US Army Corps of Engineers®

# DRAFT ENVIRONMENTAL ASSESSMENT
# J. STROM THURMOND PROJECT MASTER PLAN

## US ARMY CORPS OF ENGINEERS
## SAVANNAH DISTRICT

McCormick and Abbeville Counties in South Carolina; and Columbia, McDuffie, Warren, Wilkes, Lincoln, and Elbert Counties in Georgia

**November 2021**

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### 1.0 INTRODUCTION

The U.S. Army Corps of Engineers (USACE), Savannah District (SAS), has prepared this Environmental Assessment (EA) to evaluate the potential impacts of updating the J. Strom Thurmond Project (Thurmond Project) Master Plan (MP). This EA has been prepared in accordance with the National Environmental Policy Act of 1969 (NEPA) and the Council on Environmental Quality's (CEQ) Code of Federal Regulations (40 CFR 1500-1508), as reflected in the USACE Engineering Regulation (ER) 200-2-2. This EA provides sufficient information on the potential adverse and beneficial environmental effects to allow the SAS District Commander to make an informed decision on the appropriateness of preparing an Environmental Impact Statement (EIS) or signing a Finding of No Significant Impact (FONSI).

### 1.1 Proposed Action

The proposed action consists of updating the MP which is required for civil works projects and other fee-owned lands for which USACE has administrative responsibility for management of natural and manmade resources. The current Thurmond Project Master Plan is dated 1995. The changes proposed to recreation facilities, land classifications (Appendix A), and natural resources management practices as detailed in the MP are consistent with ER 1130-2-550 dated 30 January 2013.

Potential changes from the 1995 Master Plan include the addition of a proposed marina at the north end of the lake, satellite marina operations for Soap Creek and Savannah Lakes Marinas, and more active forest management techniques at Bussey Point, to include longleaf pine restoration, thinning operations, and gradual conversion of areas from pine to hardwood. All proposed changes to recreation facilities, including the addition of marina and satellite marina facilities, will occur in areas previously designated for high-density recreation. Improvements within USACE-operated parks and campgrounds include the addition of more parking, improved/realigned roads for better traffic flow, additional campsites and attendant camp pads, playgrounds, beaches, new fishing piers, tournament weigh stations, disc golf course, shelters, boat ramps, amphitheaters, restroom facilities, utility upgrades, trail improvements, invasive species control, and erosion control/shoreline stabilization.

Potential changes within lease areas include the addition of campsites, cabins, and yurts in parks and marinas, new hotel/convention center and restaurant facilities at Hickory Knob State Park and Wildwood Park, restaurants at Raysville and Clarks Hill

Marinas, additional restroom/bathhouse facilities in marinas and parks, disc golf and miniature golf courses, outdoor education center, amphitheaters/group shelters, trails, beaches, boat ramps, fishing piers, additional dry storage and wet slips at marinas, playgrounds, confidence courses, equestrian campground, and swimming pools. Improvements to existing facilities include restaurant expansion, utility upgrades, trail improvements, invasive species control, and erosion control/shoreline stabilization.

All potential improvements, as well as natural resource management actions, will be reviewed for compliance with the Endangered Species Act, the Fish and Wildlife Coordination Act, the National Historic Preservation Act (NHPA), the Clean Water Act, in accordance with ER 200-2-2, Procedures for Implementing NEPA, and will be addressed by the appropriate categorical exclusion at the time of implementation. For details on site specific improvements, see Appendix B.

In general, the recreation facilities listed in Table 1 may be considered for development within existing high-density recreation areas without an additional addendum or modification to the MP or an additional EA. A lessee must submit detailed plans prior to approval of such facilities. Engineer approved plans may be required and a market and feasibility analysis may be required for larger, revenue producing facilities. All state and local ordinances and laws apply. Prior to construction, an endangered species survey will be conducted in accordance with the Memorandum of Agreement (MOA) between the USACE, Savannah District, and the U.S. Fish and Wildlife Service (USFWS), dated July 2010. Cultural resources information will be reviewed to assure these resources are protected. Section 404 permits may be required for certain water-based construction. Generally, habitable structures will not be authorized below 346’ above mean sea level (amsl) elevation, the maximum flood surcharge.

In addition to changes in USACE and leased recreation areas, 277 easements for roads and utilities cross public land at Thurmond Project. Easements are renewed on a regular basis and new easements are issued for utilities to serve recreation areas and adjoining private customers. All easements are reviewed for compliance with NEPA in accordance with ER 200-2-2, the USACE Non-Recreational Outgrant Policy and all pertinent environmental laws and regulations. Issuance of easements is addressed in accordance with a categorical exclusion for real estate grants for rights-of-way.

The MP provides a programmatic approach to the management of all the lands included within the Thurmond Project boundary and serves as the basic document guiding USACE responsibilities pursuant to Federal laws to preserve, conserve, restore, maintain, manage, and develop the projects lands, waters, and associated resources.

The MP is a planning document anticipating what could and should happen and is flexible based upon changing conditions. Detailed management and administration functions are handled in the Operational Management Plan (OMP), which translates the concepts of the MP into operations terms.

**Table 1: Potential Recreational Facilities Development**

PUBLIC PARKS

| | |
|---|---|
| Facilities approved on the lease development plan | Replacement, relocation, and/or modernization of existing facilities not to exceed 10% of the original facility's footprint |
| Campsites not to exceed 25% of the existing number of campsites | Picnic Sites not to exceed 50% of the existing number of picnic sites |
| Yurts not to exceed 25% of the existing number of campsites/yurts sites combined | Portable or fixed mini cabins not to exceed 25% of the existing number of campsites/yurts sites combined. |
| Sanitary facilities necessary to meet existing or expected demand including restrooms, shower houses, septic systems, and RV dump station | Conversion of picnic areas to campgrounds or campgrounds to picnic areas |
| Picnic shelter not to exceed 200-person capacity | Amphitheater not to exceed 250-person capacity |
| Designated parking lot(s) not to exceed 100 spaces | Disc golf course not to exceed 25 acres in size |
| Archery or skeet range not to exceed 25 acres in size | Additional lanes to existing boat ramps. Realignment of roads to improve safety and traffic flow at boat ramps |
| Playground(s) | Park office or gate house |
| Restaurant | Hiking, biking, interpretive, fitness, endurance, or equestrian trails or zip lines/high ropes courses |
| Courtesy dock, fishing pier | Park attendant/camp host sites |
| Fish cleaning station | Swim beach(s) |
| Shoreline erosion control | Game court, ball field |
| Camp store not to exceed 1,000 square feet | Designated pet friendly areas |
| Interpretive center | Splash pad/mini water park not to exceed one acre |

PUBLIC MARINAS

| | |
|---|---|
| Facilities approved on the lease development plan | Replacement, relocation, and/or modernization of existing facilities not to exceed 10% of the original facility's footprint |
| Additional wet slip, dry stack, or open boat storage not to exceed 25% of the approved total of boat storage opportunities | Marina office, ships store or gate house |
| Sanitary facilities necessary to meet existing or expected demand including restrooms, shower houses, septic systems, and marine pump out station | Picnic shelters not to exceed 200-person capacity |
| Amphitheater not to exceed 250-person capacity | Marine service and sales facility not to exceed 1 acre |
| Playground(s) | Fish cleaning station |
| Courtesy dock, fishing pier | Restaurant |

## 1.2 Purpose and Need for the Proposed Action

The last Thurmond Project MP update was finalized in June 1995. Over the past 25 years, changes have occurred that warrant updating the MP. These include changes in policy, changes in regulations, increases in economic and community growth, changes in recreational use patterns, and changes in natural resources management practices. Pursuant to ER 1130-2-550, the objective of the updated MP is to provide a strategic land use management document to guide the comprehensive management and development of all recreational, natural, and cultural resources for the next 10 to 20 years.

The proposed MP update meets the following goals:

- Incorporates updates to policies and regulations pertaining to the management and future development of Thurmond Project.

- Provides the best possible combination of responses to national objectives, regional needs, resource capabilities and suitability, and expressed public interests and desires consistent with authorized project purposes.

- Addresses changes in land uses, recreational uses, and natural resources management activities.

- Protects and manages project natural and cultural resources through sustainable environmental stewardship programs.

- Recognizes the particular qualities, characteristics, and potential of the project and provides for the orderly and timely development of recreation facilities by lessees and USACE.

- Ensures that program management actions are based on current information and regulations through collaboration.

The MP guidance includes revised categories of Land Classifications used to define project lands. All lands were acquired for authorized project purposes and allocated for these uses. The classification process is a further distribution of project lands by management categories which, based upon resources available and public needs, will provide for full utilization while protecting project resources. The guidance also includes requirements for an interdisciplinary team approach for updating the MP. Coordination with other agencies, stakeholders and the public is an integral part of the MP process. Thurmond Project consists of approximately 79,588 acres of land and 70,714 acres of water. The revised MP classifies Project lands based on the following primary uses as summarized in Table 2.

**Table 2: Land and Water Classifications**

| **Land Classification** | **Acres** |
|---|---|
| Project Operations | 647.4 |
| High-density Recreation | 13,890.8 |
| Public Recreation Areas | 11,627.8 |
| Quasi-Public Recreation Areas | 935.3 |
| Private Clubs | 26.3 |
| Special Use Areas | 1,301.4 |
| Mitigation Lands | 6,882.8 |
| Environmental Sensitive Areas Above 330’ amsl (includes islands) | 2,419.8 |
| Cultural Resource Sites, Cemeteries, Buffer* | 1,654.5 |
| Plants of Concern* | 137.2 |
| Multiple Resources Management Lands | 55,746.7 |
| Low-density Recreation | 9,538.2 |
| Wildlife Management | 46,208.5 |
| Closed/Future Recreation Areas | 0 |
| Vegetative Management | 0 |
| **TOTAL LAND** | **79,587.5** |
| **Surface Water Classification** | |
| Restricted | 135.0 |
| Designated No-Wake | 852.4 |
| Fish and Wildlife Sanctuary | 0.0 |
| Sensitive Areas | 574.1 |
| Open Recreation | 68,969.0 |
| River | 183.2 |
| **TOTAL WATER** | **70,713.7** |

Within the vicinity of Thurmond Project, land use is primarily forest and agriculture, while residential development is primarily low-density and scattered. There are 91 subdivisions around Thurmond Lake. There are also 42 private club sites around the lake. There are 63 subdivisions/clubs in Lincoln County, 34 in McCormick County, 27 in Columbia County, six in Elbert County and three in McDuffie County. These developments impact the economy of the surrounding counties.

The MP serves three primary purposes that are equal in importance. First, it is the primary management document for the project and provides direction for many of the other plans that also guide the management of Thurmond Project. Second, it is a land use management tool. This MP will be utilized to update many of the resource management plans as needed such as the OMP. Third, the MP provides for the environmental assessment and public review necessary for facilities and activities proposed in the MP.

As a land use tool, this MP provides USACE and the public with the current classification and preferred future uses of project lands. The land classification maps of project lands allows USACE and the public to visually evaluate the distribution of uses of project lands. For example, the identification of project lands that are suitable for the development or expansion of recreation facilities by USACE or a lease holder is beneficial. Maintaining an up-to-date MP allows USACE to respond effectively to development plans made internally or by outside parties.

The MP includes a Geographic Information Systems (GIS) database. Management can continually update the database throughout the life of the plan to allow USACE to take proactive management actions and adapt existing strategies. Acreages were calculated using best available GIS technology and may vary from acreages in prior MP or official land acquisition records.

The policy-based MP, along with this EA, provide USACE with a document that sets goals and objectives but does not establish concrete development plans. This allows USACE flexibility in the management and development of Thurmond Project, within a clear policy framework.

## 1.3 Authority

The initial construction of Thurmond Project was authorized as part of the Rivers and Harbors Act of 1927 (Public Law 71-520). This act authorized USACE to investigate existing and prospective development on various streams throughout the nation for the purposes of navigation, power development, flood control, and irrigation. This authorization was embodied in House Document 308, 69th Congress, first session. Savannah District completed a report on the entire Savannah River Basin in May 1933. This document recommended against any U.S. Government flood control project for the river. Two locations, however, were proposed as likely sites for future power dams in

the upper Savannah River Basin: Clarks Hill (Thurmond) and Hartwell. Thurmond Project was authorized as a multipurpose dam and reservoir as part of Public Law 78-534, passed on 22 December 1944.

Section 864 of the Water Resources Development Act of 1986 (Public Law 99-662) was modified to include recreation and fish and wildlife management as Thurmond Project purposes. Project lands which are managed or reserved as of the date of the enactment of said law for the conservation, enhancement, or preservation of fish and wildlife and for recreation shall be considered as lands necessary for such purposes.

On December 22, 1987, President Ronald Reagan signed into law legislation (Public Law 100-209) which changed the name of Clarks Hill Dam, Lake and Highway to J. Strom Thurmond Dam, Reservoir, and Highway in honor of the senior Senator from South Carolina.

Pursuant to ER 1130-2-550, an MP is required for civil works projects and other fee-owned lands for which USACE has administrative responsibility for management of natural, recreational, and cultural resources throughout the life of the water resource project.

## 1.4 Description of Project Area

Thurmond Project is located on the Savannah River 22 miles upstream from Augusta, Georgia. The project is near the southeastern margin of the Piedmont Plateau Region, and compromises parts of McCormick and Abbeville counties in South Carolina; and parts of Columbia, McDuffie, Warren, Wilkes, Lincoln, and Elbert Counties in Georgia. The 70,714-acre reservoir has a shoreline of approximately 1,166 miles and an additional 79 miles of island shoreline, with the entire project comprising approximately 150,301 acres of public land and water. This data is based on 2017 LIDAR data and differs from shoreline data reported in previous master plans and shoreline management plans.

Thurmond Dam impounds a lake that stretches nearly 37.8 miles up the Savannah River to Russell Dam, 44.5 miles up Little River, Georgia and 19.7 miles up Little River in South Carolina. Other main tributaries include Long Cane Creek (6.9 miles), Benningsfield Creek (3.7 miles), and Hawe Creek (3.5 miles) in South Carolina; and Broad River (6.1 miles), Soap Creek (8.6 miles), Fishing Creek (9.5 miles), Keg Creek (6.4 miles), Pistol Creek (4.0 miles), Germany Creek (4.1 miles), Lloyd Creek (4.7 miles), Grays Creek (4.6 miles), and Murray Creek (3.2 miles) in Georgia. At full pool, there are over 300 islands in the reservoir ranging in size from 0.10 acre to 43 acres. There are also numerous islands less than 0.10 acre in size.

Thurmond Project has a 380-megawatt capacity hydropower facility and 1,045,000 acre-feet of usable storage capacity and approximately 70,714 surface acres of water at a normal pool elevation of 330 feet amsl. The project was the first of three USACE projects built in the Savannah River Basin and it was constructed from 1946 through

1954. Filling of Thurmond Project began in July 1951 and was completed in October 1952. The power plant began commercial operation in November 1952.

The authorized purposes of Thurmond Project are to provide flood control, fish and wildlife habitat, water quality enhancement, water supply, navigation, recreation, and hydroelectric power. The project has 18 feet of conservation storage from an elevation of 312 to 330 feet amsl. The project has seasonal drawdowns of the conservation pool. The power produced at the Thurmond Power Plant is sold through the Department of Energy, Southeastern Power Administration. The Thurmond Power Plant is operated primarily as a peaking plant to meet electric needs during peak demand hours. There are 93 public recreation areas located around Thurmond Lake ranging from boat ramp only areas to a destination resort state park. The States of Georgia and South Carolina lease approximately 34,992 acres of land and water for wildlife management. USACE manages approximately 22,750 acres of land for wildlife.

Detailed maps of recreation facilities can be found on JST's website at: https://www.sas.usace.army.mil/About/Divisions-and-Offices/Operations-Division/J-Strom-Thurmond-Dam-and-Lake/Plan-a-Visit/Brochures-Maps/ .

### 1.5 Prior Reports

The original MP for Thurmond Project (formerly known as Clarks Hill Lake) was published in September 1950. Updates were published in 1966, 1980, and 1995. These updates reflected changes made in response to public demands for recreational opportunities and natural resources needs. Copies of the updates are available at the Thurmond Project Manager's office and may be reviewed upon request.

## 2.0 ALTERNATIVES TO THE PROPOSED ACTION

The one alternative to the proposed action considered was no-action, or future without project condition. In the future without project condition (i.e., no-action), Thurmond Project would continue to operate under the 1995 MP. As a result, individual Environmental Assessments would be required for development or expansion of facilities or conducting activities not addressed in the 1995 MP. In accordance with ER 1130-2-550, an updated MP (5-year review) is required for civil works projects and other fee-owned lands for which USACE has administrative responsibility for management of natural, recreational, and cultural resources throughout the life of the water resource project.

# 3.0 AFFECTED ENVIRONMENT

## 3.1 General

### 3.1.1 Environmental Setting

USACE operates three major multi-purpose projects located along the Savannah River: Hartwell, Richard B. Russell, and J. Strom Thurmond Projects. Thurmond Project is a man-made lake bordering Georgia and South Carolina on the Savannah, Broad, and Little Rivers. The lake is created by the Thurmond Dam, located on the Savannah River 22 miles above Augusta, Georgia, and 239.5 miles above the mouth of the Savannah River. The lake extends 37.8 miles up the Savannah River, 44.5 miles up the Little River, and 6.1 miles up the Broad River in Georgia, and 19.7 miles up the Little River in South Carolina. At full pool elevation, Thurmond Lake comprises nearly 70,714 acres of water and 1,166 miles of shoreline.

Thurmond Project was designed for flood control, hydropower, fish and wildlife management, water quality, water supply, downstream navigation, and recreation. The Seneca and Tugaloo Rivers join to form the Savannah River near Hartwell, Georgia, approximately 90 miles north of Thurmond. There are 316,144 acres in the extended watershed; 201,296 acres or 63.7 percent located in Georgia with the remaining 114,848 acres, or 36.3 percent located in South Carolina.

Land use/land cover in the Georgia portion of the Savannah River Basin watershed includes 68.6 percent forested land, 2.1 percent water, 8.8 percent agricultural land, 2.1 percent urban land, 8.8 percent barren land, and 8.9 percent wetlands. Land use/land cover in the South Carolina portion of the watershed includes 64.5 percent forested land, 18.5 percent water, 8.5 percent agricultural land, 7.1 percent urban land, 1.8 percent barren land, and 0.6 percent forested wetland (swamp). Thurmond Project is located in the Piedmont geographical region.

Additional information about Thurmond Project can be found on their webpage: http://www.sas.usace.army.mil/About/Divisions-and-Offices/Operations-Division/J-Strom-Thurmond-Dam-and-Lake/.

### 3.1.2 Description of the Watershed

The Savannah River Basin consists of 34 watersheds. Thurmond Project is located in three hydrologic units (HUC) (Figure 1). They are HUC 03060103 (Upper Savannah, 1,830 sq. mi), HUC 03060104 (Broad, 1,500 sq. mi.), and HUC 03060105 (Little River, 766 sq. mi.). http://www.scdhec.gov/HomeAndEnvironment/Docs/60103-07.pdf.

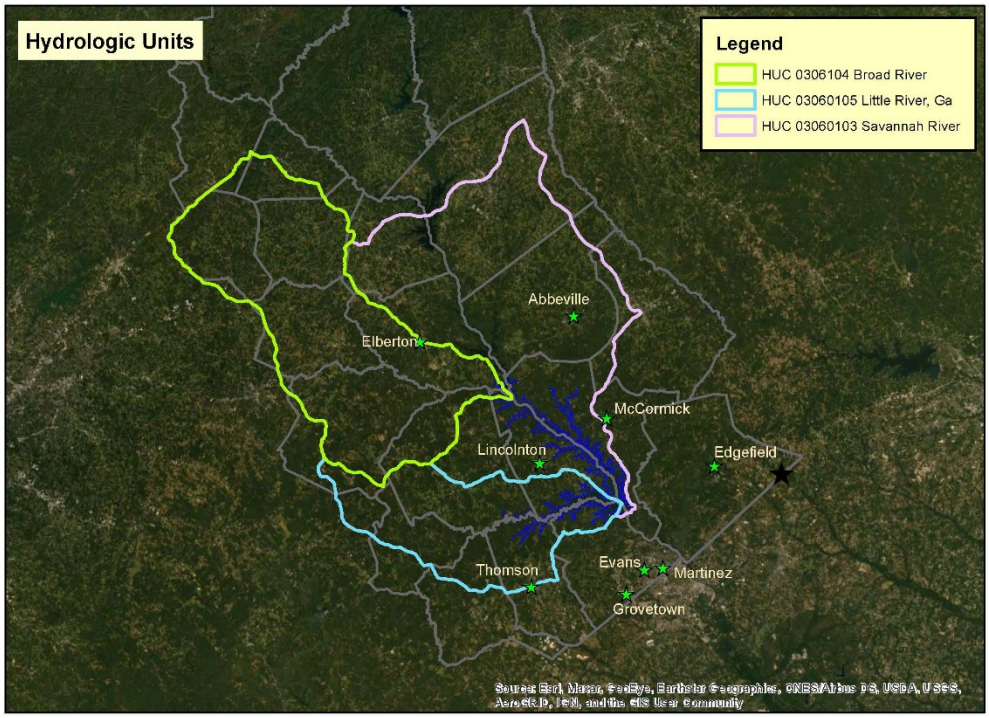



**Figure 1: Hydrologic Units Upper Savannah, Broad, and Little River at J. Strom Thurmond**

### 3.1.3 Climate

Hot, humid summers and mild, pleasant winters characterize the heavily wooded area on the shores of Thurmond Lake. A mixed pine and hardwood forest cover the site, providing summer shade and fall color. The average elevation of the region is approximately 345 feet amsl. The following climate data for 1980-2016 were taken from the South Carolina State Climatology office. McCormick, South Carolina has a warm humid temperate climate with hot summers and no dry season. The area within 50 miles of this station is covered by croplands (17 percent), forests (69 percent), water (11 percent), and built-up areas (3 percent). Over the course of a year, the temperature typically varies from 37°F to 91°F and is rarely below 24°F or above 98°F. The warm season lasts from May 25 to September 15 with an average daily high temperature above 84°F. The hottest day of the year is July 20, with an average high of 91°F and low of 72°F. The cold season lasts from November 27 to February 27 with an average daily high temperature below 55°F. The coldest day of the year is typically around January 17, with an average low of 37°F and high of 55°F.

Over the entire year, the most common forms of precipitation are thunderstorms, light rain, and moderate rain. From May 26 to August 28, there is a greater than 31 percent chance of measurable perception (at least 0.04 inches) on any given day. However, the most rainfall occurs between mid-February and mid-March with an average total accumulation of 4.1 inches.

Over the course of the year, the typical wind speeds vary from 0 miles per hour (mph) to 14 mph (calm to moderate breeze), rarely exceeding 21 mph (fresh breeze). The highest average wind speed of 5.5 mph (light breeze) occurs around March 8, at which time the average daily maximum wind speed is 4.6 mph (light breeze). The lowest average wind speed of 5 mph (light breeze) occurs around August 8, at which time the average daily maximum wind speed is 3.6 mph (light breeze). The wind is most often out of the west (74 percent of the time), north (11 percent of the time), and east (15 percent of the time).

Snowfall is rare in the region. The South Carolina State Climatology Office (www.dnr.sc.gov/climate/sco/ClimateData/countyData/county_mccormick.php) reported the following climate summaries and severe weather events for McCormick County, SC in Table 3.

**Table 3: Potential Weather Summaries and Severe Weather (1950 – 2016)**

| **Weather Summaries and Severe Events (1950 – 2016)** | |
|---|---|
| Temperature Summary (1952-2011) | |
| Highest Maximum | 109 F, July 29, 1987; Clarks Hill |
| Lowest Minimum | -2 F, January 21, 1985; Clarks Hill |
| Precipitation Summary (1952-2011) | |
| Highest Daily Rainfall | 9.40 Inches, October 12, 1990; Clarks Hill |
| Annual Average Rainfall | 46.02 Inches |
| Wettest Year | 76.28 Inches, 1964 |
| Driest Year | 24.28 Inches, 1954 |
| Highest Daily Snowfall | 8.0 Inches, February 24, 1989 |
| Severe Weather Events | |
| Tornado | 15 Tornadoes (1950-2016) Tornado damage: $509,000 4 tornado related injuries<br>0 tornado related fatalities |
| Thunderstorm Winds | 79 Wind events (winds exceeding 50 knots or 58 miles per hour, 1955-2016)<br>Hail (>1.0 inch)<br>24 Hail events (1955-2016) |
| Lightning | 1 Lightning events (1993-2016) Lightning damage: $200,000<br>0 Lightning related fatalities |
| Flood | 5 Flood Events (1993-2016) |
| Snow and Ice | 8 Winter frozen precipitation events (1993-2016) |

The typical growing season lasts for eight months from around March 18 to November 16 (243 days).

### 3.1.4 Physiography and Geology

The following information about physiography, geology and soils is incorporated by reference from the Savannah River Basin Watershed Protection Plan 2001, Georgia Department of Natural Resources (GA DNR) Environmental Protection Division (EPD).

Physiography

Thurmond Project is located within the Piedmont physiographic province. The Savannah River basin includes parts of the Blue Ridge, Piedmont, and Coastal Plain physiographic provinces, which extend throughout the southeastern United States. Similar to much of the Southeast, the basin's physiography reflects a geologic history of mountain building in the Appalachian Mountains and long periods of repeated land submergence in the Coastal Plain Province. The Fall Line is the boundary between the Piedmont and Coastal Plain provinces. This boundary approximately follows the contact between older crystalline metamorphic rocks of the Piedmont Province and the younger unconsolidated Cretaceous and Tertiary sediments of the Coastal Plain Province. As implied by the name, streams flowing across the Fall Line can undergo abrupt changes in gradient, which are marked by the presence of rapids and shoals. Geomorphic characteristics of streams differ between the Piedmont and Coastal Plain provinces. In the Coastal Plain, streams typically lack the riffles and shoals common to streams in the Piedmont and exhibit greater floodplain development and increased sinuosity.

Geology

The Blue Ridge and Piedmont provinces, which constitute approximately 60 percent of the Savannah River basin, are underlain by crystalline metamorphic and igneous rocks. The metamorphic rocks originally were sedimentary, volcanic, and igneous plutonic rocks that have been altered by several stages of regional metamorphism as well as several episodes of granite intrusion. Many of the exposed rocks of the Savannah River basin consist of several types of gneiss, largely made up of biotite gneiss, granite gneiss, and amphibolite. Granites are locally important in the basin as are metasedimentary rocks such as metagraywackes, quartzites, and schists. Less than 0.1 percent of the Savannah River basin is occupied by ultramafic rock units. Coastal Plain sediments constitute approximately 40 percent of the Savannah River basin. Approximately 80 percent of the sediments are sands and clays. The rest include calcareous sediments and Quaternary alluvium. The Coastal Plain sediments overlap the southern edge of the Piedmont Province at the Fall Line and those sediments nearest to the Fall Line are Cretaceous to Eocene in age. They are predominantly terrestrial to shallow marine in origin and consist of sand, kaolinitic sand, kaolin, and pebbly sand. These sediments host the major kaolin deposits in Georgia with many of these deposits found within the Savannah River basin. Much of the southeastern Piedmont is covered by deeply weathered bedrock called saprolite. Average saprolite thickness in the Piedmont rarely exceeds 20 meters, but the thickness can vary widely within a short distance. A considerable amount of ground water flows through the saprolite and recharges streams in the Piedmont. Saprolite is easily eroded when covering vegetation and soil are removed. Extensive erosion of soil and saprolite caused by agricultural practices during the 1800s and early 1900s contributed a vast quantity of sediment into stream valleys, choking the streams and raising the streams base level. As conservation practices stabilized erosion, streams began to reestablish grade and cut into the thick accumulations of sediments, remobilizing them into the

major rivers and eventually into reservoirs.

### 3.1.5 Soils

The Savannah River watershed in Georgia crosses 5 Major Land Resource Areas (MLRA's) soils vary widely across the watershed, ranging from nearly level to very steep, from shallow to very deep, from excessively drained to very poorly drained, and from sandy to clayey. There are some general trends with soils across the watershed. Going from north to south, degree of slope decreases, water tables are generally higher, and soil textures go from loamy in the Blue Ridge, to clayey in the Southern Piedmont, to sandy or sandy over loamy in the Sand Hills, Coastal Plain, and Atlantic Coast Flatwoods. About 6 percent of the watershed is in the Blue Ridge MLRA. Most of the soils in this area formed from weathered granite, gneiss, and schist. These are the steepest soils in the watershed, with slopes in most areas ranging from 25 to 60 percent. Soils on the steeper slopes and higher elevations are commonly loamy throughout, are brown to yellowish red, and are shallow or moderately deep to bedrock. Deep to very deep, red clayey soils are common in less sloping areas at lower elevations. About 60 percent of the watershed is in the Southern Piedmont MLRA, which includes Thurmond Project. Most of the soils in this region are very deep, well drained, red clayey soils that formed from felsic, high grade metamorphic or igneous rocks.

There is a large area in the central part of this region that contains soils formed from intermediate and mafic crystalline rocks. These soils have slower permeability and are less acid than typical Piedmont soils. Another large area in the lower portion of the Piedmont has soils formed from Carolina slate. These soils are still clayey but have a higher silt content than typical Piedmont soils. About 8 percent of the watershed is in the Carolina and Georgia Sand Hills MLRA. Soils in this area formed primarily in sandy and loamy marine sediments, which occasionally overlie residual Piedmont materials. There are two major groups of soils in this area. One group consists of deep sands ranging from 40 to more than 80 inches deep. The other group consists primarily of soils that have a sandy surface and a loamy subsoil, often exhibiting dense or brittle properties. Soils in this MLRA are generally less developed than soils in other parts of the watershed. About 17 percent of the watershed is in the Southern Coastal Plain MLRA. Soils in this part of the watershed are more variable than in other parts, particularly with regards to textures and water table depths. Typically, soils have a sandy surface layer that overlies a red to yellow, loamy subsoil. The depth of the sandy surface is quite variable. Soils in this region are on more gently sloping landforms than in previously mentioned MLRA's. There is a continuum of soils ranging from well drained soils on ridges and hillsides to poorly drained soils in depressions and along drainage ways. Approximately 9 percent of the watershed is in the Atlantic Coast Flatwoods MLRA.

Landforms in this part of the watershed are nearly level. Water tables are generally closer to the surface in this area than in other parts of the watershed. Typically, soils have a sandy surface layer that is 20 to 40 inches deep over a loamy subsoil. This

varies considerably, however. Characteristic of part of this MLRA are sandy soils that have an accumulation of an organic matter-aluminum complex.

## 3.2 Existing Conditions

This section contains a description of the existing conditions of relevant resources that could be impacted by the project. These relevant resources described in this section are those recognized by laws, executive orders, regulations, and other standards of National, state, or regional agencies and organizations; technical or scientific agencies, groups, or individuals; and the general public. The following resources have been considered and were not found to be present within the project area: coastal wetlands, cypress tupelo swamp, coastal marshes, estuarine waters, coastal wooded ridges, barrier islands, hardwood bottoms, essential fish habitat, and desert plains.

The important resources listed below are those that are frequently encountered: wetlands, aquatic resources/fisheries, terrestrial resources, bottomland hardwood forests, wildlife, threatened and endangered species, beaches, water supply, cultural and archaeological resources, and water quality. Appendix C lists common animal and fish species found around Thurmond Project.

### 3.2.1 Wetlands and Aquatic Vegetation

There are approximately 1,331 acres of various types of wetlands adjacent to Thurmond Lake. Approximately 358 acres are classified as palustrine emergent wetland habitat, 187 acres as palustrine scrub-shrub wetland habitat, and 786 acres as estimated to be palustrine forested wetland.

There are approximately 68,013 acres of lacustrine habitat created by the dam. An aquatic vegetation survey conducted on Thurmond Lake in 2010 found hydrilla present on approximately 11,271 acres of substrate. Based on an acoustic survey to determine the actual bottom coverage, hydrilla covered an average of 44 percent of the area where it has been located. The 2010 annual update of the Aquatic Plant Management Plan (APMP) also noted 32 acres of water primrose, 72 acres of alligator weed, 600 acres of slender pondweed, and approximately half of an acre of the state-listed threatened shoals spider-lily. The 2015 survey determined that hydrilla was present on 10,644 acres with a density of 22.2 percent so the estimated hydrilla coverage was 2,363 acres.

The frequency of other submerged aquatic vegetation and wetland plants are in Appendix B of the APMP. Plant growth varied greatly across the reservoir. In most areas, the hydrilla seldom exceeded three feet in height and was not problematic during the peak of the recreation season. Hydrilla has not impacted hydropower production operations. The APMP for USACE, Savannah District Water Resources Projects, SC and GA, address actions taken to reduce the negative impacts of nuisance aquatic vegetation. The Avian Vacuolar Myelinopathy (AVM) Plan for USACE, Savannah District, J. Strom Thurmond Project, addresses actions taken to reduce the effects of

AVM on American Bald Eagle, various waterfowl, and other shorebirds. As a result of the AVM plan, grass carp were incrementally stocked between 2017 and 2019 to target a rate of 15 fish per vegetated acre. Preliminary vegetation surveys in 2019 indicated a significant decline in hydrilla and aquatic vegetation. A lake-wide comprehensive survey is planned for 2022.

### 3.2.2 Aquatic Resources/Fisheries

Thurmond Lake supports popular warm-water fisheries. The reservoir is populated by a variety of native species of freshwater fish, crustaceans, and freshwater mussels, many endemic to the Savannah River system. Popular game fish within the reservoir are largemouth bass, striped bass, black crappie, hybrid bass (white bass crossed with striped bass), bluegill, redear sunfish, channel catfish, and flathead catfish. Some game fish are also stocked (striped bass, hybrid bass) within the reservoir to support recreational fishing. Other fish naturally enter the system from the reservoir's tributaries. Blueback herring and threadfin shad are important forage fish in Thurmond Lake.

The sport fisheries of Thurmond Lake are dominated by largemouth bass, spotted bass, crappie, catfish, striped bass and hybrid bass. Hybrid bass and striped bass are produced at the Richmond Hill State Fish Hatchery and stocked as fingerlings into Thurmond Lake and other Georgia reservoirs. On average, 1,000,000 total striped and hybrid striped bass are stocked in Thurmond Lake each year (USACE 2008).

The fishery resources of Thurmond Lake have been extensively studied by the USACE, with the Georgia Cooperative Fish and Wildlife Research Unit (GA COOP) performing baseline studies of fishery resources in Thurmond Lake as early as 1986. These studies included cove rotenone sampling, gillnet sampling, electrofishing, and telemetry. The Clemson University Cooperative Fish and Wildlife Research Unit (CU COOP) conducted a commercial creel estimate and a population estimate of blueback herring. SC DNR has conducted fisherman creel surveys on Thurmond Lake since 1991 (USACE 2008).

The robust redhorse is among the largest of the redhorses, reaching lengths over 700 mm and 8 kg. It is a mainstem river species that exhibits potamodromous behavior and spawns in high velocity, shallow water over gravel substrates (Breder & Rosen 1966; Grabowski & Isley 2006; Fisk 2010). After being described by Edward Cope in 1870 from a collection in the Pee Dee River basin, the species was misidentified and overlooked by the scientific community for 120 years before again being detected in Georgia, North Carolina, and South Carolina rivers in the 1980s and 1990s (Bryant et al. 1996). The species is currently protected by state endangered status in Georgia and North Carolina, but it has no official listing in South Carolina (GADNR 2015; SCDNR 2015). Stocking programs were initiated in Georgia in the 1990s and in South Carolina in the first decade of the 21st century to supplement existing robust redhorse populations and to establish new populations in suspected historical reaches http://qap2.onlinelibrary.wiley.com/doi/10.1111/fme.12050/pdf.

Stocked juvenile Robust Redhorse have been collected in the Thurmond Reservoir and in slower Coastal Plain river runs. One wild spawn juvenile was collected in Savannah River tidal freshwater. Adults in Georgia's Broad River use the downstream reservoir outside of spawning season. These reservoir collections tend to indicate a tolerance of, or a preference for, lentic habitat during a portion of the life cycle (RRCC 2000). Recent telemetry observations in both the Santee River drainage (Supplemental Volume: Species of Conservation Concern, SC SWAP 2015) and Georgia's Broad River support the hypothesis that adults select cooler water temperatures during the summer.

Habitat loss and disruption of spawning migrations resulting from dams and impoundments; predation and competition by introduced non-native species like buffalo, flathead catfish and blue catfish; and deterioration of water quality due to sedimentation and pollution are believed to have contributed to the decline of the Robust Redhorse. Additionally, the limited range of known populations and low rates of recruitment to the adult population represent challenges to the species' future (RRCC 2004). (Supplemental Volume: Species of Conservation Concern SC SWAP 2015 Contributors (2005): Scott D. Lamprecht and Jason Bettinger [SCDNR] Editors (2013): Scott D. Lamprecht and Mark C. Scott [SCDNR]).

The Savannah River downstream from the Thurmond Lake supports an abundant and diverse fish community including resident freshwater, euryhaline, and diadromous species. Augusta Shoals and other gravel bars downstream from Thurmond Dam are known spawning habitats for many fish species including striped bass, American shad, endangered sturgeon, suckers, and other riverine species (Duncan et al. 2003). Sufficient river flows during spawning runs, larval drift and juvenile outmigration, and overwintering are important for completion of diadromous and resident fish life cycles.

Summer low flow periods, particularly during drought years can reduce wetted perimeters and limit instream habitats. These periods create stressful conditions for fish and mussel species and during extreme circumstances can result in fish and mussel mortalities. Mean monthly flows were used to assess potential effects on critical time periods for fish and mussel communities in the lower Savannah River downstream from Thurmond Dam (USACE Duke 2014).

Wetland habitats support many aquatic species of frogs including the bullfrog, green frog, southern leopard frog, several species of tree frogs, cricket frogs, and chorus frogs. Turtles found in the wetlands include the river cooter, Florida cooter, eastern chicken turtle, snapping turtle, and common musk turtle. Snake found in the wetlands include the numerous water snake species and eastern mud snake (USACE 2008).

### 3.2.3 Forest Resources

Thurmond Project is situated near the southeastern margin of the Piedmont Plateau Region. Lands acquired for Thurmond Project were generally owned by small landowners, forest industries, and power companies. In many cases, the land had been

used for agricultural purposes prior to the Depression era but has been allowed to revert to forest growth. At the time of acquisition, most forested areas were supporting second growth pine with a mixture of hardwoods. Most river bottom hardwoods were inundated when Thurmond reservoir was constructed.

Five basic forest types may be identified on project lands: pine, pine-hardwood, hardwood-pine, upland hardwood, and bottomland hardwood. For practical silviculture, these five types are consolidated into three types: pine, pine-hardwood, and hardwood. The pine forest type is made up of shortleaf pine, loblolly pine, and scattered small stands of longleaf pine, occurring naturally or planted.

The pine-hardwood forest type includes the pine species listed above along with hardwood species such as sweetgum, yellow-poplar, white oak, post oak, red oaks, white ash, winged elm, and other regional hardwoods. Minor constituents of this type include sourwood, American holly, sycamore, and red maple.

Understory species vary widely and include Viburnum spp., Rhus spp., Sassafras spp., several species of blackberry, greenbriar, dogwood, and redbud. Japanese honeysuckle is abundant throughout the area but is kept in check by whitetail deer. Kudzu and wisteria are problematic in some areas. Other exotics found on project lands include chinaberry, princess tree, privet, climbing fern, tallow tree, bamboo, giant reed, and periwinkle.

Only a small percentage of the total land area is open or unforested. A few of the open areas maintained in open condition for operational use and utility right-of-ways, but most exist under the wildlife management program.

Thurmond Project has always implemented intensive forest management designed to provide increased user benefits by creating and maintaining a healthy, mixed forest. Silvicultural treatments are prescribed for forest management activities each year. Selective tree thinning and regeneration harvests are made to improve wildlife habitat, diversify habitat, and enhance values for low-density recreational use. Special consideration is given to high-density recreation areas and other areas with unique or cultural values.

### 3.2.4 Wildlife

Wildlife species can be found in various habitats within and immediately adjacent to Thurmond Lake. Commonly occurring plants and wildlife are listed in Appendix C. Habitats include open water, wetlands (emergent, shrub/scrub and forested), and uplands (forested, open/field, and disturbed). Some of these habitats can be affected by fluctuations in reservoir levels and others are likely to remain unaffected. Upland habitats are less likely to be impacted by water level changes due to their elevation above normal pool. In addition, wetland habitats that do not depend upon reservoir level as a source of hydrology are less likely to be impacted. However, open water and wetland habitats dependent on reservoir level for hydrology and primary productivity,

such as fringe wetlands, are affected by reservoir fluctuations (e.g., 10 feet or more). Therefore, wildlife species using those habitats are also affected.

Reservoir Dependent Wetland (RDW) habitats are composed of emergent, shrub/scrub, and forested wetland habitats existing due to the water level in the reservoirs. As with the open-water habitat, RDW are widely used by wildlife during various parts of their life cycle. Reptiles and amphibians use open water habitats of the reservoir. Species such as Eastern painted turtle, common musk turtle, snapping turtle, spiny softshell turtle, yellow-bellied slider, numerous species of water snakes, newt, and frogs are predominantly associated with the shallow water areas of reservoirs. These species use the open water habitats for breeding, foraging, and hibernation. Reptiles and amphibians use RDW habitats near the shorelines of reservoir. For example, a variety of turtles and snakes use RDW for feeding and basking, and numerous amphibians breed, lay eggs, forage, and undergo their aquatic larval stage in these habitats. Some species, such as the Eastern newt, could spend their entire life cycle in RDW habitats.

Like reptiles and amphibians, birds use the shoreline and shallow open water habitats within the reservoir. These open water habitats are used as migration stopovers (resting habitat) for numerous species of ducks and geese as well as wading birds such as egrets, herons, and sandpipers. During the migration stopover, these species also use these areas for feeding prior to continuing their migration. Some of these migratory species use the reservoir as overwintering habitat including Bonaparte's and ring-billed gulls, American coots, common loons, and hooded mergansers. In addition to the use of these habitats for feeding and overwintering by migratory species, resident avian species use open water for feeding. Examples of birds identified using the reservoir for feeding during the winter include belted kingfishers and great blue herons feeding in the shallow waters of the open water habitat.

Avian species use RDW habitats adjacent to the reservoir as a migration stopover. Examples include numerous species of ducks and geese, as well as Neotropical migrants such as flycatchers, vireos, thrushes, and warblers. During the migration stopover, these species also use vegetated areas for feeding prior to continuing their migration. Some of these migratory species use RDW habitats as their overwintering habitat including swamp sparrows, yellow-rumped warblers, and Wilson's snipe. In addition, RDW habitats also provide food and nesting for resident avian species. Chipping and field sparrows, yellow warblers, eastern kingbirds, mallard, wood duck, and Canada geese are a few examples of species that nest and raise their young in RDW habitats.

Several of the most common bird species noted in the immediate vicinity of Thurmond Project include red-shouldered hawk, red-tailed hawk, ruby-throated hummingbird, Eastern kingbird, blue jay, American crow, Carolina chickadee, tufted titmouse, white-breasted nuthatch, American robin, Northern mockingbird, brown thrasher, Northern cardinal, red-winged blackbird, ring-necked duck, lesser scaup, and brown-headed cowbird (USACE 2008 and USACE 1981). Additionally, some avian species commonly seen or heard in the surrounding uplands include wild turkey, American bittern, great

blue heron, osprey, mourning dove, whip-poor-will, belted kingfisher, red-headed woodpecker, Eastern bluebird, gray catbird, and Northern parula (USACE 2008 and USACE 1981).

Mammals commonly use open water, wetlands, and RDW habitats. Bats often feed over open water and wetland habitats as they forage for flying insects such as midges and mosquitoes. Furbearers and other mammals that are important components of these wetlands include the American beaver, muskrat, mink, and northern river otter. These mammals use shallow water for feeding and as a means of transportation to other habitats. Palustrine emergent wetlands also provide excellent habitat for furbearing mammals. In addition, the opossum, white-tailed deer and other mammals use RDW habitats for foraging and raising young (USACE 2014). Terrestrial species from surrounding areas often use the fresh marsh edge for shelter, food, and water. These include Northern raccoon, Virginia opossum, cottontails, nine-banded armadillo, coyote, and bobcat (USACE 2008 and USACE 1981).

Thurmond Project OMP prescribes active management for maintenance of diverse habitats for game and non-game wildlife species. A total of 53,091.3 acres of project lands are managed as wildlife management areas, including 10,181.5 acres of land leased to SC DNR, 20,160.1 acres of land leased to GA DNR, and the remaining 22,749.7 acres are managed by USACE.

### 3.2.5 Protected Species

This section cover species that have been listed under the Threatened and Endangered Species Act, as well as those protected by other Federal and state laws. The United States Fish and Wildlife Services (USFWS) Information, Planning, and Conservation System (http://ecos.fws.gov/ipac/) website provided a current inventory of federally listed species within the Thurmond Project area. Table 4 identifies federally-listed species and otherwise protected species that are known to be in the area. The list includes the bald eagle (*Haliaeetus leucocephalus*) which is protected under the Federal Bald and Gold Eagle Protection Act and the Migratory Bird Treaty Act.

There are several federally-listed fish species, including those classified as endangered, threatened, species of concern, or candidates for listing that occur in the lower Savannah River below Thurmond Dam. These include the shortnose sturgeon, Atlantic sturgeon, American eel, robust redhorse, bluebarred pygmy sunfish, and blueback herring. Three mussel species recently collected in the lower Savannah River (the Atlantic pigtoe, Savannah lilliput, and yellow lampmussel) are considered federal species of concern. The Altamaha arc-mussel and brother spike are two other federal species of concern.

The shoals spider-lily, a Federal species of concern and state threatened species, is present in the Savannah River along the rapids between the Stevens Creek Dam and Augusta, GA, and on Project lands in the Anthony Shoals portion of Broad River. Michaux sumac, a federally-listed species, occurs on Project lands in the Broad River

Wildlife Management Area. The wood stork, a federally-listed species, is an infrequent visitor on Thurmond Lake.

**Table 4: Federally Protected Species Potentially Found On Thurmond Project Lands**

| Common Name | Scientific Name | Federal Status |
|---|---|---|
| **Birds** | | |
| Bald eagle * | *Haliaeetus leucocephalus* | BGEPA |
| Wood stork + | *Mycteria americana* | T |
| Red-cockaded woodpecker | *Picoides borealis* | E |
| **Mammals** | | |
| Northern Long-eared bat | *Myotis septentrionalis* | T |
| **Reptiles** | | |
| Gopher Tortoise | *Gopherus polyphemus* | C |
| **Mullusks** | | |
| Carolina Heelsplitter | *Lasmigona decorate* | E |
| **Plants** | | |
| Harperella | *Ptilimnium nodosum* | E |
| Pool Sprite | *Amphianthus pusillus* | T |
| Miccosukee Gooseberry | *Ribes echinellum* | T |
| Michaux's Sumac* | *Rhus michauxii* | E |
| Relict Trillium | *Trillium reliquum* | E |
| Smooth Coneflower | *Echinacea laevigata* | E |

Source: FWS ECOS IPaC 2020 Notes: E = Endangered, T = Threatened, C = Candidate, BGEPA = Bald & Golden Eagle Protection Act
* Present on Thurmond Project
+ Occasional seen on Thurmond Project

In 2007, the Service removed the bald eagle from the list of threatened and endangered species under the Endangered Species Act (ESA) (72 FR 37345, July 9, 2007), but the species continues to be protected by the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act (the Eagle Act). A condition of the delisting requires the USFWS to work with State wildlife agencies to monitor eagles. If at any time, it appears that the bald eagle again needs the Act's protection, the USFWS can propose to relist the species. The goal of USFWS eagle management under the Act is to maintain stable or increasing eagle populations.

Past declines of bald eagles at Thurmond Project resulted in the development and implementation of the AVM Plan to reduce bald eagle mortality. Between 1998 and 2017, ninety-eight eagle mortalities were documented at Thurmond Project. Many of the bald eagles using Thurmond Project are transients. In spite of the localized AVM mortality at Thurmond Lake, a 2017 survey by GADNR documented a record 218 bald eagle nests in the state breaking historical records. After implementation of the plan in 2017-2018, there have been no documented mortalities. Although these earlier mortalities were suspected to be caused by AVM, most were not confirmed as AVM mortality due to various stages of decomposition. Eagle nesting and mid-winter survey

data from the 2020/2021 nesting season showed a varied age class of eagles including sub-adults and adults coming to Thurmond Project at the start of the nesting season. A total of eight active nests were observed in January 2021 and in March 2021. Six chicks were observed in the nests.

The bald eagle (http://www.fws.gov/midwest/eagle/) is a large raptor with a wingspan of approximately seven feet (2 meters). Adult individuals of this species have a mainly dark brown plumage with a solid white head and tail. Primary habitat for the bald eagle is undisturbed riparian zones including coastal, river, and lakeshore areas. Bald eagle nest sites within the southeast are usually located in living pine or cypress trees. Nest sites are often located in the largest living trees within the area commanding an open view of the surrounding terrain. Nest sites are generally located within one-half mile of open water with a clear flight path leading to the water. A tagging program was employed to track eagle movements of juvenile eagles fledged on Thurmond Project.

### 3.2.6 Cultural Resources

The Savannah River Basin has a long history of human occupation with earliest evidence of settlement dating as far back as the Paleoindian Period, ca. 9,500 B.P. The basin has long been an area of archaeological interest for researchers. Prior to the impoundment and subsequent inundation of Thurmond Lake cultural resources investigations of varying degrees of comprehensiveness were conducted. Recent archaeological investigations at Thurmond Project have focused primarily on the upland areas (i.e., above 330 ft. amsl), although smaller shoreline surveys have been conducted at Thurmond Project.

Archaeological fieldwork conducted in the late 1940s and early 1950s through the Smithsonian Institution's River Basin Survey identified more than 200 sites at Thurmond Project, with limited excavation conducted at a minimum of 21 of the sites by former Smithsonian Institution and University of Georgia personnel (Elliott 1995). The survey focused on previously recorded sites and visits to likely village sites as determined through archival research and previous experience of working in similar environmental settings. Some of the recorded sites were discovered during excavation of the reservoir. Nearly 100 of the sites were determined to be flooded by the inundation of Thurmond Lake (i.e., at or below 330 amsl) and almost the same number was situated outside of the flood pool.

Since 1990, shoreline surveys of Thurmond Project have been conducted that resulted in the recordation of numerous previously unrecorded archaeological sites. In 1983 - 84 the U.S. Forest Service identified 54 sites, 38 of which had been previously unrecorded. Sites ranged from the Early Archaic period (8,000 B.C. – 6,000 B.C) to the early 20 $^{th}$ century (Elliott 1995). Anderson et al. (1994) conducted a terrestrial and underwater survey of a two-mile section of lake shore and a 440-acre upland tract that identified 14 upland sites, 32 sites along the shoreline as well as one underwater site. Only the underwater site had been previously located by the River Basin Survey in the 1940s - 1950s.

Archaeological surveys conducted in the mid-late 1990s at Thurmond Project by cultural resources firms contracted by Savannah District have focused exclusively on upland areas. These large-scale surveys were conducted to comply with Section 110 of the National Historic Preservation Act, as amended (NHPA), in areas that were managed for timber. As a result of the surveys, over 1600 archaeological sites, isolated finds and rock piles have been recorded. A wide array of site types is represented at Thurmond Project, ranging from prehistoric camp sites to 19th - 20th century mills and cemeteries.

### 3.2.7 Recreational Resources

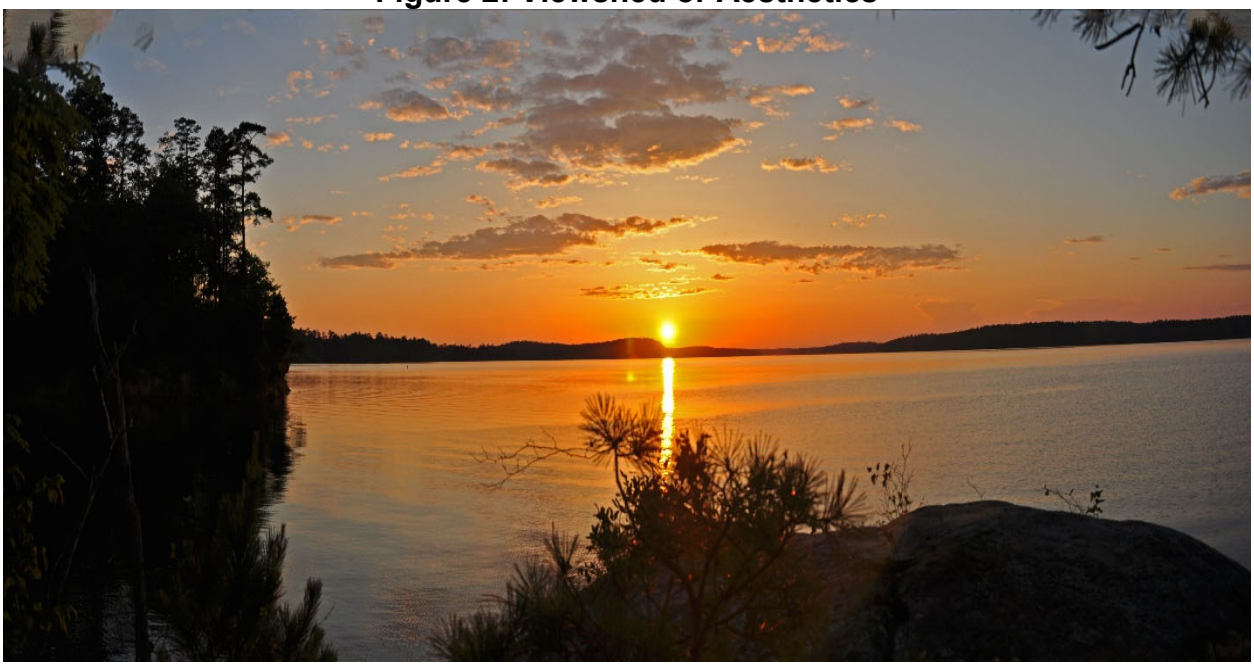
Recreational opportunities at Thurmond Project include camping, biking, picnicking, hunting, hiking, wildlife viewing, outdoor sports activities, water sport/leisure activities (boating, swimming, fishing, skiing, wake boarding, etc.), and horseback riding. Currently, Thurmond Project provides 24 recreation areas, including six state parks, twelve county parks, seven USACE-operated campgrounds, and five major USACE-operated day use areas. Thurmond Project also provides 32 boat ramps, six marinas, one commercial campground and 16 quasi-public recreation areas that are currently leased to churches, civic groups, and scout organizations. Three additional areas are leased to the Army, Veterans Administration, and the South Carolina National Guard for recreation and training purposes. Thurmond Project has 14 campgrounds and recreation areas with designated swimming areas. These manmade sand beaches provide recreational benefits but little benefits to wildlife. Thurmond Lake receives approximately 3.5 million visitors per year.

### 3.2.8 Aesthetics (Visual Resources)

Thurmond Project is one of the few civil works projects possessing a large land base consisting primarily of woodlands. Boaters can view miles of undisturbed shoreline free of docks, marinas, cabins and other signs of human habitation. These extensive woodlands provide a pleasant visual experience and serve to minimize conflicting activities (Figure 2).

The natural beauty of Thurmond Project is a recreational asset which offers almost unlimited opportunities for outdoor oriented activities such as sightseeing and hiking as well as provides a pleasant environment for campers, mountain bikers, horseback riders, hunters, and fishermen.

**Figure 2: Viewshed or Aesthetics**



### 3.2.9 Socio-Economic

The total population for the zone of interest is approximately 654,812, as shown in Table 5. More than 80 percent of the population is in the greater Augusta area which consists of Richmond, Columbia, and Aiken counties. Each of the remaining counties make up less than 5 percent each of the total population. The population in the zone of interest makes up approximately 3.9 percent of the total population of Georgia and 4.5 percent of South Carolina. The zone of interest includes those adjacent counties that would be directly impacted by the management of Thurmond Project.

In Georgia, Columbia County experienced the highest annual growth in 2020 and the highest projected growth from 2010 through 2021. In South Carolina, Aiken County experienced the highest growth in population annually and projected from 2010 through 2021.

**Table 5: 2019 Population Estimates and 2021 Projections**

| | 2019 Population Estimate[1] | 2019 Percent of Zone of Interest[1] | 2020 Annual Growth Rate[2] | Estimated Growth 2010-2021[2] |
|---|---|---|---|---|
| **States:** | | | | |
| Georgia | 10,711,908 | | | |
| South Carolina | 5,118,714 | | | |
| | | | | |
| **Counties:** | | | | |
| Abbeville, SC | 24,527 | 3.75% | -0.24% | -3.64% |
| Aiken, SC | 170,872 | 26.09% | 0.84% | 8.20% |
| Edgefield, SC | 27,260 | 4.16% | 0.47% | 2.05% |
| McCormick | 9,463 | 1.45% | 0.58% | -6.23% |
| | | | | |
| Columbia, GA | 156,714 | 23.93% | 1.68% | 29.64% |
| Elbert, GA | 19,194 | 2.93% | 0.52% | -3.52% |
| Lincoln, GA | 7,921 | 1.21% | -0.05% | -0.72% |
| McDuffie, GA | 21,312 | 3.25% | -1.02% | -4.27% |
| Richmond, GA | 202,518 | 30.93% | 0.42% | 1.54% |
| Warren, GA | 5,254 | 0.80% | 0.13% | -8.89% |
| Wilkes, GA | 9,777 | 1.49% | -0.88% | -7.56% |
| | | | | |
| Zone of Interest Total | 654,812 | | | |

[1]U.S. Bureau of the Census, 2019 Estimate
[2]Annual Growth and Estimated Growth, World Population Review Projections from the 2019 Census Estimate

The distribution of the population in the zone of interest among gender is approximately 49.2 percent male and 50.8 percent female as shown in Table 6. Table 6 also shows the population composition by age group. It should be noted that many of the rural counties have a higher population of those over age 65.

**Table 6: 2019 Age and Gender Distribution**

| Geographical Area | Under 18 | 18 to 64 | 65 and Over | Female | Male |
|---|---|---|---|---|---|
| **States:** | | | | | |
| Georgia | 23.6% | 62.1% | 14.3% | 51.3% | 48.7% |
| South Carolina | 21.6% | 60.2% | 18.2% | 51.7% | 48.3% |
| | | | | | |
| **Counties:** | | | | | |
| Abbeville, SC | 20.8% | 58.1% | 21.1% | 48.3% | 51.7% |
| Aiken, SC | 20.9% | 60.4% | 18.7% | 51.7% | 48.3% |
| Edgefield, SC | 18.6% | 63.0% | 18.4% | 46.7% | 53.3% |
| McCormick, SC | 12.2% | 54.4% | 33.4% | 44.6% | 55.4% |
| | | | | | |
| Columbia, GA | 25.5% | 61.3% | 13.2% | 51.1% | 48.9% |
| Elbert, GA | 21.9% | 57.8% | 20.3% | 52.0% | 48.0% |
| Lincoln, GA | 19.2% | 57.6% | 23.2% | 53.2% | 46.8% |
| McDuffie, GA | 25.3% | 57.4% | 17.3% | 54.2% | 45.8% |
| Richmond, GA | 23.1% | 63.3% | 13.6% | 51.6% | 48.4% |
| Warren, GA | 20.8% | 57.6% | 21.6% | 53.4% | 46.6% |
| Wilkes, GA | 21.4% | 55.7% | 22.9% | 51.5% | 48.5% |
| | | | | | |
| Zone of Interest Total | 20.9% | 58.8% | 20.3% | 50.8% | 49.2% |

Source: U.S. Bureau of the Census, 2019 American Community Survey

Population by Race and Hispanic Origin is displayed in Table 7. For the zone of interest, 58.5 percent of the population is White, 37.3 percent is Black or African American, 3.8 percent are Hispanic or Latina, 0.9 percent are Asian, and 1.9 percent are two or more races. The remainder of the races makes up less than 1 percent each.

By comparison, for the state of South Carolina, 66.7 percent of the population is White, 26.5 percent is Black or African American, and the remaining races constitute a slightly greater percentage of the total population than in the zone of interest. For Georgia, 57.8 percent of the population is White, 31.9 percent is Black or African American, and the remaining races constitute a slightly greater percentage of the total population than in the zone of interest.

**Table 7: 2019 Population Estimate by Race/Hispanic Origin**

| Geographical Area | White Alone | Black or African American Alone | American Indian and Alaska Native Alone | Asian Alone | Native Hawaiian or Other Pacific Islander Alone | Two or more races | Hispanic or Latino |
|---|---|---|---|---|---|---|---|
| **States:** | | | | | | | |
| Georgia | 57.8% | 31.9% | 0.4% | 4.1% | 0.1% | 2.7% | 9.8% |
| South Carolina | 66.7% | 26.5% | 0.4% | 1.7% | 0.1% | 2.4% | 5.8% |
| | | | | | | | |
| **Counties:** | | | | | | | |
| Abbeville, SC | 69.9% | 27.6% | 0.1% | 0.3% | 0.0% | 1.9% | 1.5% |
| Aiken, SC | 70.7% | 25.0% | 0.3% | 0.9% | 0.0% | 2.4% | 5.7% |
| Edgefield, SC | 60.0% | 35.3% | 0.4% | 0.3% | 0.0% | 1.8% | 6.0% |
| McCormick | 51.5% | 44.8% | 0.2% | 0.2% | 0.0% | 2.7% | 0.8% |
| | | | | | | | |
| Columbia, GA | 73.9% | 16.7% | 0.3% | 3.9% | 0.0% | 4.2% | 6.7% |
| Elbert, GA | 68.1% | 29.9% | 0.0% | 0.6% | 0.0% | 0.9% | 5.7% |
| Lincoln, GA | 67.4% | 31.0% | 0.1% | 0.0% | 0.0% | 1.0% | 1.8% |
| McDuffie, GA | 54.0% | 39.9% | 0.0% | 0.4% | 1.2% | 1.9% | 3.1% |
| Richmond, GA | 37.1% | 56.5% | 0.3% | 1.9% | 0.2% | 2.6% | 4.9% |
| Warren, GA | 37.5% | 61.1% | 0.0% | 0.6% | 0.0% | 0.7% | 0.5% |
| Wilkes, GA | 52.6% | 42.6% | 0.0% | 0.4% | 0.0% | 0.9% | 5.1% |
| | | | | | | | |
| Zone of Interest Total | 58.5% | 37.3% | 0.2% | 0.9% | 0.1% | 1.9% | 3.8% |

Source: U.S. Bureau of the Census, 2019 American Community Survey

Table 8 shows the population over 25 years of age by highest level of educational attainment for each of the geographical areas. In the zone of interest, for 5.4 percent of the population 25 years old and older, the highest level of education attained is below the ninth-grade level. Another 11.6 percent attended high school but did not graduate. For 36.2 percent of the population, the largest in the zone of interest, a high school degree is the highest level of educational attainment. Another 19.4 percent attended some college but did not graduate. Bachelor's degrees were the highest educational attainment of 11.9 percent, while associate degrees were 8.8 percent. The smallest group, those that have graduate or professional degrees, is 6.7 percent.

By comparison, in Georgia 4.5 percent have less than ninth grade education, 7.6 percent attended some high school, 27.4 percent graduated high school, 20.0 percent attended some college, 9.9 percent obtained an associate degree, 19.9 percent obtained a bachelor's degree, and 12.6 percent have a graduate or professional degree. For South Carolina, 3.7 percent have less than ninth grade education, 7.9 percent attended some high school, 28.5 percent graduated high school, 20.4 percent attended some college, 9.9 percent obtained an associate degree, 18.4 percent obtained a bachelor's degree, and 11.2 percent have a graduate or professional degree.

**Table 8: Population Highest Level of Education Attainment (Age 25 or greater)**

| Geographic Area | Less than 9th grade | 9th to 12th grade, no diploma | High school graduate (includes equivalency) | Some college, no degree | Associate degree | Bachelor degree | Graduate or professional degree |
|---|---|---|---|---|---|---|---|
| **States:** | | | | | | | |
| Georgia | 4.5% | 7.6% | 27.4% | 20.0% | 9.9% | 19.9% | 12.6% |
| South Carolina | 3.7% | 7.9% | 28.5% | 20.4% | 9.9% | 18.4% | 11.2% |
| | | | | | | | |
| **Counties:** | | | | | | | |
| Abbeville, SC | 6.0% | 12.4% | 34.0% | 18.9% | 13.1% | 11.0% | 4.5% |
| Aiken, SC | 4.3% | 7.7% | 32.8% | 20.3% | 8.5% | 17.1% | 9.3% |
| Edgefield, SC | 6.7% | 10.4% | 36.7% | 20.8% | 8.8% | 10.2% | 6.5% |
| McCormick | 4.1% | 12.5% | 33.9% | 18.4% | 10.6% | 13.9% | 6.6% |
| | | | | | | | |
| Columbia, GA | 2.4% | 4.9% | 23.8% | 22.0% | 10.6% | 22.5% | 13.9% |
| Elbert, GA | 6.2% | 15.4% | 40.9% | 18.9% | 7.0% | 6.9% | 4.7% |
| Lincoln, GA | 5.4% | 12.5% | 39.7% | 18.8% | 7.8% | 11.0% | 4.9% |
| McDuffie, GA | 4.2% | 12.5% | 41.6% | 19.6% | 8.1% | 8.7% | 5.3% |
| Richmond, GA | 4.1% | 11.8% | 31.4% | 22.7% | 8.6% | 13.1% | 8.3% |
| Warren, GA | 9.8% | 17.0% | 39.8% | 14.2% | 6.9% | 8.1% | 4.2% |
| Wilkes, GA | 6.0% | 10.3% | 44.0% | 18.6% | 7.3% | 8.0% | 5.8% |
| | | | | | | | |
| Zone of Interest Total | 5.4% | 11.6% | 36.2% | 19.4% | 8.8% | 11.9% | 6.7% |

Source: U.S. Bureau of the Census, 2019 American Community Survey

Employment by sector is presented in Table 9 (See next page). Each figure represents the percentage of the employed civilian population in each area. In the zone of interest, the largest sectors are educational services, health care, and social assistance, employing 22.6 percent of the population. The second largest sector is manufacturing, employing 17.1 percent. This is followed by retail trade with 11.5 percent.

**Table 9: Employment by Sector (percentage of employed civilian population)**

| Sector | GA | SC | Abbe-ville, SC | Aiken SC | Edge field, SC | McCor mick, SC | Colum -bia, GA | Elbert GA | Lincoln GA | McDuffie GA | Richmond GA | Warren GA | Wilkes GA | Zone of Interest Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Public Administration | 4.4% | 4.3% | 3.2% | 4.6% | 4.3% | 8.2% | 7.9% | 5.7% | 6.3% | 4.4% | 5.6% | 5.9% | 7.3% | 5.7% |
| Other Service except Public Administration | 4.7% | 5.0% | 4.6% | 5.5% | 6.7% | 4.8% | 4.0% | 5.5% | 3.7% | 3.1% | 4.4% | 3.6% | 5.4% | 4.8% |
| Arts, entertainment, recreation, food | 9.4% | 10.8% | 7.0% | 8.5% | 5.1% | 7.1% | 7.4% | 4.4% | 5.6% | 10.0% | 11.8% | 2.4% | 4.5% | 7.2% |
| Educational services, health care, social | 20.8% | 21.9% | 24.3% | 21.1 % | 19.6 % | 28.5% | 26.4% | 20.1% | 30.5% | 16.8% | 24.9% | 17.8% | 27.2% | 22.6% |
| Professional, scientific, admin | 13.1% | 10.2% | 7.9% | 10.7 % | 8.9% | 4.9% | 11.5% | 5.2% | 7.1% | 8.9% | 11.9% | 7.0% | 6.7% | 8.9% |
| Finance, insurance, real estate, rentals | 6.3% | 5.6% | 3.3% | 4.4% | 3.7% | 3.3% | 4.2% | 3.3% | 5.3% | 2.9% | 3.5% | 1.8% | 5.2% | 3.4% |
| Information | 2.3% | 1.3% | 1.1% | 1.4% | 1.6% | 3.0% | 1.8% | 0.6% | 1.5% | 2.4% | 1.6% | 0.4% | 1.1% | 1.2% |
| Transportation, warehouse, utilities | 7.2% | 5.3% | 4.6% | 6.1% | 5.2% | 3.4% | 5.2% | 4.4% | 5.8% | 4.7% | 5.4% | 8.1% | 6.5% | 5.2% |
| Retail trade | 10.7% | 11.5% | 9.2% | 12.6 % | 11.5 % | 7.5% | 13.0% | 11.4% | 10.8% | 16.8% | 13.4% | 14.3% | 8.2% | 11.5% |
| Wholesale trade | 2.9% | 2.3% | 1.7% | 1.5% | 2.2% | 0.8% | 1.9% | 4.4% | 1.7% | 3.1% | 1.9% | 2.1% | 2.2% | 2.1% |
| Manufacturing | 10.6% | 13.7% | 24.0% | 14.1 % | 17.7 % | 21.7% | 9.8% | 27.3% | 14.0% | 15.3% | 9.7% | 25.2% | 16.3% | 17.1% |
| Construction | 6.7% | 7.2% | 6.3% | 8.0% | 7.4% | 6.0% | 6.7% | 3.4% | 15.1% | 8.9% | 5.2% | 4.4% | 3.8% | 7.4% |
| Agriculture, forestry, fishing and hunting | 1.0% | 0.9% | 1.5% | 1.5% | 6.2% | 0.9% | 0.3% | 4.4% | 2.5% | 2.6% | 0.6% | 6.6% | 5.4% | 2.9% |

Source: U.S. Bureau of Census, 2019

Similarly, the largest employment sectors for Georgia and South Carolina are also educational services, health care, and social assistance, with 20.8 percent and 21.9 percent, respectively, of the total employment. While manufacturing has importance in both the zone of interest and state, it is evident that the economies are driven by service sector employment.

As shown in Table 10, the 2019 unemployment rate for the zone of interest at 6.8 percent is higher than that of Georgia and South Carolina average unemployment rate of 4.7 and 4.6 percent, respectively. Columbia, Lincoln and Wilkes Counties are the only counties with unemployment rates below the state averages.

**Table 10: Labor Force, Employment and Unemployment Rates for Civilian Labor Force Over Age 16**

| Geographical Area | Labor Force | Employed | Unemployed | Unemployment Rate | Armed Forces |
|---|---|---|---|---|---|
| **States:** | | | | | |
| Georgia | 5,308,730 | 5,002,153 | 251,981 | 4.7% | 54,596 |
| South Carolina | 2,513,088 | 2,359,714 | 116,037 | 4.6% | 37,337 |
| | | | | | |
| **Counties:** | | | | | |
| Abbeville, SC | 10,719 | 10,104 | 586 | 5.5% | 29 |
| Aiken, SC | 77,441 | 71,279 | 5,813 | 7.5% | 349 |
| Edgefield, SC | 11,389 | 10,602 | 753 | 6.6% | 34 |
| McCormick | 3,066 | 2,803 | 263 | 8.6% | 0 |
| | | | | | |
| Columbia, GA | 75,480 | 68,738 | 3,271 | 4.3% | 3,471 |
| Elbert, GA | 8,401 | 7,769 | 623 | 7.4% | 9 |
| Lincoln, GA | 3,418 | 3,289 | 116 | 3.4% | 13 |
| McDuffie, GA | 9,229 | 8,481 | 641 | 6.9% | 107 |
| Richmond, GA | 96,101 | 82,032 | 8,095 | 8.4% | 5,974 |
| Warren, GA | 2,224 | 2,115 | 107 | 4.8% | 2 |
| Wilkes, GA | 4,234 | 4,092 | 128 | 3.0% | 14 |
| | | | | | |
| Zone of Interest Total | 301,702 | 271,304 | 20,396 | 6.8% | 10,002 |

Source: U.S. Bureau of the Census, 2019 American Community Survey

There are approximately 233,416 households in the zone of interest with an average household size of 2.51 persons. For Georgia, there are 3.85 million households and in South Carolina, 1.98 million, with an average size of households at 2.69 for Georgia and 2.54 for South Carolina, as shown in Table 11. Also as shown in Table 11, the zone of interest is poorer than Georgia and South Carolina overall. In the counties in the zone of interest, the median household income is $45,896 compared to the state median

household incomes of $56,227 in South Carolina and $61,890 in Georgia. Similarly, the zone of interest has a lower per capita income ($23,423) compared to Georgia ($32,657) and South Carolina ($31,295). Within the zone of interest, Columbia County has the highest per capita income ($34,579).

**Table 11: Households, Household Size, Median Income, and Per Capita Income**

| Geographical Area | Households | Persons/ household | Median household income 2019 Dollars | Per capita income 2019 Dollars |
|---|---|---|---|---|
| **States:** | | | | |
| Georgia | 3,852,714 | 2.69 | $61,890 | $32,657 |
| South Carolina | 1,975,915 | 2.54 | $56,227 | $31,295 |
| | | | | |
| **Counties:** | | | | |
| Abbeville, SC | 9,660 | 2.46 | $38,714 | $22,646 |
| Aiken, SC | 67,598 | 2.45 | $51,399 | $28,396 |
| Edgefield, SC | 9,176 | 2.64 | $49,127 | $26,228 |
| McCormick, SC | 3,957 | 2.11 | $43,633 | $25,617 |
| | | | | |
| Columbia, GA | 47,215 | 3.18 | $82,330 | $34,579 |
| Elbert, GA | 7,559 | 2.50 | $38,678 | $22,355 |
| Lincoln, GA | 3,475 | 2.23 | $39,742 | $26,918 |
| McDuffie, GA | 8,153 | 2.59 | $43,468 | $21,625 |
| Richmond, GA | 71,400 | 2.69 | $42,728 | $22,787 |
| Warren, GA | 2,244 | 2.32 | $37,203 | $23,448 |
| Wilkes, GA | 3,979 | 2.45 | $37,838 | $24,674 |
| | | | | |
| Zone of Interest Total | 233,416 | 2.51 | $45,896 | $23,423 |

Source: U.S. Bureau of the Census, 2019 American Community Survey

### 3.2.10 Environmental Justice and Protection of Children

Executive Order (EO) 12898 and Department of Defense's Strategy on Environmental Justice, dated March 24, 1995 (Table 12), directs Federal agencies to identify and address the disproportionately high adverse human health or environmental effects of their actions on minority and low-income populations, to the greatest extent practicable and permitted by law (Table 7 and Table 11). The order also directs each agency to develop a strategy for implementing environmental justice. Minority populations are those persons who identify themselves as Black or African American, Hispanic, Asian American, American Indian/Alaskan Native, and Pacific Islander. A minority population exists where the percentage of minorities in an affected area either exceeds 50 percent or is meaningfully greater than in the general population. No environmental justice communities exist within the project area based on the 2019 census data.

EO 13045, Protection of Children from Environmental Health Risks and Safety Risks, requires each federal agency, to the extent possible, to make it a high priority to identify and assess environmental health and safety risks that may disproportionately affect children; and ensure its policies, programs, activities, and standards address disproportionate risks to children resulting from environmental health or safety risks (White House Press Release 1997).

### 3.2.11 Air Quality

Thurmond Project extends into several counties; McCormick and Abbeville counties in South Carolina; and parts of Columbia, McDuffie, Warren, Wilkes, Lincoln and Elbert Counties in Georgia. All of these counties are considered in attainment for all federal air quality standards (http://www3.epa.gov/airquality/greenbk/astate.html). Despite being in compliance for these standards, portions of the area that contain the reservoir are at times subjected to temporary impacts to air quality resulting from activities such as large-scale construction projects and prescribed burning.

Air quality within the project boundary is influenced by exhaust from motor vehicles and boats, the use of grills and fire pits, and other regional activities (such as large-scale construction projects, prescribed burning as well as timber industry logging operations). The large open area created by the reservoir allows strong air currents to reduce and/or eliminate localized air quality concerns caused by these pollutants. Air quality is strongly influenced by external factors such as urban areas and factories located as far away as Augusta and Atlanta, GA.

Air quality is regulated by the Clean Air Act Section 176(c) and implemented by the Environmental Protection Agency (EPA), South Carolina Department of Health and Environmental Control (SC DHEC), and GA DNR–EPD. Air quality standards are defined in the National Ambient Air Quality Standards. Actions which result in increased emissions may require a permit issued by SC DHEC or GA DNR-EPD.

### 3.2.12 Hydrology, Water Quality and Water Supply

Water quality in Thurmond Lake is measured by Georgia and South Carolina natural resource state agencies. There are nine SC DHEC monitoring stations (Figure 3) along Thurmond Lake (CL-040, RL-05405, RL-05407, RL-03357, RL-05463, SV-291, RL-06423, RL-04385, CL-041). Aquatic life and recreational uses are fully supported at all SC DHEC monitoring sites. Currently, both states have identified fish consumption advisories for largemouth bass caught in Thurmond Lake due to potential mercury levels resulting from outside sources. Additionally, the state of South Carolina has designated Thurmond Lake as a No Discharge Lake.

The headwaters of Thurmond Lake back up to the Richard B. Russell (RBR) Dam. As a result, water released from RBR Dam affects water quality in Thurmond Lake. USACE conducts an annual water quality sampling program in both reservoirs to evaluate the impacts of USACE project operations on water quality in the reservoirs and immediate tailrace areas.

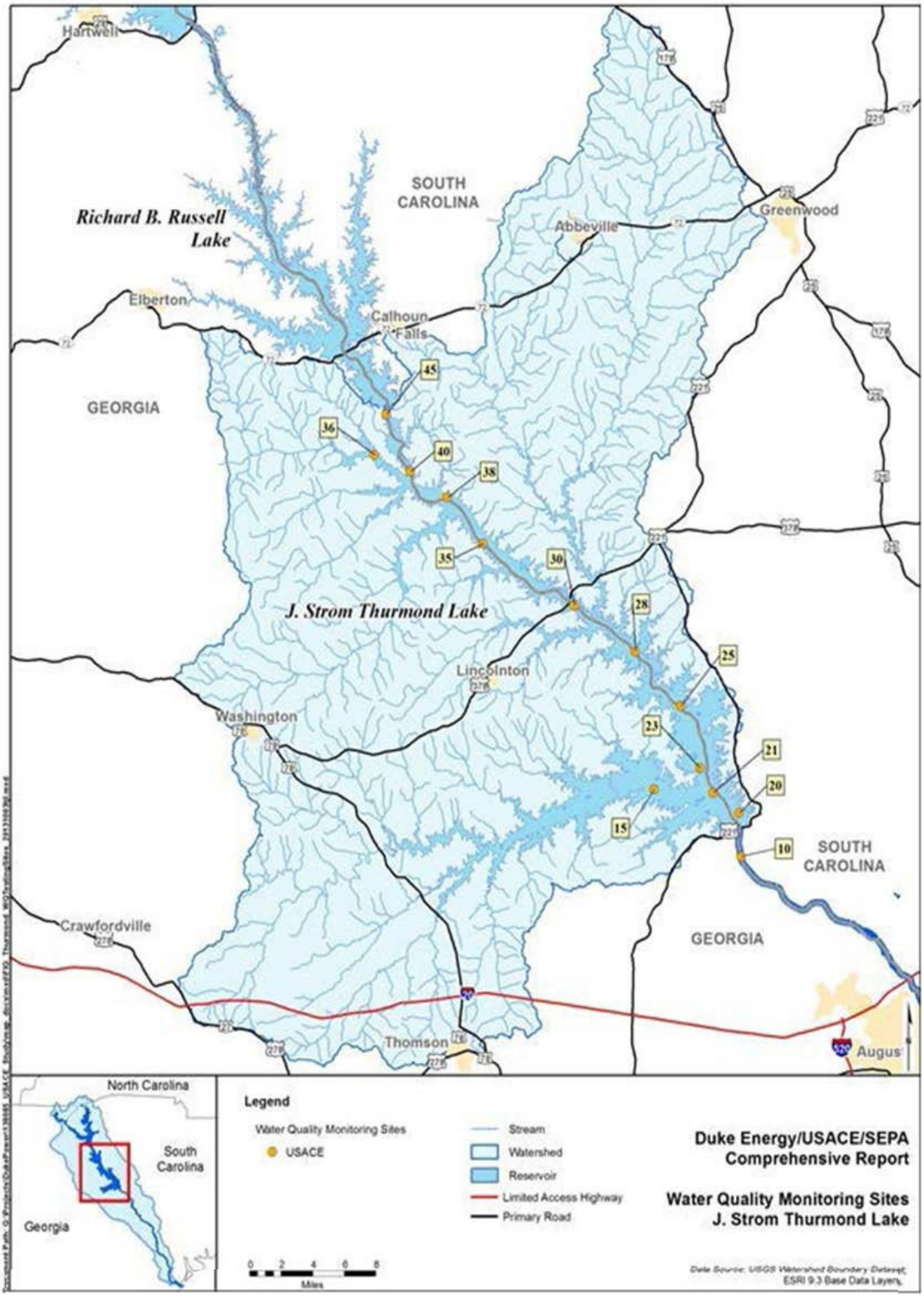
Thurmond Project conducts monthly sampling of dissolved oxygen (DO) and temperature at established locations in the reservoir. The routine monthly sampling is conducted only at the forebay station from December through March when reservoir conditions are isothermal and DO concentrations are near saturation. From April through November, stratification drives reservoir processes that lead to reduced DO conditions, and the reservoir is sampled at 12 established locations throughout the mainstream and major tributaries. Sampling locations are shown in Figure 3. Additional sampling may occasionally be required for special studies (i.e. operation of oxygen system, blueback herring entrainment, etc.).

Thermal stratification in the downstream region of the reservoir usually begins late-April with the establishment of a thermocline (20 - 26 feet) in mid-May. Temperatures range from 57.2 to 86°F and the thermocline remains near a depth of 26 to 33 feet throughout the stratification period. The thermocline begins to weaken in late-September when seasonal cooling begins, until the reservoir conditions are almost completely isothermal by mid-October. Temporal regimes in the Savannah River portion (mainstem) of Thurmond Lake can be influenced by flow releases from RBR Lake.

Similarly, temporal and spatial gradients of DO. were observed in the mainstem of the reservoir during stratification (1984 – 1988 monitoring period). DO concentrations remained near 8 to 10 milligrams per Liter (mg/L), gradually decreasing towards the downstream area of the reservoir. Anoxic conditions were established in the downstream hypolimnion area from mid-to-late August continuing until late October.

Anoxic conditions remained within 33 feet of the surface. Concentrations of DO did not fall below 4 mg/L in the mid-region of the reservoir. The oxygenated waters during stratification can be attributed to the well-oxygenated flow releases from RBR Dam. Anoxic conditions may also be the result of the proximity of major and secondary

**Figure 3: JST Water Quality Monitoring Sites**



tributaries entering Thurmond Lake. Temperature and D.O. concentrations in the water releases showed similar trends to those of the forebay. During fall mixing, D.O. levels were near 10 mg/L in the tailrace (Ashby et al. 1994).

The turbines at Thurmond Dam were replaced during a major rehabilitation effort that was completed in 2007. The new turbines include a self-aspirating design that is an advanced form of turbine venting. This venting adds 2 to 3 mg/L of DO to the water as it passes through the dam. In addition to turbine venting, USACE installed an oxygen injection system in the lake that began operating in 2011. This system is located adjacent to the Modoc Boat Ramp near Modoc, SC, approximately 5.5-miles upstream of the dam. The primary objective of this system is to improve cool water fishery habitat in the lower 1/3 of the reservoir, but the system also improves the DO of water immediately upstream of Thurmond Dam. Thus, the operation of this DO system in combination with the turbine venting at the dam results in the DO concentration below Thurmond Dam remaining near or above 5 mg/l throughout the year.

Average daily water withdrawals from Thurmond Lake (2017 - 2019) are 6.7 million gallons per day (mgd) including withdrawals from eleven raw water intakes. There are six users with a total of eight permanent water storage contracts withdrawing from the lake: McCormick, South Carolina (two contracts); Lincolnton, Georgia (two contracts); Thomson, Georgia; Columbia County, Georgia; Savannah Lakes Village, South Carolina; and Washington, Georgia. Additionally, Hickory Knob State Park Golf Course withdraws water in accordance with riparian rights. The contracted amount of storage accounts for 3,741-acre feet of conservation storage.

### 3.2.13 Hazardous, Toxic and Radioactive Waste (HTRW)

Under ER 1165-2-132, USACE assumes responsibility for the reasonable identification and evaluation of all Hazardous, Toxic, and Radioactive Waste (HTRW) contamination within the vicinity of proposed actions.

In accordance with ER 1165-2-132, Section 13b, USACE conducts Environmental Review Guide for Operations (ERGO) inspections every five years, using an external team. In addition, SAS performs an internal ERGO review annually. Those inspections include developed recreation areas around the lake that are operated by USACE, as well as outgrant areas for commercial concession (marinas) and state parks. USACE tracks the results and findings of these inspections in the CPTrack to better track any needed corrective actions.

USACE prepares an Environmental Condition of Property (ECP) report (in place of a Phase 1 Site Assessment in accordance with ASTM standards) on lands that the USACE leases to other agencies, non-profit organizations, and private entities.

From the 1950s until 1970s, Thurmond Project conducted mosquito control programs that included the use of pesticides, such as DDT. A chemical mixing area located at the lower airstrip near Lake Springs Road required remediation. Approximately 389 tons of contaminated material were removed in 2010. GA DNR-EPD has required that the J. Strom Thurmond Master Plan include the following controls in order to remove the site from the State of Georgia Hazardous Site Index (Appendix D):

a. The Site shall not be used for recreational purposes, agricultural or grazing purposes, residential purposes, childcare centers, schools, parks, athletic fields, sporting activities of any kind, kennels, private animal pens or riding clubs without the written approval of the GA DNR-EPD.

b. Groundwater beneath the Site shall not be used as a source of potable or irrigation water without the written approval of the GA DNR-EPD.

c. The USACE shall take no action to modify the Site provisions of the J. Strom Thurmond Lake Master Plan listed in subsections a & b above, without the written approval of the GA DNR-EPD.

The USACE shall include a copy of the Revised Compliance Status Report as an appendix to the J. Strom Thurmond Project Master Plan.

Thurmond Marina (Clarks Hill Marina) was originally established in 1953 as Little River Sportsmen's Camp. Two 2,000-gallon underground fuel storage tanks (UST) and one 1,000-gallon UST were installed. These tanks were abandoned in place and replaced with two 4,000-gallon tanks and one 2,000-gallon tank in 1988.

Upon expiration of the previous lease in 2010, all USTs were replaced with above-ground storage tanks. During removal of the USTs in 2014, soil and groundwater contamination was discovered. A corrective action plan was developed in accordance with State of Georgia regulations for removal of 1,482 cubic yards of benzene, toluene, and ethylbenzene (BTEX) contaminated soil and installation of injection and monitoring wells to treat and monitor groundwater contamination. Oxygen Release Compound (ORC-A) in pellet form was placed in the excavated area prior to backfilling and ORC-A in liquid form was subsequently injected via the wells for a second treatment. Periodic groundwater monitoring will be conducted in accordance with state requirements and the corrective action plan.

## Table 12: Relevant Resources

| Resource | Institutionally Important | Technically Important | Publicly Important |
|---|---|---|---|
| **Wetlands** | Clean Water Act of 1977, as amended; EO 11990 of 1977, Protection of Wetlands; Coastal Zone Management Act of 1972, as amended; and the Estuary Protection Act of 1968., EO 11988, and Fish and Wildlife Coordination Act. | Provide necessary habitat for various species of plants, fish, and wildlife; serve as ground water recharge areas; provide storage areas for storm and flood waters; serve as natural water filtration areas; provide protection from wave action, erosion, and storm damage; and provide various consumptive and non-consumptive recreational opportunities. | The high value the public places on the functions and values that wetlands provide. Environmental organizations and the public support the preservation of marshes. |
| **Aquatic Resources/ Fisheries** | Fish and Wildlife Coordination Act of 1958, as amended. | A critical element of many valuable freshwater and marine habitats; an indicator of the health of the various freshwater and marine habitats; and many species are important commercial resources. | The high priority that the public places on their aesthetic, recreational, and commercial value. |
| **Bottomland Hardwood Forest** | Section 906 of the Water Resources Development Act of 1986 and the Fish and Wildlife Coordination Act of 1958, as amended. | Provides necessary habitat for a variety of plant, fish, and wildlife species; often provides a variety of wetland functions and values; an important source of lumber and other commercial forest products; and provides various consumptive and non-consumptive recreational opportunities. | The high priority that the public places on its aesthetic, recreational, and commercial value. |
| **Wildlife** | Fish and Wildlife Coordination Act of 1958, as amended and the Migratory Bird Treaty Act of 1918 | A critical element of many valuable aquatic and terrestrial habitats; an indicator of the health of various aquatic and terrestrial habitats; and many species are important commercial resources. | The high priority that the public places on their aesthetic, recreational, and commercial value. |
| **Threatened and Endangered Species** | Endangered Species Act of 1973, as amended; Marine Mammal Protection Act of 1972; and Bald and Golden Eagle Protection Act of 1940 (as amended in 1962). | USACE, USFWS, NMFS, NRCS, USEPA, GADNR, and SCDNR cooperate to protect these species. The status of such species provides an indication of the overall health of an ecosystem. | The public supports the preservation of rare or declining species and their habitats. |
| **Cultural and Archaeological Resources** | National Historic Preservation Act of 1966, as amended; Native American Graves Protection and Repatriation Act of 1990; and Archeological Resources Protection Act of 1979 | State and Federal agencies document and protect sites. Their association or linkage to past events, to historically important persons, to design and construction values; and to yield important information about prehistory and history. | Preservation groups and private individuals support protection and enhancement of historical resources. |

| Resource | Institutionally Important | Technically Important | Publicly Important |
|---|---|---|---|
| **Recreation Resources** | Federal Water Project Recreation Act of 1965 as amended, and Land and Water Conservation Fund Act of 1965 as amended | Provide high economic value to local, state, and national economies. | The public places a high value on public fishing, hunting, and boating areas. |
| **Aesthetics** | USACE ER 1105-2-100, and National Environmental Policy Act of 1969. | Visual accessibility to unique combinations of geological, botanical, and cultural features that may be an asset to a study area. State and Federal agencies recognize the value of beaches and shore dunes. | Environmental organizations and the public support the preservation of natural pleasing vistas. |
| **Socio-Economic Resources** | River and Harbor Flood Control Act of 1970 (PL 91-611). | N/A | Social concerns and items affecting area economy are of interest to community. |
| **Environmental Justice and Protection of Children** | EO 12898 and the Department of Defense's Strategy on Environmental Justice of 1995, EO 13045, Protection of Children from Environmental and Safety Health Risks | The social, environmental health, and economic welfare of minority, children, and low-income populations may be positively or disproportionately impacted by the tentatively selected plans. | Public concerns about the fair and equitable treatment (fair treatment and meaningful involvement) of all people with respect to environmental, safety, and human health consequences of federal laws, regulations, policies, and actions. |
| **Air Quality** | Clean Air Act of 1963 | State and Federal agencies recognize the status of ambient air quality in relation to the NAAQS. | Virtually all citizens express a desire for clean air. |
| **Hydrology, Water Quality, and Water Supply** | Clean Water Act of 1977; Fish and Wildlife Coordination Act; Coastal Zone Mgt Act of 1972; and Water Supply Act of 1958 (43 US Code §390b) | USACE, USFWS, NMFS, NRCS, USEPA, and State DNR and wildlife/fishery offices recognize value of fisheries and good water quality. National and state standards have been established to assess water quality.<br><br>State and Federal agencies recognize the value of drinking water and maintain a reliable source of clean water. | Environmental organizations and the public support the preservation of water quality and fishery resources and the desire for clean drinking water. This legislation gives communities throughout the Savannah River Basin the option to receive water supply allocations from the reservoirs. In total, the entire basin supplies drinking water to more than 1.2 million people in GA and SC from its headwaters to the estuary. |

# 4.0 ENVIRONMENTAL CONSEQUENCES

The changes being considered from the 1995 MP to this MP to recreation facilities and natural resources management practices as detailed in the MP are consistent with current regulations and policies. All proposed improvements, as well as natural resource management actions, will be reviewed for compliance with the Endangered Species Act, the Fish and Wildlife Coordination Act, the National Historic Preservation Act, the Clean Water Act, etc., in accordance with ER 200-2-2, Procedures for Implementing NEPA, and will be addressed by the appropriate categorical exclusion at the time of implementation.

## 4.1 Wetlands

### 4.1.1 Future Conditions with No Action

Without implementation of the proposed action, there would be no adverse impacts. The MP would not be updated.

### 4.1.2 Future Conditions with the Proposed Action

With implementation of the proposed action, the MP has been updated and includes maps of recreation areas with proposed improvements (Appendix D of the MP). Proposed recreation area improvements avoid impacts to wetlands.

Natural resources management activities that may impact wetlands will be conducted in accordance with the appropriate state Best Management Practices (BMP). Activities beyond the scope of the BMP will require Section 404 permits.

## 4.2 Aquatic Resources/Fisheries

### 4.2.1 Future Conditions with No Action

Without implementation of the proposed action, there would be no adverse impacts to the aquatic resources/fisheries.

### 4.2.2 Future Conditions with the Proposed Action

With implementation of the proposed action, there may be beneficial impacts to the aquatic resources/fisheries. Improved angler access and proposed improvements to aquatic plant habitat would have minor beneficial impacts by potentially increasing the abundance of game and non-game fish and access to the fishery.

## 4.3 Floodplains

In accordance with Executive Order 11988, federal agencies must avoid to the extent possible the long and short-term adverse impacts associated with the occupancy and modification of floodplains and avoid direct and indirect support of floodplain development wherever there is a practicable alternative.

### 4.3.1 Future Conditions with No Action

The No Action alternative would result in no adverse impacts to the floodplain or management of the floodplain.

### 4.3.2 Future Conditions with the Proposed Action

The proposed action would result in no adverse impacts to the floodplain or management of the floodplain.

## 4.4 Terrestrial Resources

### 4.4.1 Future Conditions with No Action

Without implementation of the proposed action, there would be no adverse impacts to the terrestrial resources.

### 4.4.2 Future Conditions with the Proposed Action

With implementation of the proposed action, recreation facilities will be constructed in areas designated for recreational use.

Natural resources management activities described in the proposed action, mainly timber harvesting, will have no long-term adverse impacts on terrestrial resources. The short-term impacts of timber harvest will be offset by site restoration (replanting) in areas that are clear cut. The short-term impacts to timber stands that are thinned are offset by providing short-term early successional habitat and long-term improvements to the residual stand. These short-term negative impacts to the terrestrial vegetation caused by timber harvesting have the long-term benefits of diversifying wildlife habitat.

## 4.5 Bottomland Hardwood Forest

### 4.5.1 Future Conditions with No Action

Without implementation of the proposed action, there would be no adverse impacts to the bottomland hardwoods.

### 4.5.2 Future Conditions with the Proposed Action

With implementation of the proposed action, there would be no adverse impacts to the bottomland hardwoods. Adverse impacts will be minimized using BMP for forest roads and accepted trail construction standards.

## 4.6 Wildlife

### 4.6.1 Future Conditions with No Action

Without implementation of the proposed action, there would be no adverse impacts to the wildlife.

### 4.6.2 Future Conditions with the Proposed Action

With implementation of the proposed action*,* beneficial impacts to wildlife could occur with additional improvements to wildlife habitat, timber stand diversity, and incorporation of former quasi-public lease areas into wildlife management areas.

## 4.7 Protected Species

### 4.7.1 Future Conditions with No Action

Without implementation of the proposed action, there would be no adverse impacts to protected species, or their designated critical habitats.

### 4.7.2 Future Conditions with the Proposed Action

With implementation of the proposed action, there would be no adverse impacts to any protected species and their critical habitats. Recreation area development will not occur in critical habitats or if a protected species is present. Protected species will be better protected as maps of Environmentally Sensitive Areas are maintained within the GIS and made available to natural resources management personnel.

A protected species survey will be completed prior to constructing any new facilities or land disturbing activities to ensure no adverse effects to any Federally-listed species or their habitat. Protected species surveys are valid for two years in accordance with the MOA between USACE, Savannah District and USFWS May 28, 2010 (Appendix E).

## 4.8 Waterbodies

### 4.8.1 Future Conditions with No Action

Without implementation of the proposed action, there would be no adverse impacts to Thurmond Lake.

### 4.8.2 Future Conditions with the Proposed Action

The proposed action would result in no adverse impacts to Thurmond Lake. Erosion control measures will be implemented during proposed recreation area development and BMPs will be followed during timber harvest and wildlife management activities.

## 4.9 Cultural Resources

### 4.9.1 Future Conditions with No Action

Without implementation of the proposed action, there would be no impacts on any cultural resources. Management of cultural resources would continue in accordance with the J. Strom Thurmond Project Historic Properties Management Plan, updated April 2001 and the Programmatic Agreement Among the U.S. Army Engineer District, Savannah, the Georgia State Historic Preservation Officer, the South Carolina Historic Preservation Office, and the Advisory Council on Historic Preservation for the Operation and Maintenance of the J. Strom Thurmond Lake Project, Georgia and South Carolina, dated 2003. This plan and agreement define policies and procedures implemented at Thurmond Project to assure compliance with federal cultural resources laws and regulations.

### 4.9.2 Future Conditions with the Proposed Action

With implementation of the proposed action, there would be no adverse impacts to any cultural resources. Management of cultural resources would continue in accordance with the Historic Properties Management Plan and Programmatic Agreement.

## 4.10 Recreational Resources

### 4.10.1 Future Conditions with No Action

Without implementation of the proposed action, there would be minor adverse impacts to recreation resources. Existing facilities would deteriorate more rapidly due to overuse if additional facilities are not provided to keep pace with current and future visitation.

### 4.10.2 Future Conditions with the Proposed Action

There could be minor beneficial impacts to recreation due to the updated MP. With implementation of the proposed action, more recreation resources may be provided. The additional facilities are proposed within existing recreational areas.

## 4.11 Aesthetics

### 4.11.1 Future Conditions with No Action

Without implementation of the proposed action, there would be no adverse impacts to aesthetics or any view of the watershed.

### 4.11.2 Future Conditions with the Proposed Action

With implementation of the proposed action, additional recreational facilities would not have an adverse impact to the aesthetics or view of the watershed since these areas are already classified for recreation use.

## 4.12 Socio-Economic Resources

### 4.12.1 Future Conditions with No Action

Without implementation of the proposed action, there would be no adverse impacts on the socio-economic resources.

### 4.12.2 Future Conditions with the Proposed Action

Implementation of the proposed action provides for economically and socially productive uses of the project. Beneficial impacts on the socio-economic resources are expected to result. Enhancing the recreational capacity of the project will increase public use and draw more visitors to the area, benefitting the local economy. Proper management of the natural resources will have a beneficial impact on the timber industry and business that support outdoor enthusiasts. Beneficial effects on residential property values in the surrounding area can also be expected, which can lead to proportionally higher property tax revenues for local governments. Conversely, higher property values could result in an adverse effect of higher taxes for individual property owners.

The implementation of the 2021 Thurmond Project MP is not expected to have any adverse impacts on the area's socioeconomic well-being. Community benefits from recreation, power generation, and water supply for industrial and residential use will not be adversely impacted. There are no specific impacts on general health or quality of life that would adversely or disproportionately impact the surrounding population.

## 4.13 Environmental Justice and Protection of Children

### 4.13.1 Future Conditions with No Action

Without implementation of the proposed action, there would be no adverse impacts on environmental justice or health or safety risks to children.

### 4.13.2 Future Conditions with the Proposed Action

With implementation of the proposed action, there would be no adverse impacts on environmental justice or health or safety risks to children.

## 4.14 Air Quality

### 4.14.1 Future Conditions with No Action

Without implementation of the proposed action, there would be no adverse impacts on air quality.

### 4.14.2 Future Conditions with the Proposed Action

With implementation of the proposed action, there would be no adverse impacts on air quality. All of the counties within the Zone of Interest are considered to be in "Attainment" for all federal air quality standards (EPA 2014). Despite being in compliance for these standards, portions of the area that contains the Reservoir are at times subjected to temporary impacts to air quality as a result of activities like large-scale construction projects on and off Thurmond Project lands.

Air quality within the project boundary is influenced by exhaust from motor vehicles and boats, the use of grills and fire pits, and other regional activities (such as large-scale construction projects, timber industry logging operations, and prescribed burning). The large open area that is created by the reservoir allows for strong air currents to reduce and/or eliminate any localized air quality concerns caused by these pollutants. Air quality is strongly influenced by external factors, such as urban areas and factories located as far away as Augusta and Atlanta, GA.

## 4.15 Water Quality

### 4.15.1 Future Conditions with No Action

Without implementation of the proposed action, there would be no adverse impacts on water quality.

### 4.15.2 Future Conditions with the Proposed Action

With implementation of the proposed action, there would be no adverse impacts on water quality. Construction activities are required to follow state regulations for stormwater and erosion control measures and Section 404 permitting as required. Natural resources management activities that may impact water quality will be conducted in accordance with the appropriate state BMP. Off-site activities such as major construction, road maintenance, timber logging operations, and agricultural uses have the largest potential impact on water quality.

### 4.16 Hazardous, Toxic, and Radioactive Waste (HTRW)

#### 4.16.1 Future Conditions with No Action

Without implementation of the proposed action, there would be no adverse impacts on HTRW.

#### 4.16.2 Future Conditions with the Proposed Action

With implementation of the proposed action, there would be no adverse impacts on HTRW. Any change in the storage or use of hazardous materials must comply with federal and state regulations. Thurmond Project is responsible for ensuring compliance with EPA, SC DHEC and GA DNR-EPD regulations on public lands at Thurmond Project. The EPA EnviroMapper website was researched and identified no known hazardous waste sites at Thurmond Project.

## 5.0 CUMULATIVE IMPACTS

The CEQ regulations implementing the procedural provisions of the NEPA of 1969, as amended (42 U.S.C. 4321 et seq.) define cumulative effects as:

> "The impact on the environment which results from the incremental impact of the action when added to other past, present, or reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions (40 CFR 1508.7)".

Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time. Past, present, and reasonably foreseeable future actions have and continue to contribute to the cumulative impacts of activities in and around Thurmond Project. Past actions include the construction and operation of the reservoir, the recreation sites surrounding the reservoir, as well as residential, commercial, and industrial facilities throughout the region. All of these developments have had varying levels of impacts on the physical and natural resources in the region. Implementing management plans like the MP help to ensure a balance between public uses and stewardship of the natural environment. The proposed updates to the MP involve the additional recreational facilities and changes to natural resources management practices. Additional recreational facilities will be developed in areas that are already designated for recreational use. Natural resource management activities will be conducted in accordance with BMP standards.

# 6.0 COORDINATION

## 6.1 Agencies and Non-Governmental Organizations (NGO)

This EA was circulated for a 30-day review and comment period to the following agencies, groups, and individuals. Preparation of this EA and FONSI was coordinated with appropriate Congressional, Federal, state, and local interests, as well as environmental groups and other interested parties. The following is a list of the federal and state agencies and NGOs that were contacted during the evaluation and will receive a copy of the EA for review.

Federal Agencies

- Advisory Council on Historic Preservation
- Federal Highway Administration
- National Center for Environmental Health
- National Marine Fisheries Service - Southeast Regional Office
- U.S. Department of Agriculture
- U.S.D.A., Natural Resources Conservation Service
- U.S. Department of Energy
- U.S. Department of the Interior - Office of Environmental Policy & Compliance
- U.S. Department of Housing & Urban Development
- U.S. Environmental Protection Agency
- U.S. Fish and Wildlife Service
- U.S. Forest Service - Southern Region

State Agencies

South Carolina

- SC State Historic Preservation Office
- SC Department of Health and Environmental Control
- SC Department of Parks, Recreation and Tourism
- SC Department of Natural Resources

Georgia

- GA State Historic Preservation Office
- GA Department of Natural Resources, Environmental Protection Division
- GA Department of Natural Resources - State Parks and Historic Sites
- GA Department of Natural Resources - Wildlife Resources Division

Local Agencies

South Carolina Counties: Abbeville, Aiken, Edgefield, Greenwood, and McCormick,
Georgia Counties: Columbia, Elbert, Lincoln, McDuffie, Richmond, Taliaferro, Warren, and Wilkes

Elected Officials

- All South Carolina & Georgia U.S. Senators and Local Representatives
- All Local State Senators and Representatives

Conservation Groups

- National Wildlife Federation
- The National Audubon Society
- The Nature Conservancy
- The Wilderness Society
- Trust for Public Land
- Savannah River Keeper
- The Sierra Club

### 6.2 Public Review

Savannah District will provide documents for comment on website and request comment without in-person meetings. Information provided during the 30-day comment period was used to develop the Thurmond MP.

See Appendix F for comments that were received and responses.

## 7.0 COMPLIANCE WITH ENVIRONMENTAL LAWS AND REGULATIONS

Environmental compliance for the proposed action would be achieved upon:

- Coordination of this EA and FONSI with appropriate agencies, organizations, and individuals for their review and comments; and USFWS and NMFS concurrence that the proposed action would not be likely to adversely affect any endangered or threatened species;

- Receipt of the Georgia and South Carolina Historic Preservation Officer concurrence in the District's determination of No Effect on cultural resources; and

- Receipt and acceptance or resolution of all USFWS Fish and Wildlife Coordination Act recommendations.

The draft FONSI will not be signed until the proposed action achieves environmental compliance with applicable laws and regulations, as described above.

**Table 13: Relationship of the Proposed Action to Applicable Federal Laws and Policies**

| Public Laws | | |
|---|---|---|
| **Title of Public Law** | **U.S. Code** | **Compliance Status*** |
| Anadromous Fish Conservation Act of 1965, as amended | 16 U.S.C. §757a *et. seq.* | Full Compliance |
| Archaeological and Historic Preservation Act, as amended | P.L. 93-29 | Full Compliance |
| Archeological Resources Protection Act | P.L. 96-95 | Full Compliance |
| Bald and Golden Eagle Act of 1972 | 16 U.S.C. §§668-668d | Full Compliance |
| Clean Air Act of 1972, as amended | 42 U.S.C. Chapter 85 | Full Compliance |
| Clean Water Act of 1971, as amended | 33 U.S.C. §1251 *et. seq.* | Full Compliance |
| Endangered Species Act of 1973 | 16 U.S.C. §1531 *et. seq.* | Full Compliance |
| Fish and Wildlife Coordination Act of 1958, as amended | 16 U.S.C. §§661-665; 665a; 666; 666a-666c | Full Compliance |
| Flood Control Act of 1944, as amended, Section 4 | P.L. 78–534 | Full Compliance |
| Migratory Bird Conservation Act of 1928, as Amended | 16 U.S.C. §715 | Full Compliance |
| Migratory Bird Treaty Act of 1918, as amended | 16 U.S.C. §§703-712 | Full Compliance |
| National Environmental Policy Act of 1969, as amended | 42 U.S.C. §4321 *et. seq.* | Full Compliance |
| National Historic Preservation Act of 1966, as amended | 54 U.S.C. §300101 *et. seq.* | Full Compliance |
| Noise Control Act of 1972, as amended | 42 U.S.C. §4901 *et. seq.* | Full Compliance |
| Safe Drinking Water Act | 42 U.S.C. §§300f-300j | Full Compliance |

| Executive Orders | | |
|---|---|---|
| **Title of Executive Order** | **Executive Order Number** | **Compliance Status*** |
| Protection and Enhancement of Environmental Quality | 11514/11991 | Full Compliance |
| Protection and Enhancement of the Cultural Environment | 11593 | Full Compliance |
| Floodplain Management | 11988 | Full Compliance |
| Protection of Wetlands | 11990 | Full Compliance |
| Federal Compliance with Pollution Control Standards | 12088 | Full Compliance |
| Procurement Requirements and Policies for Federal Agencies for Ozone-Depleting Substances | 12843 | Full Compliance |
| Federal Compliance with Right-To-Know Laws and Pollution Prevention | 12856 | Full Compliance |
| Federal Actions to Address Environmental Justice and Minority and Low-Income Populations | 12898 | Full Compliance |
| Federal Acquisition and Community Right-To-Know | 12969 | Full Compliance |
| Indian Sacred Sites | 13007 | Full Compliance |
| Protection of Children from Environmental Health Risks and Safety Risks | 13045 | Full Compliance |
| Invasive Species | 13112 | Full Compliance |
| Consultation and Coordination with Indian Tribal Governments | 13175 | Full Compliance |
| Responsibilities of Federal Agencies to Protect Migratory Birds | 13186 | Full Compliance |
| Executive Order Facilitation of Cooperative Conservation | 13352 | Full Compliance |

*Compliance Status:
*Full Compliance*: Having met all requirements of the statute, EO, or other environmental requirements.
*Partial Compliance*: Not having met some of the requirements at current stage of planning. Compliance with these requirements is ongoing.
*Non-Compliance*: Violation of a requirement of the statute, EO, or other environmental requirement.
*Not Applicable*: No requirements for the statute, EO, or other environmental requirement for the current stage of planning.

## 8.0 CONCLUSION

The proposed action consists of updating the Thurmond Project MP. USACE has assessed the environmental impacts of the proposed action and has determined that the proposed actions would have no adverse or beneficial impact upon cultural resources and no adverse cumulative impacts on other resources associated with the proposed action. The creation of additional recreation facilities within existing recreation areas would provide for additional recreational benefits to lake visitors. Changes to natural resources management practices will have beneficial long-term effects on wildlife, fishery, and forest resources.

The Proposed Plan is not expected to significantly adversely affect the quality of the environment; therefore, an Environmental Impact Statement would not be required. For all alternatives, the potential effects were evaluated, as appropriate. A summary assessment of the potential effects of the recommended plan are listed in Table 15.

**Table 14: Summary of Potential Effects of the Preferred Alternative**

| | Insignificant effects | Insignificant effects due to mitigation | Resource unaffected by action |
|---|---|---|---|
| Aesthetics | ☒ | ☐ | ☐ |
| Air quality | ☒ | ☐ | ☐ |
| Aquatic resources/wetlands | ☒ | ☐ | ☐ |
| Invasive species | ☒ | ☐ | ☐ |
| Fish and wildlife habitat | ☒ | ☐ | ☐ |
| Threatened/Endangered species/critical habitat | ☒ | ☐ | ☐ |
| Historic properties | ☒ | ☐ | ☐ |
| Other cultural resources | ☒ | ☐ | ☐ |
| Floodplains | ☒ | ☐ | ☐ |
| Hazardous, toxic & radioactive waste | ☒ | ☐ | ☐ |
| Hydrology | ☒ | ☐ | ☐ |
| Land use | ☒ | ☐ | ☐ |
| Navigation | ☒ | ☐ | ☐ |
| Noise levels | ☒ | ☐ | ☐ |
| Public infrastructure | ☒ | ☐ | ☐ |
| Socioeconomics | ☒ | ☐ | ☐ |
| Environmental justice | ☒ | ☐ | ☐ |
| Soils | ☒ | ☐ | ☐ |
| Tribal trust resources | ☒ | ☐ | ☐ |
| Water quality | ☒ | ☐ | ☐ |
| Climate change | ☒ | ☐ | ☐ |

All practicable and appropriate means to avoid or minimize adverse environmental effects were analyzed and incorporated into the recommended plan. BMPs as detailed throughout the draft EA will be implemented, if appropriate, to minimize impacts.

## 9.0 PREPARERS

This EA and the associated FONSI were prepared by Allen Dean, Natural Resources Specialist; Cynthia Gose, Environmental Engineer; Nathan Dayan, Biologist; Marty Harm, Economist; with relevant sections prepared by: Susan Boyd – Shoreline Management; Julie Morgan - Cultural Resources; Chris Spiller - Natural Resources Management; Jeff Brooks – Wildlife Management, James Sykes – Fisheries Management, Kenneth Boyd – Forestry, Fish and Wildlife Management, Aaron Murphy, Project Forester and Evan Brashier, Conservation Biologist.

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