
18	60	42	139
24	79	48	Previous flow times recession factor of 0.965

Approximately 60 percent of the total annual runoff occurs between the five month period of December through April. Total runoff is approximately 27 inches per year. Infiltration rates are lowest in winter when they may be as low as 0.01 inch per hour, whereas rates of 0.10 inch per hour are typical in the summer and early fall. Average computed monthly inflows in day-second-feet (dsf) are displayed in Figure 2.3.

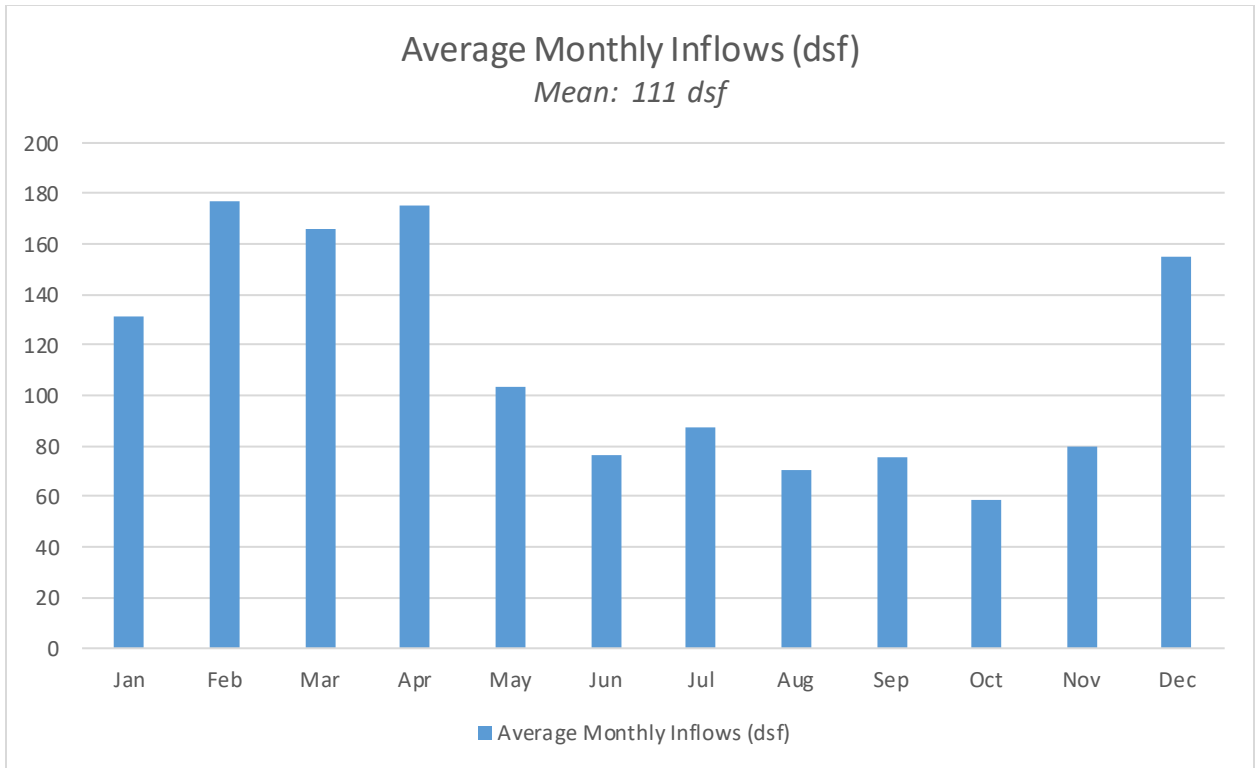


Figure 2.3 - Average Computed Monthly Inflows in Day-Second-Feet (dsf)

### 2-03. Sedimentation and Shoreline Erosion

The sedimentation range network at Martins Fork consists of 14 ranges on Martins Fork, four on tributaries, and five on Cranks Creek below Cranks Creek Dam. Two of the Martins Fork ranges are downstream of the dam. The Cranks Creek reservoir also has eight ranges. Ranges were surveyed in 1978, 1979, 1980, 1983, 1984, 1987, 1992, and 2000; however no survey has been completed since July 2000.

Historically, Martins Fork Lake has experienced an unexpectedly high rate of sedimentation infill. Measured infill rates have been roughly three times greater than the design infill rate of 0.50 acre-feet/square mile/year. The primary source of sedimentation is from previously active coal strip mines in the basin above the dam. The Corps' Waterways Experiment Station (WES) performed a sedimentation study of Martins Fork Lake for the Nashville District in 1988. The study was to verify previously measured infill rates and determine future infill rates and resulting storage loss based on a myriad of hydrologic, sediment load, and land use conditions. The study confirmed a high rate of sediment infill and indicated a no-action worst case loss of about 9 percent of flood control storage and about 13 percent of total storage after 50 years

with existing land use. These estimates were increased to 13.8 and 19.4 percent respectively if all available coal resources were strip mined in the upper Martins Fork Basin. Estimates of flood control storage lost, primarily due to the development of mud flats at the upper end of the lake, represent siltation that would be expected between elevation 1,300 and 1,341.

Generally from the 1st of November through February, the lake destratifies and the water quality within the lake is homogeneous. Thus the water released from the different sluices would be of generally the same quality and efforts to optimize quality by shifting the discharge among the sluices would be pointless. During this time of the year the effort shifts toward using the bottom sluice as much as possible. By using the bottom sluice, as much sediment as possible is passed through the project and long term sediment buildup is reduced. Additionally, once the lake destratifies in late fall or early winter, the bottom sluice is opened to 3.0 to 3.5 feet for at least 30 minutes to flush sedimentation.

Shoreline erosion has historically been of little concern at Martins Fork. The steep and rocky banks coupled with the 10 horsepower restriction on all motor boats tends to limit erosion of the banks. However, some areas of the Cranks Creek embayment near the Highway 987 Bridge have been armored with riprap.

## 2-04. Water Quality

Martins Fork is the only project in the Cumberland River Basin where water quality is an authorized project purpose. The goal is to release water that is of equal or better quality than that which was flowing in the river before the dam was constructed. During the summer the bottom of the inactive storage pool in the reservoir is oxygen depleted and changes in gate settings are required to obtain desired outflow quality. The three parameters which are regularly measured for this purpose are: water temperature, dissolved oxygen, and pH. The target levels for these parameters are listed below:

- Water Temperature - within 2 1/2 degrees centigrade of pre project conditions.
- Dissolved Oxygen - minimum 5 mg/l (Kentucky state standard).
- pH - between 6 and 9.

Most of the time these parameter goals are not in conflict, but occasionally situations arise where all criteria cannot be met at the same time. While there are no formal priorities dictated, DO is generally given preference over water temperature and pH. Such a conflict usually occurs in the summer and fall when warmer than desired water is frequently released from upper level sluices in order to maintain minimum DO levels.

The tool by which the water quality parameters are managed is the selective withdrawal

capability of the three different sluices in Martins Fork Dam. The inverts of the three sluices are located at elevations 1,296, 1,283, and 1,272. Water quality measurements are taken hourly from locations adjacent to these sluices and by adjusting the proportion of water released from each sluice and/or bypass valve, the manager attempts to keep each of the parameters within its prescribed range.

Mean water depth during the summer at Martins Fork is about 31 feet. Mean retention time is about 22 days based on mean discharge and reservoir storage at typical minimum headwater elevation. The lake typically stratifies in June but because of its small size, can quickly destratify from a heavy rainfall event. Complete thermal destratification normally occurs by November.

The Nashville district water quality team has established three lake water quality stations, five inflow stations, and the tailwater station. Water quality sampling by Nashville District Water Management is generally done seasonally three times per year, usually in the spring, summer, and fall. Benthic macroinvertebrates are monitored annually in the tailwater and three inflow locations. Phytoplankton are monitored at three lake locations during the physical/chemical sampling trips and sediment contaminant samples are collected in the lake once every five years. A map of the Nashville District water quality sampling locations is located on Figure 2.4. In addition to field sampling by water management staff, the face of Martins Fork Dam is outfitted with a water quality profiler which records water temperature, DO, pH, and specific conductance and various elevations throughout the water column. There is also a water quality gage in the tailwater. Water quality monitors are typically installed and maintained from March through November when water quality is a concern.

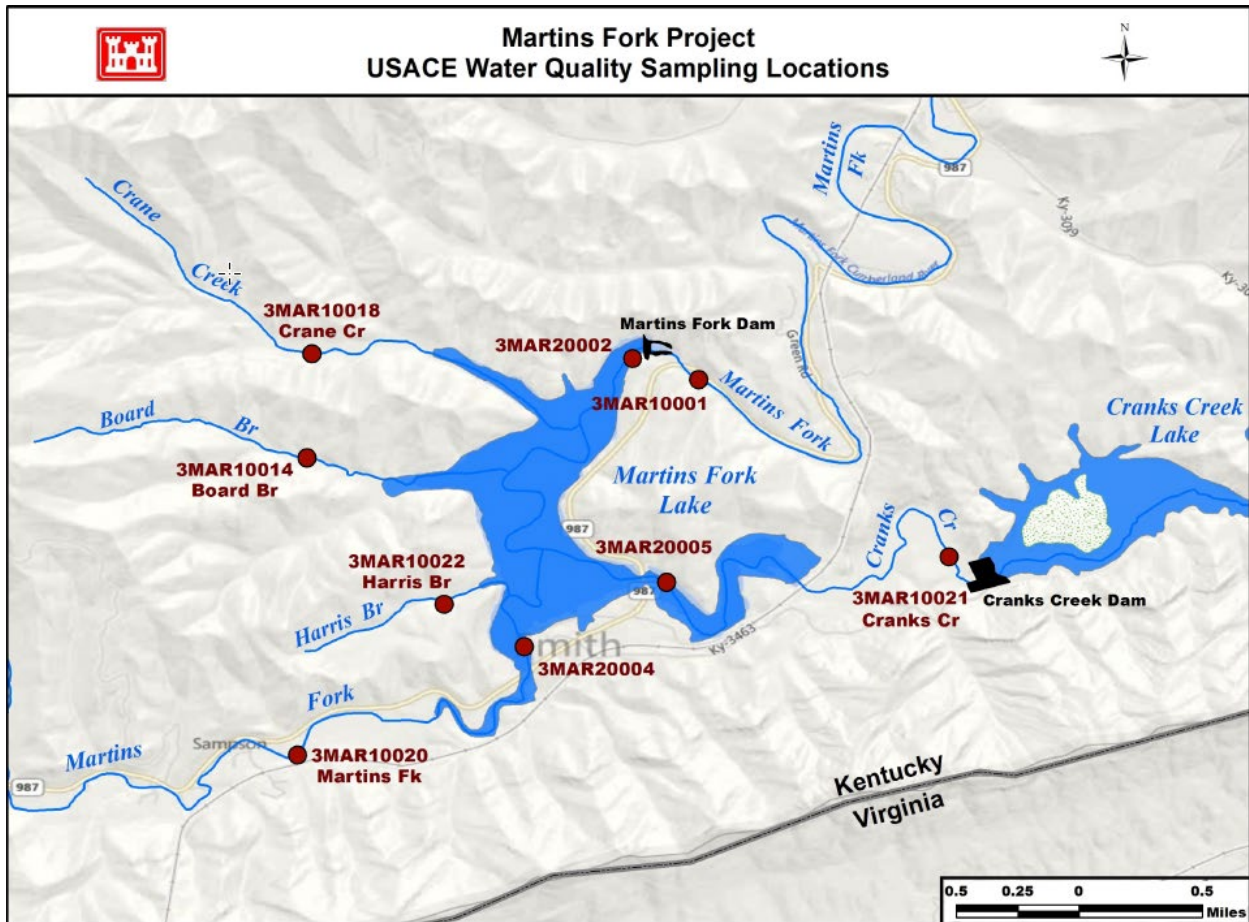


Figure 2.4 - Martins Fork Water Quality Sampling Locations

## 2-05. Project Access

**From Knoxville:** Taking TN-33 north out of Knoxville, continue on the highway through Maynardville and to Tazewell. At Tazewell, turn onto TN-32 and continue on through Harrogate. Once through the tunnel into Kentucky, the road becomes Highway 25E and continues north. Before Pineville, turn east onto US-119 and continue forward to Baxter and turn south on Highway 421. Drive through the town of Harlan and then on another 15 minutes or so before turning onto 987 at Cawood and following the signs to Martins Fork Lake.

**From Lexington:** Taking I-75 South from Lexington, take exit 29 (Corbin/Barbourville) and turn left onto South US-25E. Continue along this road until you reach Pineville, KY. Turn east onto US-119 and continue forward to Baxter and turn south on Highway 421. Drive through the



town of Harlan and then on another 15 minutes or so before turning onto 987 at Cawood and following the signs to Martins Fork Lake.

**From Kingsport:** From Kingsport, proceed north on US-23/58/421 to Duffield, VA. Turn left at the light onto US-58/421. Continue through Sticklelyville and go about 10 miles and bear right on US-421 towards Pennington Gap, VA. Follow US-421 into Kentucky before turning onto 987 at Cawood and following the signs to Martins Fork Lake.

## 2-06. Climate

The climate of Martins Fork Lake is moderate but variable throughout the year. The higher elevation in the Appalachians provides cooler temperatures than other projects in the Nashville District experience. Average high temperatures peak in July at 84°F and drop to 44° F in January. Average low temperatures range from 65-27° F in July and January respectively. Figure 2.5 shows the daily average high (red line) and low (blue line) temperature, with the 25<sup>th</sup> and 75<sup>th</sup> and 10<sup>th</sup> to 90<sup>th</sup> percentile bands. The thin dotted lines are the corresponding average perceived temperatures (Weather Spark, 2020). The area weather station has collected data from 1952-2016 and reports a record high of 103° F and a record low of -19° F during those years.

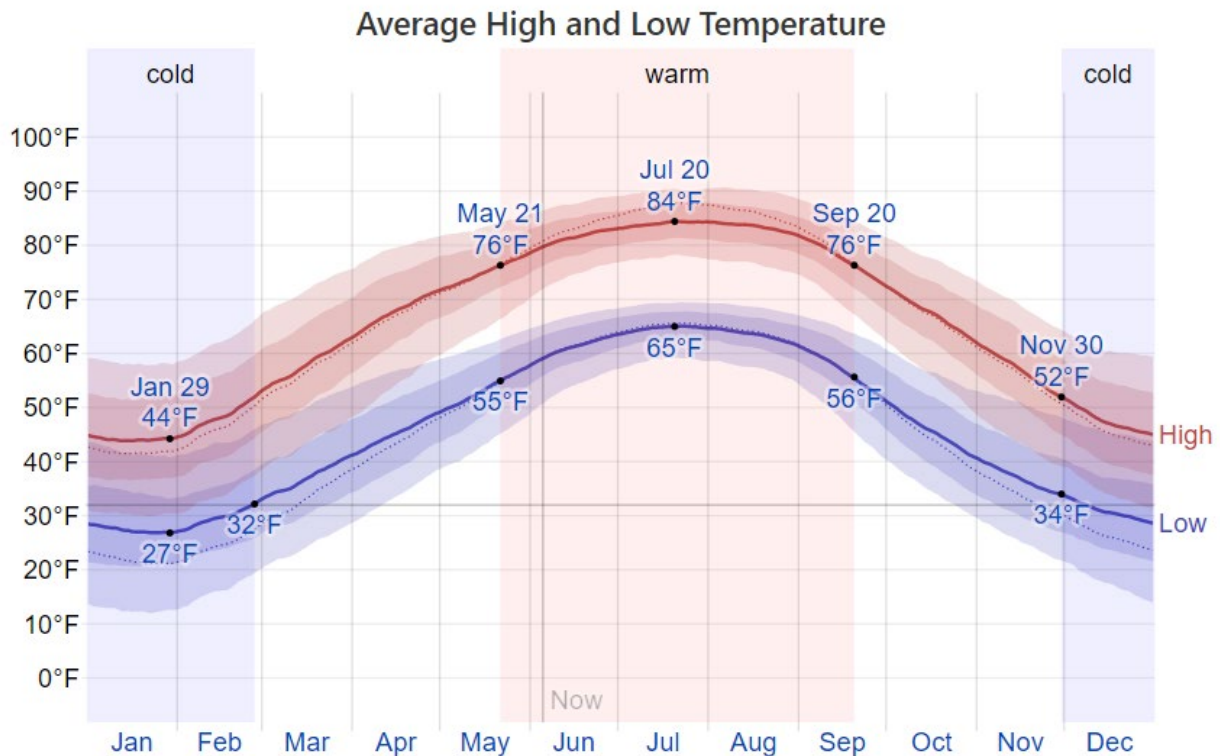


Figure 2.5 - The Daily Average High and Low Temperatures in Harlan, KY

The first and last frosts occur around mid-April through late October yielding an average 193 day growing season. Annual rainfall averages 50 inches with an additional annual average of 11 inches of snow. There are an average of 128 precipitation days per year. Precipitation is highest April through August, and the rest of the year has a lower precipitation chance with the lowest precipitation month being October. High levels of humidity are likely between June and September with muggy conditions 73% of the time during those months. Winds average less than six miles per hour and only varies mildly between seasons with the November through April being slightly windier than the rest of the year. The Air Quality Index for Harlan, KY averages in the good to moderate range as designated by the US Environmental Protection Agency.

## 2-07. Topography, Geology, and Soils

## 2-07(a). Topography

Martins Fork Dam is located at mile 15.6 on the Martins Fork, a tributary to the Clover Fork. Clover Fork meets the Poor Fork to form the mouth of the Cumberland River approximately 10 miles south of Harlan, Kentucky. The dam's primary functions are: flood control storage, public recreation and water quality. There are no non-Federal sponsor Operation and Maintenance, Repair, Replacement and Rehabilitation (OMRR&R) responsibilities. Immediately upstream of Martins Fork is Cranks Creek Dam, which is owned by Harlan County, Kentucky.

Topographically the area is very rugged, with summits on Cumberland Mountain rising to more than 3,500 feet above mean sea level, resulting in approximately 2,400 feet in relief. Flat areas are confined to occasional widenings of the valley floors, which are only as much as one-half mile wide in some places. The land rises very steeply from the valley floor to the surrounding mountains where slopes frequently exceed 40 percent. The area surrounding Martins Fork Lake is of mountainous terrain with heavily wooded slopes and ravines. The highest point in Kentucky (4,150 feet MSL) is approximately 20 miles northeast of the lake on Big Black Mountain. Geology of the area is characterized by a dendritic drainage pattern carved from more or less horizontal strata of the Middlesboro Basin, a geosyncline situated between Pine and Cumberland Mountains. Exposed rocks in the region are of Pennsylvanian age (sandstone, shale, siltstone, coal) and occur mainly along streambeds dissecting the slopes. Well-drained loamy soils and shallow sandy soils predominate.

Land uses in the area of the project consists mainly of coal mining, family farming for local consumption, and small timbering operations. Mining operations, which became quite active prior to and during project construction are being reopened in the valley and surrounding area as the demand for coal increases. The mines are generally located around elevation 1,800 ft to 2,000 ft but some are as low as elevation 1,400 ft to 1,500 ft. These operations involve primarily strip and auger and drift-type mines and have caused considerable defacement to the surrounding landscape. Some reclamation has been accomplished, but it has only been a token effort and generally ineffective.

Of the approximately 10 miles of shoreline at the summer recreation pool level, only about one mile of shoreline (where the community of Smith, Kentucky was previously located) is conducive to recreational development.

The area at the dam site has been ruled out for further extensive development due to the steep terrain. Any extensive development would result in excessive cuts and fills, thus despoiling the scenic qualities of the dam site. However, recreational facilities requiring only limited development, such as nature or hiking trails and expansion of existing parking facilities when needed should be considered. Other areas around the lake, which are restricted from extensive recreational development by the steep terrain, still have the potential for recreational activities such as hiking, primitive camping, and certainly hunting.

## 2-07(b). Physical Geography

Kentucky is not one of the largest states, but its geography is diverse. It is composed of five geographic regions that attest to this diversity; the Bluegrass Region, the Cumberland Plateau, the Western Coal Field (Martins Fork), the Pennyroyal Region, and the Jackson Purchase Region.

**Bluegrass Region:** In the northern central area of Kentucky lies the Bluegrass Region. This area extends into Ohio but is bordered in Kentucky on the north and west by the Ohio River. This area of Kentucky is characterized by rolling meadows in the central portion and by sandstone "knobs" on the eastern, southern, and western edges. These areas are referred to as the Knobs Region.

**Eastern Coal Field:** The Appalachian Plateau (also called Cumberland Plateau) which extends from New York to Alabama, and includes the Martins Fork Basin, is referred to as the Cumberland Plateau in Kentucky. This area, dominating the eastern third of the state, is a heavily forested area of mountains, plateaus, and valleys. The Cumberland and Pine mountain ranges are found in this region of Kentucky as well as Black Mountain, the highest point in the state.

**Western Coal Field:** Northwestern Kentucky is a land of hills bordered by the Ohio River on the north, and the Pennyroyal region on the east, west, and south. It's called the Western Coal Field because of its large coal deposits. Farmland borders the Ohio River in the Western Coal Field.

**Pennyroyal Region:** The Pennyroyal Region (also called Pennyrile) stretches along the southern border of Kentucky from the Appalachian Plateau west all the way to Kentucky Lake. The southern portion of the Pennyroyal Region consists of flat lands with some rolling hills. In the center of the region lies a treeless area called The Barrens. The northern section consists of rocky ridges. Under this rocky area are underground caves and tunnels. Mammoth Cave is

located in the Pennyroyal region. By the way, the Pennyroyal region is named after the small herb that grows there.

Jackson Purchase Region: In the far western tip of Kentucky is the Jackson Purchase Region, part of greater Gulf Plains Region that starts at the Gulf of Mexico and extends north to Illinois. This area is bordered on the east by Kentucky Lake. To the north is the Ohio River; to the west, the Mississippi River. This area is characterized by flood plains with low hills. The Mississippi River crosses the Madrid Fault zone here. Earthquakes in 1811 and 1812 caused the Mississippi River to flow backwards. Reelfoot Lake, near the Tennessee border was created when this happened.

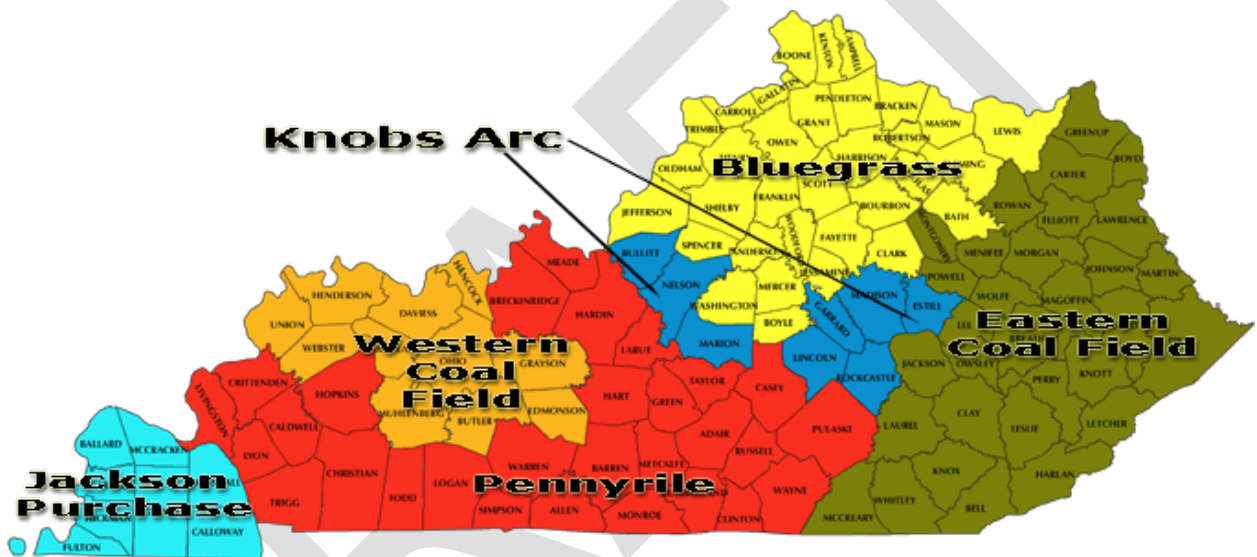


Figure 2.6 - Physiographic Map of Kentucky

The state's waterways are dominated by the massive Ohio River, forming its entire northern border, and by the Cumberland and Tennessee River systems, and their many spin-off lakes.

Other rivers of note include the Green, Licking, Kentucky and the Mississippi.

## 2-07(c). Geology

The Martins Fork project is located in the Valley and Ridge Province along the border of Kentucky and Virginia and at the edge of the Cumberland Plateau. The Valley and Ridge Province consist of a series of high ridges and low valleys as the province name would suggest. The rocks in this area were deformed during the Allegheny Orogeny, which was the principal

mountain building episode, ~250 Million Years Ago. Unlike the heart of the Blue Ridge Province in the Appalachian Mountains, the Valley and Ridge is made mostly of sedimentary rocks which have been minimally impacted by metamorphism (Miracosta.edu, 2017). However, the province is greatly deformed by compressional tectonics and thrust faulting. In particular, the Pine Mountain Thrust Fault is responsible for forming the Martins Fork Basin and Cumberland Mountain (which marks the state boundary between Kentucky and Virginia) to the East (Figures 2.3 and 2.4). Consequently, large displacements of rock, caused by faulting, created geomorphic features such as anticlines (geologic ridges) and synclines (geologic troughs), and is ultimately responsible for the geometry of this province. Subsequent erosion of these structures have caused inverted topography where the axis of an anticline forms most valleys and the axis of synclines tend to form ridges (Miracosta.edu, 2017). Interestingly, Martins fork valley does not follow this general trend. Bedrock at the project site is located along the axial plain of the syncline, and the Cumberland Mountain to the southeast consists of steeply dipping beds on the limb of a large fold.

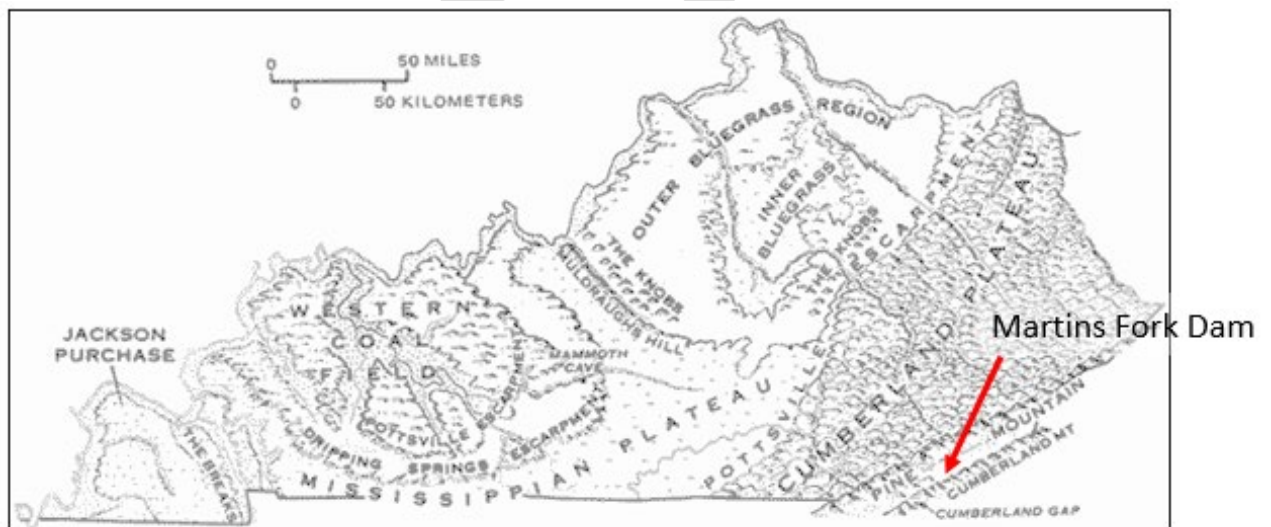


Figure 2.7 - Physiographic map of Kentucky

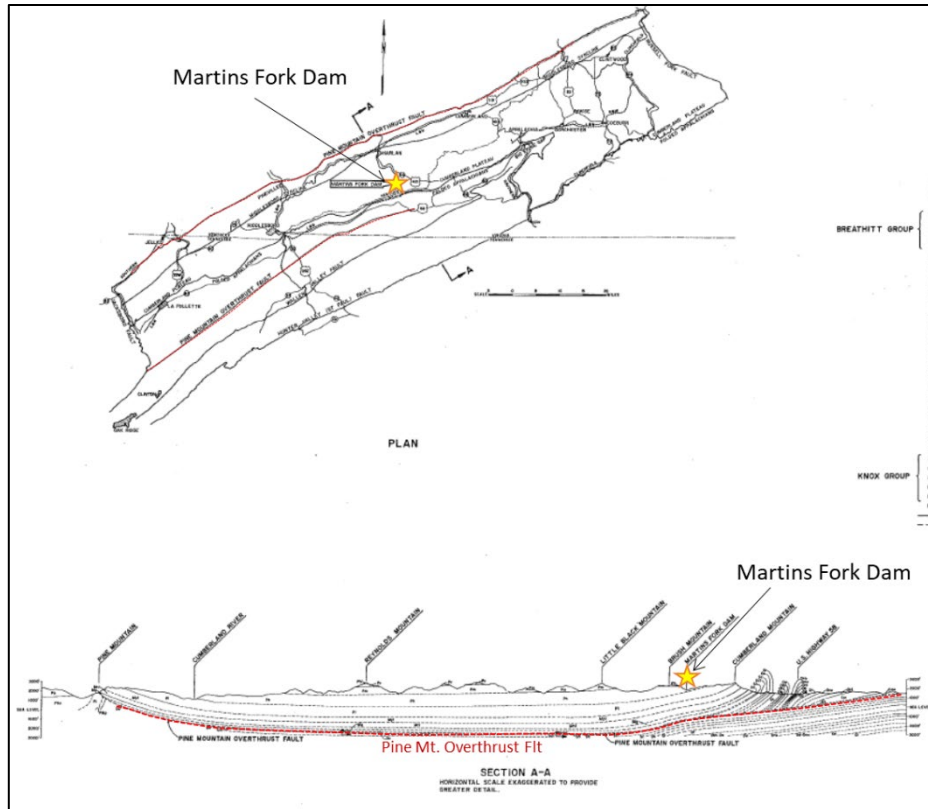


Figure 2.8 - Location of Martins Fork in reference to Pine Mountain Overthrust Fault

Martins Fork Dam is founded in the Lower Pennsylvanian Hance Formation (Figure 2.5). This Formation consists of sandstones, siltstones, and shales that grade into each other both laterally and vertically. A more detailed stratigraphic column can be seen in figure 2.6. The beds of the region are a typical record of the transient seaside swamps that produced the vast coal found in Eastern Kentucky. Interesting geologic features at this project include valley relief stress fractures (Figure 2.7). These features form as the river down cuts the rock and relieves the internal stresses allowing for a ‘popping off’ effect within the rock. These features can be seen throughout the project and are especially prevalent close to the river channel. Other interesting geologic features at the project, which may be of interest to some people, include probable penecontemporaneous deformation structures (figure 2.8).

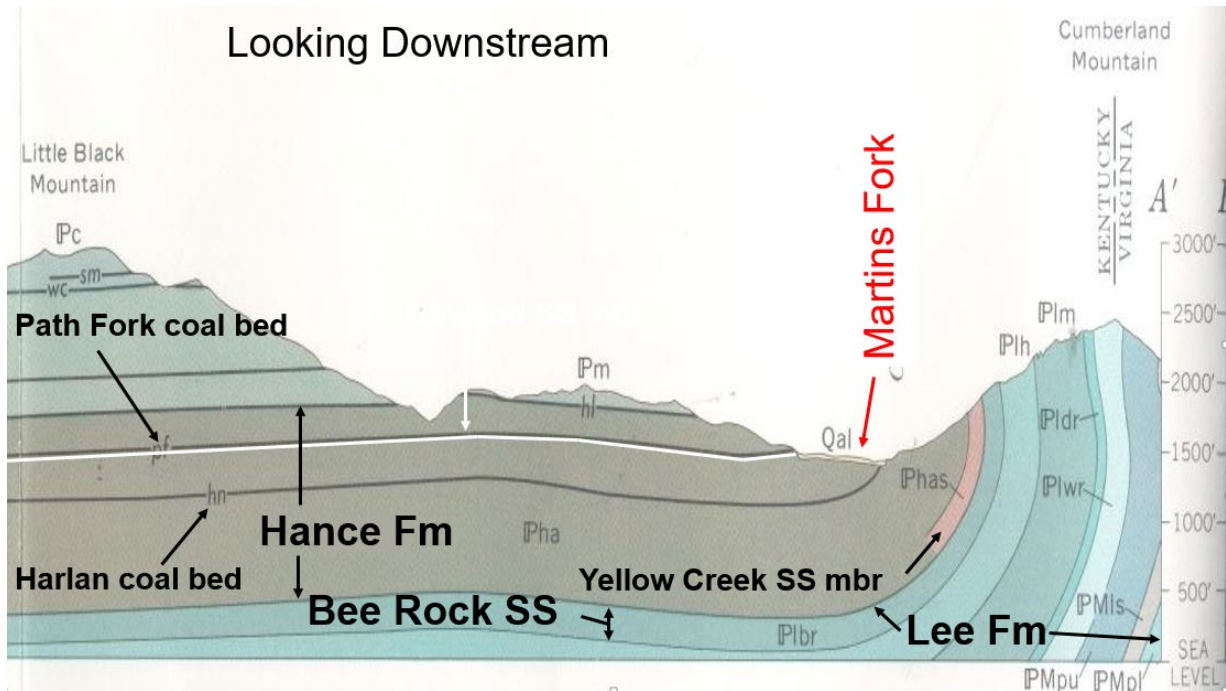


Figure 2.9 - Cross Sectional Drawing of Geology at Martins Fork Dam

DRAFT



TABLE 1			
<u>Dam Site Stratigraphy</u>			
		<u>Thickness</u>	<u>General Elevation</u>
			From To
"a"	<u>sandstone</u> , massive bedded, hard, fine grained, light gray to brown.	>65'	>1420 1355
"b"	<u>shale</u> , silty, moderately hard, dark gray to black.	3'-5'	1355 1350
"c"	<u>sandstone</u> , thin to massive bedded, hard, fine to medium grained, light gray, occasionally slightly calcareous, grades or interfingers into thin bedded, silty, moderately hard, gray to dark gray, <u>shale</u> or thin bedded, hard, gray to dark gray <u>siltstone</u> ; member has occasional thin shale or coal partings and stringers and micaceous partings.	76'-89'	1350 1260
			<b>Upper left &amp; right abutments</b>
"d"	<u>shale</u> , thin to massive bedded, well indurated, soft to predominately moderately hard, dark gray; upper portion has irregular sandstone bands and occasional thin beds and brown hard irregular phosphatic bands; member has a thin limestone band that is utilized as a stratigraphic marker and occasional calcareous zones, lignitic partings and mica.	17'-27'	1260 1233
			<b>Underlying main part of the dam foundation across valley.</b>
"e"	<u>siltstone</u> , massive bedded, sandy, moderately hard to hard, gray to dark gray, with occasional lignitic partings and dark gray shale bands.	6'-11'	1233 1222
			<b>Below dam foundation</b>
"f"	<u>sandstone</u> , massive bedded, hard, fine grained, light gray, with shaley zones or beds and occasional calcareous and micaceous zones.	5'-11'	1222 1210
"g"	<u>shale</u> , massive bedded, moderately hard, occasionally sandy, dark gray; with brown irregular phosphatic bands.	>14'	1210 <1224

Figure 2.10 - Site Geologic Column

# VALLEY STRESS RELIEF MECHANISM

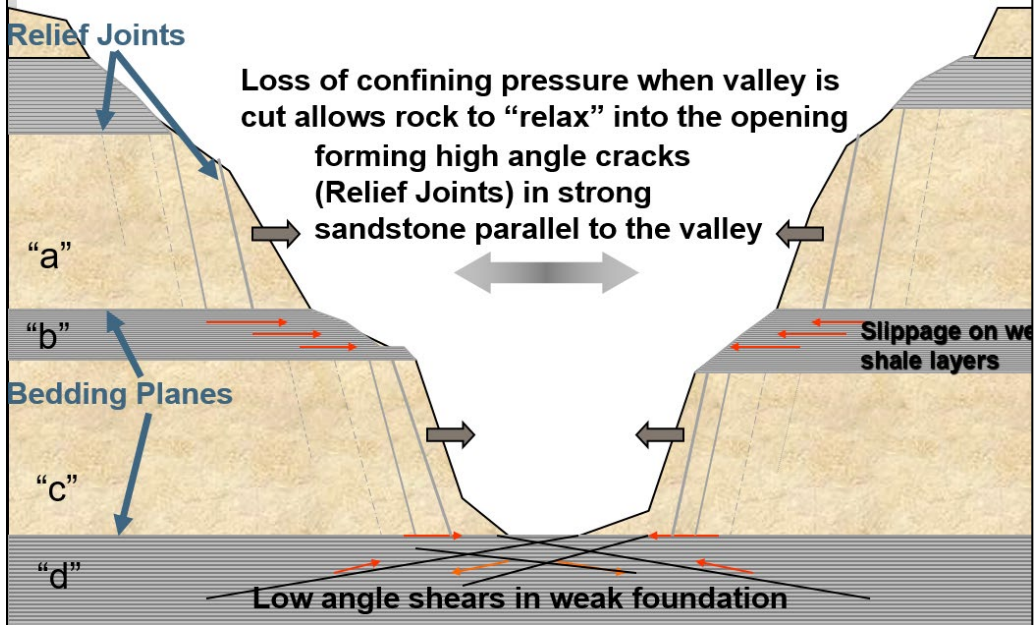


Figure 2.11 - Generalized cross section showing valley stress relief mechanism at the project



*Figure 2.12 - Typical penecontemporaneous deformation structure found in the siltstones around Martins Fork*

### Hydrogeology

This region is made up principally of sandstones and shales with interbeds of coal of the lower Pennsylvania Age. Groundwater observations made in borings during the exploration program indicate that Martins Fork is a gaining stream with a steep water table gradient in the valley walls. The water table is about twenty feet below the surface in the abutments and exists at essentially stream level in the alluvial materials of the valley bottom. In the abutments, the groundwater is moving through secondary permeability features in the rock, i.e., joints and

bedding planes, while the sands and minor amounts of gravel, just above rock, comprise the most permeable zones of the valley alluvium.

### Geologic Significance

Coal mining is an extremely important resource to the region. There are two active coal mines in the immediate vicinity of The Martins Fork Basin, these include: Green Hill Mining Inc and Nally & Hamilton Enterprises Inc mines. The amount of information regarding historical and active mining is vast. A reader is encouraged to visit the state of Kentucky Geological Survey, or the United States Geological Survey, for more information regarding the history and development of coal operations in this region.

## 2-07(d). Soils

The soils above the minimum pool are generally silty, clayey sands or sandy clays having a variable amount of sandstone fragments and boulders. The depth to rock can be as shallow as ten inches. This would be a serious restriction to the development of a septic tank absorption field. The soils in the project will be susceptible to considerable erosion when the vegetative cover is removed and disturbed by construction operations or intensive recreation use.

Soil is formed by weathering processes acting on materials deposited or accumulated by geologic activity. The important factors in soil formation are parent materials, climate, geological organisms (particularly vegetation), topography, and time. The soils of the project area have developed from two general kinds of parent material; the more predominant soils are residuum formed by weathering of sedimentary rocks in place. The other soils consist of the weathering products of accumulations of sand, silt, clay, and rock fragments transported by water, wind, or gravity. The soils of project site exhibit considerable variation from one point to another as a result of the diverse, geologic and topographic formations that characterize the area. The basic soil characteristics will be discussed in this section of the plan in order to give an overview of the resource.

### *2-07(d)i. Soil Associations of the Project Area*

Within the project boundaries are four general soil series areas: Shelocta, Helechawa, Gilpin, and Alticrest. A soil association can be defined as a particular land area that has a distinctive proportional pattern of soils. The four general soil associations and association areas are

described below. Also, the land capability class is a rating defined by the Natural Resources Conservation Service that relates to the lands capability for agricultural production. Knowledge of the land capability, or suitability, for various natural sources related to land use is fundamental to basic stewardship of natural resources.



Figure 2.13 - General soil map of the Martins Fork area

(Data Source: March 2020 Data from NRCS Web Soil Survey)

**Shelocta:** This series consists of deep and very deep, well drained, moderately permeable soils formed in mixed colluvium from shale, siltstone, and sandstone or colluvium and residuum. They are located on steep concave mountain sides, foot slopes, and benches. Slopes range from 2 to 90 percent. The average annual precipitation is about 48 inches, and the average annual temperature is about 54 degrees F. Shelocta consists of fine-loamy, mixed, active, mesic Typic Hapludults. This series is typically located in McCreary County, Kentucky but are also found in Maryland, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia. They are

usually found on gently sloping to very steep upland areas, foot slopes, and benches. Slopes range from 2 to 90 percent and most are concave. Shelocta soils have formed in the weathered product of colluvial material or colluvium and residuum from shale, siltstone, and sandstone. Solum thickness ranges from 40 to to 60 inches or more. Depth to bedrock is more than 40 inches. Reaction of the unlimed soils is strongly acid to extremely acid. Some pedons have A horizons that are medium acid or slightly acid. Well drained, medium to rapid surface runoff and moderate permeability. About 25 percent of Shelocta soils are cleared and used for general crops and pasture. Wooded areas have mixed hardwoods-- oaks, gum, maple, yellow-poplar, cucumber, and some pine and hemlock.

**Helechawa:** The Helechawa series consists of deep and very deep, somewhat excessively drained soils on hillsides and mountainsides. Permeability is moderately rapid. These soils formed in loamy colluvium weathered dominantly from sandstone. This series is typically located in Wolfe County, Kentucky. Thickness of the solum ranges from 30 to 60 inches or more. Depth to bedrock ranges from 40 to 60 inches or more. Rock fragments, mostly sandstone channers, make up 0 to 35 percent of the solum and 5 to 80 percent of the substratum. Some pedons contain highly resistant quartzite gravel weathered from conglomerate. Reaction is commonly extremely to strongly acid throughout, but a few A horizons are moderately or slightly acid. Helechawa soils are on linear side slopes, benches, and foot slopes of hillsides and mountainsides. Slopes are dominantly 18 to 35 percent, but range from 5 to 75 percent. These soils formed in loamy colluvium weathered from Mississippian and Pennsylvanian clastics where siliceous sandstones predominate and are commonly located downslope of sandstone rock outcrops. Elevation ranges from about 600 to 3,800 feet. Near the type location mean annual precipitation is about 53 inches and the mean annual temperature is about 54 degrees F. Most areas are in secondary growth forest with mixed stands of eastern hemlock, white oak, yellow-poplar, chestnut oak, American beech, scarlet oak, pitch pine, Virginia pine and hickory. Minor species include red maple, northern red oak, black oak, black gum, sourwood and black cherry. A few of the less sloping areas are used for pasture and as sites for homes and gardens.

**Gilpin:** This series consists of Fine-loamy, mixed, active, mesic Typic Hapludults. Gilpin channery silt loam on a 3 percent northwest facing slope in cropland. It is mostly found in Pennsylvania but also in Georgia, Indiana, Kentucky, Maryland, New York, Ohio, Tennessee, Virginia, and West Virginia. It can be found in upland areas along ridges, hills, and hillslopes. Slopes are dominantly 0 to 70 percent. Elevation ranges from about 91 to 1,097 feet. Near the type location mean annual precipitation is about 36 to 50 inches and the mean annual temperature is about 46 to 57 degrees F. The major uses are Hayland, pasture, cropland, and woodland.

**Alticrest:** The Alticrest series consists of moderately deep well drained soils. They formed in residuum weathered from acid sandstone. Coarse-loamy, siliceous, semiactive, mesic Typic Dystrudepts. The soils are generally located in Fentress County, Tennessee but also found in along the Cumberland Plateau in Tennessee, Kentucky, Virginia, and Alabama. Solum thickness and depth to bedrock range from 20 to 40 inches. Content of fragments of sandstone or pebbles of quartzite less than 3 inches in diameter ranges from 0 to 15 percent by volume in each horizon. Reaction is very strongly acid or strongly acid except the surface layer is less acid where limed. Alticrest soils are on plateau ridgetops, benches, crests of hills and hillsides. Slopes range from 5 to 55 percent. The soil formed in residuum weathered from acid sandstone. Near the type location mean annual temperature is 55 degrees F. and mean annual precipitation is 53 inches. Well drained to somewhat excessively drained; medium runoff; moderately rapid permeability. Most areas are in forest consisting of shortleaf pine, pignut hickory, white oak, scarlet oak, maple, black oak, sourwood, laurel, and hemlock. A few cleared areas are used to grow pasture, hay, corn, and vegetables.

2-07(d)ii. *Description of the Major Soil Series*

This section describes the major soils that occur within the Martins Fork Dam Project boundaries. There are six major soil series within the project boundaries and are described below. They are Alticrest-Totz-Helechawa (AtF), Fairpoint and Bethesda soils (FbF), Gilpin-Rayne-Sequoia (GtF), Helechawa-Varilla-Jefferson (HeF), Shelocta-Highsplint-Gilpin (ShF), and Shelocta-Kimper-Cloverlick (SkF). Particular emphasis has been placed on those factors which affect the suitability of land for various land use activities.

Permeability can be described as the quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as “permeability.” Characteristics of permeability can be seen in Table 2.3, below:

Table 2.3 - Characteristics of Soil Permeability

Permeability	Measurement (inches per hour)
Impermeable	0.0 to 0.01 inch
Very Slow	0.01 to 0.06 inch
Slow	0.06 to 0.2 inch

Moderately Slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately Rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very Rapid	More than 20 inches

**Alticrest-Totz-Helechawa (AtF):** The series consist of Alticrest, Totz, and Helechawa. They are generally found on 20 to 55 percent slopes, elevation 1,000 to 3,400 feet, mean annual precipitation 43 to 55 inches, mean annual air temperature 42 to 67 degrees F, frost free period 159 to 200 days. They are not considered prime farmland. Alticrest are well drained soils located on ridges, summits, and mountaintops. Their parent material is coarse-loamy residuum weathered from sandstone. Depth to restrictive feature is 20 to 40 inches to lithic bedrock. Depth to water table is more than 80 inches. Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr). Hydrologic Soil Group: B. No hydric soil rating. Totz are somewhat excessively drained soils located on ridges, summits, and mountaintops. Their parent material is sandy residuum weathered from sandstone. Depth to restrictive feature is 10 to 20 inches to lithic bedrock. Depth to water table is more than 80 inches. Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr). Hydrologic Soil Group: D. No hydric soil rating. Helechawa are somewhat excessively drained soils located on ridges, summits, and mountaintops. Their parent material is coarse-loamy residuum weathered from sandstone. Depth to restrictive feature is 40 to 80 inches to lithic bedrock. Depth to water table is more than 80 inches. Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr). Hydrologic Soil Group: A. No hydric soil rating.

**Fairpoint and Bethesda soils (FbF):** The series consist of Fairpoint and Bethesda soils. They are generally found on 20 to 70 percent slopes, elevation 1,000 to 3,000 feet, mean annual precipitation 40 to 57 inches, mean annual air temperature 39 to 69 degrees F, frost free period 163 to 231 days. They are not considered prime farmland. Fairpoint are well drained soils located on hill slopes, back slopes, and side slopes. Their parent material is loamy-skeletal coal extraction mine spoil derived. Depth to restrictive feature is more than 80 inches. Depth to water table is more than 80 inches. Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr). Hydrologic Soil Group: C. No hydric soil rating. Bethesda are well drained soils located on back slopes and side slopes. Their parent material is loamy-skeletal coal extraction mine spoil derived. Depth to restrictive feature is more than 80 inches. Depth to water table is more than 80 inches. Capacity of the most limiting layer to transmit



water (Ksat): Moderately high (0.20 to 0.57 in/hr). Hydrologic Soil Group: C. No hydric soil rating.

**Gilpin-Rayne-Sequoia (GtF):** The series consist of Gilpin, Rayne, and Sequoia soils. They are generally found on 25 to 55 percent slopes, elevation 870 to 3,590 feet, mean annual precipitation 25 to 55 inches, mean annual air temperature 43 to 68 degrees F, frost free period 150 to 215 days. They are not considered prime farmland. Gilpin are well drained soils located on ridges, summits, and mountaintops. Their parent material is fine-loamy residuum weathered from sandstone. Depth to restrictive feature is 24 to 40 inches to lithic bedrock. Depth to water table is more than 80 inches. Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.01 in/hr). Hydrologic Soil Group: C. No hydric soil rating. Rayne are well drained soils located on ridges, summits, and mountaintops. Their parent material is fine-loamy residuum weathered from shale and siltstone. Depth to restrictive feature is 40 to 50 inches to paralithic bedrock. Depth to water table is more than 80 inches. Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr). Hydrologic Soil Group: B. No hydric soil rating. Sequoia are well drained soils located on ridges, summits, and mountaintops. Their parent material is clayey residuum weathered from shale and siltstone. Depth to restrictive feature is 24 to 40 inches to paralithic bedrock. Depth to water table is more than 80 inches. Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr). Hydrologic Soil Group: C. No hydric soil rating.

**Helechawa-Varilla-Jefferson (HeF):** The series consist of Helechawa, Varilla, and Jefferson soils. They are generally found on 35 to 75 percent slopes, elevation 1,000 to 3,200 feet, mean annual precipitation 25 to 55 inches, mean annual air temperature 43 to 68 degrees F, frost free period 150 to 210 days. They are not considered prime farmland. Helechawa are well drained soils located on mountain slopes. Their parent material is coarse-loamy colluvium derived from sandstone. Depth to restrictive feature is more than 80 inches. Depth to water table is more than 80 inches. Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr). Hydrologic Soil Group: A. No hydric soil rating. Varilla are well drained soils located on mountain slopes. Their parent material is loamy-skeletal colluvium derived from sandstone. Depth to restrictive feature is more than 80 inches. Depth to water table is more than 80 inches. Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr). Hydrologic Soil Group: A. No hydric soil rating. Jefferson are well drained soils located on mountain slopes. Their parent material is fine-loamy colluvium derived from sandstone. Depth to restrictive feature is is more than 80 inches. Depth to water table is more than 80 inches. Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr). Hydrologic Soil Group: A. No hydric soil rating.

**Shelocta-Highsplint-Gilpin (ShF):** The series consist of Shelocta, Highsplint, and Gilpin soils. They are generally found on 20 to 70 percent slopes, elevation 680 to 2,680 feet, mean annual precipitation 28 to 58 inches, mean annual air temperature 42 to 68 degrees F, frost free period 147 to 200 days. They are not considered prime farmland. Shelocta are well drained soils located on hill slopes, back slopes, and side slopes. Their parent material is fine-loamy colluvium derived from sandstone and shale. Depth to restrictive feature is 48 to 65 inches to paralithic bedrock. Depth to water table is more than 80 inches. Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr). Hydrologic Soil Group: B. No hydric soil rating. Highsplint are well drained soils located on hill slopes, foot slopes, and base slopes. Their parent material is Loamy-skeletal fine-loamy colluvium derived from sandstone and shale. Depth to restrictive feature is more than 80 inches. Depth to water table is more than 80 inches. Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr). Hydrologic Soil Group: A. No hydric soil rating. Gilpin are well drained soils located on hill slopes. Their parent material is fine-loamy residuum weathered from sandstone. Depth to restrictive feature is 24 to 40 inches to lithic bedrock. Depth to water table is more than 80 inches. Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.01 in/hr). Hydrologic Soil Group: C. No hydric soil rating.

**Shelocta-Kimper-Cloverlick (SkF):** The series consist of Shelocta, Kimper, and Cloverlick soils. They are generally found on 20 to 80 percent slopes, elevation 700 to 2,360 feet, mean annual precipitation 41 to 58 inches, mean annual air temperature 42 to 68 degrees F, frost free period 147 to 200 days. They are not considered prime farmland. Shelocta are well drained soils located on mountain slopes. Their parent material is fine-loamy colluvium derived from sandstone and shale over clayey residuum weathered from shale and siltstone. Depth to restrictive feature is 48 to 65 inches to paralithic bedrock. Depth to water table is more than 80 inches. Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr). Hydrologic Soil Group: B. No hydric soil rating. Kimper are well drained soils located on mountain slopes. Their parent material is fine-loamy colluvium derived from sandstone and shale. Depth to restrictive feature is 65 to 80 inches to lithic bedrock. Depth to water table is more than 80 inches. Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr). Hydrologic Soil Group: A. No hydric soil rating. Cloverlick are well drained soils located on mountain slopes. Their parent material is loamy-skeletal colluvium derived from sandstone and shale. Depth to restrictive feature is is more than 80 inches. Depth to water table is more than 80 inches. Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr). Hydrologic Soil Group: A. No hydric soil rating.

Table 2.4 - Description of Hydrologic Soil Groups

Group	Description
Group A	Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.
Group B	Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.
Group C	Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.
Group D	Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

## 2-08. Resource Analysis

### 2-08(a). Fish and Wildlife Resources

#### 2-08(a)i. Terrestrial Fauna

The large majority of the lands at Martins Fork Lake are managed for the benefit of wildlife and their habitats. The Corps, with assistance from the Kentucky Department of Fish and Wildlife Resources (KDFWR), has established, maintains and manages open areas for wildlife. Periodically, some of these areas are overseeded in clover, cool season grasses and crops to enhance food sources for wildlife. Invasive plant species are managed by the Corps through mechanical and chemical (herbicide) means.

KDFWR has the primary jurisdiction for wildlife management on public lands at Martins Fork. The Corps of Engineers issued a license to the KDFWR to implement, operate, and manage a wildlife program on public lands surrounding the lake through the establishment of the

approximately 988.6-acre Martins Fork Wildlife Management Area. These lands provide an excellent environment for a variety of game and non-game wildlife species and some opportunities for recreational hunting as well as non-consumptive uses such as photography and bird watching. The lands surrounding the lake provide habitat for approximately 30 species of mammals, 110 species of birds, and 65 species of reptiles and amphibians. Wildlife species commonly found in the area include gray and fox squirrels, white-tailed deer, bobcats, ruffed grouse, wild turkeys, bobwhite quail, eastern cottontail rabbits, ground hogs, mourning doves, various waterfowl, minks, red and gray foxes, northern copperheads and short-tailed shrews. Black bears are sporadic visitors and have occasionally been a nuisance species especially around recreational and administrative areas where they can rummage through garbage dumpsters, etc. KDFWR has assisted the Corps in managing nuisance bear activity in the past.

#### 2-08(a)ii. Aquatic Fauna

At the time of impoundment, fish habitat had been improved within the lake by leaving sections of standing timber within the reservoir. In addition, artificial reefs were added to the lake floor before impoundment. To this day, the Resource Manager and KDFWR coordinate the construction and placement of fish attractors including an annual program to reuse Christmas trees as fish habitat. Hardwood brush piles and pallet structures are also constructed and placed to enhance the fishery. Fish common to the area include largemouth bass, smallmouth bass, Kentucky bass, channel and flathead catfish, bluegill, redear sunfish, and white crappie. There are some limited remnant brook trout in headwaters. Martins Fork, upstream of the reservoir, provides the only population of Coosa (or redeye) bass, *Micropterus coosae*, in the state of Kentucky though it is not actively managed.

Fish management is the responsibility of the KDFWR. According to a 4 February 1972, letter from KDFWR concerning the future management of the fisheries resources at the then proposed Martins Fork Lake, the KDFWR had conducted a pre-impoundment study of the fish population and made extensive analyses of the water quality conditions of Martins Fork. This included the tailwaters areas of the then proposed dam, the area of impoundment, and the streams upstream of the reservoir. This study revealed “that all the major [fish] species... that will be expected to form the reservoir population now exist in Martins Fork in addition to a number of stream species that will not survive in the reservoir. The latter is of little consequence in that those same species will continue to inhabit the flowing waters of Martins Fork.” According to current KDFWR electrofishing survey results, the reservoir fish populations

are black bass (largemouth, smallmouth, spotted, and Coosa), white crappie, catfish (channel and flathead), bluegill, warmouth, longear sunfish, green sunfish, redear sunfish, native river strain walleye, common carp, and gizzard shad. There are some golden redhorse, northern hogsucker, white sucker, bluntnose minnow, and striped shiner that migrate to and from the lake and the headwater streams of Martins Fork and Cranks Creek.

The KDFWR intended on only stocking white crappie, *Pomoxis annularis*, into the lake at the time of impoundment “because the stream is now capable of supplying brood stock of other fishes to adequately stock the lake.” Since impoundment, crappie management has not been a particular focus at Martins Fork Lake. Several methods of collection have been unsuccessful for crappie at the reservoir. There has been one angler creel survey conducted at the lake in 1998 giving fisheries biologists limited data on crappie.

KDFWR stocked largemouth bass and Erie strain walleye into the lake in the spring of 1979, and bluegill and channel catfish in the fall of the same year. Erie strain walleye continued to be stocked in Martins Fork Lake from 1979 to 1981 and from 1987 to 2004. From 2005 to 2012, no walleye were stocked at the lake to allow time for the Erie strain of walleye to disappear and prepare for a transition to stocked native river strain walleye. The goal was to prevent genetic crossing with the planned introduction of native river strain walleye. Annual stockings of native river strain walleye began in 2013. Currently, walleye are stocked at the rate of 16,700 two-inch fingerlings per year. Annual native walleye stockings will continue until natural recruitment is able to sustain the population. Electrofishing surveys are conducted in spring and fall primarily to evaluate walleye and black bass populations. Largemouth bass are periodically stocked based on the results from these surveys. If age zero largemouth bass numbers are low, they are stocked in the fall at a rate of 3,300 fish per year. Martins Fork Lake is also stocked with 4,900 fingerling channel catfish in even-numbered years.

Nin-inch rainbow trout are stocked in the tailwater downstream of the Martins Fork Dam at the rate of 750 fish per month for the months of April, May, June, October and November. Tailwater trout stocking may be adjusted due to water quality. Historically, KDFWR stocked streams with rainbow trout in the area upstream from the current Martins Fork impoundment. The trout stocking upstream of the lake has ceased due to several factors. The access to the streams was poor and was largely through private property. More importantly, KDFWR has concerns about the effects trout stocking potentially has on species of concern including the arrow darter, *Etheostoma spilotum*, and blackside dace, *Chrosomus cumberlandensis* that occur in that area.

It was expected that Martins Fork Lake would, within a very short time after impoundment, become deficient in forage fishes, or deficient in forage species of the proper size to be utilized as food. It was thought that when or if this condition occurred, KDFWR would stock forage species, e.g., brook silversides, *Labidesthes sicculus* or threadfin shad, *Dorosoma petenense*. Threadfin shad were, in fact, experimentally stocked from 1981 to 1991, but they failed to provide a self-sustaining population in Martins Fork or in any other stocked water bodies in Kentucky due to overwintering die-offs related to cold water temperatures. Threadfin shad are no longer stocked in Martins Fork or in any Kentucky waters. KDFWR stocked adult gizzard shad in 1981 to aid in establishing this species in Martins Fork. Presently, based on information provided by KDFWR, the lake has a sufficient gizzard shad population to provide forage for most of the year. In addition to gizzard shad, log perch, golden redhorse, bluegill and various sunfish contribute to a sufficient forage base according to KDFWR fishery professionals.

Fisheries management includes some size and creel limits for various species. Currently, largemouth, smallmouth, spotted and coosa bass have a daily limit of six fish singly or combined. The current minimum size limits are 12 inches for largemouth and smallmouth bass and no size limit for spotted and coosa bass. The previous walleye regulation was a six fish daily limit and 15-inch minimum size limit. Beginning in 2016, the regulation was changed to a two fish daily limit and 18-26 inch protective slot. White crappie have a 20 fish daily limit and no minimum size limit. In the tailwater, rainbow trout are managed with a daily limit of eight fish and no minimum size limit.

## 2-08(b). Vegetative Resources

### **General Vegetative Resources**

The vegetative cover that occurs on the project represents an element in the natural beauty of the landscape. Site planning of all recreational areas at the project will capitalize on the screening and buffering attributes of vegetative cover while also providing an attractive and diverse environment. The following discussion includes descriptions of past land use and current vegetation conditions on project lands at Martins Fork Lake. The vegetative land cover information in Table 2.5 is extracted from the Multi-Resolution Land Characteristics Consortium's 2016 dataset for National Land Cover (Multi-Resolution Land Characteristics Consortium, 2016).

Table 2.5 - Current Vegetation Composition at Martins Fork Lake

Land Cover	% of Martins Fork
Deciduous closed tree canopy	59%
Deciduous open tree canopy	3%
Deciduous shrubs	1%
Evergreen closed tree canopy	<1%
Evergreen open tree canopy	<1%
Marsh wetlands	<1%
Mixed evergreen-deciduous closed tree canopy	8%
Mixed evergreen-deciduous open tree canopy	1%
Non-Vegetated	27%
Grasses	2%

### Forest Resources

Four general forest types have been identified within the project boundaries as discussed below.

**Oak-Hickory Type:** The oak-hickory type tends to be "dominant" in Eastern Kentucky in that the representative species associated with this type have the ability to spread into and maintain dominance over other forest types in the area. In general, the oak hickory forest type occurs on all types of terrain throughout the project; from well drained, thin soiled slopes to dry ridges. The exact composition of a particular stand is determined by a variety of related environmental factors such as aspect, depth to bedrock, and soil characteristics. Dominant canopy species which characterize this forest type include northern red oak, white oak, chestnut oak, southern red oak, post oak, black oak, mockernut hickory, black walnut, shagbark hickory, pignut hickory, yellow poplar, white ash and American beech. The understory vegetation consists primarily of viburnum, huckleberry, dogwood, redbud, black cherry, persimmon and sassafras.

**Eastern Red Cedar Type:** Next to the oak-hickory forest type, the eastern red cedar type is the most prevalent plant community on the project. The eastern red cedar forest type is prevalent on old fields and rocky areas that are too poor to support other forms of vegetation. Red cedar may occur in pure stands or it may include other woody and herbaceous plant species such as broom sedge, honeysuckle and eastern redbud.

**Mixed Mesophytic:** Mixed mesophytic is a climax forest type that favors moist coves, lower

slopes, flats, and hollows where the soils are deep, fertile and moist. Species occurring within this type include American beech, various oaks and hickories, sugar maple, red maple and box elder. Common understory species include pawpaw, sourwood, redbud and dogwood.

**Cove Hardwood Type:** The cove hardwood forest type requires deep, fertile, moist soils that are found on lower slopes, creek bottoms, coves and flats within the project. This type of habitat is generally limited to the heads of small creeks and streams that flow into the lake. (U.S. Forest Service, 1952)

## 2-08(c). Threatened and Endangered Species

In 1973, Congress passed the Endangered Species Act (ESA) which identifies those species of flora and fauna determined by the Director of the U.S. Fish and Wildlife Service (USFWS) to be endangered or threatened with extinction, and which are protected by law. There are currently 718 species of animal and 941 species of plant in the United States listed as federally threatened or endangered under Section 4 of the ESA (USFWS, 2015). In Kentucky alone, 49 species of animal and 11 species of plant were listed as either federally threatened or endangered (USFWS 2020 a).

The number of threatened and endangered species changes over time as new species are added to the list and other species are delisted, or removed from the list. For instance, in September 2020, there are 14 species of animal and plant in the United States (one in Kentucky) that are candidate species, for which USFWS has sufficient information on biological vulnerability to support issuance of proposal to list, but issuance of proposed rule is currently precluded by higher priority listing actions (USFWS 2020 c). After an extensive review process, candidate species can be “proposed” for listing in the U.S. Federal Register. Currently, there are no species in the United States proposed in the Federal Register to be listed under Section 4 of the ESA (USFWS 2020 c).

A list of endangered species within Corps fee and easement properties on Martins Fork Lake is found in Table 2.6. The list, which was derived from the USFWS iPac database, contains three mammals, all bat species. Also, the bald eagle (*Haliaeetus leucocephalus*), which has been delisted from the Endangered Species Act, is present throughout the area (USFWS 2020 d).



Table 2.6 - Federally Listed Species Recorded in the Martins Fork Lake Project Area

Group	Species	Common Name
Mammals	<i>Myotis sodalis</i>	Indiana bat
	<i>Myotis grisescens</i>	Gray bat
	<i>Myotis septentrionalis</i>	Northern long-eared bat

Source: (USFWS, 2017)

Any Federal actions which may directly or indirectly affect a federally listed threatened or endangered species, or the critical habitat of a listed species, require consultation with USFWS to ensure compliance with Section (7) of the Endangered Species Act. This includes any actions undertaken, funded or licensed by the Corps on Martin’s Fork Lake. Consultation could be formal or informal depending on whether or not a Federal action is likely to adversely affect a listed species or critical habitat. The potential effects of the action to Federally-listed species would be addressed during consultation.

### State Listed Species

The Kentucky State Nature Preserves Commission has updated and revised the lists of rare and extinct or extirpated biota. This is the most current list of statuses available and represents an updated version of the formal list last published in the Journal of the Kentucky Academy of Science in 2018. The list is based on a standard methodology now utilized by NatureServe. Natural communities have been included in this update. The newly revised lists include one lichen, 387 vascular plant and lesser taxa, 347 animal taxa, and 36 natural communities considered rare. Twenty-one plant and 46 animal taxa are considered extirpated or extinct from Kentucky (KSNPC, 2020). The following list consists of rare fauna located in Harlan County, Kentucky.

Table 2.7 - State Listed Flora in Harlan County, Kentucky

Scientific Name	Common Name
<i>Acer spicatum</i>	Mountain Maple
<i>Adlumia fungosa</i>	Allegheny-vine
<i>Agrimonia gryposepala</i>	Tall Hairy Groovebur
<i>Amianthium muscitoxicum</i>	Fly Poison
<i>Angelica triquinata</i>	Flimy Angelica
<i>Anomodon rugelii</i>	Rugel's Anomodon Moss
<i>Aralia nudicaulis</i>	Wild Sarsaparilla
<i>Baptisia tinctoria</i>	Yellow Wild Indigo
<i>Bartonia virginica</i>	Yellow Screwstem
<i>Boykinia aconitifolia</i>	Brook Saxifrage

<b>Scientific Name</b>	<b>Common Name</b>
<i>Carex aestivalis</i>	Summer Sedge
<i>Carex appalachica</i>	Appalachian Sedge
<i>Carex austrocaroliniana</i>	Tarheel Sedge
<i>Carex leptonevia</i>	Finely-nerved Sedge
<i>Carex roanensis</i>	Roan Mountain Sedge
<i>Castanea dentata</i>	American Chestnut
<i>Chrysosplenium americanum</i>	American Golden-saxifrage
<i>Circaea alpina</i>	Small Enchanter's Nightshade
<i>Corallorhiza maculata</i>	Spotted Coralroot
<i>Corydalis sempervirens</i>	Rock Harlequin
<i>Cymophyllus fraserianus</i>	Fraser's Sedge
<i>Cypripedium parviflorum</i>	Small Yellow Lady's-slipper
<i>Deschampsia flexuosa</i>	Crinkled Hairgrass
<i>Dryopteris carthusiana</i>	Spinulose Wood Fern
<i>Entodon brevisetus</i>	Entodon Moss
<i>Eriophorum virginicum</i>	Tawny Cotton-grass
<i>Eupatorium steelei</i>	Steele's Joe-pye-weed
<i>Gentiana decora</i>	Showy Gentian
<i>Helianthemum canadense</i>	Canada Frostweed
<i>Herzogiella turfacea</i>	Eastern Waterleaf
<i>Hydrophyllum virginianum</i>	Virginia Waterleaf
<i>Juglans cinerea</i>	White Walnut
<i>Juncus articulatus</i>	Jointed Rush
<i>Lathyrus venosus</i>	Smooth Veiny Peavine
<i>Leucothoe recurva</i>	Red-twig Doghobble
<i>Lilium superbum</i>	Turk's Cap Lily
<i>Liparis loeselii</i>	Loesel's Twayblade
<i>Listera smallii</i>	Kidney-leaf Twayblade
<i>Lycopodiella appressa</i>	Southern Bog Clubmoss
<i>Lycopodium clavatum</i>	Running Pine
<i>Lycopodium inundatum</i>	Northern Bog Clubmoss
<i>Maianthemum canadense</i>	Wild Lily-of-the-valley
<i>Melampyrum lineare</i> var. <i>latifolium</i>	American Cowwheat
<i>Minuartia glabra</i>	Appalachian Sandwort
<i>Neckera pennata</i>	Neckera Moss
<i>Oclemena acuminata</i> - Whorled Aster	Whorled Aster
<i>Oncophorus raii</i>	Oncophorus Moss

Scientific Name	Common Name
<i>Paronychia argyrocoma</i>	Silverling
<i>Platanthera psycodes</i>	Small Purple-fringed Orchid
<i>Polytrichum strictum</i>	Bog Haircap Moss
<i>Prosartes maculata</i>	Nodding Mandarin
<i>Rubus canadensis</i>	Smooth Blackberry
<i>Sambucus racemosa</i> ssp. <i>pubens</i>	Red Elderberry
<i>Saxifraga michauxii</i>	Michaux's Saxifrage
<i>Saxifraga micranthidifolia</i>	Lettuce-leaf Saxifrage
<i>Silene ovata</i>	Ovate Catchfly
<i>Solidago curtisii</i>	Curtis' Goldenrod
<i>Solidago puberula</i>	Downy Goldenrod
<i>Solidago roanensis</i>	Roan Mountain Goldenrod
<i>Trillium undulatum</i>	Painted Trillium
<i>Vaccinium erythrocarpum</i>	Southern Mountain Cranberry
<i>Veratrum parviflorum</i>	Appalachian Bunchflower
<i>Viburnum lantanoides</i>	Alderleaf Viburnum

Table 2.8 - State Listed Fauna in Harlan County, Kentucky

Group	Scientific Name	Common Name	Status
Fish	<i>Chrosomus cumberlandensis</i>	Blackside Dace	T
	<i>Etheostoma sagitta</i>	Cumberland Arrow Darter	S
	<i>Etheostoma spilotum</i>	Kentucky Arrow Darter	T
Amphibians	<i>Cryptobranchus alleganiensis alleganiensis</i>	Eastern Hellbender	E
	<i>Plethodon wehrlei</i>	Wehrle's Salamander	E
Birds	<i>Accipiter striatus</i>	Sharp-shinned Hawk	S
	<i>Actitis macularius</i>	Spotted Sandpiper	E
	<i>Cardellina canadensis</i>	Canada Warbler	S
	<i>Corvus corax</i>	Common Raven	T
	<i>Empidonax minimus</i>	Least Flycatcher	E
	<i>Falco peregrinus</i>	Peregrine Falcon	E
	<i>Fulica americana</i>	American Coot	E
	<i>Haliaeetus leucocephalus</i>	Bald Eagle	T
	<i>Junco hyemalis</i>	Dark-eyed Junco	S
	<i>Pandion haliaetus</i>	Osprey	S

Group	Scientific Name	Common Name	Status
	<i>Peucaea aestivalis</i>	Bachman's Sparrow	E
	<i>Phalacrocorax auritus</i>	Double-crested Cormorant	T
	<i>Pheucticus ludovicianus</i>	Rose-breasted Grosbeak	S
	<i>Setophaga fusca</i>	Blackburnian Warbler	T
	<i>Sitta canadensis</i>	Red-breasted Nuthatch	E
	<i>Spatula clypeata</i>	Northern Shoveler	E
	<i>Spatula discors</i>	Blue-winged Teal	T
	<i>Vermivora chrysoptera</i>	Golden-winged Warbler	T
Gastropods	<i>Anguispira rugoderma</i>	Pine Mountain Disc	E
	<i>Glyphyalinia rhoadsi</i>	Sculpted Glyph	T
	<i>Mesomphix rugeli</i>	Wrinkled Button	T
	<i>Neohelix dentifera</i>	Big-tooth Whitelip	T
	<i>Pilsbryna vanattai</i>	Honey Glyph	E
	<i>Vertigo bollesiana</i>	Delicate Vertigo	E
	<i>Vertigo clappi</i>	Cupped Vertigo	E
Insects	<i>Amphiagrion saucium</i>	Eastern Red Damsel	E
	<i>Callophrys irus</i>	Frosted Elfin	E
	<i>Erora laeta</i>	Early Hairstreak	T
	<i>Phyciodes batesii</i>	Tawny Crescent	H
	<i>Polygonia progne</i>	Gray Comma	H
	<i>Pseudanophthalmus rogersae</i>	Rogers' Cave Beetle	T
	<i>Pseudanophthalmus scholasticus</i>	Scholarly Cave Beetle	T
Crustaceans	<i>Cambarus buntingi</i>	Longclaw Crayfish	S
	<i>Cambarus parvocolus</i>	Mountain Midget Crayfish	T
Mammals	<i>Clethrionomys gapperi maurus</i>	Kentucky Red-backed Vole	S
	<i>Corynorhinus rafinesquii</i>	Rafinesque's Big-eared Bat	S
	<i>Myotis grisescens</i>	Gray Myotis	T
	<i>Myotis leibii</i>	Eastern Small-footed Myotis	T
	<i>Myotis septentrionalis</i>	Northern Myotis	E
	<i>Myotis sodalis</i>	Indiana Bat	E
	<i>Sorex cinereus</i>	Cinereus Shrew	S
	<i>Sorex dispar blitchi</i>	Long-tailed Or Rock Shrew	E
	<i>Spilogale putorius</i>	Eastern Spotted Skunk	S
	<i>Ursus americanus</i>	American Black Bear	S

Group	Scientific Name	Common Name	Status
Reptiles	Eumeces anthracinus	Coal Skink	T
	Pituophis melanoleucus melanoleucus	Northern Pine Snake	E

E-Endangered T-Threatened S-Special Concern (may become threatened or endangered)

## 2-08(d). Invasive Species

Invasive plants and animals may have many impacts on fish and wildlife resources; they may degrade, change, or displace native habitats and compete with our native wildlife. Invasive species are serious threats which may cause significant damage to the environment, harming not only wildlife resources and fisheries, but also the human economy and human health. Public agencies often expend enormous amounts of time and money related to the prevention, monitoring, and management of invasive species. Public resources are also expended on community education regarding the dangers of introducing and spreading invasive species.

Invasive species have been introduced through routes called invasion “pathways.” Transported by air, water, rail, or road, invasive species move beyond natural geographic barriers and with no respect to political boundaries. By altering species diversity, hydrology, nutrient cycling, and other ecosystem processes, invasive species can change whole ecosystems and irreparably damage natural resources. The management of invasive species may involve steps including 1) prevention, 2) early detection, 3) rapid response, 4) control and 5) eradication. These steps can be costly and time consuming with varying effects on the targeted species.

Education is an important mechanism to prevent the introduction and spread of invasive species through such routes as recreational boating, release of live bait, landscaping with non-native ornamentals, keeping exotic pets, etc. Education emphasizes that some non-native species, intentionally or accidentally introduced, may later turn out to be invasive.

The eradication of an invasive species may be an option if the organism is rapidly detected and the extent of its invasion is limited. Many invasive species have become so widespread and established that their management and the control of further invasion is the only option. The cost of this management and control can often be excessive and priority must be given to efficiently use resources available.

## 2-07(d) (1) Invasive Insects

The hemlock woolly adelgid, *Adelges tsugae*, is a very small insect that affects hemlock trees (mostly *Tsuga canadensis*). The adelgid is an invasive insect from Asia which was first discovered in Virginia in 1951. Since the mid-twentieth century, it has spread to 17 states from Maine to Georgia and has been observed in eastern Kentucky since 2006 where it was first discovered at Rebel's Rock in Harlan County (see Figure 2.14). Hemlock woolly adelgid infestation is responsible for the death of as much as 80% of the hemlocks in certain eastern U.S. piedmont forests including hemlocks within Shenandoah National Park and along the Blue Ridge Parkway. Infestation in the Great Smoky Mountain National Park has begun to take a toll on the hemlocks there. Time from infestation to the mortality of a hemlock tree in Kentucky is usually between three and 15 years. When it is mature and laying eggs, the tiny 1/16-inch long insect is often found with a covering of wool-like wax filaments. The "wool" can be found on the underside tips of infested hemlock branches from autumn to spring and the white cotton-like substance is actually the insect's ovisacs. The species' activity in hemlock trees leads to the disruption of nutrient supplies causing discoloration of foliage, loss of needles, and thinning of the crown of the trees. The spread of the species is often by wind and birds transporting the insects from one tree to the next.

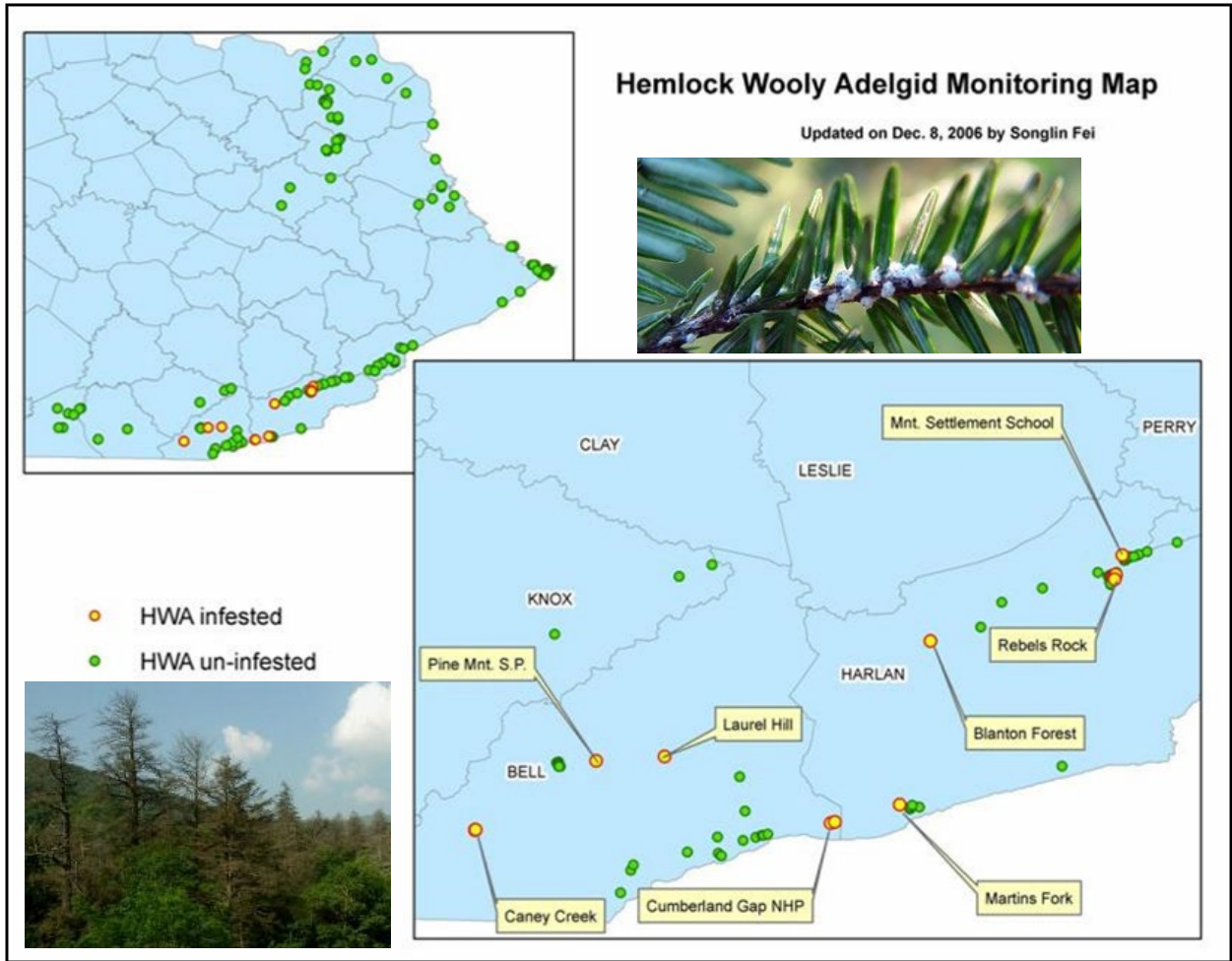


Figure 2.14 - Hemlock Woolly Adelgid Survey, 2006

The southern pine beetle, *Dendroctonus frontalis*, is a small black beetle that is native to North America. Despite being smaller than a grain of rice, (measuring only 1/8-inch long), it is considered the most destructive forest insect in the southern United States. The beetle seems to prefer and is the most lethal to shortleaf, loblolly, Virginia, and pitch pines. More resistant trees include slash, longleaf, and eastern white pines which have a high resin exudate that provides an effective defensive mechanism against the beetle. However, even these “resistant” trees can experience mortality when the beetles are very abundant. Successful management of southern pine beetle outbreaks requires understanding that they often attack stressed, injured, and older trees in dense stands. Promoting healthy pines and culling unhealthy trees is key to blunting the beetles’ impact. During outbreaks, avoid pruning and other activities which produce odors that attract further beetle infestation. When an active infestation is observed, insecticides can be sprayed onto trunks of unaffected pines to protect them. Insecticides

generally will not penetrate the bark to kill beetles and larvae already present, so this is used only to protect pines from future infestation. To combat an active infestation, the complete removal and destruction of severely infested trees is recommended since they are very unlikely to survive, will likely serve as a source for beetles to attack nearby trees, and can pose a threat to property and life if located near recreational or operational activities and areas frequented by people.

European gypsy moths, *Lymantria dispar*, were accidentally introduced into Massachusetts in 1869, and by 1987, the species was established throughout the northeastern United States. These insects are very destructive to native forests because their caterpillars' feeding habits make them responsible for the prolific and non-discriminating defoliation of over 500 species of trees and shrubs. The caterpillars seem to prefer oaks (*Quercus* spp.), but they will also feed on apple, sweetgum, basswood, birch, poplar, willow, and hawthorn. More mature caterpillars can even be found feeding on hemlocks, pines, and spruce. According to the Kentucky Cooperative Agricultural Pest Survey (University of Kentucky - College of Agriculture, Food and Environment, 2020), although individual gypsy moths are found every year in Kentucky, no breeding population of these pests is known to have been established in the state. There is local concern since the species apparently has a firm foothold in the surrounding states of Virginia, West Virginia, Ohio, and Indiana. From 2000-2002, neighboring West Virginia experienced record defoliations that totaled over one million acres. Because of this concern, officials are taking measures to ensure that the insect does not become established in Kentucky. One reconnaissance and control method is to set and regularly check the light green (sometimes orange) gypsy moth traps containing the female moth's sex pheromones. Kentucky has been trapping gypsy moths since 1983. Three infestations have been discovered and eradicated by using mass trapping, viral controls, and insecticides.



Figure 2.15 - Gypsy Moth Traps



Gypsy moths have been shown to move long distances on outdoor household articles such as cars and recreational vehicles, firewood, and household goods. Female moths often lay egg masses on such articles which are then transported long distances by people. Therefore, restrictions such as firewood quarantines can be important control measures.

The emerald ash borer beetle, *Agrilus planipennis*, attacks only ash trees (*Fraxinus americana* and *F. pennsylvanica*) and can cause tree mortality within three years of initial infestation. That infestation begins when the half-inch long, dark iridescent green female adults lay their eggs in bark crevices. When the larvae emerge from the eggs, they remain hidden under the outer bark while feeding on the inner bark. The damage they do disrupts the tree's ability to transport water and nutrients. When the beetles later emerge as adults they leave D-shaped holes in the bark about one-eighth inch wide. It is believed that emerald ash borer beetle were accidentally introduced into Michigan a few decades ago on wood packing material carried in cargo ships or airplanes originating from Asia. Since its introduction, this destructive pest has spread quite rapidly and has been found in more than 30 states, including Kentucky. There have been confirmed findings of the species in Harlan County. The risk of major damage due to the emerald ash borer is negligible at Martins Fork Lake due to the low numbers of ash trees on public lands surrounding the lake. Even so, Harlan County is covered by a firewood quarantine which also covers much of the Eastern United States including the entire state of Kentucky. The quarantine is designed to help mitigate the transport and spread of emerald ash borers and will likely have the collateral impact of limiting the spread of other invasive pests—including pest insects such as gypsy moths, southern pine beetles, and hemlock woolly adelgids—that may hide out in transported firewood. LRN DR 1165-1-1 (Previously Policy Letter #32) has been developed by the Corps in conjunction with other state and federal agencies and non-governmental organizations as an appropriate firewood policy for Corps lands.



Figure 2.16 - Emerald Ash Borer Beetles and D-Shaped Exit Holes in an Ash Tree

### 2-07 (d) (2) Invasive Exotic Plants

Numerous invasive exotic plants exist on project lands surrounding Martins Fork Lake. These non-native plants can pose a serious threat to biodiversity as they invade and displace native plant communities which may disrupt and alter wildlife habitat. Invasive plant species are managed jointly by the Corps of Engineers and Kentucky Department of Fish and Wildlife Resources by mechanical and chemical (herbicide) means.

Table 2.9 lists invasive exotic plant species typical to Kentucky and the lands surrounding Martins Fork Lake.

Table 2.9 - List of Common Invasive Exotic Pest Plants in Kentucky

<b>Trees</b>
Mimosa or silk tree ( <i>Albizia julibrissin</i> )
Princess tree ( <i>Paulownia tomentosa</i> )
Tree of heaven ( <i>Ailanthus altissima</i> )
<b>Shrubs</b>
Autumn olive ( <i>Elaeagnus umbellate</i> )
Amur bush honeysuckle ( <i>Lonicera japonica</i> )
Japanese barberry ( <i>Berberis thunbergii</i> )
Marrows bush honeysuckle ( <i>Lonicera marrowii</i> )
Multiflora rose ( <i>Rosa multiflora</i> )
Privet ( <i>Ligustrum</i> spp.)
<b>Herbaceous Plants</b>

Eurasian water milfoil ( <i>Myriophyllum spicatum</i> )
Garlic mustard ( <i>Alliaria petiolata</i> )
Japanese knotweed ( <i>Fallopia japonica</i> )
Japanese spiraea ( <i>Spiraea japonica</i> )
Japanese stilt grass ( <i>Microstegium vimineum</i> )
Musk thistle ( <i>Carduus nutans</i> )
Purple loosestrife ( <i>Lythrum salicaria</i> )
<b>Vines</b>
Climbing euonymus ( <i>Euonymus fortunei</i> )
Japanese honeysuckle ( <i>Lonicera japonica</i> )
Japanese wisteria ( <i>Wisteria floribunda</i> )
Kudzu ( <i>Pueraria montana</i> )
Oriental bittersweet ( <i>Celastrus orbiculata</i> )

## 2-08(e). Ecological Setting

The Natural Resource Management Mission of the U.S. Army Corps of Engineers (ER 1130-2-550, Chapter 2, Paragraph 2-2.a. (1), dated 15 November 1996) states the following:

The Army Corps of Engineers is the steward of the lands and waters at Corps water resources projects. Its Natural Resource Management Mission is to manage and conserve those natural resources, consistent with ecosystem management principles, while providing quality public outdoor recreation experiences to serve the needs of present and future generations.

In all aspects of natural and cultural resources management, the Corps promotes awareness of environmental values and adheres to sound environmental stewardship, protection, compliance, and restoration practices. The Corps manages for long-term public access to, and use of, the natural resources in cooperation with other Federal, State and local agencies as well as the private sector.

The Corps integrates the management of diverse natural resource components such as fish, wildlife, forests, wetlands, grasslands, soil, air and water with the provision of public recreation opportunities. The Corps conserves natural resources and provides public recreation opportunities that contribute to the quality of American life.

In support of this mission statement, the following paragraphs describes the ecoregion where Martins Fork Lake is located and the natural resources components found within the project area. Ecoregions are areas with generally similar ecosystems and with similar types, qualities

and quantities of environmental resources. Ecoregion boundaries are determined by examining patterns of vegetation, animal life, geology, soils, water quality, climate and human land use, as well as other living and non-living ecosystem components.

The purpose of ecological land sorting is to provide information for research, assessment, monitoring and management of ecosystems and ecosystem components. Federal agencies, state agencies and nongovernmental organizations responsible for different types of resources within the same area use this information to estimate ecosystem productivity, determine probable responses to land management practices and other ecosystem disturbances, and address environmental issues over large areas, such as air pollution, forest disease or threats to biodiversity.

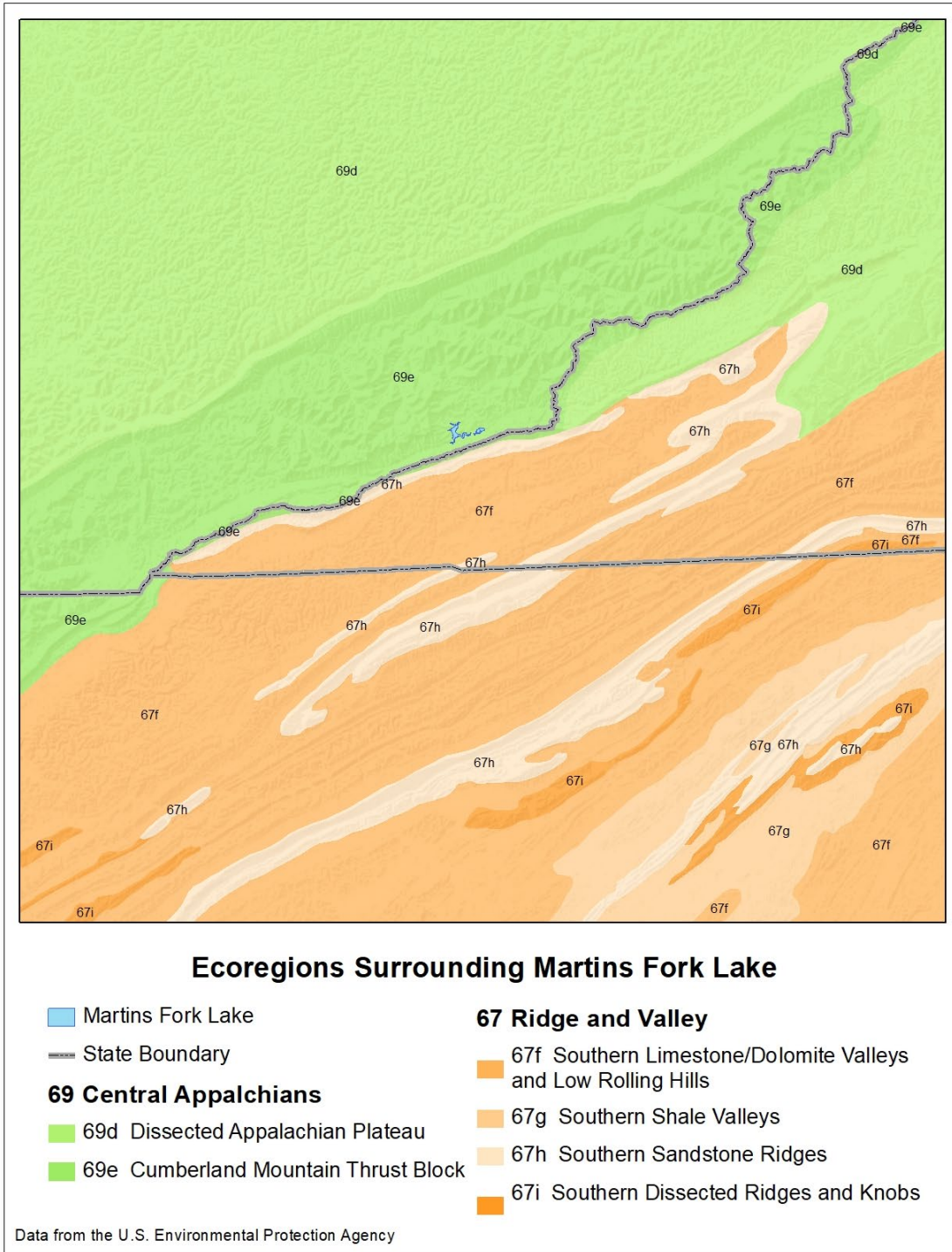
Martins Fork Lake falls within the Cumberland Mountain Thrust Block Ecoregion within the Central Appalachians. See Figure 2.17 to reference the location of the ecoregion in southeastern Kentucky (U.S. Environmental Protection Agency (EPA), 2018).

### *Central Appalachians (69)*

The dissected, forested hills and mountains of Ecoregion 69 are typically underlain by flat-lying, Pennsylvanian sandstone, shale, siltstone, conglomerate, and coal. Ecoregion 69 is higher, cooler, steeper, more rugged, and more densely forested than the Western Allegheny Plateau (70) and the Interior Plateau (71). Its potential natural vegetation is mixed mesophytic forest and contrasts with the oak–hickory forest of Ecoregion 71. Like in Ecoregion 68, mixed mesophytic forests grow on cool, moist north- and east-facing slopes and in coves; mixed oak forests are common on drier sites including upper slopes and south- and west-facing middle and lower slopes. White oak forests are also common and red maple is widespread, especially in secondary forests and on sites formerly occupied by American chestnut. Rugged terrain, cool temperatures, and nutrient-poor soils sharply limit agricultural potential. Surface and underground bituminous coal mines are common. Surface mines have reshaped ridges and hollows and are responsible for the siltation and acidification of many streams. Upland soils are derived from residuum and colluvium and are mostly Ultisols and Inceptisols which contrast with the Alfisols that dominate most of Ecoregion 71. Streams have moderate to high gradients and cobble or boulder substrates. They have low nutrient and ionic concentrations. Elements of the fish and mussel assemblages in the Kentucky River tributaries of Ecoregion 69 are distinct from those in the Cumberland River tributaries of Ecoregion 68.

### *Cumberland Mountain Thrust Block (69e)*

The mostly forested Cumberland Mountain Thrust Block (69e) contains high, steep ridges, hills, coves, narrow valleys, and the Pine Mountain Overthrust Fault. Maximum elevation is greater than elsewhere in Kentucky. Forests are usually more mesophytic than in the Dissected Appalachian Plateau (69d) but forest composition is highly variable and controlled by aspect, slope position, past usage, and degree of topographic shading. Components of the bird, amphibian, small mammal, and plant assemblages are also distinct from Ecoregion 69d. The Cumberland Mountain Thrust Block (69e) is mostly underlain by Pennsylvanian shale, siltstone, sandstone, conglomerate, and coal. Sedimentation from coal mines, coal washing, and logging as well as acidic mine drainage have decreased the biological integrity and productivity of surface waters. Small streams are common and have high gradients, waterfalls, many riffles, few pools, and cobble or boulder substrates. Nutrient and alkalinity levels are lower, thermal regimes are cooler, and fish populations are less diverse than in Ecoregion 69d.



*Figure 2.17 - Ecoregion Map of the Martins Fork Lake Region*

## 2-08(f). Wetlands

Quantifying the wetlands in the Martins Fork area was done using data from the US Fish and Wildlife Service’s National Wetlands Inventory (U.S. Fish & Wildlife Service, 2019). The data uses the Cowardin Classification System (Federal Geographic Data Committee, 2013). The Cowardin classification of wetlands includes lacustrine (lake area) systems and riverine (river area) systems in addition to the palustrine systems that are what most commonly comes to mind when one envisions a wetland.

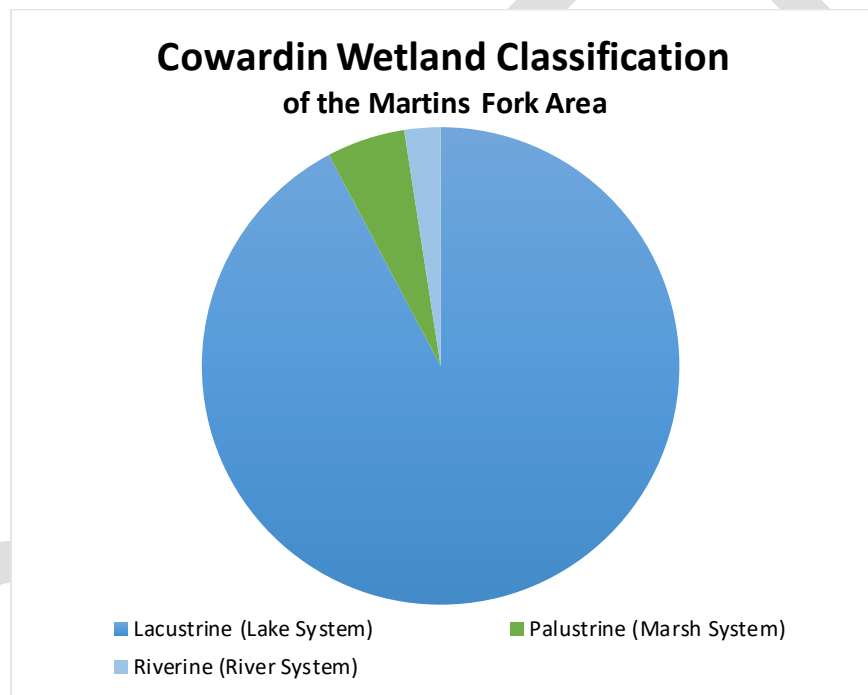


Figure 2.18 - Cowardin Wetland Classifications by Percentage at Martins Fork.

This quantification will break out the palustrine wetlands. The Cowardin description of Palustrine System includes, “...vegetated wetlands traditionally called by such names as marsh, swamp, bog, fen, and prairie, which are found throughout the U.S. It also includes the small, shallow, permanent or intermittent water bodies often called ponds. Palustrine wetlands may be situated shoreward of lakes, river channels, or on slopes.” (Federal Geographic Data Committee, 2013). While these wetlands make up a comparatively small portion of the

USACE managed area at Martins Fork Lake, they provide important functions to the ecosystem such as water filtration, erosion reduction, and unique habitat.

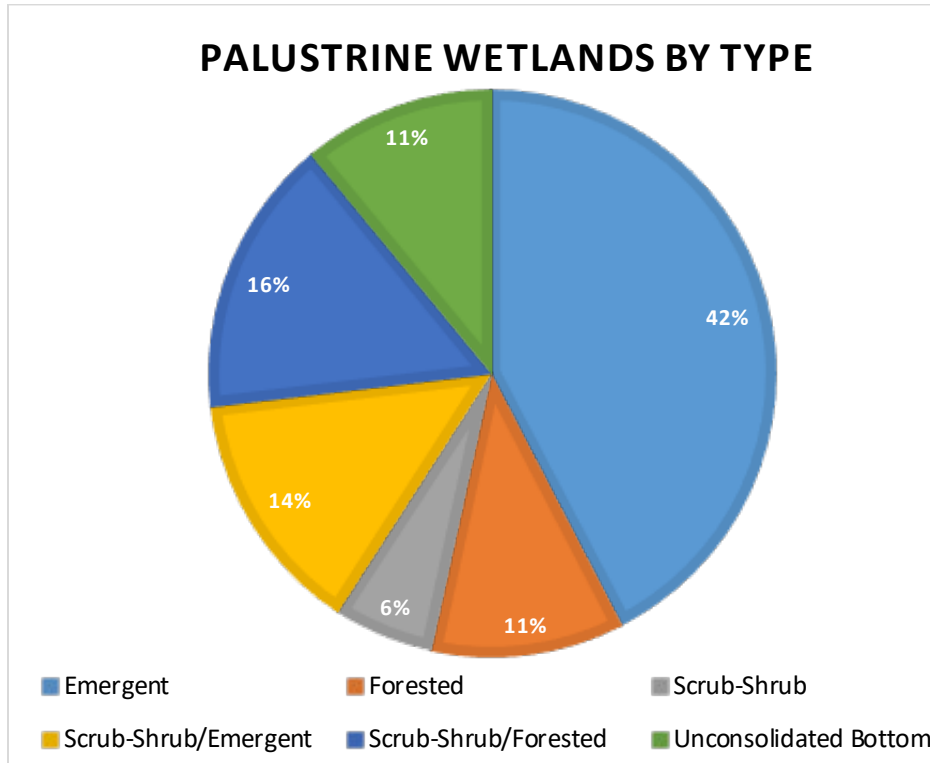


Figure 2.19 - Breakout of Palustrine Types of Wetlands at Martins Fork

There are four classes (and two combined classes) of palustrine wetlands found at Martins Fork Lake. They are defined as:

**Emergent:** In this wetland class, emergent plants are the tallest life form with at least 30% of coverage. This vegetation is present for most of the growing season in most years. These wetlands are usually dominated by perennial plants. In areas with relatively stable climatic conditions, Emergent Wetlands maintain the same appearance year after year. Emergent wetlands are found throughout the U.S. and are known by many names, including marsh, wet meadow, and slough.

**Forested:** In forested wetlands, trees (woody plants at least 20 ft in height) are the dominant life form. Forested wetlands are most common in the eastern U.S., particularly along rivers and



in the mountains. They normally possess an overstory of trees, an understory of young trees or shrubs, and an herbaceous layer. Such common names are often applied, in combination with species names or plant association names, in Palustrine forests as well (e.g., cedar swamp, bottomland hardwoods).

**Scrub-Shrub:** In scrub-shrub wetlands, woody plants less than 20 ft tall are the dominant life form. The “shrub” life form includes true shrubs, young specimens of tree species that have not yet reached 20 ft in height, and woody plants (including tree species) that are stunted because of adverse environmental conditions. Scrub-shrub wetlands may represent a successional stage leading to forested wetland, or they may be relatively stable communities. They are one of the most widespread Classes in the U.S. and are known by many names, such as shrub swamp, bog, and pocosin.

**Unconsolidated Bottom:** This class is known not for vegetation, but rather for bottom substrate characteristics. Unconsolidated bottom includes all wetlands with at least 25 percent cover of particles smaller than stones and a vegetative cover less than 30 percent. Unconsolidated Bottoms are characterized by the lack of large stable surfaces for plant and animal attachment.

## 2-09. Cultural Resources

Cultural resources include archaeological sites, historic buildings and structures, artifacts, and other items and locations important to past or present cultures. Archaeological resources include material evidence of past human behavior and land use. Archaeological sites contain artifacts (portable objects) and features (non-portable evidence of past activities such as storage pits, post-holes, hearths, or middens) and provide information about past human behavior, subsistence practices, social organizations, and religious practices. Archaeological sites in the Cumberland River Basin represent over 12,000 years of human occupation. Archaeological sites dating to the Paleoindian (9,500 – 8,000 B.C.), Archaic (8,000 – 1,000 B.C.), Woodland, Late Prehistoric, and Historic periods are represented throughout the basin. The location of past occupations form archeological sites, which are categorized into temporary camps, procurement areas, habitation sites, villages, cemeteries, among others.

Martins Fork Lake lies within the Southeastern Mountains Section of the Upper Cumberland Management Area of the Kentucky plan for archaeological resources and the Coalfields Section

of the Appalachian Mountains Cultural Landscape (Kentucky Heritage Council, 2008). In general, this area experienced only limited settlement until the construction of the railroads at the turn of the last century and subsequent growth from the twentieth century. Few nineteenth century buildings or landscapes survive, however, the paucity of National Register sites may reflect a lack of effort to record sites rather than an indication of the region's research potential (Kentucky Heritage Council, 2008).

In 1970, the Corps conducted a preinundation survey of Martins Fork Reservoir in compliance with the Reservoir Salvage Act of 1960 (Warholic & Dorwin, 1970). The survey, conducted over a two day period, did not record any archaeological sites. However, interviews with landowners confirmed local collections of projectile points and observations of pre-contact features within the reservoir. The Corps also completed surveys of lands prior to excess (Karwedsky, 1982) (Karwedsky, 1983). No sites were recorded within these tracts. While the few surveys suggest a low density of archaeological resources, historic buildings or other cultural resources within the area, a complete inventory has not been completed by today's standards.

## 2-10. Demographics

### 2-10(a). Population

The primary user base of Martin's Fork Lake includes the residents of Harlan County, Kentucky. For this analysis, the catchment area was expanded to include the six neighboring counties that may provide additional users. Four of these (Bell, Leslie, Letcher, and Perry) are located in Kentucky, while the remaining two (Lee and Wise) are part of southeast Virginia.

Harlan County reached a peak population of over 75,000 residents during the 1940s when the coal industry was at its height in Appalachia. Following the turn of the millennium, this number has fallen below 30,000 and is forecast to lose an additional 10,000 residents by the year 2040.

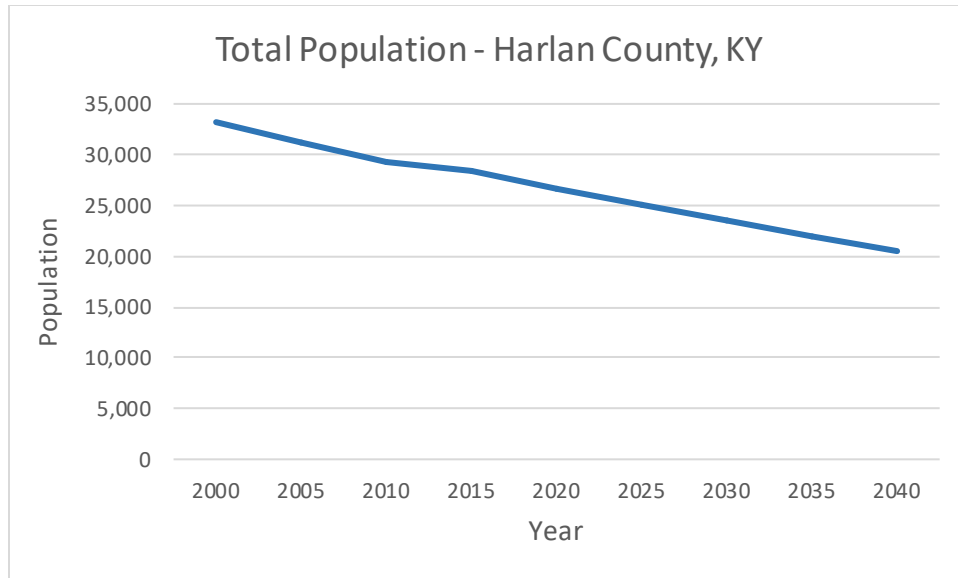


Figure 2.20 - Annual Population and Projected Population of Harlan County, KY

This decrease in population is mirrored on a regional scale. Comparing the expected trends for neighboring counties, the area surrounding Martin’s Fork is forecast to lose a quarter of its 2000 population totals by 2040. The decline in resource extraction job opportunities has largely led to this exodus. Previous employment in the coal industry numbered over 10,000 employees annually. As of 2018, that number has fallen below 700 (U.S. Census Bureau, 2019).

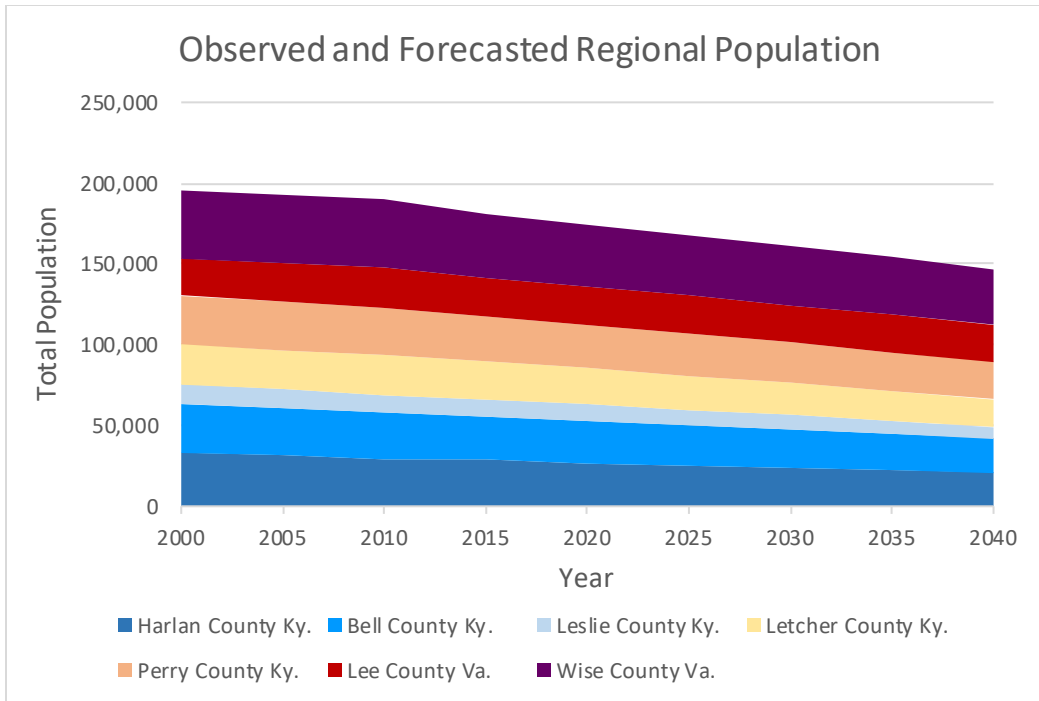


Figure 2.21 - Regional Population Trend 2000-2040

In terms of age distribution, Harlan County has an almost equal distribution among its residents. Twenty-five percent of the population are younger than 20, while another quarter are over 60. Working aged adults lean slightly older, but only by two percentage points. Residents aged 40-59 make up twenty-seven percent of the population; young adults (20-39) make up the remaining twenty-three percent. Across the region, the age distribution is similar to that of Harlan County; the highest proportion of the population are within the pre-retirement age group of 50-65. These individuals make up twenty-two percent of the total (University of Louisville, 2016) (University of Virginia, n.d.).

## 2-10(b). Race

The racial distribution of Harlan County is predominately white. Over ninety-five percent of the residents identify as white alone. This pattern is consistent across the neighboring counties. Each county has a white population greater than ninety-two percent, and all but two have percentages greater than ninety-five.

Table 2.10 - Population by ethnicity within Harlan County, KY

Population by Race within Harlan County	Total
White alone	25,899
Black or African American alone	699
American Indian and Alaska Native alone	21
Asian alone	110
Native Hawaiian and Other Pacific Islander alone	0
Some other ethnicity alone	101
Two or more ethnic backgrounds	304
Total:	27,134

## 2-10(c). Education

A relatively high percentage of Harlan County residents have never received a high school diploma. A quarter of the population under 25 and nearly thirty percent of those older have not done so. Regional numbers are similar and these more than double the state average for both age groups. In the same vein, fewer young adults go on to receive college degrees and return to the county.

Table 2.11 - Educational attainment within Harlan County by Population Totals

Educational Attainment	Population
<b>Population 18 to 24 years</b>	<b>2,050</b>
Less than high school graduate	512
High school graduate (includes equivalency)	444
Some college or associate's degree	1,003
Bachelor's degree or higher	91
<b>Population 25 years and over</b>	<b>18,885</b>
Less than 9th grade	2,226
9th to 12th grade, no diploma	3,137
High school graduate or higher	13,522
Bachelor's degree or higher	2,036

Table 2.12 - Educational Attainment for Harlan County and the State of Kentucky

Educational Attainment	Harlan County	Kentucky
------------------------	---------------	----------

<b>Population 18-24 years</b>	Less than high school graduate	25%	12%
	High school graduate (includes equivalency)	22%	38%
	Some college or associate's degree	49%	42%
	Bachelor's degree or higher	4%	9%
<b>Population 25 years and over</b>	Less than high school graduate	12%	5%
	9th to 12th grade, no diploma	17%	8%
	High school graduate or higher	72%	87%
	Bachelor's degree or higher	11%	25%

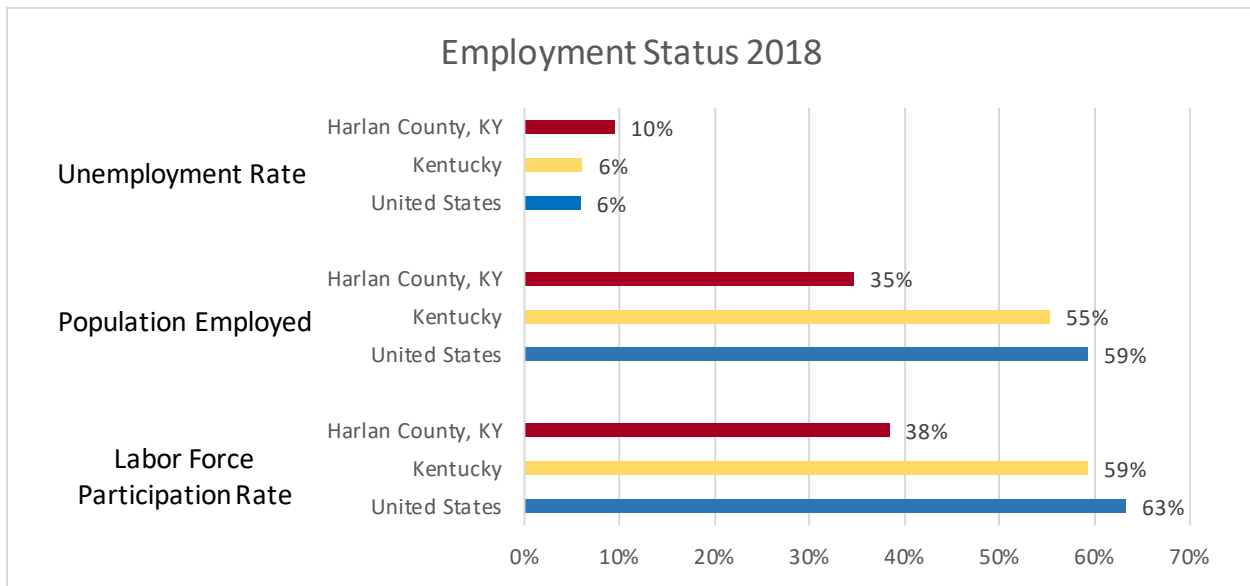
## 2-11. Economics

Harlan County and its immediate neighbors are among the most economically depressed counties in Kentucky and rank near the bottom on a national level. The median household income has remained steady over the past decade and totaled just over \$26,000 in 2018. For comparison, the median income for the state was \$48,000 during that same year. This number is nearly twice as low because of high unemployment numbers and very low labor participation rates. In 2016, Harlan County ranked in the top five counties in the nation for federal income support. Over half of the total county income came from federal assistance programs including Medicaid, Social Security, and food stamps. Two years later in 2018, data from the U.S. Bureau of Economic Analysis shows that this has continued. Fifty-four percent of all county income was from transfer receipts of this nature.

### Employment

Just over a third of the population of Harlan County were employed in 2018. Participation in the labor force: adults who are currently employed or actively seeking employment totaled just thirty-eight percent. Owing partly to the decline of the mining industry, unemployment levels have remained higher than state and national numbers and approached ten percent in 2018.

Table 2.13 - Comparative Employment Status in 2018, Harlan County, State of Kentucky, and the United States



Employment by industry is largely skewed away from past trends. Following many decades of dominance, resource extraction jobs within the county now make up less than ten percent of the workforce while one in three workers within Harlan County now work in professions associated with education, healthcare, or social assistance. A further twenty percent of employees work in retail, accommodation, or food service jobs.

Table 2.14 - Harlan County Employment by Industry Profession

Employment By Industry	Total	Percent
<b>Civilian employed population 16 years and over</b>	<b>7,489</b>	
Agriculture, forestry, fishing and hunting, and mining:	671	9%
Construction	503	7%
Manufacturing	424	6%
Wholesale trade	38	1%
Retail trade	866	12%
Transportation and warehousing, and utilities:	422	6%
Information	45	1%
Finance, Insurance, Real Estate rental and leasing:	376	5%
Professional, Scientific, Management, and Waste Management	469	6%
Educational services, and health care and social assistance:	2,499	33%

Arts, Recreation, Accommodation, and food services:	621	8%
Other services, except public administration	221	3%
Public administration	334	4%

## 2-12. Economic Impact of Martins Fork Lake

Corps of Engineers lakes, and Martins Fork Lake in particular, attract residents and businesses to the area resulting in investments to take advantage of the sporting and tourism opportunities the lake offers. Corps of Engineers lakes can be powerful economic drivers and often contribute to a consistent economy and steady jobs. The recreation industry thrives from people enjoying the outdoors and often driving to access fresh air and relaxing waters.

The Corps of Engineers works to calculate the value of these outdoor resources to the surrounding community (U.S. Army Corps of Engineer, Institute for Water Resources, 2020). Four components are needed to estimate economic effects: recreation spending, visitor use estimates, capture rates and economic multipliers.

**Economic effects =**

**# of visits × average spending per visit × capture rate × regional economic multiplier**

The visitation data used here was derived from 2019 traffic meter data at Martins Fork Lake, while the spending profiles were estimated from a national visitor spending survey that was conducted in 2011-2013 and price indexed to 2019 dollars using Consumer Price Index by sectors. Economic contributions are calculated using the Army Corps' Regional Economic System (RECONS) with capture rates and economic multipliers were extracted from the Impact Analysis for Planning (IMPLAN) system. Regional models were developed for each of the USACE projects, districts, divisions, plus a national model and 43 state models to estimate the total economic effects at various geographic levels. Spending averages were computed and multiplied by visitation statistics to estimate total annual visitor spending. Generalized spending profiles were developed for three sets of visitor segments: (1) day users, (2) boaters and non-boaters, and (3) locals vs. non-locals. These profiles were applied to recreation use data gathered from the visitation use survey and from visitation data to estimate total spending for Martins Fork.



Economic data in computed using fiscal year 2019 visitation data for the year at Martins Fork Lake resulted in:

- \$ 1,458,368 in visitor spending within 30 miles of the USACE lake
- \$ 696,666 in sales within 30 miles of the USACE lake
- 12 jobs within 30 miles of the USACE lake
- \$ 254,393 in labor income within 30 miles of the USACE lake
- \$ 345,941 in value added within 30 miles of the USACE lake
- \$ 232,630 in National Economic Development Benefits

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## 2-13. Recreation Facilities, Activities, and Needs

### 2-13(a). Zones of Influence



#### Distances from Martins Fork Lake

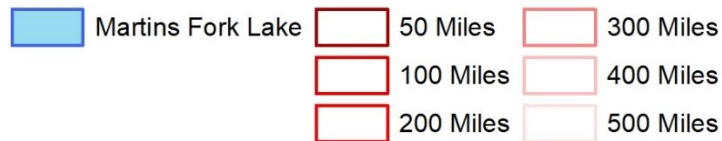


Figure 2.22 - Distances as the Crow Flies from Martins Fork Lake

Martins Fork Lake is located within 500 miles, or a day's travel, of the main population base of the United States (Figure 2.22). Actual visitation to the lake, however, consists mostly of visitors from Harlan County and the counties immediately adjacent. Customer survey cards

from 2011 polled 150 visitors to Smith Recreation Area on Martins Fork Lake. The large majority (over 70%) of the survey responses reside in zip codes within a 50 mile drive of Martins Fork, with the highest concentration residing in the larger Harlan and Middlesboro areas. However, the survey data indicates that some guests travel from slightly further stretches extending through Southeastern Kentucky, Southwestern Virginia, and Northeastern Tennessee.

The overall trend in population growth for counties surrounding Martins Fork Lake is down trending (See Section 2-10. ), and the lake is disconnected from major transportation thoroughfares. While this makes Martins Fork a less-likely destination lake, it remains a tremendous asset to local communities for high quality outdoor recreation opportunities close to home.

### 2-13(b). Visitation Profile

Visitors to Martins Fork Lake are a diverse group ranging from swimmers enjoying the beach, , hunters who use the Wildlife Management Areas associated with Martins Fork, day users who picnic and use playgrounds, and many other user groups. Visitation on Martins Fork Lake is at its highest during the months of April to September, and is significantly lower during the cold months of November to March (OMBIL, 2017)

Recent trends in visitation, shown in Table 2.15, indicate about 42,000 visits to Martins Fork Lake annually.

*Table 2.15 - Recent Visitation to Martins Fork Lake, by Fiscal Year*

<b>Fiscal Year (October to September)</b>	<b>Number of Visits to Martins Fork Lake</b>
FY20	66,672
FY19	44,463
FY18	37,432
FY17	50,428
FY16	40,051
FY15	39,404
FY14	41,158

Beginning in 2012, the Corps of Engineers underwent reassessment and modification of the way visitation counts are calculated across the nation. As a result, the new visitation data collection is becoming more precise at Martins Fork Lake and across the Corps based on the new procedures used to collect and calculate project visitation.

### 2-13(c). Recreation Analysis

The Kentucky Outdoor Recreation Plan, published in October of 2019, offers current attitudes towards outdoor recreation in the state, as well as a projected direction for outdoor recreation opportunities and focus for the next five years (Kentucky Department for Local Government, 2019). The Plan established a baseline of current recreation use and attitudes by mail and email surveys to residents throughout the state. Of the respondents, over 75% of them stated they like to recreate outdoors to have fun, to spend time with family and friends, and just to enjoy being outside. Surveys also requested feedback on the outdoor recreation activities that citizens had participated in over the last five years. Respondents overwhelmingly had enjoyed activities offered at Martins Fork Lake, with over 80% having visited a lake, beach or river; walking for leisure or exercise; and visiting parks as a group or individual. The next most common activity was scenic viewing with 67% of respondents participating and lesser percentages for all other activities.

The Kentucky Outdoor Recreation Plan also addressed the frequency of visits to different types of parks. Over 87% of respondents reported enjoying local parks in the last year, higher than state parks (81%), National Parks and federal lands (47%). Respondents also conveyed visitation to local parks at a much higher frequency than state or federal parks. This is significant to Martins Fork, because as discussed in section 2-13(a), most visitors to Smith Recreation Area are from the local area and use Martins Fork and the recreation facilities at Smith Recreation Area as a local community asset.

### 2-13(d). Recreational Carrying Capacity

Carrying capacity has several connotations. Natural science disciplines view carrying capacity in terms of resource degradation and restoration. Site planners view capacity in relation to areas and sizes required to conduct activities effectively. Sociologists and psychologists are concerned about behavior and human interactions and their effect on the quality of the activity experience. Administrators consider capacity in relation to policies, management, and flexibility. Recreational carrying capacity generally relates to social capacity and resource

capacity. Social capacity is the level of use beyond which the user does not achieve a reasonable level of satisfaction in their recreational experience.

Carrying capacity, for purposes of this master plan, is defined as the maximum potential level of use, which avoids overuse or overcrowding. Studies have shown that in evaluating the carrying capacity of water-based recreation, social capacity factors (overcrowding) were generally more important than resource capacity factors (overuse).

“Carrying capacity” at a project like Martins Fork Lake is difficult to quantify merely by statistics on numbers of visitors or boats, types of uses or users, trends of adjacent development, changing demographics, or other selected social or environmental factors. Much of the determination of overcrowding tends to be subjective. One hunter may think that having another hunter in his area of the woods is too much. Some user groups prefer to congregate in large social groups, while others prefer more spacing and smaller groups at picnic areas, swim beaches, or campgrounds. At heavily used boat ramps, congestion at the point of access may be a serious problem during heavy use periods but overcrowding quickly is relieved a short distance from these facilities as users have a large area in which to disperse.

At this time, and into the foreseeable future, there are no needs to actively limit use beyond those already in place, such as restricting parking to designated parking spaces, etc. If future public use increases to the extent that significant use conflicts occur, a formal carrying capacity study may be warranted if it could lead to solutions not available in the absence of such a report. At this time, such a study would have minimal meaningful utility.

## 2-14. Real Estate

### 2-14(a). Acquisition Policy

The acquisition of 3,323 acres of fee title land and 27 acres of flowage easements began in 1972 and was completed before the reservoir’s impoundment in 1978. Approximately 1,523 acres of fee title land was acquired to meet the acquisition guideline, as defined by EM 405-2-150. The guideline required a freeboard of 5 feet above the crest of the spillway or 300 horizontal feet from the summer pool elevation. Therefore, the basic guideline for this project was established at elevation 1,346 feet above sea level or a 300 feet horizontal distance from 1310 feet above sea level, whichever was greater. This same 300 feet horizontal distance was used as the

guideline for all flowage easements. (U.S. Army Corps of Engineers, Nashville Real Estate Division, 1971)

In addition to the above, 7 acres were acquired in fee for the relocation of Kentucky State Highway 987 along the right bank of the project. This relocation resulted in the inaccessibility of 1,800 acres west of the reservoir, which were consequently also acquired in fee. Furthermore, the acquisition of this property was ecologically in the best interest of the project ecologically, as most of the property was previously committed to coal mining.

In reference to the CSX railroad property (called Louisville and Nashville Railroad at the time of acquisition), the application of the 300-foot policy measured from the 1,310 contour would result in the acquisition of the railroad's right of way. As the railroad bed itself is located above typical flooding elevations, it was determined that the acquisition of flowage easements in lieu of fee on these tracts would satisfy the project requirements, while at the same time reducing the impact on the railroad. (U.S Army Corps of Engineer, Nashville Real Estate Division, 1972)

## 2-14(b). Encroachments

Encroachments pertain to unauthorized placement, construction, or continued existence of privately owned property on, under, in or over public property. Encroachments also include the destruction, injury, defacement, removal, or alteration of public property. Any encroachments identified on public property will be handled according to the procedures identified in "ORD 405-2-11, Real Estate Encroachments."

When an encroachment cannot be resolved at the project level, or involves the placement of a permanent structure, resolution may be determined by the Nashville District Real Estate Division, in coordination with the Operations Division and the consideration to Office of Counsel. USACE's general policy is to require removal of encroachments, restoration of the premises, and collection of appropriate administrative costs and fair market value for the term of the unauthorized use.

Few encroachments are found at Martins Fork Lake due to the project's remote location and limited residential development. The primary adjacent properties are owned and operated by coal mining companies. More information on how encroachments and boundary line disputes are handled at the project level can be found in Section 6-09. Boundary Line Disputes.

## 2-14(c). Guidelines for Issuance of Outgrants

### National Land Use Policy for Recreational and Non-Recreational Outgrants

A national land use policy for recreational outgrants, titled “Recreational Outgrant Development Policy,” was issued by the Corps in December 2005. This policy outlines the Corps’ philosophy and guidelines related to the acceptable types of uses of Corps-managed public lands. A sister policy for activities not involving recreation, such as roadways, utilities, commercial or residential development, municipal requests for infrastructure, state and federal agency requests for use of Corps-managed lands, etc., was published in March 2009 titled “Non-Recreational Outgrant Policy. Both policies have been incorporated into the ER-1130-2-550 in Chapters 16 and 17.

### Nashville District Outgrant Guidelines

A Real Estate outgrant is generally defined as a written document setting the terms and conditions of non-Army use of public property and conveys or grants the right to use Army-controlled real property. Common outgrants include public park and recreation leases, commercial concession leases, fish and wildlife licenses, agricultural leases and various easements for roadways, communication lines, power lines and water or sewer lines. Each outgrant proposal will be reviewed for compatibility with all project purposes, current policies and regulations to include ER 1130-2-550, Chapters 16 and 17, ER 405-1-12, Chapter 8, environmental impacts and concerns, cultural resources effects and compliance, fish and wildlife, endangered species, public sentiment and the overall public interest. Outgrant requests will be processed in accordance with the Routing Process of Reports of Availability for Requests Involving Real Estate Actions on Fee Land (11 Sept 2020) and standard processes set by USACE.

All federal actions are subject to National Environmental Policy Act (NEPA) coordination and compliance reviews. Minor requests with minimal environmental impact may be determined to fit a Categorical Exclusion under NEPA. Requests involving more than minor impacts may require an Environmental Assessment (EA) or Environmental Impact Study (EIS) which must consider, among other factors, cultural and historic resources, water quality, air quality, threatened and endangered species, economic and social impacts, aesthetics, hazardous substances and cumulative impacts. Coordination also occurs with corresponding Federal agencies, state agencies and public involvement with respect to requested activities.

## 2-14(d). Project Outgrants

An outgrant is defined as a real estate instrument that authorizes a private or public entity, that is not USACE, to access Federally controlled property. Types of instruments may include leases, licenses, easements, consents, and permits. Martins Fork currently has two leases in place, covering a total of 1,023.23 acres for recreation and wildlife management.

Although Martins Fork's recreation potential was recognized during early planning, developed recreation facilities were not provided initially due to no local sponsor interest at the time. The lack of a sponsor prevented the Corps from acquiring any additional property for the purpose of recreation. This resulted in limited shoreline at Martins Fork Lake suitable for recreation development and use (USACE, 1980), and consequently there are currently only two outgranted areas at the project.

Smith Recreation Area is currently leased by Harlan County. The county contacted the Corps seven months prior to the project's impoundment in 1978, expressing a desire and intent to participate in recreation development on the lake. This resulted in a temporary license for the 1980 recreation season, followed by a 50 year lease for the recreational use of 34.63 acres of land and water starting in July of 1981, and is still ongoing today. Additional information on the Smith Recreation Area can be found in [Section 5](#).

Martins Fork Wildlife Management Area (WMA) is currently leased by the Kentucky Department of Fish and Wildlife Resources. Kentucky Department of Fish and Wildlife Resources entered into the 25-year lease beginning April of 2016 for the purposes of fish and wildlife activities over, across, in and upon lands 988.60 acres of land and water. The term of the lease ends April of 2041, which is still ongoing today. Additional information on the WMA can be found in [Section 5](#).

In addition to the two leases listed above, Martins Fork currently has six easements in place for utilities such as telephone lines, water lines, cable lines, public highways, and a road easement associated with the adjacent CSX railroad.



## 2-15. Pertinent Public Laws

Development and management of federal reservoirs for various purposes is provided under multiple statutes. These laws cover development of recreation facilities, licensing of project lands for fish and wildlife purposes, protection of natural and cultural resources, and leasing of public lands for incidental uses other than recreation. The following public laws are applicable to Martins Fork:

### Environmental Laws:

- The Fish and Wildlife Coordination Act (1934), as amended, 16 U.S.C. §§ 661 et. seq., provides authority for making project lands of value for wildlife purposes available for management by interested federal and state wildlife agencies. It further provides for more effective integration of a fish and wildlife conservation program with federal water resources developments.
- The Solid Waste Disposal Act (1965), as amended by the Resource Conservation and Recovery Act (1976), 42 U.S.C. §§ 6901 et seq., authorizes a research and development program with respect to solid waste disposal.
- The National Environmental Policy Act (1969), as amended, 42 USC §§ 4321 et seq., 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 arts in planning and decision making. NEPA declared a “continuing policy of the Federal Government....to use all practicable means and measures....to foster and promote the general welfare, to create conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans.” Section 102 authorized and directed that, to the fullest extent possible, the policies, regulations, and public law of the United States shall be interpreted and administered in accordance with the policies of the Act, and requires the United States to consider the environmental impacts associated with Federal actions. Section 101 of NEPA requires the federal government to use all practicable means to create and maintain conditions under which man and nature can exist in productive harmony.

- The Federal Environmental Pesticide Control Act (1972), 7 U.S.C. §§ 136 et seq., provides for complete regulation of pesticides to include regulation, restrictions on use, actions within a single State, and strengthened enforcement.
- The Clean Water Act (1972), 33 U.S.C. §§ 1151 et seq., establishes a national goal of eliminating pollutant discharges into waters of the United States, requires Federal agencies to comply with all laws regarding control and abatement of water pollution, and regulates the discharge of dredged or fill material into navigable waters of the United States.
- The Endangered Species Act (1973), as amended, 16 U.S.C. §§ 1531 et seq., 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.
- The Safe Drinking Water Act (1974), 42 U.S.C. § 300f, assures that water supply systems serving the public meet minimum national standards for protection of public health. The act (1) authorizes the Environmental Protection Agency to establish Federal standards for protection from all harmful contaminants, which standards would be applicable to all public water systems, and (2) establishes a joint Federal-State system for assuring compliance with these standards and for protecting underground sources of drinking water.

Natural Resources Laws:

- The Forest Management and Conservation Act (1960), PL 86-717, as implemented by Engineering Regulation (ER) 1130-2-400, 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 shall be accomplished to the extent practicable and compatible with other uses of the project. The law further provides that 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 the preceding sentence shall be coordinated with the Secretary of Agriculture, and with appropriate state conservation agencies.

- Freedom to Fish Act (2013), Public Law 113-13, directs the Nashville District to suspend and desist permanent 24/7 waterborne restrictions, to not take any action to establish a permanent physical barrier in connection with restricted areas, and transferred the sole responsibility of enforcement of restricted areas to the States. This Act was further modified by Section 2012 of the Water Resources Reform and Development Act (WRRDA) of 2014, which extended the moratorium imposed by Freedom to Fish Act on when a new or modified restricted area could be implemented or enforced to June 10, 2018.

#### Land Use Laws:

- The Federal Property and Administrative Services Act (1949), 40 U.S.C. §§ 101 et seq., authorizes the Secretary of the Army to dispose of certain properties under his/her jurisdiction.
- Section 4 of the Flood Control Act of 1944, as amended, 16 U.S.C. § 460d, authorizes the Federal Government to construct, maintain and operate recreational facilities at water resources development projects and further authorizes the Federal Government to permit local interests to construct, maintain, and operate such recreation facilities. It further authorizes use of public lands for any public purpose, including fish and wildlife, if it is in the public interest.

- 10 U.S.C. § 2667 authorizes the lease of land at water resource projects for any commercial or private purpose not inconsistent with other authorized purposes, subject to specific restrictions thereupon, as set out in regulations, policy, and Delegations of Authority.
- Lands and rights-of-way are acquired pursuant to provisions of the Uniform Real Property Acquisition and Relocation Assistance Act (1970), as amended, 42 U.S.C. §§ 4601 et seq.
- 10 U.S.C. § 2695 authorizes the acceptance of funds to cover administrative expenses related to certain real property transactions.
- Section 1035 of WRRDA (2014) addresses requests from marinas for floating cabins and associated docks within the Cumberland River Basin.
- The Federal Water Project Recreation Act (1965), 16 U.S.C. § 460L, contains cost sharing provisions for acquisition of lands and development of recreation facilities for water resources projects authorized after 1965. It also provides for cost sharing development of new areas that were not part of initial project construction.
- The Rivers and Harbors Act (1899), as amended, 33 U.S.C. §§ 403 et seq., authorizes the Secretary of the Army, on the recommendation of the Chief of Engineers of the US Army Corps of Engineers, to grant permission for the alteration or occupation or use of a civil works project if the Secretary determines that the activity will not be injurious to the public interest and will not impair the usefulness of the project. Further legislation authorized the construction, repair, and preservation of certain public works on rivers and harbors for navigation, flood control, and for other purposes, Public Law 87-874 (Rivers and Harbors Act of 1962), and specified 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, Public Law 79-14 (Rivers and Harbors Act of 1945).

Cultural Consultation and Preservation Laws:

- The Historic Sites Act of 1935, 16 U.S.C. §§ 461 et seq., specifically establishes national policy to preserve prehistoric sites of national significance. The National Park Service was directed to make the necessary investigations to obtain the “true and accurate...facts and information...”
- The National Historic Preservation Act (1966), U.S.C. §§ 470 et seq., established a program for the preservation of historic properties throughout the nation, including requirements for federal agencies to take into account the effects of undertakings on historic properties.
- The Archaeological Resources Protection Act (1979), 16 U.S.C. §§ 470 et seq.), revised and updated the Antiquities Act of 1906, 16 U.S.C. §§ 431-33. The Act protects archaeological resources and sites found on public lands and Indian land, and fosters increased cooperation and exchange of information between governmental authorities, the professional community, and private individuals.
- The National Historic Preservation Act (1966), as amended, 16 U.S.C. § 470 et seq., states a policy of preserving, restoring and maintaining cultural resources and requires that federal agencies take into account the effect of any undertaking on any site eligible for the National Register of Historic Places. *See generally* 54 U.S.C. §§ 300101 et seq.
- The Archaeological and Historic Preservation Act (1974), as amended, 16 U.S.C. §§ 469-469c, provides for the preservation of historical and archaeological data which 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.
- The Archeological Resources Protection Act (1974), as amended 16 U.S.C. § 470aa-mm, provides authority to Federal officials to manage archaeological sites and to regulate legitimate archeological investigation on public lands, and to enforce penalties against those who loot or vandalize archeological resources.
- The Native American Graves Protection and Repatriation Act (1990), 25 U.S.C. §§ 3001 et seq., requires federal agencies and museums to inventory human remains and associated funerary objects and to provide culturally affiliated tribes with the inventory of collection. The Act requires repatriation, on request, to the culturally affiliated tribes

and establishes a grant program within the Department of the Interior to assist tribes in repatriation and to assist museums in preparing the inventories and collections summaries.


- Section 208 of the Water Resources Development Act (WRDA) of 2000, allows for the reburial of Native American remains found on Corps-administered lands. In consultation with affected Indian tribes, the Secretary of the Army may identify and set aside areas at civil works projects of the Department of the Army that may be used to rebury Native American remains that have been discovered on project land; and have been rightfully claimed by a lineal descendant or Indian tribe in accordance with applicable Federal law.

#### Anti-Discrimination Laws:

- The Architectural Barriers Act (1968), 42 U.S.C. §§ 4151 et seq.; the Rehabilitation Act (1973), 29 U.S.C. §§ 701 et seq., as amended by the Rehabilitation, Comprehensive Services, and Developmental Disabilities Amendments (1978), see 29 C.F.R. § 1615.101; and the Americans with Disabilities Act (1990), 42 U.S.C. § 12101, together provide information and guidance regarding universal accessibility for persons with disabilities to Corps' recreation facilities and programs.
- The Age Discrimination Act (1975), 29 U.S.C. §§ 621 et seq., and Title VI of the Civil Rights Act (1964), 42 U.S.C. §§ 2000d et seq., together ensure that no person in the United States shall, on the ground of race, creed, color, national origin, sex, or age be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under the recreation program.

### **2-15(a). Federal Water Project Recreation Act (P.L. 89-72) and Martins Fork Lake**

In 1965, the Federal Water Project Recreation Act (P.L. 89-72) was enacted requiring that full consideration be given to the opportunities, if any, that water resource projects afford outdoor recreation and fish and wildlife enhancement. This legislation also requires that, on projects authorized after 9 July 1965, 50 percent of the separable costs for development of recreation

facilities by borne by a non-federal public agency and that the non-federal public agency bear the cost of operation and maintenance of the recreation (Purvis, 1980). 

At Martins Fork Lake, an agreement was signed in 1980 between the Corps of Engineers and Harlan County, Kentucky agreeing to a 50/50 cost share in the development of recreation facilities at Smith Recreation area. In 1981, the area was turned over to Harlan County for management and operation of recreation and continues to operate under the provisions of the 89-72 Act.

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## Chapter 3 Resource Objectives

### 3-01. Primary 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 primary goals of the Master Plan are to prescribe an overall land use management plan, resource objectives and associated design and management concepts. The following expresses the goals for the Martins Fork Lake Master Plan.

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

### 3-02. 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 Nashville District, Martins Fork Lake Project Office. The objectives stated in this document 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 are also accounted for during development of the objectives found in this Master Plan. The Kentucky State Comprehensive Outdoor Recreation



Plans (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 Martins Fork Lake.

### 3-02(a). Recreational Objectives

- Support the demand for improved recreation facilities and increased public access on partner-managed public lands and water for recreational activities (i.e. camping, walking, hiking, biking, boating, hunting, fishing, wildlife viewing and photography, 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
- Support partner-managed recreational opportunities in providing an equal recreational opportunity for a spectrum of public use, providing equal opportunity for all, including individuals, families, groups, youth, elderly and handicapped, with a variety of recreational facilities. Goal A, C, E
- Ensure consistency with national USACE recreation missions. Leverage opportunities to partner through outgrants and/or other means to continue to provide recreational services where funding is constrained. Goal E
- Reference the Kentucky Statewide Comprehensive Outdoor Recreation Plan to ensure consistency in achieving recreation goals. Goal E

### 3-02(b). Natural Resource Management Objectives

- Coordinate with state and federal agencies to actively manage and protect fish and wildlife populations and habitats. Identify and protect special status species by implementing ecosystem management principles. Goal A, B, D, E
- Maintain the natural qualities and historic vegetative cover of federally managed lands to enhance aesthetic qualities of the environment, perform essential erosion control functions in support of the lake's pristine water quality, and protect the natural character of the project's resources. Goal A, D
- Optimize resources, labor and partnerships for the prevention and control of exotic and invasive species. Goal B
- Identify, manage, and protect unique or sensitive habitat areas to ensure the longevity of Martins Fork's irreplaceable natural and scenic features. Goal A, B, C, D, E

- Stop unauthorized uses of public lands and waters such as: agricultural trespass, structures, clearing and/or alteration of vegetation, roadways, off-road vehicle (ORV) use, trash dumping and placement of advertising signs, and other activities that create negative environmental impacts. Goal A, B, C, D, E

### 3-02(c). Cultural Resource Objectives

- Recognize that project cultural resources are a part of the historic context and heritage of the United States and increase public awareness and education of regional history. Goal B, D, E
- Identify and inventory all significant cultural resources (National Register or eligible properties) which occur within the project area as funds permit. Goal A, 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 the inadvertent loss of the project's cultural resources from natural or human causes through a program of evaluation and protective or mitigative measures. Goal B, D, E

### 3-02(d). Economic Impact Objectives

- Balance economic and environmental interests involving Martins Fork Lake. Goal A, B, C, D, E
- Work with local communities to promote tourism and recreational use of the lake to favorably impact socioeconomic conditions surrounding the lake. Goal A, B, C, D, E

### 3-03. Environmental Operating Principles

The U.S. Army Corps of Engineers Environmental Operating Principles (EOPs) were developed to ensure that Corps missions include totally integrated sustainable environmental practices. The EOPs provided corporate direction to ensure the workforce recognized the Corps' role in, and

responsibility for, sustainable use, stewardship, and restoration of natural resources across the Nation and, through the international reach of its support missions.

Since the Environmental Operating Principles were introduced in 2002 they have instilled environmental stewardship across business practices from recycling and reduced energy use at Corps and customer facilities to a fuller consideration of the environmental impacts of Corps actions and meaningful collaboration within the larger environmental community.

The re-energized Environmental Operating Principles are:

- Foster sustainability as a way of life throughout the organization.
- Proactively consider environmental consequences of all Corps activities and act accordingly.
- Create mutually supporting economic and environmentally sustainable solutions.
- Continue to meet our corporate responsibility and accountability under the law for activities undertaken by the Corps, which may impact human and natural environments.
- Consider the environment in employing a risk management and systems approach throughout the life cycles of projects and programs.
- Leverage scientific, economic and social knowledge to understand the environmental context and effects of Corps actions in a collaborative manner.
- Employ an open, transparent process that respects views of individuals and groups interested in Corps activities.

The concepts embedded in the original EOPs remain vital to the success of the Corps and its missions. However, as the Nation's resource challenges and priorities have evolved, the Corps has responded by close examination and refinement of work processes and operating practices. This self-examination includes how the Corps considers environmental issues in all aspects of the corporate enterprise. In particular, the strong emphasis on sustainability must be translated into everyday actions that have an effect on the environmental conditions of today, as well as the uncertainties and risks of the future. These challenges are complex, ranging from global trends such as increasing and competing demands for water and energy, climate and sea level change, and declining biodiversity; to localized manifestations of these issues in extreme weather events, the spread of invasive species, and demographic shifts. Accordingly, the Corps

of Engineers is re-invigorating commitment to the Environmental Operating Principles in light of this changing context.

The Environmental Operating Principles relate to the human environment and apply to all aspects of business and operations. They apply across Military Programs, Civil Works, Research and Development, and across the Corps. The EOPs require a recognition and acceptance of individual responsibility from senior leaders to the newest team members. Re-committing to these principles and environmental stewardship will lead to more efficient and effective solutions, and will enable the Corps of Engineers to further leverage resources through collaboration. This is essential for successful integrated resources management, restoration of the environment and sustainable and energy efficient approaches to all Corps of Engineers mission areas. It is also an essential component of the Corps of Engineers' risk management approach in decision making, allowing the organization to offset uncertainty by building flexibility into the management and construction of infrastructure. (U.S. Army Corps of Engineers, 2020)

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

Land management at Martins Fork Lake is governed by the allocation and classification category to which each parcel is assigned based on authorized purpose, resource capability, and managerial direction for the future of the lake. Combined with the project-wide Resource Objectives in Chapter 3 and site-specific Resource Plans presented in Chapter 5, this land use plan provides a programmatic approach to the use, management, and development of all project lands at Martins Fork Lake. Together, these elements are the core of this Master Plan.

### **4-01. Land Allocation**

Project lands are allocated according to the congressionally authorized purposes for which they were acquired. The entire Martins Fork Lake project has a land allocation of Project Operations, which means all project lands were originally purchased to provide safe, efficient operation of the project for its authorized purposes—hydropower generation and flood control. No specific parcels were acquired for or assigned to individual purposes of recreation, fish and wildlife conservation and enhancement, or mitigation. However, the presence of the lake has certainly provided secondary benefits of water supply, water quality, conservation and enhancement of fish and wildlife, and recreation.

### **4-02. Land and Water Classification**

Land Classification is the primary use for which project lands are managed. Project lands are zoned for development of resource management consistent with authorized project purposes and the provisions of NEPA and other Federal laws. The classification process fully defines the management and use of project lands and considers public preferences and needs, legislative authority, regional and project-specific resource requirements, and suitability. Management and use of the lands assigned to each of the land classifications are discussed in connection with the appropriate resource objectives in this section, and done with site-specifics in Chapter 5. The four categories of classification on Martins Fork Lake are identified as: Project Operations, High Density Recreation, Environmentally Sensitive Area, and Multiple Resource Management Lands.

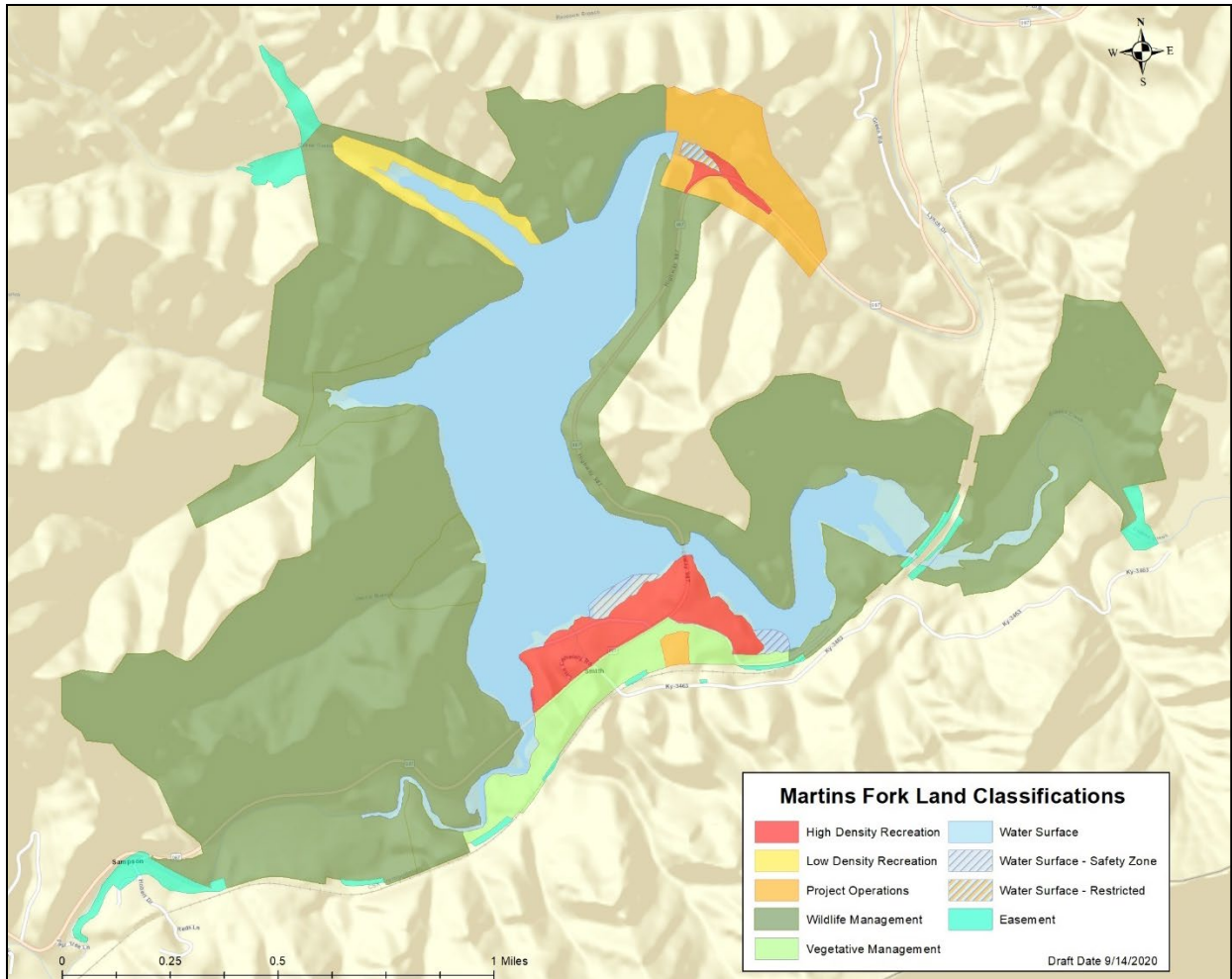


Figure 4.1 - Land and Water Classification Map of Martins Fork Lake

#### 4-02(a). Project Operations

This category includes those lands required for the dam, spillway, resource management and administrative offices, maintenance facilities, and other areas that are used solely for the operation of the project. While some reservoir operation functions fall outside the scope of the master planning process, designation of the portion of the project lands dedicated to supporting operations is an important part of the Master Plan. Uses that interfere with operational activities or compromise the safety and security of these areas cannot be allowed.

#### 4-02(b). High Density Recreation

This classification includes land developed for intensive recreational activities for the visiting public. Martins Fork Lake considers amenities to support “intensive” recreational activities to include features such as developed picnic areas, maintained swimming beaches, paved and developed boat launching facilities, waterborne bath houses, athletic fields, structures that support recreation, and other recreation-based developed facilities. At Martins Fork, these areas include Smith Recreation Area and Tailwaters Recreation Area.

#### 4-02(c). Environmentally Sensitive Areas

This classification includes areas where scientific, ecological, cultural, or aesthetic features have been identified. Designation of these lands is not limited to just lands that are otherwise protected by laws such as the Endangered Species Act, the National Historic Preservation Act, or applicable State statutes. These areas must be considered by management to ensure they are not adversely impacted. Limited or no development of public use is allowed on these lands. No agricultural or grazing uses are permitted on these lands unless necessary for a specific resource management benefit. There are no lands at Martins Fork Lake specifically designated with Environmentally Sensitive Classification. The large majority of wild lands in the area are managed by KYDFWR and their objectives include protection and consideration of natural and cultural values. The small footprint of this lake allows for the whole project to be viewed through a conservation lens and the steep topography and rural location make extensive development very unlikely.

#### 4-02(d). Multiple Resource Management Lands

This classification allows for the designation of a predominate use as described by one of the subclassifications below, with the understanding that other compatible uses described by other subclassifications within this category may also occur on these lands. (e.g. a Low Density Recreation trail through an area designated as Wildlife Management). Classification Maps and Plates, reflect the predominant sub-classification, rather than just Multiple Resource Management. Site-specific management objectives and compatible uses for areas are found in Chapter 5.

#### *4-02(d)i. Low Density Recreation*

Low Density Recreation lands are designated for dispersed and/or low-impact recreation use. Emphasis is on providing opportunities for activities that have minimal impact on the surrounding environmental resources, such as hiking, fishing, hunting, sightseeing, and nature study. Site specific, low-impact activities, such as primitive camping and picnicking, may also be allowed. Development of facilities on these lands is limited to gravel boat ramps, small gravel parking lots, unpaved trails, as well as rustic camping and picnic facilities (i.e., pit toilets, fire rings, and wood picnic tables). At Martins Fork Lake there are one area along the Cumberland Shadow Trail designated for low density recreation; Crane Creek.

#### *4-02(d)ii. Wildlife Management*

These lands are managed predominately for the stewardship of fish and wildlife resources. They contain valuable wildlife habitat components that are maintained to yield habitat suitable for designated game and non-game species and are jointly administered with the Kentucky Department of Fish and Wildlife Resources (KDFWR). Often vegetative management comes in the form of habitat management for these areas that support wildlife found at Martins Fork. The outgrant for management of these lands at Martins Fork encompasses nearly all the land acreage at Martins Fork.

#### *4-02(d)iii. Future or Inactive Recreation Areas*

Lands in this sub-classification are areas with site characteristics compatible with potential future recreational development or areas that are closed. Until these lands are developed by others or funding is obtained by the Corps, they will be managed for wildlife, vegetation, or low density recreation. If proposals for future development arise, further analysis of these sites would be conducted to ensure compatibility of proposed actions with statutory requirements. Management has designated these areas on Martins Fork based on appropriate terrain, road access, and absence of existing recreation facilities in the vicinity. No lands at Martins Fork are classified with future or inactive recreation as their primary management objective within multiple resource management, and the size and topography do not lend itself well to large developments. If a project of the appropriate size and scale arises, it may be discussed with local partners

*Table 4.1 - Land Classification approximate acreage based on GIS calculations*



Classification	Approximate Acreage	Percent of Fee Land (above normal pool)
Project Operations	48.1	5%
High Density Recreation	41.8	43%
Environmentally Sensitive Areas	0	0%
Multiple Resource Management Lands Low Density Recreation	17.1	2%
Multiple Resource Management Lands Future or Inactive Recreation	0	0%
Multiple Resource Management Lands Wildlife Management	916.1	86%
Multiple Resource Management Lands Vegetative Management	38.5	4%

#### 4-02(e). Water Surface

Martins Fork Lake has a surface water management program that designates the following four classifications: Restricted, Designated No-Wake, Fish and Wildlife Sanctuary, and Open Recreation. The KDFWR implements the water surface zoning plans at Martins Fork. The Corps partners with these agencies to administer and enforce these areas. Acreages for each water surface classification can be found in Table 4.2.

##### *4-02(e)i. Restricted*

These are water areas restricted for project operations, safety, and security purposes. This includes the waters directly adjacent to Martins Fork Dam as well as areas near designated swimming beaches.

##### *4-02(e)ii. Designated Safety Zone*

These water areas are designated for public safety, protection of environmentally sensitive shoreline areas, and defending recreational water access areas from disturbance. Typically, these areas are located around public boat ramps, busy recreation spots, and some narrow sections of the lake.

4-02(e)iii. *Fish and Wildlife Sanctuary*

These water areas have annual or seasonal restrictions to protect fish and wildlife species during periods of migration, resting, feeding, nesting, and/or spawning. No waters at Martins Fork are zoned for this purpose.

4-02(e)iv. *Open Recreation*

The remainder of the lake is open to recreational use. There is no specific zoning for these areas, but there is a buoy system in place to help aid in public safety. Buoys are maintained by the Martins Fork Lake Resource Office. Nearly all of the water surface at Martins Fork is zoned for recreation. Even though this water surface classification is “Open Recreation”, the size of Martins Fork Lake doesn’t accommodate fast moving vessels and for safety reasons, motorized boats are required to operate at idle or wakeless speeds.

Table 4.2 - Water Surface Classification approximate acreage based on GIS calculations

<b>Classification</b>	<b>Approximate Acreage</b>	<b>Percent of Fee Land (above normal pool)</b>
Restricted	1.7	1%
Designated No-Wake	6.4	2%
Fish and Wildlife Sanctuary	0	0%
Open Recreation	321	97%

### 4-03. Project Easement Lands

These are lands on which the Corps of Engineers holds easement interests, but no fee title ownership. The lands were acquired for specific purposes and do not convey the same rights or ownership to the Corps as other lands. The only type of easement found on Martins Fork is flowage easement, which covers 70 acres at the upper end of the reservoir. Typical management of flowage easement lands include surveillance to ensure that landowners do not construct habitable structures or place fill material within the easement. All activities within the flowage easement must be evaluated to guarantee compliance with the Nashville District Cut and Fill Policy, December 2002.

## Chapter 5 Resource Plan

This chapter further describes the specific management strategies by area and classification type for the lands and waters at Martins Fork. Each classification will be further described to include area names, managing agency, location, acreage resource objectives and developmental needs.

### 5-01. Recreation Areas

Areas included in this classification, 42 acres, are developed and managed for intensive recreational activities including campgrounds, day use/recreation areas, secondary access areas (i.e. boat ramps and overlooks), commercial marinas and state parks. High Density Recreation areas may be managed and operated by the Corps of Engineers or outgranted to another agency or private entity for management. These areas are managed primarily to meet the recreational and economic impact resource objectives identified in Chapter 3.

#### 5-01(a). Smith Recreation Area

Management Agency: Harlan County

Land Classification: High Density Recreation

Rationale: This area supports a classification of High Density Recreation because of the aesthetic qualities, existing recreational facilities, and convenient public access by vehicle

Location: This area is located on either side of Highway 987. The beach and group camp area are located on the north side of the highway. The launching ramp and adjacent Resource Manager's Office are located on the south side of the highway.

Description: This area consists of about 35 acres and supports high density recreation with facilities like a beach, playgrounds, a launching ramp, primitive camping space, and several picnic locations. This area has views of the beautiful hills that are indicative of Eastern Kentucky topography.

Area Use: This area receives heavy use from both water-oriented and land based activities. This area is frequented by swimmers, picnickers, boaters launching the boats, families playing on playgrounds or sports courts, and groups using the camping area.

Site-Specific Objectives:

- Provide lake access for fishing and boating
- Provide opportunities and facilities for land based recreation
- Improve tourism to the local community
- Provide outdoor physical activity opportunities to benefit community health

Development Needs:

- Update amenities like paving and repaving parking lots, updating picnic facilities, etc.
- Other development needs are dependent on Harlan County's development plans and feasibility within Corps regulations

**5-01(b). Tailwaters Recreation Area**

Management Agency: U.S. Army Corps of Engineers

Land Classification: High Density Recreation

Rationale: This area supports a classification of High Density Recreation because of the aesthetic qualities, existing recreational facilities, and convenient public access by vehicle

Location: Tailwaters Recreation Area is below Martins Fork Dam along Highway 987.

Description: This area consists of a 15 space parking lot and pathways for bank access to fish below the dam. Across the highway and further downstream there are some picnic sites and continued bank fishing access. There is a small pull off area at the trailhead to one end of the Cumberland Shadow Trail located in this area as well.

Area Use: This area is used by fishermen for bank access fishing and for hiking access to individuals getting on the Cumberland Shadow Trail.

Site-Specific Objectives:

- Provide safe fishing access
- Foster a peaceful setting for visitors to relax
- Encourage species success, especially in the waters around this area

Development Needs:

- Picnic shelter with shade for guests

- More facilities and pathways to accommodate universal accessibility

## 5-02. Multiple Resource Management – Low Density Recreation

These are lands with minimal development that support passive recreational use. There are 17 acres classified as Low Density Recreation on Crane’s Creek of Martins Fork. This area is managed primarily to meet the low impact recreational requests of the public usually using the WMA. Secondary management objectives are wildlife management, followed by vegetative management with the intent of encouraging public use of the wildlife management area.

### 5-02(a). Crane Branch

Management Agency: Leased for management to Kentucky Department of Fish & Wildlife Resources

Land Classification: Multiple Resource Management – Low Density Recreation

Rationale: This area supports a classification of Low Density Recreation because of the aesthetic qualities, proximity to wildlife management areas, presence of primitive campsites where the Cumberland Shadow Trail passes near the lake, and it is a point in the KDFWR lease where there is convenient road access.

Location: This area is located along the Crane Branch on the north side of Martins Fork Lake. Access is also available via Highway 991 (Three Point Road)

Description: Crane Branch Low Density Recreation Area borders the Crane Branch of Martins Fork Lake. It houses a designated primitive campsite along the Cumberland Branch Trail.

Area Use: Area is used primarily by hunters, hikers and outdoor enthusiasts as a convenient access point and a place of respite during their adventures.

Site-Specific Objectives:

- Provide lake access for fishing
- Provide opportunities and primitive facilities for land based recreation
- Provide convenient access for hunting and hiking

### Development Needs:

- Could be a good opportunity for low impact maintenance of primitive campsite and trail

## 5-03. Multiple Resource Management – Wildlife Management

These lands, approximately 916 acres, are designated for the management of wildlife and fisheries resources to meet the natural resource management objectives. The primary goal for these lands is to coordinate with state and federal agencies to actively manage and protect fish and wildlife populations and habitats and to provide recreational hunting and fishing opportunities. Wildlife management on Martins Fork Lake is conducted primarily by the Kentucky Department of Fish and Wildlife Resources (KDFWR). These lands are managed with secondary sub-classifications of low density recreation and vegetative management. Passive recreation like wildlife watching, hunting, paddling and hiking may occur in these areas. The plant communities in this area are critical to providing suitable habitat for native wildlife.

### 5-03(a). Martins Fork Wildlife Management Area

Management Agency: Leased for management to Kentucky Department of Fish & Wildlife Resources

Land Classification: Multiple Resource Management – Wildlife Management

Rationale: This area supports a classification of Wildlife Management because of the wildlife management activities to benefit animal communities, aesthetic qualities, and enjoyment of sportsmen and nature enthusiasts.

Location: The majority of the Corps Managed lands around Martins Fork Lake are designated as Wildlife Management.

Description: The steep topography around the lake offers prime wildlife habitat as well as challenging terrain for sportsmen and outdoor enthusiasts

#### Area Use:

- Provide quality habitat for wildlife populations
- Serve as available land for the hunting public

- Promote physical activity and outdoor enjoyment through hiking trails and undisturbed space.

Site-Specific Objectives:

- Provide public land hunting opportunities for the region
- Protect and enhance wildlife populations and habitats
- Provide quality outdoor experiences for visitors from around the region

Development Needs:

- Opportunities for volunteer trail maintenance
- Other management dependent on KDFWR WMA strategic objectives.

## 5-04. Multiple Resource Management – Vegetative Management

These approximately 38.5 acres, are designated for the management of vegetative resources to meet the natural resource management objectives. The primary goal for these lands is to foster ecosystem success through focus on plant communities. Vegetative management on Martins Fork Lake is conducted through a combination of active and passive practices and coordinated when applicable with other lake management partners. These lands are managed with secondary sub-classifications of low density recreation and wildlife management. Low impact recreation like wildlife watching and hiking may occur in these areas. The animal communities in this area thrive from native plant communities in the area.

Management Agency: U.S. Army Corps of Engineers

Land Classification: Multiple Resource Management – Vegetative Management

Rationale: This area supports a classification of vegetative management because of the passive and active vegetative management techniques used to enhance plant communities for the natural value of the ecosystem, the aesthetic enjoyment to guests, and the benefit to animal communities.

Location: This management area is located between Highway 987, south of Smith Recreation Area, and the old railroad tracks that denote the project boundary.

Description: This area is densely vegetated and allows for other passive activities such as wildlife habitat

Area Use: This area gets little human use and is primarily managed for plant communities and the animal communities that enjoy them.

Site-Specific Objectives:

- Preserve and encourage natural ecosystems
- Work to preserve native plant communities and eradicate invasives

Development Needs:

- Plant and encourage native and pollinator species
- Potential enhancement of passive recreation amenities

## 5-05. Project Operations Areas

These areas, 48 acres, include all restricted access zones around Martins Fork Dam (i.e. dam structure, warehouses, operations buildings, equipment areas and resource shop compound). The management goal for these areas is to provide basic safety and security of Corps' facilities to protect and ensure proper operations of the Project. Developmental needs for these areas include facility upgrades to meet Corps sustainability objectives.

## 5-06. Flowage Easement

The 30 acres of flowage easement on Martins Fork Lake were purchased to give the Corps of Engineers the right to inundate these lands during flood risk management operations to provide adequate storage capacity for flood waters. Typical management of flowage easement lands include surveillance and elevation marking to ensure that landowners do not construct habitable structures or place fill material within the easement. All activities within the flowage easement must be evaluated to ensure compliance with the Nashville District Cut and Fill Policy, December 2002.



## Chapter 6 Special Topics, Issues & Considerations

### 6-01. Cumberland Shadow Trail

Martins Fork Lake is home to the Cumberland Shadow Trail. This is an approximately five mile trail for use by hikers, backpackers, and horseback riders. The trail follows the shoreline of the lake and has several designated backcountry campsites for campers to enjoy. This trail was developed in by a collaboration of the Harlan County Conservation District, the U.S. Army Corps of Engineers, the U.S. Soil Conservation Service (now NRCS), and the Harlan County Fiscal Court.

### 6-02. Partnerships

Demands on public land resources and recreational facilities paired with declining budgets makes partnerships essential for the Corps's ability to provide safe and healthy recreation experiences. These may include working with our outgrantee partners at Smith Recreation Area and the surrounding wildlife management area, and using volunteers to perform various maintenance projects including trail enhancement. Future partnership and volunteer opportunities will be pursued in accordance with the USACE Natural Resources Management Strategic Plan.

### 6-03. Water Safety

With over 260 million annual visits nationally, the Corps is one of the largest federal providers of outdoor recreation. Since a large majority of these visitors engage in water related activities, water safety education is top priority. Nationwide, the Corps participated with other agencies concerned with water safety as far back as the early 1950s. The Corps in the Nashville District started an organization in 1951 that became the National Water Safety Congress. In the mid-1970s, the Chief of Engineers issued the first official directive for the Corps to amplify its water safety educational efforts after nearly 500 lives were lost at Corps lakes in a single year. In 1986, the Corps National Water Safety Program was started with a mission to increase public awareness of boating and water safety through educational materials and products.

With public safety as a primary concern, Martins Fork Lake implements the water safety program at the project level to reduce public accidents and fatalities through education, publicity, patrols on land and water and teamwork with partners. Education is provided through information in recreation areas, bulletin boards, posters, signs, banners, coloring books, and brochures. The water safety promotional materials provided by the HQUSACE

Water Safety Committee are used extensively to leave a lasting impression and physical message visitors can take home. Web pages (like the National Water Safety Congress and the National Safe Boating Council), fishing reports, and exhibits in the Resource Office provide educational information. The Martins Fork Lake staff routinely conducts water safety programs for schools, summer camps and various civic groups.

Publicity is provided through participation in special events such as boat shows, State Fairs, local festivals and parades, shoreline cleanups, and National Public Lands Day. News releases are issued through radio, TV and print media. Social media is also heavily utilized to disseminate the water safety message. The Martins Fork Lake staff also receives guidance from the Nashville District Water Safety Task Force on ways to promote water safety, share information and develop strategies for reducing public accidents and fatalities at Nashville District lakes, locks and dams.

#### 6-04. Tree Vandalism

Tree vandalism is the unauthorized removal of woody vegetation from public property. More specifically, the cutting of trees or the damage or removal of any vegetation for any purpose, including the creation of lake views, pruning, landscaping, mowing or under brushing, is a federal crime punishable under the provisions of Title 36 Code of Federal Regulations, Part 327.14.

Tree vandalism can damage or destroy necessary vegetative buffer zones resulting in the loss of wildlife habitat, increased erosion, reduced water quality and degraded view shed aesthetics. In the past, the Corps has worked closely with violators to restore the areas and/or collect monetary value of damages to protect the natural resources of the lake. However, prevention of tree vandalism is the Corps' primary objective in addressing this issue.

Anyone who observes or has knowledge of theft, vandalism, or any other threat or suspicious activity against Corps property is also encouraged to participate in the "Corps Watch" program, which is a nationwide crime-watch program developed to protect public property managed by the Corps of Engineers. Each year, millions of tax dollars are lost due to property damage from vandalism, larceny, arson, and environmental and cultural resource degradation. This program is designed to heighten public awareness of the impacts of crime within or around dams, lakes, locks, recreation areas, and other Corps of Engineers property and facilities.

## 6-05. Cultural Resources Vandalism

Some archaeological sites are present at Martins Fork Lake. Collecting artifacts and illegal excavation of sites is prohibited under Title 36 Code of Federal Regulations, Part 327.14 (Title 36) and the Archaeological Resources Protection Act (ARPA). In addition, the Archaeological Resources Protection Act also extends to historic resources over 100 years old, which includes buildings and structures. Archaeological sites, historic buildings, and historic structures are non-renewable resources. Once the resource is damaged and destroyed, information about the resource is lost forever. As the stewards of these resources, the Corps is responsible for protecting and managing cultural resources for future generations.

The value of archaeological sites derives from data and context. The relationship of artifacts to one another spatially within a site provides insight into past cultures. When artifacts are removed from those contexts through uncontrolled excavation, the context is lost and little meaning can be assigned to the artifacts. Moreover, looters tend to be interested in specific complete artifacts such as projectile points, pots, or items of personal adornment. In the search for artifacts that may be salable on the black market, looters frequently destroy middens, which may be rich with information relating to diet (such as charred seeds and bones), pot holes, which reveal information on houses, families, and structures, burials, and other data rich features. Metal detecting is equally disruptive, because digging the metal object from the ground destroys the context and removes the object from the site. In turn, any future investigations of the site would be missing important pieces of information that lead to reliable interpretations about the past.

Looting is an illegal, unethical, and selfish act that leads to the loss of public resource and incurs public expense. Looting is punishable under Title 36 and ARPA. Under ARPA, looting is a felony and a first offense may result in fines up to \$100,000 and one year in prison. A second offense may result in a maximum fine of \$500,000 and five years in jail. Alternatively, illegal looting activities may be prosecuted under Title 36. In addition to the expenses incurred relating to the prosecution, the Corps must act to inventory the site damage, stabilize damage sites to prevent further natural erosion and curate artifacts in perpetuity.

Citizens providing tips leading to the arrest and prosecution of offenders may be rewarded up to \$1,000. The Archaeological Resources Protection Act, Section 205 of the Water Resources

Development Act of 2000, and the Economy Act (31 U.S.C. 1535) authorize such awards. The “Corps Watch” toll free hotline at 1-866-413-7970 is available 24-hours-a-day to report theft, vandalism or any threat or suspicious activity against Corps property. Caller identity is protected and the proper authorities are notified. Legitimate excavations of archaeological sites are permissible by obtaining an Archaeological Resources Protection Act Permit. An ARPA permit application requires a research design, field methodology, curation agreement and supervision by an archaeologist that meets the Secretary of Interior’s qualifications for professional archaeologists (36 CFR part 61). Pursuant to Corps regulations, ARPA permit applications are reviewed by the Resource Manager’s office, coordinated with other elements of the District office as to the availability of civil lands for the permit activity by the District Real Estate Branch and the Cultural Resource Management staff will perform technical review, but may require additional reviews and consultation with Tribes.

#### **6-06. Metal Detecting**

Due to the potential to destroy archaeological sites and other natural resources, metal detecting is permitted in designated use areas only. The designated metal detecting use areas for Martins Fork Lake are the sand beach and playground areas within the Smith Recreation Area. Metal detecting is prohibited in all other terrestrial and marine areas of Martins Fork Lake. As discussed in the previous section about Cultural Resources (Chapter 6-06).

#### **6-07. American Bald Eagle**

The Bald and Golden Eagle Protection Act (16 U.S.C. 668-688d) prohibits the taking of eagles, and provides criminal penalties for any person who takes, possess, sell, purchase, barter, offer to sell, purchase or barter, transport any bald or golden eagle, alive or dead, or any part, nest, or egg without a permit. The Department of Interior’s Morton Policy, issued in 1975 by then Secretary of Interior Rogers C.B. Morton, provides certain exemptions for enrolled members of federally recognized tribes. On October 12, 2012, the Attorney general of the United States reaffirmed the Morton Policy. Pertinent to Martins Fork Lake, enrolled members of federally recognized tribes may acquire “from the wild, without compensation of any kind, naturally molted or fallen feathers of federally protected birds, without molesting or disturbing such birds or their nests.” The Corps works with Tribal Partners to coordinate collections that meet the terms of the Morton Policy to assist with their ability to meaningfully practice their religions

and preserve their cultures.

## 6-08. Boundary Line Disputes

The beautiful scenery afforded by lakes such as Martins Fork can attract home development near project boundaries, the danger of encroachments from private property onto Corps land requires continuous monitoring and surveillance. These possible encroachments could have a damaging effect on the resources of Martins Fork Lake. In order to discourage damaging activity, annual remarking of sections of the project boundary line are done on a yearly rotation, in accordance with the Martins Fork Maintenance Contract specifications. The Nashville District's policy is that the marked government boundary has been in place for a sufficient time that we will no longer accept challenges to it. Project personnel can assist in identifying the marked boundary, which will be considered the definitive demarcation between Corps property and adjacent private or other non-Corps lands. The government boundary line has been surveyed, marked, and periodically remarked for over 50 years. Title 28, U.S. Code Section 2409(n) states that: "Nothing in this section shall be construed to permit suits against the United States based upon adverse possession." Encroachments identified on public property will be handled according to procedures identified in ORD 405-2-11, Real Estate Encroachments, ORD 1130-2-30, Trespasses on Public Lands, and Policy Guidance - U.S. Army Corps of Engineers Boundary Management and Encroachment Resolution (10 May 2019). Encroachments are generally required to be removed at the owner's expense.

## 6-09. Nashville District Guidelines and Policy for Cut and Fill Proposals

Drafted in December, 2002, this document provides formal guidelines and coordination procedures to evaluate cut and fill placement proposals on Corps of Engineers fee or flowage easement lands within the Nashville District. Typically, flowage easement estates contain restrictions that prohibit the construction of habitable structures. These restrictions also prohibit the placement of any other structure, including fill material, without the approval of the District Engineer. Generally, no fill material will be allowed below the top of the flood control pool (1341 feet MSL) unless alternate storage volume is provided within same general elevation band. Martins Fork Lake provides water storage and mitigates flood damage downstream, making any fill in the pool an unviable option without, and some cases regardless

of, equal offset. All requests for cut and fill placement shall be submitted in writing to the Resource Manager. The Resource Manager will then submit the complete proposal to the Natural Resource Management Branch for routing to the appropriate offices.

## 6-10. Paddlesports

Paddlesports (canoes, kayaks, paddle boards etc.) have become more and more popular over the last few years at Martins Fork Lake and across the country. In a 2019 report by the Outdoor Foundation in collaboration with the American Canoe Association (The Outdoor Foundation, 2019) shows that kayaking and stand up paddle boarding in particular have seen a remarkable increase in popularity. Some of the appeal of paddlesports includes the ability to enjoy and access waters close to home, as well as the lower cost of participation (as compared to motorized boating). Martins Fork Lake's size and scenic terrain lends itself well to non-motorized boating and is a great recreational asset to Harlan County and surrounding communities.

## 6-11. ATVs

WMA Areas and government lands are frequently used for All Terrain Vehicle (ATV) use, despite area prohibitions on operating on Federal lands. While enjoyable for some, the overall impact to the project from prohibited ATV use leads to erosion issues and noise disruptions to both wildlife populations and other visiting public. All Terrain Vehicle (ATV) use at the project must be in compliance with USACE Title 36 section 327.2 Regulations, and all Federal, State, and Local laws. The operation and/or parking of a vehicle off authorized roadways is prohibited. Additionally, KDFWR restricts ATV use except for in specifically designated areas.

## 6-12. Unmanned Aerial Systems

The use of unmanned aerial systems (UAS), also known as drones, has become increasingly popular. However, due to the potential breaches of security in and around critical infrastructure (locks, dams, power plants, and switch yards) and user conflicts at recreation areas, the Nashville District passed a policy in 2016 limiting the use of UAS by the public at Corps projects. According to the policy, UAS operation for hobby, recreational, and/or commercial purposes is prohibited unless authorized by the District Commander. Corps'

regulations regarding the public and commercial operation of aircraft, including UAS, is contained in 36 CFR, Chapter III, Part 327.4, Aircraft. Due to these limitations, no operation of UAS is permitted at Martins Fork Lake. Operators who wish to request exceptions to the policy, or for commercial use must contact the Martins Fork Lake Resource Manager's Office.

DRAFT

## Chapter 7 Agency and Public Coordination

### 7-01. September 10, 2020 – Stakeholder Meeting

#### ADMINISTRATIVE RECORD MARTINS FORK LAKE MASTER PLAN REVISION

CELRN-OPE-MR

10 September 2020

SUBJECT: Martins Fork Lake MP Revision – Stakeholder Meeting  
Meeting Minutes Memorandum

Purpose: Initial gathering with stakeholder organizations to explain the Master Plan process and garner feedback from their organizations.

1. The following participants attended the meeting:

List attendees	Attendees contact info and office
Dave Robinson	U.S. Army Corps of Engineers
Allison Walker	U.S. Army Corps of Engineers
Sue Bush	U.S. Army Corps of Engineers
Gary Grant	Kentucky Division of Forestry
Kaitlin Berry	Kentucky Division of Mine Reclamation and Enforcement
Jason Russell	Kentucky Department of Fish & Wildlife Resources
Kevin Frey	Kentucky Department of Fish & Wildlife Resources
Brandon Pennington (virtual)	Harlan Tourist & Convention Commission
Mike Strunk (virtual)	Kentucky Department of Fish & Wildlife Resources
Dan Mosley	Harlan County
Brian Mangrum (virtual)	U.S. Army Corps of Engineers
Kyle Clark	Kentucky Department of Fish & Wildlife Resources

#### 2. Meeting Minutes

A. Discussion Items:

a. **Item one.** Welcome and Introductions



- b. **Item two.** Dave gives an overview of the project
- c. **Item three.** Allison gives an overview of the Master Plan process
- d. **Item four.** Open discussion
  - i. Can the speed on the lake be higher than wakeless/idle? *The size of the lake has historically dictated the lower speeds for safety. In recent years the lake has become more popular with kayakers and other paddle sports and increasing the motor speed may make it less safe for paddlers on a small surface area. The shoreline being close on all sides, lake banks might experience tremendous erosion from increased boat speed.*
  - ii. Lots of requests for more camping at Martins Fork. Any possibility of that? *Camping in the Smith Recreation Area would be decided by Harlan County. Encouraging more primitive camping in the wildlife areas may be a conversation with KYDFWR. It's a double edged sword on limited budgets to maintain and clean up after campers that might not pack their trash out. Perhaps look at charging fees*
  - iii. Wouldn't mind seeing creative ways to manage unauthorized ATV use on the project
  - iv. Would like to see partnerships to help maintain the Cumberland Shadow Trail
  - v. Would like to think of ways to cut down trash left by visitors or programs encouraging "pack it out" actions by visitors
- B. Data requests/Action Items:
  - a. Item. Any action plans or long term strategic plans from stakeholder organizations
  - b. Item. Specific assistance from partner organizations based on their areas of expertise to be solicited
- C. Plan Forward
  - a. Stakeholder input by the end of October
  - b. USACE will put together a "draft final" and reach out to stakeholders for another review and in person meeting if necessary
  - c. Public meeting proposed for early 2021

Disclaimer

This document is not intended as an exact translation but is intended to address generalized topics of discussion covered during the meeting.

Submitted 11 September 2020

PREPARED BY: Allison Walker, Tel: 615.736.7988

## 7-01(a). Stakeholder Comments and Responses from Harlan Tourism

***Has the lake ever considered installing disc golf around the recreation area? It's a rather inexpensive fun sport to partake in and was seeing rapid growth in park system across the United States in the last few years especially for youth. It would just be another activity that could be fun while getting our visitors and locals alike out and enjoying the lake and the grounds that surround the lake.*** I've heard of disc golf courses having a lot of draw to visitors. The Corps is restricted in spending funds on recreation, so any addition of a disc golf course in the Smith Recreation Area would need to be created by Harlan County, but there would be no foreseeable issues from the Corps as long as the plans were safe for the public and natural and cultural resources. There is likely room in the current Smith Recreation Area lease area and also room for a "shorter/smaller" course in the open area around the Lake office complex. Of course, any potential changes to the SRA area should be first routed through the County Judge Executive. Any additions to the Corps managed areas would be coordinated through the Lake Office.

***Another low hanging fruit would be geocaching. We placed some around Harlan County with some students a few years ago and it costed us less than \$60 to place about 7 caches. The only concern about it is if folks don't have cell service it is a little trickier to hunt the caches - which leads me to the next item:*** Geocaching is also another great idea for a "low-impact" and very inexpensive recreation opportunity at Martins Fork. There is still one active Boy Scout Troop in Harlan that may be a potential partner in this. There may be other community organizations that would be interested in helping to develop this as well. However, cell service is somewhat limited at Martins Fork Lake. Appalachian Wireless is the only available provider here. This project may be enhanced if there was better service available to the area and that may become a reality down the road. This is something the lake staff and/or county folks could work with.

***Has the lake ever considered installing WIFI points? I know personally that I don't have service around Martins Fork Lake but some public WIFI points could inspire more people to utilize the facilities. It could also help serve as a point for safety for the lake for those who do not have cell service there. You would be able to make WIFI calling or shoot texts off in an emergency.*** This has been a difficult topic from the Corps perspective because of the IT

requirements and restrictions to public access on internet networks housed by the Department of Defense. But it is something that the project would be interested in partnering with another entity if the right opportunity was available. Recently Harlan County Schools established a mobile WIFI hot spot in the area to allow children to do schoolwork remotely and have a place to get free internet access. Perhaps there's a partnership available that could make that happen.

***Concerning Cumberland Shadow Trail - I have never taken this trail but I would like to. However, I have looked up reviews online for the trail itself and spoken to some folks who have hiked it and one of the recommendations we have heard is that more signage would be ideal for the trail.*** Signs have recently been ordered for the trailheads at the dam and above the lake office. Martins Fork Lake has worked with scout groups in the past for trail maintenance/upkeep, etc. The lake staff is able to do limited improvements/maintenance with our current budget and manpower and would be happy to work with anyone wanting to promote/improve the Cumberland Shadow Trail experience, including working on signage.

***The other suggestion I would have is a little more signage for guidance on the hiking, picnicking, camping, etc. I think you can never have enough signage - we are in desperate need of it in Downtown Harlan as well for way finding. I think with clear and concise signage that says you may camp in these designated areas, you may rent the shelters by calling this number, etc. it would make some folks more comfortable with those activities in the recreation area.*** Great suggestion. Harlan County is copied so he can see suggestions for the Smith Recreation Area. Improving signage in other areas is something that could certainly be included in the Master Plan section for management by areas and planned for on the ground implementation.

***Of course, I would love to suggest something like a floating play park but I realize the liability on that would be astronomical and the funding is likely not allocated for something of that nature. I think that there are multiple ways for our organization and the lake to be stronger partners in events as well that I've talked to Dave about before such as hosting events like "Jaws on the Water" on the lake but unfortunately we were not able to do it due to a unforeseen expense on our end. But I think those types of events exist and we can capitalize on them in the future.*** At this time, you're right, those bigger scale items aren't options for the Corps for safety reasons and also we aren't able to spend federal funds for those types of

items. But keeping communication open and ideas flowing will help us keep building on momentum in the future.

7-02.

## Chapter 8 Summary of Recommendations

8-01. Significant Changes in the Revision of the Master Plan

8-02. Summary of Classification Changes

1980 MP Site Number (and Name)	2021 MP Revision Site Number (and Name)	1980 Classification	2021 Classification	Notes
Harris Branch	unnamed	Low Density Recreation	Multiple Resource Management – Wildlife Management	Area no longer managed with low density recreation as its primary objective
Board Branch	unnamed	Low Density Recreation	Multiple Resource Management – Wildlife Management	Area no longer managed with low density recreation as its primary objective
unnamed	Crane Creek	Wildlife Management (undesignated)	Multiple Resource Management – Low Density Recreation	Area offers primitive camping for guests to the Cumberland Shadow Trail
Unnamed area west of Smith Recreation Area	Smith Recreation Area (expansion)	Low Density Recreation	High Density Recreation	Area was included in the management agreement in 1980
Portion of tract MAR-200-1, south of the highway	unnamed	Low Density Recreation	Multiple Resource Management – Wildlife Management	Area is in the KYDFWR WMA and is reclassified to wildlife management

<b>1980 MP Site Number (and Name)</b>	<b>2021 MP Revision Site Number (and Name)</b>	<b>1980 Classification</b>	<b>2021 Classification</b>	<b>Notes</b>
Portion of tracts MAR-132 and MAR-129-1, along inflow from Cranks Creek	unnamed	Low Density Recreation	Multiple Resource Management – Wildlife Management	Area is in the KYDFWR WMA and is reclassified to wildlife management
Area south of the highway and south of Smith Recreation Area	unnamed	Low Density Recreation	Multiple Resource Management – Vegetative Management	Area is outside WMA and not actively managed fr

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## Chapter 9 Bibliography

- Cumberland River Compact. (2019, November). *Cumberland River Compact - Upper Cumberland Watershed*. Retrieved from Cumberland River Compact:  
[https://cumberlandrivercompact.org/wp-content/uploads/2019/11/040716\\_CRC\\_UpperCumberland-Watershed.pdf](https://cumberlandrivercompact.org/wp-content/uploads/2019/11/040716_CRC_UpperCumberland-Watershed.pdf)
- Karwedsky, R. (1982). *Cultural Resources Reconnaissance, Channel excavation, Martins Fork of Cumberland River, Harlan County, Kentucky*.
- Karwedsky, R. (1983). *Cultural Resources reconnaissance of Martins Fork Lake Tract 200-2, Harlan County, Kentucky*.
- Kentucky Heritage Council. (2008). *Kentucky Heritage Council*. Retrieved July 22, 2020, from The Archaeology of Kentucky: An Update. State Historic Preservation Comprehensive Plan Report No. 3, Vols 1 & 2: <https://heritage.ky.gov/Documents/TheArchaeologyofKYAnUpdateVol1.pdf>  
<https://heritage.ky.gov/Documents/TheArchaeologyofKYAnUpdateVol2.pdf>
- OMBIL. (2017). *U.S. Army Corps of Engineers, Operations Management Business Information Link (OMBIL)*. Retrieved from <https://ombil.usace.army.mil/>
- Purvis, G. T. (1980). The U.S. Army Corps of Engineers Recreation Resource Management Challenges. *National Outdoor Recreation Trends Symposium*. Durham, NH.
- The Outdoor Foundation. (2019). *Paddlesport Statistics & Reports*. Retrieved September 2020, from 2019 Special Report on Paddlesports & Safety:  
[https://cdn.ymaws.com/www.americancanoe.org/resource/resmgr/sei-educational\\_resources/2019\\_Special\\_Report\\_on\\_Paddl.pdf](https://cdn.ymaws.com/www.americancanoe.org/resource/resmgr/sei-educational_resources/2019_Special_Report_on_Paddl.pdf)
- U.S Army Corps of Engineer, Nashville Real Estate Division. (1972). *Martins Fork Lake - Cumberland River Basin Design Memorandum No. 5, Real Estate for Entire Project*. Nashville, TN.
- U.S. Army Corps of Engineers. (2020, January 30). *U.S. Army Corps of Engineers*. Retrieved from Environmental Operating Principles:  
<https://www.usace.army.mil/Missions/Environmental/Environmental-Operating-Principles/>
- U.S. Army Corps of Engineers, CECW-EC. (2018, August 31). EC 1110-1-109: Acquisition and Operation of Unmanned Aircraft Systems (UAS) Technology. Retrieved June 25, 2020, from  
<https://gateway.erd.c.dren.mil/nrm/uas/EC%201110-1-109.pdf>
- U.S. Army Corps of Engineers, CELRN-OP-R. (2016, July 18). Memorandum: Recreational Operation of Unmanned Aircraft Systems (UAS) By Members of the Public at Nashville District Projects.
- U.S. Army Corps of Engineers, Nashville District. (1980). *Martins Fork Lake - Master Plan Design Memorandum No. 6B*. Nashville, TN.

- U.S. Army Corps of Engineers, Nashville District. (2017). *Martins Fork Water Control Manual*. Hydrology and Hydraulics Section.
- U.S. Army Corps of Engineers, Nashville Real Estate Division. (1971). *Martins Fork Lake - Design Memorandum No. 3, Guide Line for Land Acquisition*. Nashville, TN.
- U.S. Environmental Protection Agency (EPA). (2018, March 17). *U.S. Environmental Protection Agency*. Retrieved from Ecoregions: <https://www.epa.gov/eco-research/ecoregions>
- U.S. Forest Service. (1952). *Forest Statistics of Eastern Kentucky*. doi:[https://www.fs.fed.us/nrs/pubs/CSFES\\_forest\\_survey\\_release/csfes\\_forsurvrel-12\\_1952.pdf](https://www.fs.fed.us/nrs/pubs/CSFES_forest_survey_release/csfes_forsurvrel-12_1952.pdf)
- University of Kentucky - College of Agriculture, Food and Environment. (2020). *Kentucky Cooperative Agricultural Pest Survey*. Retrieved from <https://ky-caps.ca.uky.edu/>
- USDA Natural Resources Conservation Service. (2020, March 10). *USDA NRCS Web Soil Survey*. Retrieved from <https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>
- Warholic, D. T., & Dorwin, J. T. (1970). *Archaeological Reconnaissance of the Proposed Martins Fork Reservoir, Kentucky*.
- Weather Spark*. (2020). Retrieved from Average Weather in Harlan, Kentucky: <https://weatherspark.com/y/16346/Average-Weather-in-Harlan-Kentucky-United-States-Year-Round>

## Appendices

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