

**ENVIRONMENTAL ASSESSMENT
FOR HYDROPOWER LICENSE**

Wallace Dam Pumped Storage Project
FERC Project No. 2413-124
Georgia

Federal Energy Regulatory Commission
Office of Energy Projects
Division of Hydropower Licensing
888 First Street, NE
Washington, D.C. 20426

October 2019

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ACRONYMS AND ABBREVIATIONS

Advisory Council	Advisory Council on Historic Preservation
APE	area of potential effects
BMP	Best Management Practice
Certification	Water Quality Certificate
CFR	Code of Federal Regulation
cfs	cubic feet per second
Commission (or FERC)	Federal Energy Regulatory Commission
Corps	U.S. Army Corps of Engineers
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
DO	dissolved oxygen
EA	environmental assessment
Eagle Protection Act	Bald and Golden Eagle Protection Act
EPA	U.S. Environmental Protection Agency
EPRI	Electric Power Research Institute
ESA	Endangered Species Act
°F	degrees Fahrenheit
Forest Service	U.S. Forest Service
Forestry Commission	Georgia Forestry Commission
FPA	Federal Power Act
fps	feet per second
ft/sec	feet per second
FWS	U.S. Fish and Wildlife Service
Georgia DNR	Georgia Department of Natural Resources
Georgia EPD	Georgia Environmental Protection Division
Georgia Pest Council	Georgia Exotic Pest Plant Council
Georgia Power (applicant)	Georgia Power Company
hp	horsepower
HPMP	Historic Properties Management Plan
ILP	Integrated Licensing Process
IPaC	Information, Planning, and Conservation system
kV	kilovolt
kW	kilowatts
m	meters
mg/L	milligrams per liter
mgd	million gallons per day
msl	mean sea level
MW	megawatt
MWh	megawatt-hour
National Register	National Register of Historic Places

NEPA	National Environmental Policy Act
NERC	North American Electric Reliability Corporation
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
O&M	operations and maintenance
PA	Programmatic Agreement
PAD	Pre-application Document
PD	plant datum
PLP	Preliminary Licensing Proposal
Project	Wallace Dam Pumped Storage Project
PM&E measure	protection, mitigation, and enhancement measure
RM	river mile
ROW	right-of-way
RTE	rare, threatened, and endangered
SCORP	State Comprehensive Outdoor Recreation Plan
SD1	Scoping Document
SERC-SE	SERC Reliability Corporation, southeast sub-region
SHPO	State Historic Preservation Officer
sq. mi. (or mi ²)	square miles
TSI	Trophic State Index
USGS	U.S. Geological Survey
WMA	Wildlife Management Area

ENVIRONMENTAL ASSESSMENT

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Wallace Dam Pumped Storage Project FERC Project No. 2413-124 – Georgia

1.0 INTRODUCTION

1.1 APPLICATION

On May 31, 2018, Georgia Power Company (Georgia Power) filed an application to relicense its 321.3-megawatt (MW) Wallace Dam Pumped Storage Project (Wallace Dam Project) with the Federal Energy Regulatory Commission (Commission or FERC). The proposed project is located on the Oconee River, in Hancock, Putnam, Green, and Morgan Counties, Georgia (figure 1). The project occupies about 493.7 acres of federal land administered by the U.S. Forest Service (Forest Service) within the Oconee National Forest, which abuts Lake Oconee’s northernmost reaches.

1.2 PURPOSE OF ACTION AND NEED FOR POWER

1.2.1 Purpose of Action

The purpose of the Wallace Dam Project is to provide a source of hydroelectric power. Relicensing the Wallace Dam Project would allow Georgia Power to continue generating electricity at the project for the term of a new license, making electric power from a renewable resource available to the regional grid and its customers.

Under the provisions of the Federal Power Act (FPA), the Commission must decide whether to issue a new license to Georgia Power for the Wallace Dam Project, and what conditions should be placed on any license issued. In deciding whether to issue a license for a hydroelectric project, the Commission must determine that the project will be best adapted to a comprehensive plan for improving or developing a waterway. In addition to the power and developmental purposes (such as flood control, irrigation, and water supply) for which licenses are issued, the Commission must give equal consideration to the purposes of: (1) energy conservation; (2) the protection, mitigation of damage to, and enhancement of fish and wildlife (including related spawning grounds and habitat); (3) the protection of recreational opportunities; and (4) the preservation of other aspects of environmental quality.

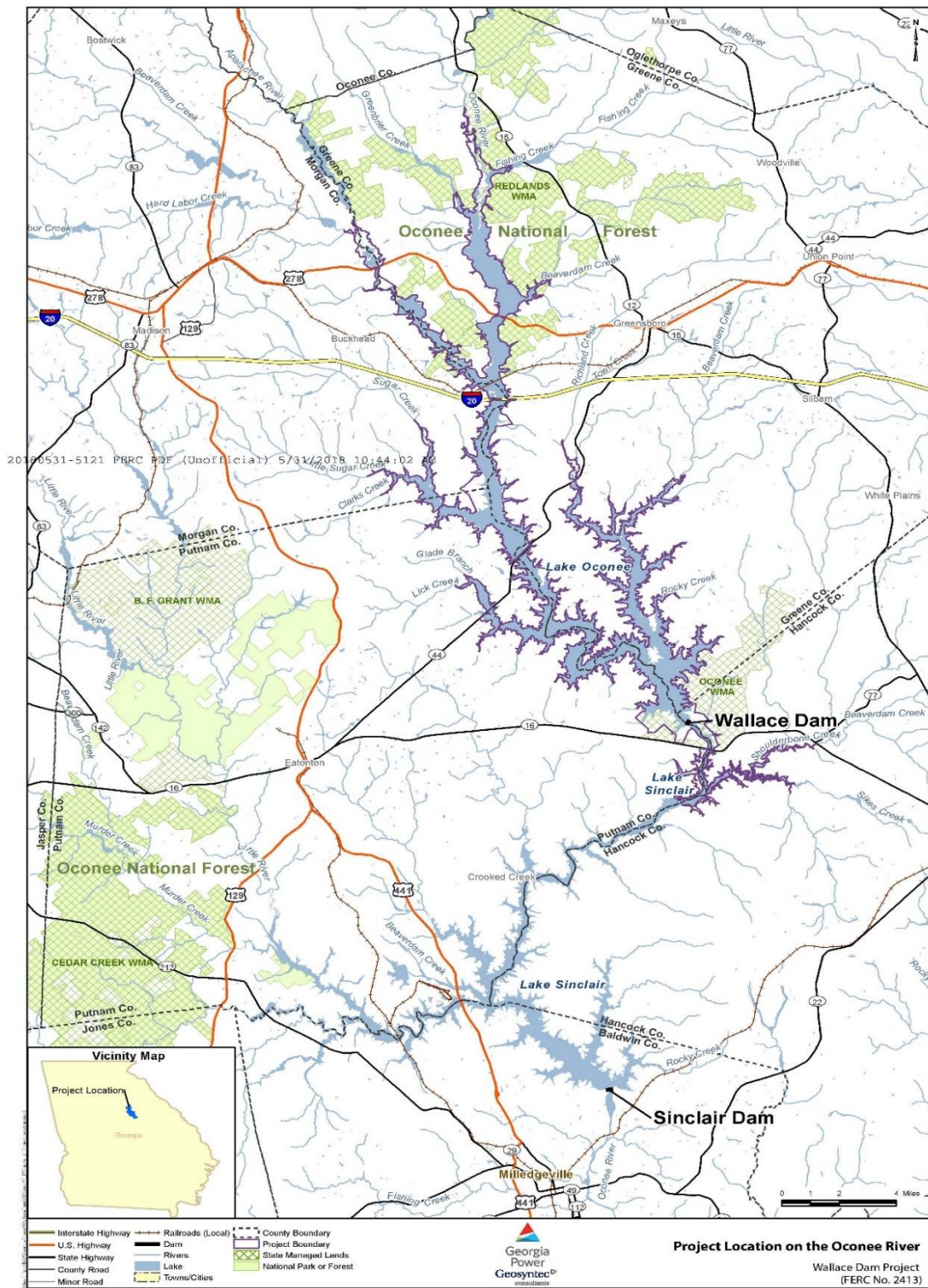


Figure 1. Location of the Wallace Dam Pumped Storage Project in the Oconee River Basin. (Source: Georgia Power, 2018).

This environmental assessment (EA) assesses the effects associated with continued operation of the project, and makes recommendations to the Commission on whether to issue a license, and if so, under what terms and conditions. In this EA, we assess the environmental and economic effects of operating the maintaining the project: (1) as proposed by Georgia Power; (2) as proposed by Georgia Power with our recommended measures (staff alternative); and (3) the staff alternative with mandatory conditions.¹ We also considered the effects of a no-action alternative. The primary issues addressed in the EA include water quality and dissolved oxygen (DO) enhancement upstream of, and downstream from, the project dam; low-flow management; aquatic habitat in Lake Oconee; invasive vegetation management; recreation improvements; and cultural resource management.

1.2.2 Need for Power

The project has a generating capacity of 321.3 MW, and generates approximately 390,083 megawatt-hours (MWh) per year.

The North American Electric Reliability Corporation (NERC) annually forecasts electrical supply and demand nationally, and regionally for a 10-year period. The Wallace Dam Project is located in the SERC Reliability Corporation (SERC) region of NERC,² in the southeast sub-region (SERC-SE), which covers portions of Alabama, Georgia, Mississippi, and Florida.

NERC's 2018 Long-Term Reliability Assessment shows the projected growth in capacity demand for the period 2019-2028. The summer period is typically the heaviest demand period for Southern Company³ and Georgia Power. The capacity growth trends for the SERC-SE assessment area for the period 2019 to 2028, for the summer peak season demand, show that the SERC-SE region will need to add 3,691 MW of capacity. This represents a demand increase of 8.6 percent over the 10-year period, or an annual growth rate of about 0.96 percent.

The power from the Wallace Dam Project would help meet the need for power in the SERC-SE in both the short and long term. In addition, most of the power generated by the Wallace Project would be available during daily peak demand periods, and help meet the variable load requirements of the region. The project provides power that can

¹ In this EA, the staff alternative with mandatory conditions is the action alternative for section 7 consultation under the Endangered Species Act.

² The SERC region includes all or portions of 16 southeastern and central states, and is divided geographically into five assessment areas that are identified as SERC-E, SERC-N, SERC-SE, SERC-PJM, and SERC-MISO.

³ Southern Company is the parent company of Georgia Power Company.

displace non-renewable, fossil-fired generation, and contribute to a diversified generation mix. Displacing the operation of non-renewable facilities may avoid some power plant emissions, thus creating an environmental benefit.

1.3 STATUTORY AND REGULATORY REQUIREMENTS

Any new license for the Wallace Dam Project is subject to numerous requirements under the FPA, and other applicable statutes. The major regulatory requirements are describe below.

1.3.1 Federal Power Act

1.3.1.1 Section 18 Fishway Prescriptions

Section 18 of the FPA states that the Commission is to require the construction, operation, and maintenance by a licensee of such fishways as may be prescribed by the Secretaries of the U.S. Department of Commerce (Commerce) or the U.S. Department of the Interior (Interior). Interior, in a letter filed April 16, 2019, requests that a reservation of authority to prescribe fishways under section 18 be included in any license issued for the project.

1.3.1.2 Section 4(e) Conditions

Section 4(e) of the FPA provides that any license issued by the Commission for a project within a federal reservation shall be subject to and contain such conditions as the Secretary of the responsible federal land management agency deems necessary for the adequate protection and use of the reservation. The U.S. Forest Service (Forest Service) filed preliminary conditions on April 19, 2019 (Appendix B. These conditions are described under section 2.2.4, *Modifications to Applicant's Proposal – Mandatory Conditions*, are summarized in table 20, and are discussed in section 5.3.2, *Forest Service's Section 4(e) Conditions*.

1.3.1.3 Section 10(j) Recommendations

Under section 10(j) of the FPA, each hydroelectric license issued by the Commission must include conditions based on recommendations provided by federal and state fish and wildlife agencies for the protection, mitigation, or enhancement of fish and wildlife resources affected by the project. The Commission is required to include these conditions unless it determines that they are inconsistent with the purposes and requirements of the FPA or other applicable law. Before rejecting or modifying an agency recommendation, the Commission is required to attempt to resolve any such inconsistency with the agency, giving due weight to the recommendations, expertise, and statutory responsibilities of such agency.

On April 23, 2019, the Georgia Department of Natural Resources (Georgia DNR) timely filed three recommendations under section 10(j), which we summarize in table 19 in section 5.3.1, *Fish and Wildlife Agency Recommendations*. In section 5.3.1, we also discuss how we address Georgia DNR’s recommendations and comply with section 10(j).

1.3.2 Clean Water Act

Under section 401 of the Clean Water Act (CWA),⁴ a license applicant must obtain either a water quality certification (certification) from the appropriate state pollution control agency verifying that any discharge from a project would comply with applicable provisions of the CWA, or a waiver of such certification. A waiver occurs if the state agency does not act on a request for certification within a reasonable period of time, not to exceed 1 year, after receipt of such request.

On April 23, 2019, Georgia Power applied to the Georgia Environmental Protection Division (Georgia EPD) for section 401 certification for the Wallace Dam Project. Georgia EPD received this request on the same day. Georgia EPD has not yet acted on the application. Action on the certification application is due April 23, 2020.

1.3.3 Endangered Species Act

Section 7 of the Endangered Species Act (ESA)⁵ requires federal agencies to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species, or result in the destruction or adverse modification of the critical habitat of such species.

FWS’s Information, Planning, and Conservation (IPaC) system⁶ indicates that six federally-listed threatened and endangered species may occur at the project, or be affected by the project: the endangered red-cockaded woodpecker, harperella, black-spored quillwort, and mat-forming quillwort; and the threatened wood stork and little amphianthus (or pool sprite). No designated critical habitat for any federally listed

⁴ 33 U.S.C. § 1341(a)(1) (2012).

⁵ 16 U.S.C. § 1536 (2018).

⁶ See FWS’s official list of threatened and endangered species accessed by staff using the IPaC website (<https://ecos.fws.gov/ipac/>) on January 19, 2017, October 4, 2018, and June 9, 2019 (FWS, 2017a, 2018, and 2019a).

threatened and endangered, or proposed, species occurs within project-affected lands (FWS, 2017a, 2018, and 2019a).⁷

Georgia Power, acting as the Commission's non-federal representative for informal consultation under the ESA, consulted with FWS and conducted a rare, threatened, and endangered species study.⁸ In addition to the species identified in the IPaC system, Georgia Power included Michaux's sumac in its review of federally listed species at FWS's request. The study report was submitted to FWS and filed with the Commission on November 18, 2016. The study found two federally listed species on a granite outcrop in the Oconee Wildlife Management Area (WMA),⁹ within the Wallace Dam Project boundary. These species include the threatened pool sprite and the endangered mat-forming quillwort. In addition, transient occurrences of the threatened wood stork have been sighted in shallow, freshwater ponds/wetlands of the Oconee National Forest, within project boundary, during post-breeding dispersal. (Georgia Power, 2016d; FWS, 2017b).

Our analysis of project effects on red-cockaded woodpecker, wood stork, pool sprite, harperella, black spored quillwort, mat-forming quillwort, and Michaux's sumac is presented in section 3.3.4, *Threatened and Endangered Species*. We conclude that relicensing the project, as proposed with the staff-recommended measures and mandatory agency conditions,¹⁰ would have no effect on harperella and Michaux's sumac because these species are not known to occur within the project boundary and were not observed during Georgia Power's 2016 surveys (Georgia Power, 2016d). Therefore, no further action under the ESA is required for harperella and Michaux's sumac.

⁷ In addition, no critical habitat has been designated for any of the species on the official species list for the Wallace Dam Project (FWS 2019c, 2019d, 2019e, 2019g, 2019h, and 2019i).

⁸ The purposes of the rare, threatened, and endangered species study were to: (a) identify federally and state protected species, federal candidate species, and other species of concern with known records of occurrence in the four-county project area; (b) identify their habitat requirements; and (c) describe the distributions and habitat use of rare, threatened, and endangered species presently occurring near the project. The study area included: (a) the FERC project boundary around Lake Oconee and the Wallace Dam tailrace; (b) project lands adjacent to Wallace Dam; (c) the project recreation facilities; (d) Forest Service's recreational access to Lake Oconee; and (e) the project's transmission line right-of-way.

⁹ The Oconee WMA is managed by the Georgia Department of Natural Resources (Georgia DNR).

¹⁰ See *supra*, note 1.

Red-cockaded woodpeckers are not currently known to occur at the project and the majority of the forest tracts in the project boundary are lacking this species' preferred nesting trees, but this species does occur in the project vicinity and suitable foraging habitat may be present. However, potential effects to this species could be avoided or minimized through implementation of Georgia Power's Avian Protection Plan and Forest Service's 4(e) conditions. Therefore, we find that relicensing the project as proposed, with the staff-recommended measures and mandatory agency conditions, is not likely to adversely affect the red-cockaded woodpecker.

Wood storks are transient visitors to the project area but are not currently known to breed at the project. It is anticipated that the shallow ponds within the project boundary would continue to be maintained by Georgia DNR for waterfowl, which would benefit this species' continued use of the project. Potential effects to wood storks could be avoided or minimized through the implementation of Georgia Power's Avian Protection Plan and Forest Service's 4(e) conditions. Therefore, we find that relicensing the project, as proposed, with the staff-recommended measures and mandatory agency conditions, is not likely to adversely affect the wood stork.

Pool sprite occurs at Eatonton Outcrop and mat-forming quillwort was planted on this outcrop and black-spored quillwort was not observed during Georgia Power's rare, threatened, and endangered species study. However, these granite outcrop species can be difficult to detect (e.g., black-spored quillwort leaves die quickly and leave no trace of the plant above the soil after the pools/substrate in granite outcrops dry). Populations of rare plants at Eatonton Outcrop could be subject to trampling and/or degradation of suitable habitat as a result of informal recreation activities such as hiking. However, potential effects to these species could be avoided or minimized through Georgia Power's avoidance of effects to sensitive areas during operation and maintenance activities, ongoing Georgia DNR management of Eatonton Outcrop, as well as the implementation of Forest Service's 4(e) conditions. Therefore, we find that relicensing the project, as proposed, with the staff-recommended measures and mandatory agency conditions, is not likely to adversely affect the pool sprite, mat-forming quillwort, and black-spored quillwort.

On April 19, 2019, the Forest Service filed preliminary section 4(e) conditions for the project, which included a condition to protect special status species (i.e., Condition 19), including federally listed species. The Forest Service 4(e) conditions are summarized in section 2.2.4, *Modifications to Applicant's Proposal – Mandatory Conditions*, and attached to this EA in Appendix B. Given that that the 4(e) conditions include changes to environmental protection measures related to special status species, we will request FWS concurrence with our findings for the red-cockaded woodpecker, wood stork, pool sprite, black-spored quillwort, and mat-forming quillwort.

1.3.4 Coastal Zone Management Act

Under section 307(c)(3)(A) of the CZMA,¹¹ the Commission cannot issue a license for a project within or affecting a state's coastal zone unless the state's CZMA agency concurs with the license applicant's certification of consistency with the state's CZMA program, or the agency's concurrence is conclusively presumed by its failure to act within 180 days of its receipt of the applicant's certification.

On May 6, 2019, Georgia Power filed Georgia DNR-Coastal Resource Division's response to its inquiry of CZMA consistency. Georgia DNR's Coastal Resource Division agreed that the project is not located within Georgia's coastal management zone and is beyond the scope of the CZMA. Therefore, the project is not subject to Georgia coastal zone program review, and no consistency certification is needed.

1.3.5 National Historic Preservation Act

Section 106 of the National Historic Preservation Act (NHPA)¹² requires that a federal agency "take into account" how its undertakings could affect historic properties. Historic properties are districts, sites, buildings, structures, traditional cultural properties, and objects significant in American history, architecture, engineering, and culture that are eligible for inclusion in the National Register of Historic Places (National Register).

On April 17, 2015, Commission staff designated Georgia Power as its non-federal representative for the purposes of conducting section 106 consultation under the NHPA. Pursuant to section 106, and as the Commission's designated non-federal representative, Georgia Power consulted with the Georgia State Historic Preservation Officer (SHPO) and potentially affected Indian tribes to identify historic properties, determine National Register-eligibility, and assess potential adverse effects on historic properties within the project's area of potential effects (APE). This consultation, and other investigations conducted to date, identified six archeological sites and certain project facilities as eligible, or potentially eligible, for listing in the National Register.

Georgia Power filed a draft Historic Properties Management Plan (HPMP) on March 14, 2018, and filed a revised HPMP with the license application. The HPMP, which was developed in consultation with the Georgia SHPO and the Cherokee Nation, would direct the preservation and long-term management of historic properties and archeological sites within the project's APE, including measures to avoid, minimize, or mitigate adverse effects on historic properties throughout the term of a new license.

¹¹ 16 U.S.C. § 1456(c)(3)(A) (2018).

¹² 54 U.S.C. § 306108 (Pub. L. No. 113-287, 128 Stat. 3227, Dec. 19, 2014).

To meet the requirements of section 106, the Commission intends to execute a Programmatic Agreement (PA) with the Georgia SHPO for the protection of historic properties and archeological sites within the project's APE from the effects of continued operation and maintenance of the Wallace Dam Project. The terms of the PA would ensure that Georgia Power addresses and treats all historic properties identified within the project's APE through the implementation of its HPMP.

1.4 PUBLIC REVIEW AND CONSULTATION

The Commission's regulations¹³ require applicants to consult with appropriate resource agencies, tribes, and other entities before filing an application for a license. This consultation is the first step in complying with the Fish and Wildlife Coordination Act,¹⁴ the ESA, the NHPA, and other federal statutes. Pre-filing consultation must be complete and documented according to the Commission's regulations.

Relicensing of the project was formally initiated February 18, 2015, when Georgia Power filed with the Commission a Pre-Application Document (PAD) and a Notice of Intent to license the project using the Integrated Licensing Process (ILP). The Commission issued a Notice of Commencement of Pre-Filing Process and Scoping on April 17, 2015.

1.4.1 Scoping

Before preparing this EA, we conducted scoping to determine what issues and alternatives should be addressed. Scoping Document 1 (SD1) was issued on April 17, 2015, which was noticed in the Federal Register on April 28, 2015. Scoping meetings were held in Eatonton, Georgia on May 20, 2015, to request comments on the project. A court reporter recorded all comments and statements made at the scoping meetings, and these are part of the Commission's public record for the project. An environmental site review was conducted on May 19, 2015.

In addition to comments provided at the scoping meetings, the following entities provided written comments on SD1, the PAD, and additional study needs:¹⁵

¹³ 18 C.F.R. §§ 5.1 to 5.16 (2019).

¹⁴ 16 U.S.C. §§ 661 *et seq.* (2018).

¹⁵ On June 18, 2015, Commission staff issued comments on Georgia Power's preliminary study proposal, and requested additional information on the PAD. Georgia Power filed its response to staff's additional information request on July 27, 2015.

<u>Commenting entities</u>	<u>Date filed</u>
Ms. Barbara Bell Tyson	June 15, 2015
FWS	June 18, 2015
U.S. Environmental Protection Agency (EPA)	June 18, 2015
Georgia DNR, Wildlife Resources Division	June 19, 2015
Forest Service	June 19, 2015

1.4.2 Comments on the Preliminary Licensing Proposal

Georgia Power filed its PLP with the Commission on November 21, 2017. The PLP provided a draft environmental analysis by resource area of the continuing and incremental effects of Georgia Power’s proposal to continue operating the Wallace Dam Project. Georgia Power developed the PLP in consultation with state and federal resource agencies, local governments, Indian tribes, various stakeholders, and other members of the public, and by using the information generated by eight resources studies conducted under the Commission-approved study plan.¹⁶ The following entities provided written comments on the PLP. Georgia Power addressed these entities’ comments in its license application filed May 31, 2018.

<u>Commenting entities</u>	<u>Date filed</u>
Congressman Jody Hice of the 10 th District of Georgia, on behalf of Barbara Bell Tyson	December 12, 2017
Georgia DNR, Wildlife Resources Division	February 19, 2018

1.4.3 Interventions

On February 22, 2019, the Commission issued a notice accepting the application and setting April 23, 2019, as the deadline for filing protests and motions to intervene. In response to the notice, the following entities filed notices of intervention or motions to intervene (none opposed issuance of a license):

¹⁶ See Study Plan Determination issued December 17, 2015, and Determination on Requests for Study Modifications and New Studies – Wallace Dam Pumped Storage Project.

<u>Intervenors</u>	<u>Date Filed</u>
Barbara Bell Tyson & Miriam Bell Foster	March 25, 2019
Interior	April 3, 2019
Forest Service	April 19, 2019
Oconee Land Development Company LLC & Reynolds Owners Association, Inc.	April 22, 2019

1.4.4 Comments on the License Application

The February 22, 2019 notice also requested comments, recommendations, preliminary terms and conditions, and preliminary prescriptions. The following entities responded.

<u>Commenting Entity</u>	<u>Date Filed</u>
Interior	April 16, 2019
Forest Service	April 19, 2019
Georgia DNR	April 23, 2019

Georgia Power filed reply comments on June 7, 2019.

2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 NO-ACTION ALTERNATIVE

Under the no-action alternative, the project would continue to operate under the terms and conditions of the current license, and no new environmental protection, mitigation, or enhancement (PM&E) measures would be implemented. We use this alternative as the baseline environmental condition for comparison with other alternatives.

2.1.1 Existing Project Features

The Wallace Dam Project is located at river mile (RM) 172.7 on the Oconee River, about 13.4 miles east of the City of Eatonton. The project dam (Wallace Dam) is located 29.7 miles upstream of Georgia Power's Sinclair Dam (RM 143; licensed as part of the Sinclair Hydroelectric Project No. 1951), and immediately upstream of Lake Sinclair. Releases from Wallace Dam flow directly into Lake Sinclair; there is no intervening free-flowing, or bypassed reach of river. The project facilities are shown in figure 2.

Wallace Dam is 2,395 feet long and 118 feet high, and is composed of a 347-foot-long west earth embankment, a 300-foot-long west concrete non-overflow section, a 266-foot-long gated concrete spillway with five Taintor gates, a 531-foot-long powerhouse intake section that is integral with the dam, a 226-foot-long east concrete non-overflow section, and a 725-foot-long east earth embankment. In addition, the project includes two saddle dikes located on the eastern bank of Lake Oconee. The saddle dikes total about 900 feet in length¹⁷ and have a maximum height of 20 feet.

The project intake consists of six submerged gates (invert elevation¹⁸ 343.0 feet Plant Datum¹⁹), which lead to six 25.5-foot-diameter steel penstocks. The penstocks convey water to six 52.2-MW turbine/generator units located in the powerhouse, which is positioned at the base of the dam. Two of the generating units are conventional generating units and four are reversible pump units. The intakes are protected by steel trashracks with vertical bar spacing ranging from 1 inch to 3.5 inches.

¹⁷ The northern dike is about 250 feet in length and the southern dike is about 615 feet in length. They are separated by about 82 feet.

¹⁸ The invert elevation is the elevation of the bottom of an intake relative to full pond.

¹⁹ Plant Datum equals mean sea level (NAVD 88) minus 0.20 feet (+/-0.01 feet), or mean sea level (NGVD 29) minus 0.60 feet (+/-0.01 feet). Unless otherwise stated, all elevations referenced in this EA are in plant datum.

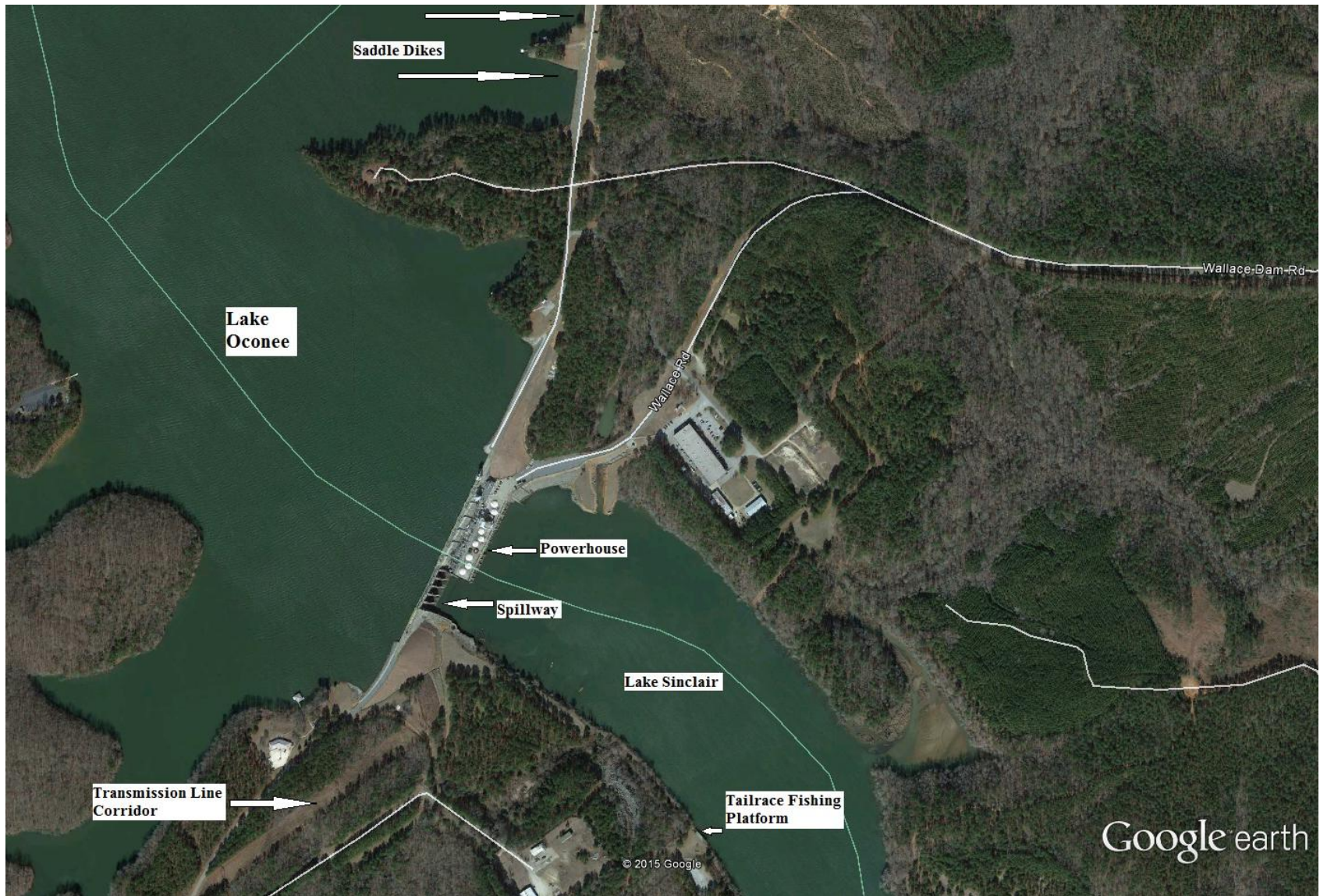


Figure 2. Project facilities for the Wallace Dam Project. (Source: Georgia Power 2018, as modified by staff).

The total installed capacity of the project is 321.3 MW, and is limited by the rating of the generators. The dependable capacity is 328.1 MW in the summer, the most critical power demand season. Dependable capacity is defined as the maximum average capacity that is available for 8 hours each day for five consecutive days using average summer flows. The average annual generation is about 390,083 MWh.

The Wallace Dam Project includes Lake Oconee as the upper reservoir. Lake Oconee has 374 miles of shoreline and a surface area of about 19,050 acres at a normal full pool elevation 435.0 feet. The maximum design elevation for Lake Oconee is 441.0 feet. The project discharges to a 20,000-foot-long tailrace, which flows into Lake Sinclair. Lake Sinclair, while not part of the Wallace Dam Project, serves as the lower reservoir for the Wallace Dam Project. The normal maximum tailwater elevation is 340.0 feet.

Electricity generated by the Wallace Dam Project is transmitted overland from the dam to its interconnection with the grid. The transmission facilities consist of: (1) 13.8-kilovolt (kV) generator leads; (2) two 13.8/230-kV step-up transformers; (3) a 230-kV substation; and (4) a 15.67-mile-long transmission line. The transmission line begins at Wallace Dam and extends west to a switching station near Eatonton, Georgia.

Recreational Facilities

Georgia Power currently owns, operates, and maintains, or provides for the operation and maintenance of, seven project recreation sites within the project boundary, as part of the Wallace Dam Project. These sites include:

- Armour Bridge on Lake Oconee
- Long Shoals Boat Ramp on Lake Oconee
- Sugar Creek Boat Ramp on Lake Oconee
- Lawrence Shoals Park on Lake Oconee
- Old Salem Park on Lake Oconee
- Parks Ferry Park on Lake Oconee
- Tailrace Fishing Area on the west shoreline of the Wallace Dam tailrace

Project Boundary and Surrounding Non-Project Lands

The project boundary (figure 3) encloses all project features and recreation facilities described above, including Lake Oconee at the normal full pool elevation of 435.0-feet; the project tailrace, which extends downstream from Wallace Dam for about

1.3 river miles to the Georgia Highway 16 Bridge; and the 15.67-mile-long,²⁰ 230-kV transmission line. In total, Georgia Power's project boundary encloses about 4,442 acres of upland area, which includes areas for wildlife management, recreation, and a shoreline buffer of land owned in fee simple by Georgia Power around the entire shoreline (with the exception areas where the project boundary crosses Forest Service lands).²¹ Below the Highway 16 Bridge, the project boundary continues for several miles along both the east and west shorelines of Lake Sinclair and the Shoulderbone Creek embayment, but does not include the waters of Lake Sinclair. In general, below Wallace Dam, the project boundary encompasses only a narrow strip of land, except where it extends to enclose three small waterfowl impoundments in the floodplain adjacent to the channel within the Oconee WMA (see figure 17 in section 3.3.3, *Terrestrial Resources*).²²

Within the project boundary are ten undeveloped areas that are reserved for future recreational use, in accordance with the project's existing recreation plan. The areas are dispersed around the shoreline of Lake Oconee, and vary in size from 5 to 561 acres (see figure 19 in section 3.3.5, *Recreation and Land Use*). The project boundary contains about 493.7 acres of Forest Service lands within the Oconee National Forest, along the Oconee and Apalachee River embayments upstream of Interstate 20. Georgia Power leases 5,375 acres within, and adjacent to, the project boundary to Georgia DNR for use as the Oconee WMA; 764 acres of the Oconee WMA are included in the Wallace Project boundary.²³ The Oconee WMA is managed for waterfowl habitat, hunting, and other recreational purposes.

²⁰ The Exhibit G drawings (maps 2 and 5) filed with the license application show a portion of the 15.67-mile-long primary transmission line within the project boundary.

²¹ The shoreline strip is generally 25 feet wide, and expands to widths of 100- or 200-feet across the lake from certain recreation areas.

²² These ponds include Pond 2 on the east side of the project tailrace, as well as Ponds 3 and 4 on the west side of the Oconee River, downstream from Hwy 16. A fourth pond (Pond 1) is outside of the project boundary.

²³ See Georgia Power's July 27, 2015 AIR response.

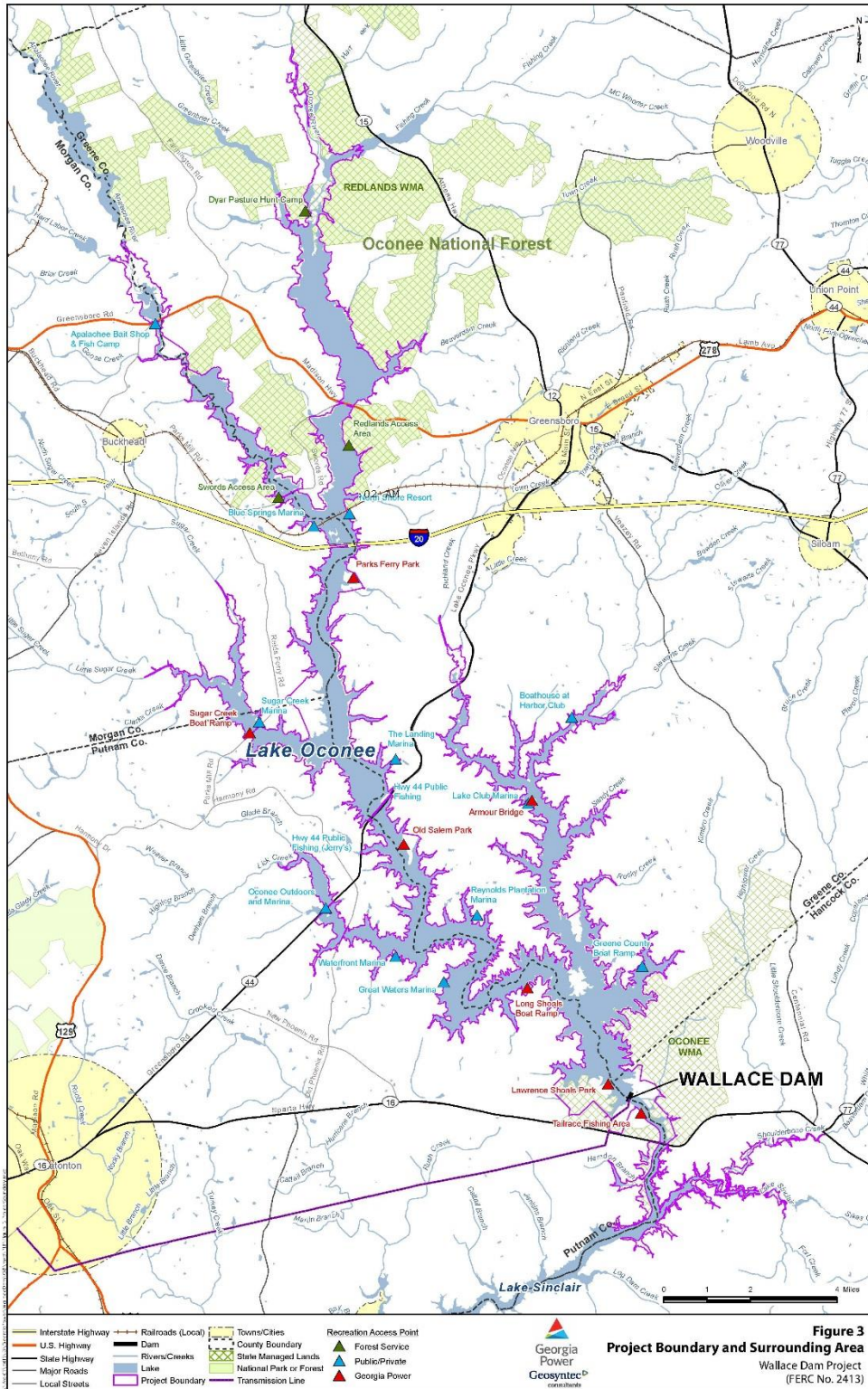


Figure 3. Wallace Dam Project boundary and surrounding area. (Source: Georgia Power, 2018).

2.1.2 Project Safety

The Wallace Dam Project has been operating for more than 38 years under the existing license.²⁴ During this time, Commission staff has conducted operational inspections focusing on the continued safety of the structures, identification of unauthorized modifications, efficiency and safety of operations, compliance with the terms of the license, and proper maintenance. In addition, the project has been inspected and evaluated every 5 years by an independent consultant, and the consultant's safety reports have been submitted for Commission review.

As part of the relicensing process, Commission staff will evaluate the continued adequacy of the project's facilities under a new license. Special articles will be included in any license issued, as appropriate. Commission staff will continue to inspect the project during the term of the new license to ensure continued adherence to Commission-approved plans and specifications, special license articles relating to construction (if any), operation and maintenance, and accepted engineering practices and procedures.

2.1.3 Existing Project Operation and Environmental Measures

Normal Operation

The Wallace Dam Project is a pumped storage project, with Lake Oconee serving as the upper reservoir, and Lake Sinclair serving as the project's lower reservoir.²⁵ Water for generation at Wallace Dam comes from inflow plus storage in Lake Oconee. Wallace Dam generates during peak power demand hours to meet electrical system demand. Some of the releases from Wallace Dam remain in Lake Sinclair for a few hours before being pumped back into Lake Oconee by the four reversible turbine units for reuse in the next day's generation cycle. Pumpback operation occurs at night, when electrical system demand is low (i.e., off-peak hours). The remainder of releases pass downstream to the Sinclair Project, where flows are used for hydropower generation, and to meet the minimum flow requirement for the Sinclair Project. The Sinclair Project is currently required to release a minimum flow of 250 cubic feet per second (cfs), as measured downstream of Sinclair Dam.

²⁴ The Commission issued an original 50-year license to Georgia Power on August 1, 1969, which as modified, expires on May 31, 2020. *See Georgia Power Co.*, 42 F.P.C. 356 (1969), *order on reh'g*, 43 F.P.C. 915 (1970); 45 F.P.C. 266 (1971) (modifying license order to revise license effective date to June 1, 1970).

²⁵ The Wallace Dam Project also serves as a black-start facility for Georgia Power, meaning that it is capable of being used to restore electricity to the nearby system should a major generating facility go off-line.

For normal day-to-day operation, Lake Oconee fluctuates between elevation 435.0 feet, which is full pond, and elevation 433.5 feet. Lake Oconee typically starts near elevation 435.0 feet before the Wallace Dam generation cycle, and ends near elevation 433.5 feet. During the night-time pumping cycle, Lake Oconee typically refills to elevation 435.0 feet. Depending on power demand, the reservoir may not fluctuate the full amount on a daily basis. The average daily fluctuation in Lake Oconee is 1.5 feet; the maximum daily fluctuation is 2 feet.

Wallace Dam discharges into an excavated tailrace section, which empties directly into Lake Sinclair, with no intervening riverine or bypassed reach. For the period 1997 through 2013, the daily average discharge from Wallace Dam exceeded 0 cfs 85 percent of the time and 1,000 cfs 64 percent of the time.

The majority of the Lake Oconee water used for annual generation at the project is obtained from the downstream Lake Sinclair through pumping at night. Generation typically is the highest during the summer months, where Wallace Dam generates for about 7 to 8 hours during the afternoon peak demand period. During the fall and winter months, generation typically lasts 5 to 6 hours.

Drought/Low-Flow Operation

On October 2, 2003, and supplemented on February 26, 2004, Georgia Power filed a drought management plan for Lake Oconee and Lake Sinclair. The Commission issued an order approving this plan on April 27, 2007.²⁶ The order approved, for both the Wallace Dam Project and the Sinclair Project, a drought management plan, which includes the Georgia Drought Management Plan.²⁷ The approved plan includes a provision requiring that releases from Lake Oconee and Wallace Dam be sufficient to ensure that a 250-cfs minimum flow can be released from the downstream Sinclair Project at all times.²⁸ If Lake Oconee water levels drop below the historic minimum levels, which could occur under extreme drought conditions, Georgia Power consults

²⁶ *Georgia Power Co.*, 107 FERC ¶ 62,081 (2004).

²⁷ The Georgia Drought Management Plan, approved by the Georgia DNR's Environmental Protection Division on March 26, 2003, includes a comprehensive set of drought indicators and response triggers to restrict water uses at Lake Oconee and Lake Sinclair during severe droughts.

²⁸ When calculated inflow at the Sinclair Project falls below 250 cfs, water is released from Lake Oconee to supplement the minimum flow release requirement of the Sinclair Project.

with state and federal agencies, and the Drought Response Committee of the Georgia Drought Management Plan, to determine appropriate actions to maintain a balance between lake resources and downstream water needs.

During drought periods, water is released from Lake Oconee to maintain the Wallace Dam tailrace (i.e., Lake Sinclair) at the minimum level necessary for safe pumpback operation at the Wallace Dam Project. The normal minimum pond level at Lake Sinclair is 338.2 feet. The pump units at Wallace Dam begin to cavitate²⁹ at elevation 337.2 feet; thus, releases from Lake Oconee may be necessary during droughts to maintain an elevation of 338.2 feet in the project tailrace.

On January 22, 2019, Georgia Power filed information on the effectiveness of the drought management plan in providing sufficient flow at the Sinclair Project to maintain a 250-cfs minimum flow release at that project. In the 13-year period, between 2004 and 2016, flows were supplemented in 9 of the 13 years. The average number of days supplemented was 43 days per year, and the greatest number of days supplemented was 126 days in 2012.

Flood Flow Operations

Lake Oconee is not designed to provide flood control, and lacks sufficient storage to do so. During flood conditions, after maximizing turbine discharge, the spillway gates are opened so that discharge matches inflow. To date, the main spillway has been sufficient to pass the largest observed flood. The Probable Maximum Flood³⁰ can be handled by the main spillway, without overtopping the dam.

Existing Environmental Measures

As mentioned above, Georgia Power owns and operates seven project recreation facilities, which provide for a variety of recreational opportunities and access to the project. All seven facilities include a day-use area; six provide boat ramps, picnic tables, and restrooms; and three provide full-service campgrounds and swimming beaches. These facilities are described in section 3.3.5, *Recreation and Land Use*.

²⁹ A condition where bubbles form that rapidly implode, causing shockwaves that may damage the generator/pump units.

³⁰ The Probable Maximum Flood is the flood that may be expected from the most severe combination of critical meteorological and hydrologic conditions that are reasonable possible in a particular drainage area. It is calculated by combining information about the precipitation, geology and water management strategies of a particular area.

Georgia Power manages project shorelines in accordance with its Shoreline Management Guidelines, which provide guidance to adjacent residents on permitting and constructing shoreline structures. The guidelines provide: (1) specific requirements for tree removal, mechanical clearing, and other activities along the Lake Oconee shoreline in order to minimize shoreline disturbance; and (2) restrictions for constructing seawalls, docks, wharves, boatslips, and boat lifts and personal watercraft lifts. The guidelines also include information about protecting and enhancing the scenic, recreational, and environmental values of Lake Oconee.

2.2 APPLICANT’S PROPOSAL

2.2.1 Proposed Project Facilities

Georgia Power is not proposing to add capacity or make any major modifications to the project under the new license.

2.2.2 Proposed Project Operation

Georgia Power proposes to continue operating the Wallace Dam Project as it has in the past (*see* section 2.1.3, *Existing Project Operation and Environmental Measures*). The project would continue to be operated in a pumped-storage mode for the generation of peaking power, and Lake Oconee would continue to be operated within a 2.0-foot range to support the pump-back operation at Wallace Dam. Georgia Power would continue to implement the drought management plan as described in section 2.1.3.

2.2.3 Proposed Environmental Measures

Georgia Power proposes the following measures to protect, mitigate adverse effects to, or enhance environmental resources at the Wallace Dam Project.

- Monitor project operation in accordance with the proposed compliance monitoring measures.³¹
- Consult with Georgia DNR regarding the timing of any planned, non-emergency drawdown that would reduce the elevation of Lake Oconee below

³¹ Georgia Power’s monitoring measures include: (1) remote monitoring of headwater flow gages on the Oconee and Apalachee Rivers and monitoring changes in Lake Sinclair storage; (2) monitoring and recording headwater elevations by digitally and physically recording readings from a staff gage and transducer installed at Wallace Dam; (3) physically recording headwater elevation every hour; and (4) recording and reporting provisions.

433.0 feet (lower limit of normal operation), and notify FWS and the Commission at least 10 days in advance of the drawdown.

- Continue to coordinate Wallace Dam’s operation with the operation of the downstream Sinclair Project by using Lake Oconee’s storage to supplement flows during drought(s) to support the minimum flow requirement of the downstream Sinclair Project.
- Implement a Shoreline Stabilization Plan that includes installing riprap along the shoreline at Old Salem Park, Parks Ferry Park, Long Shoals Boat Ramp, and Armour Bridge to (a) improve soil retention, (b) reduce sedimentation and turbidity of adjacent waters, (c) enhance near-shore (or littoral-zone) aquatic habitat, and (d) maintain shoreline recreational uses.
- Repair eroded shoreline at the pump site for downstream Pond 2 waterfowl management area and inspect the water level control structure on the eastern shore of the Wallace Dam tailrace to (a) improve soil retention at the site, (b) protect water quality and aquatic habitat, and (c) enhance the ability to maintain waterfowl refuge habitat.
- Install a forebay oxygen line diffuser system in Lake Oconee to enhance summer dissolved oxygen (DO) concentrations in the project tailrace, and operate the system as needed from May 1 through October 31 each year.
- Continuously monitor tailrace DO concentrations and water temperature May 1 through October 31 for a period of 3 years following deployment of the forebay oxygen line diffuser system, and file requisite reports of the monitoring, to verify system operation and DO enhancement in the tailrace.
- Consult annually with Georgia DNR to review available Georgia DNR fisheries population monitoring data to identify any changes or trends in the health of the fishery relative to operation of the proposed oxygen diffuser system, and include information on water quality in the annual monitoring reports.³²
- Implement a Recreation and Land Use Plan that includes the following provisions.
 - (1) enhance recreation amenities at Lawrence Shoals Park by: (a) constructing new facilities to replace two campground restrooms, a beach house, a boat ramp restroom, a courtesy dock at the boat ramp, a pavilion and dedicated pavilion restroom, and a guest relations gate house; and (b) upgrading the existing well system that supplies water to park facilities and customers.

³² See Georgia Power’s June 17, 2019 Reply Comments at 2.

- (2) enhance recreation amenities at Old Salem Park by: (a) constructing new facilities to replace two group docks (and add a third group dock), a pavilion and dedicated pavilion restroom, a boat ramp restroom, a courtesy dock at the boat ramp, a beach house, and a guest relations gate house; (b) upgrading the existing well system that supplies water to park facilities and customers; and (c) reconfiguring the park entrance and gate house to reduce single-lane traffic congestion, and allow for year-round operation of the boat ramp.
 - (3) enhance recreation amenities at Parks Ferry Park by: (a) constructing new facilities to replace two campground restrooms, a beach house, a courtesy dock at the boat ramp, and a pavilion and dedicated pavilion restroom; (b) upgrading the existing well system that supplies water to park facilities and customers; (c) replacing the underground water and electrical service; and (d) reconfiguring the entrance gate and gate house to reduce single-lane traffic congestion and allow for year-round operation of the boat ramp.
 - (4) increase bank fishing access on Lake Oconee by providing new facilities at the Area C-5 tract and at Jerry's Highway 44 Bridge, including barrier-free piers and gravel parking areas.
 - (5) enhance recreation amenities and increase bank fishing access at Sugar Creek Boat Ramp by adding a new barrier-free fishing pier, upgrading the vault toilet with a flush toilet, and upgrading the courtesy dock.
 - (6) enhance recreation amenities at Armour Bridge by upgrading the courtesy dock and replacing the vault toilet with a flush toilet.
 - (7) enhance recreation amenities and improve bank fishing access at Long Shoals Boat Ramp by upgrading the courtesy dock and trimming vegetation to provide additional bank fishing access.
 - (8) enhance recreation amenities and improve tailrace bank fishing access at the Georgia Highway 16 Bridge Boat Ramp, downstream from the dam, by providing a new barrier-free tailrace fishing pier and vault toilet.
 - (9) enhance recreational access at Georgia Power boat launch facilities by installing improved lighting at the 9 sites mentioned in items 1-8 above.
- Consult with Georgia DNR to develop a plan to ensure year-round public boating access for fishing tournaments.³³
 - Implement the proposed Shoreline Management Plan (SMP) that consolidates Georgia Power's existing shoreline management components to: (a) continue managing the project's shorelines in accordance with the *Shoreline Management Guidelines for Georgia Power Lakes*; and (b) promote the

³³ *Id.* at 3.

maintenance of vegetative buffers around Lake Oconee to protect water quality, aquatic habitat, and aesthetic and cultural resources. The proposed plan also includes a provision to modify a 100-foot buffer on the shoreline bordering the reserved area A-1 future recreation lands, to a 25-foot buffer.

- Implement the proposed HPMP, in accordance with the PA, to assure the preservation and long-term management of archaeological sites, as well as historic buildings and structures, within the project boundary.

2.2.4 Modifications to Applicant’s Proposal – Mandatory Conditions

The Forest Service filed 24 preliminary terms and conditions under section 4(e) of the FPA, which we include in Appendix B and summarize below.³⁴

- Condition No. 11 prohibits the storage of hazardous substances on National Forest System lands without prior approval of the Forest Service, and requires submittal of a spill prevention and cleanup plan for approval by the Forest Service as part of any request to store hazardous substances.
- Condition No. 12 prohibits the use of pesticides on National Forest System lands to control undesirable woody and herbaceous vegetation, aquatic plants, insects, rodents, non-native fish, etc., without prior Forest Service approval.
- Condition No. 13 requires that Georgia Power annually consult with the Forest Service, prior to April 15.
- Condition No. 14 requires that Georgia Power, within 3 months of license issuance, establish a consultation group, whose primary purpose is to provide a forum for Georgia Power to consult with resources agencies and other interested entities regarding: (1) the annual meeting required by Condition No. 13; (2) any plans that are developed under the license; and (3) any proposed temporary or permanent modifications to license conditions.
- Condition No. 17 requires Georgia Power to consult with the Forest Service, prior to erecting signs related to safety issues on National Forest System lands covered by the license.

³⁴ Preliminary 4(e) Conditions 1 – 10, 15, and 16 are administrative in nature, and not considered further in this EA. The remaining 12 conditions are considered in this EA. Condition 19 is administrative in that it only requires the drafting of a report and reviewing existing special status species lists; no specific protective measures are provided that can be evaluated in this EA. However, the condition stipulates that should a new special status species be identified that may be potentially affected by the licensee’s actions, appropriate protection measures would be developed and implemented. This would potentially require a future amendment to the project license.

- Condition No. 18 requires Georgia Power, within 1 year of license issuance, to develop: (1) an Aquatic Invasive Species Plan; and (2) a Vegetation and Invasive Weed Management Plan for all National Forest System lands potentially affected by the project.
- Condition No. 19 requires Georgia Power to: (1) prepare and submit to the Forest Service a Biological Evaluation prior to taking actions to construct new project features on National Forest System lands that may affect special status species or their critical habitat on National Forest System land; and (2) annually review the lists of special status species and assess the presence of new species on federal land.
- Condition No. 20 requires Georgia Power, within 1 year of license issuance, to develop an Erosion and Sediment Control Plan to provide direction for treating erosion and controlling sedimentation with the project boundary and project-affected National Forest System lands during the term of the new license.
- Condition No. 21 requires Georgia Project, within 1 year of license issuance, to develop a Fire and Fuels Management Plan.
- Condition No. 22 requires Georgia Power, beginning in the first full year after license issuance, to provide annual employee awareness training regarding special status species, noxious weeds and sensitive areas that are known to occur within or adjacent to the project boundary on National Forest System lands, and the procedures for reporting and complying with license requirements.
- Condition No. 23 requires Georgia Power to make a reasonable effort to protect and secure any human remains, funerary objects, sacred objects, or objects of cultural patrimony that may be inadvertently discovered on federal or tribal lands.
- Condition No. 24 requires Georgia Power to implement “deferred” maintenance measures³⁵ at the Forest Service’s three recreation areas on Lake Oconee: Redlands Recreation Area; Swords Recreation Area; and Dyar Pasture Recreation Area.

³⁵ The measures include: (1) replacing outdated toilets; (2) stabilizing shoreline areas using rip-rap; (3) replacing picnic tables, boat ramp light fixtures, and damaged trash receptacles; (4) upgrading the boat dock; (5) increasing bank fishing access by building new fishing piers; (6) replacing signs at the entrance to the recreation areas; (7) repaving and restriping the parking areas at the Redlands and Swords Recreation Areas, and replacing gravel and paving the accessible area(s) at the Dyar Pastures parking area; (8) replacing information and interpretive signage; and (9) replacing damaged decking on the wildlife viewing platform and resurfacing the walking trail to the dike and wildlife viewing platform at Dyar Pastures.

2.3 STAFF ALTERNATIVE

Under the staff alternative, the Wallace Dam Project would be operated as proposed by Georgia Power, and with the following additional staff-recommended measures:

- Revise the proposed Recreation and Land Use Plan to include a provision for Georgia Power to develop options, in consultation with Georgia DNR on ensuring that public boating access for fishing tournaments remains available throughout each year, when the capacity at boat ramps begins to regularly exceed 85 percent on non-holiday weekends during the recreation season.
- Revise the proposed SMP to include (a) a provision for Georgia Power to consult with the appropriate agencies at each 10-year SMP review to ensure the adequacy of the SMP measures, and file a report that includes agency comments and any recommended measures, and (b) a copy of the *Georgia Power Shoreline Management Guidelines for Georgia Power Lakes* and the *1993 Dredge Permitting Procedures* in the SMP, to bring in all applicable shoreline management components.

In addition, the staff alternative would include all but the following four Forest Service 4(e) conditions.

We do not recommend annual consultation with Forest Service and other agencies to review: (1) a status report regarding implementing license conditions; (2) the results of monitoring; (3) planned maintenance activities; (4) any proposed modifications to project facilities or features; (5) any revisions to the monitoring plans and/or other environmental measures included in the license; and (6) any planned pesticide use. We do not recommend this consultation because consultation and reporting is already a requirement of each resource-specific compliance plan and measure.

Similarly, we do not recommend organizing a Consultation Group. Licensees are already required to consult with federal and state agencies, including the Forest Service, during preparation of reports that are components of Commission-approved management plans.

We do not recommend Georgia Power prepare a Biological Evaluation and annually review the list of special status species. Consultation prior to new construction and non-routine maintenance could help protect federally listed and other special status species, as well as their habitats over the term of the license. However, to annually review the list of special status species is unnecessary. If new construction is proposed, such consultation would take place in the context of an application to amend the license.

As to annual employee training, although we recognize that annually training project operation and maintenance staff in the identification of special status species, noxious weeds, sensitive areas, and reporting requirements would benefit environmental resources, all licensees are expected to train their employees to the extent needed to comply with the terms of a license. Therefore, we do not recommend inclusion of staff training as a specific license condition.

2.4 STAFF ALTERNATIVE WITH MANDATORY CONDITIONS

We recognize that the Commission is required to include all section 4(e) conditions in any license issued for the project. Therefore, the staff alternative with mandatory conditions³⁶ includes all 24 preliminary 4(e) conditions filed by Forest Service, including the four not included in the Staff Alternative discussed in section 2.3.

2.5 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER ANALYSIS

The following alternatives were considered, but have been eliminated from further analysis, because they are not reasonable in the circumstances of this case: (1) issuing a non-power license; (2) Federal Government takeover of the project; and (3) retiring the project.

2.5.1 Issuing a Non-Power License

A non-power license is a temporary license that the Commission will terminate when it determines that another governmental agency will assume regulatory authority and supervision over the lands and facilities covered by the non-power license. At this point, no agency has suggested a willingness or ability to do so. No party has sought a non-power license, and we have no basis for concluding that the project should no longer be used to produce power.

2.5.2 Federal Government Takeover of the Project

Federal takeover and operation of the project would require Congressional approval. While that fact alone would not preclude further consideration of this alternative, there is currently no evidence to indicate that federal takeover should be recommended to Congress. No party has suggested federal takeover would be appropriate, and no federal agency has expressed an interest in operating the project.

³⁶ See *supra*, note 1.

2.5.3 Retiring the Project

As the Commission has previously held, decommissioning is not a reasonable alternative to relicensing a project in most cases, when appropriate PM&E measures are available.³⁷ The Commission does not speculate about possible decommissioning measures at the time of relicensing, but rather waits until an applicant actually proposes to decommission a project, or there are serious resource concerns that cannot be addressed with appropriate measures, making decommissioning a reasonable alternative.³⁸ This is consistent with the National Environmental Policy Act (NEPA) and the Commission's obligation under section 10(a) of the FPA to issue licenses that balance developmental and environmental interests.

Project retirement could be accomplished with or without dam removal.³⁹ Either alternative would involve denial of the relicense application, and surrender or termination of the existing license with appropriate conditions. No participant has recommended project retirement, and we have no basis for recommending it. The Wallace Dam Project is a source of clean, renewable energy. This source of power would be lost if the project was retired, and replacement power would need to be found. There also could be significant costs associated with retiring the project powerhouse and appurtenant facilities.

Project retirement without dam removal would involve retaining the dam and disabling or removing equipment used to generate power. Certain project works could remain in place, and could be used for historic or other purposes. The approach would require the State of Georgia to assume regulatory control and supervision of the remaining facilities. However, no participant has advocated this alternative, nor do we have any basis for recommending it. Removing the dam would be more costly than retiring it in place, and removal could have substantial, negative environmental effects.

³⁷ See, e.g., *Eagle Crest Energy Co.*, 153 FERC ¶ 61,058, at P 67 (2015); *Public Utility District No. 1 of Pend Oreille County*, 112 FERC ¶ 61,055, at P 82 (2005); *Midwest Hydro, Inc.*, 111 FERC ¶ 61,327, at PP 35-38 (2005).

³⁸ See generally *Project Decommissioning at Relicensing; Policy Statement*, FERC Stats. & Regs. ¶ 31,011 (1994); see also *City of Tacoma, Washington*, 110 FERC ¶ 61,140 (2005) (finding that unless and until the Commission has a specific decommissioning proposal, any further environmental analysis of the effects of project decommissioning would be both premature and speculative).

³⁹ In the event that the Commission denies relicensing a project or a licensee decides to surrender an existing project, the Commission must approve a surrender "upon such conditions with respect to the disposition of such works as may be determined by the Commission" 18 C.F.R. § 6.2 (2019). This can include simply shutting down the power operations, removing all or parts of the project (including the dam), or restoring the site to its pre-project condition.

3.0 ENVIRONMENTAL ANALYSIS

This section includes: (1) a general description of the project vicinity; (2) an explanation of the scope of our cumulative effects analysis; and (3) our analysis of the proposed action and recommended environmental measures. Sections are organized by resource area (aquatic, recreation, etc.). Historic and current conditions are described for each resource area. The existing conditions are the baseline against which the environmental effects of the proposed action and alternatives are compared, including an assessment of the effects of proposed PM&E measures, and any cumulative effects of the proposed action and alternatives. Our conclusions and recommended measures are discussed in section 5.1, *Comprehensive Development and Recommended Alternative*.⁴⁰

3.1 GENERAL DESCRIPTION OF THE RIVER BASIN

The Wallace Dam Project is located on the Oconee River at RM 172.7 in the upper Oconee River Basin of the greater Altamaha River Basin (figure 4). The Altamaha River Basin includes the Oconee, Ocmulgee, and Altamaha Rivers. The Middle Oconee and North Oconee Rivers originate in the Piedmont physiographic province (Edwards *et al.*, 2013). These streams converge at the southern border of Athens-Clarke County to form the Oconee River, about 20 river miles upstream of Lake Oconee. The Oconee River flows south for 220 miles and joins the Ocmulgee River in the Coastal Plain physiographic province to form the Altamaha River. The Altamaha River flows 137 miles southeast to the Atlantic Ocean. The Altamaha River Basin drains an area of 14,000 square miles (mi²), located entirely within Georgia.

The Oconee River Basin drains a total watershed area of 5,330 mi² in east-central Georgia (Georgia EPD, 1998). The watershed upstream of Wallace Dam covers an area of 1,830 mi², comprising about 34 percent of the Oconee River Basin. Of the 34 percent, Lake Oconee and its tributaries (excluding the Oconee River) account for about 40 percent of the drainage upstream of Wallace Dam. The five largest tributaries include the Apalachee River, Hard Labor Creek, Richland Creek, Sugar Creek, and Fishing Creek. From Wallace Dam, the river flows immediately into Lake Sinclair, a 15,330-acre reservoir formed by Sinclair Dam (*see* figure 1). From Sinclair Dam,⁴¹ the Oconee River flows 143 miles to its confluence with the Ocmulgee River.

⁴⁰ Unless otherwise indicated, the sources of our information are Georgia Power's May 31, 2018, license application and Georgia Power's responses to requests for additional information filed on January 22, 2019, and February 20 and 22, 2019.

⁴¹ About 5 miles downstream from Sinclair Dam, the Oconee River enters the Fall Line Hills District, the hilly transition zone that descends from the Piedmont into the Coastal Plain (Edwards *et al.*, 2013).

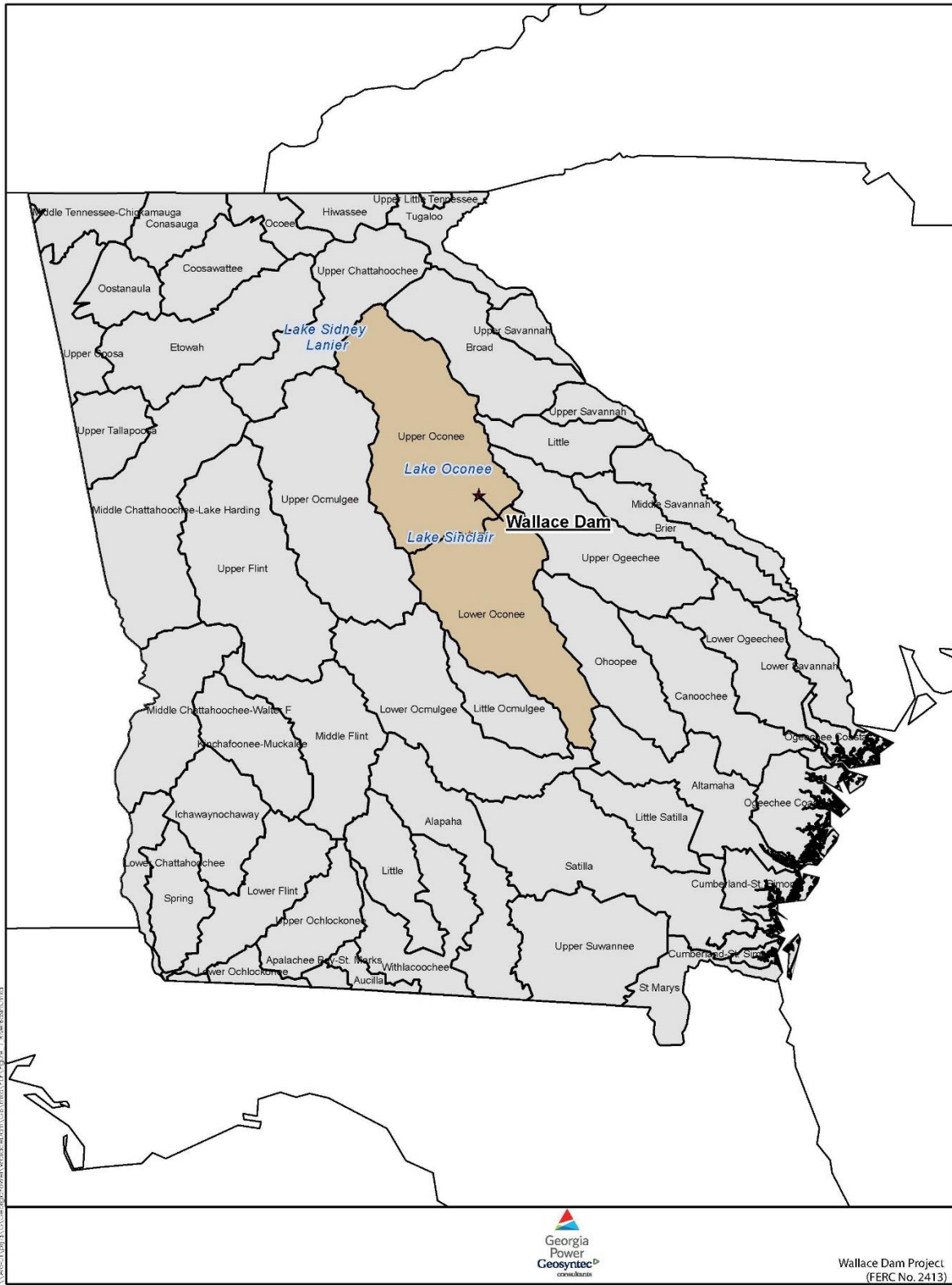


Figure 4. Project location in the Oconee River Basin.
 (Source: Georgia Power, 2018).

There are two large dams on the mainstream Oconee River: Wallace Dam and Sinclair Dam. Sinclair Dam is part of the Sinclair Hydroelectric Project No. 1951. There is no intervening reach or bypassed reach of river between Wallace Dam and Lake Sinclair. The two dams impound about 69 miles of the mainstem Oconee River. In addition to Wallace and Sinclair Dams, there are two small hydropower dams located upstream of the Wallace Dam Project: Barnett Shoals Dam, which is located on the Oconee River 16 river miles upstream; and the Tallassee Shoals Hydroelectric Project No. 6951, which is located farther upstream on the Middle Oconee River.

There are 14 counties and over 40 cities and towns located upstream of the Wallace Dam Project. The predominant land uses in the counties north of the project include a mix of low-intensity urban, forested lands, and row crop and pasture lands. Livestock, poultry, and dairy operations are relatively common in the area. Timber production and related businesses (e.g., sawmills) also are common (Georgia Forestry Commission, 2015). With the exception of urban lands around the cities of Eatonton and Greensboro, most of the lands around the project contain forest, row crop/pasture, or clearcut/sparse vegetation. The Lake Oconee area is known for its private residential and resort developments, including many golf courses and marinas (*see* figure 19). Additional land uses in the project area include: (1) the 116,731-acre Oconee National Forest; and (2) two WMAs, including the Redlands WMA (located on Oconee National Forest lands) and the Oconee WMA (surrounding Wallace Dam and tailrace area). Both WMAs have lands within the project boundary. Fishing is also a primary use of the Oconee River in the project area.

The upper Oconee River is an important water supply source in the region. Surface water provides 94 percent of the water used by the municipal, industrial, energy, and agricultural water-use sectors in the upper Oconee River Basin (Jacobs, 2017). The Oconee River also serves as a primary receiving water for assimilating treated wastewater.

The climate of the Oconee River Basin is characterized as moist and temperate. Summers are long and hot, and winters are short and mild. Average annual air temperature ranges from 60 to 65° Fahrenheit (°F) (Georgia EPD, 1998). Average daily temperatures range from 40 to 45°F in January to 75 to 80°F in July. Average annual precipitation ranges from 47 inches in the lower basin to 56 inches in the upper basin. March tends to be the wettest month of the year, and September and October are usually the driest.

3.2 SCOPE OF CUMULATIVE EFFECTS ANALYSIS

According to the Council on Environmental Quality's regulations for implementing NEPA,⁴² a cumulative effect is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such actions. Cumulative effects can result from individually minor, but collectively significant, actions taking place over a period of time, including hydropower and other land and water development activities.

Based on our review of the relicense application, as well as agency and public comments, we have identified water quality, downstream aquatic habitat, and fish as resources that could be cumulatively affected by continued operation of the project.

3.2.1 Geographic Scope

The geographic scope of the cumulative effects analysis defines the physical limits or boundaries of the proposed action's effects on the resource, and contributing effects from other hydropower and non-hydropower activities within the Oconee River Basin. We have identified the Oconee River Basin as our geographic scope of analysis water quality, downstream aquatic habitat, and fish resources. We chose this geographic scope because the operation and maintenance of the Wallace Dam Project, in combination with other hydroelectric projects, water supply intakes, and wastewater discharges in the Oconee River Basin,⁴³ may affect fish survival and habitat quality at the project, as well as downstream in Lake Sinclair and the Oconee River.

In section 3.3.2, *Water Resources*, we discuss the cumulative effects of relicensing the Wallace Dam Project on water quality, downstream aquatic habitat, and fish resources.

⁴² 40 C.F.R. § 1508.7 (2019).

⁴³ There are three dams on the mainstem Oconee River (Sinclair, Wallace, and Barnett Shoals) and one on the Middle Oconee River (Tallassee Shoals); three used for hydropower and one that is not (Barnett Shoals). There are no dams on the Oconee or the Altamaha River downstream from Sinclair Dam, meaning the river system is free-flowing from the Piedmont to the Georgia Coast (See <https://www.americanrivers.org/conservation-resource/feds-revoke-operating-license-hydropower-dam-ocmulgee-river/>). There are: (a) two existing water supply intakes located on Lake Oconee; and (b) four wastewater treatment facilities, 10 land application permits, four private/industrial permits, and 18 National Pollutant Discharge Elimination System-permitted discharges in the four closest counties located upstream of Lake Oconee. These discharges are the primary sources of phosphorus entering Lake Oconee.

3.2.2 Temporal Scope

The temporal scope of analysis includes a discussion of the past, present, and reasonably foreseeable future actions, and their effects on water quality, downstream aquatic habitat, and fish resources. Based on the potential new license term, the temporal scope looks 30 to 50 years into the future, concentrating on the effect on the resources from reasonably foreseeable future actions. The historical discussion is limited, by necessity, to the amount of available information for each resource. We identified the present resource conditions based on the license application, agency comments, and comprehensive plans.

3.3 PROPOSED ACTION AND ACTION ALTERNATIVES

In this section, we discuss the project-specific effects of the project alternatives on environmental resources. For each resource, we first describe the affected environment, which is the existing condition and baseline against which we measure project effects. We then discuss and analyze the specific cumulative and site-specific environmental issues.

Only the resources that would be affected, or about which comments have been received, are addressed in detail in this EA. Based on this, we have determined that geology and soils, water resources (water quantity, water quality, and fish), terrestrial resources (wetlands and wildlife), threatened and endangered species, recreation access and facilities, land use, and cultural resources may be affected by the proposed action and alternatives. We have not identified any substantive issues related to aesthetic resources or socioeconomics associated with the proposed action; therefore, these resources are not addressed in the EA. We present our recommendations in section 5.1, *Comprehensive Development and Recommended Alternative*.

3.3.1 Geologic and Soil Resources

3.3.1.1 Affected Environment

The Wallace Dam Project is located in the Washington Slope District of the Piedmont physiographic province (Clark and Zisa, 1976). The Piedmont is a hilly upland province underlain by crystalline metamorphic and igneous rocks. The topography is gently rolling, and descends from an elevation of around 700 feet near its northern limits to an elevation of about 500 feet at its southern margin. Streams in the Washington Slope District occupy broad, shallow valleys separated by broad, rounded divides, with local relief of 50 to 100 feet (Clark and Zisa, 1976).

The project is located in the Southern Outer Piedmont ecoregion. This ecoregion has low hills, major forest types of loblolly-shortleaf pine, underlying rocks of gneiss,

schist and granite, fine sandy loam soils, and a deep, red clayey subsoil (Griffith *et al.*, 2001; Edwards *et al.*, 2013).

The Lake Oconee shoreline is characterized by gently sloping topography in most areas. Rock outcroppings and boulders occur along the shoreline in some areas of the lower end of the reservoir, particularly at the confluence of the Oconee River and Richland Creek (Area A-1) and in Tract B (within the Oconee WMA) next to Lawrence Shoals Park (*see* figure 19).

The project's 15.67-mile transmission line is also located entirely within the Piedmont province and Southern Outer Piedmont ecoregion. Relief along the right-of-way (ROW) is gently sloping.

Shoreline Erosion and Sedimentation

Georgia Power (2016a) conducted a shoreline reconnaissance survey of Lake Oconee and the Wallace Dam tailrace area in June 2016. The survey inventoried and characterized existing shoreline conditions, as well as potential sources of erosion and sedimentation within the project boundary. It also characterized physical aquatic habitat and available sources of littoral-zone cover for fish. A total of 146 shoreline segments, or sites, were selected, including 35 sites in each of four sections of the reservoir (upper reservoir, middle reservoir, Richland Creek embayment, lower reservoir) and six sites in the tailrace area. The sites included all seven project recreation facilities, three Forest Service recreation areas, nine undeveloped areas on the reservoir reserved for future recreational development, and one site in the tailrace area next to Pond 2 in the Oconee WMA. Sites were visually assessed and rated for vegetative buffer zone condition, adjacent land uses, bank stability and vegetative protection, shoreline structural stabilization practices (e.g., seawalls, riprap), potential causes of shoreline erosion (project related and non-project related), and sources of littoral-zone fish cover.⁴⁴

The shoreline survey found that the majority of the shoreline in the study area to have stable or moderately stable banks. These sites exhibited low potential for erosion problems due to bank vegetative protection and/or the use of shoreline structural stabilization practices (e.g., seawalls, riprap, etc.). Natural vegetative buffer zone conditions were most widespread in the upper reservoir section (upstream of I-20) and in the tailrace area. Sites with landscaped riparian zones occurred throughout the reservoir, but were most prevalent in the Richland Creek embayment and the lower reservoir section (between Highway 44 and Wallace Dam). Sites with a mixture of landscaped and

⁴⁴ A variety of natural and man-made habitat features provide littoral-zone habitat in the project reservoir, within a distance of 50 feet of the shoreline. The most common sources of this habitat type include overhanging vegetation, docks and piers, large woody debris, riprap, emergent vegetation, boathouses, bedrock, and boulders.

natural riparian zones were more numerous in the lower and middle reservoir sections, than in the upper reservoir section. The most common categories of shoreline land uses, in descending frequency of observation, were residential, forested, and recreation access.

The most common potential source of shoreline erosion inventoried on Lake Oconee was wave action from wind and watercraft. The second most common potential source was residential landscaping. These non-project related sources of erosion were identified most frequently in the lower and middle reservoir sections.⁴⁵ Other, less frequently observed, potential sources of erosion were stormwater runoff, recreational access, reservoir fluctuations, tributary inflows, roads and bridges, and lack of natural vegetation.

Reservoir or water level fluctuations related to project operations were identified as a potential source of erosion at five reservoir sites, but all of these sites were along undeveloped, heavily vegetated shorelines with natural vegetative buffers. None of these sites exhibited active erosion problems. One site in the tailrace exhibited an active erosion problem next to Pond 2.⁴⁶ All seven sites surveyed at Georgia Power's project recreation facilities were rated as having stable or moderately stable banks. The most common potential sources of shoreline erosion at these sites included wave action from wind and watercraft, and recreational access.

Sixty percent of the total number of surveyed sites had shoreline structural stabilization structures in place, which included seawall, riprap, or seawall with riprap at the base. The majority of sites with structural stabilization were located in the lower reservoir, middle reservoir, and Richland Creek embayment sections, and were associated with residential lots. Fifty percent of the total shoreline length surveyed had structural stabilization in place: 21 percent seawall and riprap combined; 19 percent seawall; and 10 percent riprap.

3.3.1.2 Environmental Effects

Project Operation

Georgia Power proposes no changes in project operation, and would continue to operate the Wallace Dam Project as it has in the past, in a pumped-storage mode for the generation of renewable peaking power. Average daily fluctuations on Lake Oconee

⁴⁵ In lower and middle sections of Lake Oconee, residential shoreline uses are widespread, the reservoir is more open, the shoreline more exposed to wave action, and boating activity is more concentrated.

⁴⁶ Although bordered by a well-vegetated riparian zone, the Pond 2 site exhibited a steep erosion cut at the pond's outflow pipe.

would continue to be about 1.5 feet, with a maximum daily fluctuation of 2.0 feet or less 100 percent of the time.

Our Analysis

Georgia Power's proposed operation is not likely to significantly affect shorelines within the project boundary, due to erosion and sedimentation. Under normal operation, Georgia Power would continue to operate Lake Oconee, year-round, between a full-pond elevation of 435.0 feet and elevation 433.0 feet.

During drier seasons, in some years, the maximum daily reservoir elevation may not reach 435.0 feet; i.e., the maximum operating level may drop below 433.0 feet. However, Georgia Power continues to fluctuate Lake Oconee, on a daily basis, up to 2 feet to take advantage of the pumped-storage feature of the project. In drought years, the lake level may be drawn down seasonally in the summer or fall due to the combination of low inflows and downstream flow supplementation releases. During these periods, daily fluctuations typically remain within 2.0 feet, so that pumpback operation can continue. During the period 1997-2016, the elevation of Lake Oconee reached a peak elevation of 435.99 feet during a high-flow event, and a low elevation of 430.59 feet during the 2007 drought. The daily water level fluctuations were less than 2.0 feet during both times. With the exception of drought years, there tends to be little seasonal variation in reservoir operating levels. From 1997 through 2016, Lake Oconee was below elevation 433.0 feet 5 percent of the time (in total hours) and above 435.0 feet 14 percent of the time. Daily fluctuations of Lake Oconee were less than 2.0 feet 100 percent of the time (in days) (Georgia Power, 2016a).

Daily fluctuations of Lake Oconee are relatively small, and, therefore, likely have only minor effects on shoreline erosion and sedimentation in the project boundary. The shoreline reconnaissance survey documented reservoir fluctuations as a potential source of active erosion at five sites on Lake Oconee, though other sources of erosion occur at the sites. For example, erosion from wave action from wind and watercraft was documented at four of the sites (Georgia Power, 2016a). None of the sites exhibited severe erosion or bank failure due to lake level fluctuations.

Georgia Power's proposal to continue to operate as it has under the current license would result in no effect on shoreline conditions in the project tailrace. Although instantaneous project releases from Wallace Dam go as low as 0 cfs on a daily basis, there is no dewatering of the tailrace because it is located in the impounded upper reach of Lake Sinclair. Lake Sinclair is operated within a normal elevation range of 338.0 feet and 340.0 feet, with daily fluctuations averaging less than 2.0 feet. The potential for shoreline erosion in the Wallace Dam tailrace area is further moderated by the use of bank protection (i.e., riprap) immediately downstream from Wallace Dam, along the western shore of the tailrace and along a portion of the eastern shore. In addition, bank

and riparian zone vegetation helps to maintain bank stability and minimize erosion along both sides of the tailrace. The one exception is an active erosion site next to the Pond 2 outlet, along the eastern shore of the tailrace. Finally, Georgia Power land management personnel routinely monitor the shoreline areas of the recreation facilities.

Construction-Related Activities

Georgia Power proposes measures that would require new construction that may result in ground disturbance leading to erosion and sedimentation. For example, Georgia Power proposes to install a forebay oxygen line diffuser system in Lake Oconee. As described further in section 3.3.2.2, *Water Resources-Environmental Effects*, this would require the construction of an onshore liquid oxygen facility (Ruane *et al.*, 2017), and the requisite piping to distribute oxygen to Lake Oconee's forebay area. The facility would involve permanently disturbing about 3 acres of wooded land on the northeast side of Wallace Dam. As part of the construction of the onshore liquid oxygen facility, Georgia Power would implement BMPs to prevent erosion and manage stormwater runoff, such as: (1) 2,000 linear feet of silt fence; and (2) grass mats or other grass seeding methods (e.g., hydroseeding) to revegetate the disturbed area.

Georgia Power also proposes recreation enhancements at six project recreation sites. As described in section 3.3.5.2, *Recreation and Land Use-Environmental Effects*, such improvements would include: (1) constructing barrier-free fishing piers and adding gravel parking at two sites and a barrier-free fishing pier at a third site; (2) constructing new facilities, upgrading the existing well system, and reconfiguring the entrances at two sites; and (3) upgrading the existing toilets and courtesy docks at two sites. Constructing the proposed facilities and other enhancements would result in ground-disturbing activities, leading to shoreline erosion and sedimentation in adjacent waters. Georgia Power's proposal for BMPs, including silt fences (single- and double-row), using grass mats or other grass seeding methods (e.g., hydroseeding) to revegetate disturbed areas, and leaving tree roots in place for trees that area removed, would help reduce the localized shoreline disturbance, erosion, and sedimentation associated with the proposed recreation improvements.

Our Analysis

Installing the proposed forebay oxygen line diffuser system would provide a means to improve summer DO levels in the Wallace Dam tailrace (*see* section 3.3.2.2, *Water Resources-Environmental Effects*). Implementing Georgia Power's proposed BMPs during construction of the liquid oxygen facility would minimize soil erosion on the disturbed land, as well as reduce sedimentation and turbidity in adjacent waters. The area also would be revegetated, further reducing the likelihood of long-term erosion and sedimentation. With regard to the piping, this system would be deployed to its permanent location via barge. It would be floated into place and sit on the top of the lake bed,

anchored by weights. With the exception of a temporary disturbance when the system settles into its permanent location, no lasting, long-term effects are expected.

Construction of the recreation enhancements would cause temporary shoreline disturbances in local areas. Georgia Power proposes to perform all construction activities associated in a manner that would minimize effects on shoreline vegetation, bank stability, and water quality. Proper erosion control and restoration practices during, and immediately following, all construction activities would minimize any effects.

Shoreline Stabilization

Georgia Power proposes to implement the proposed Shoreline Stabilization Plan (*see* Appendix B of Volume 2 of the license application). Under the plan, Georgia Power would install riprap along about 5,100 feet of shoreline at Old Salem Park; 6,000 feet of shoreline at Parks Ferry Park; 2,000 feet of shoreline at Long Shoals Boat Ramp; and 3,400 feet of shoreline at Armour Bridge (*see* figure 3). In addition, Georgia Power would implement BMPs to prevent erosion and manage stormwater runoff during installation of the proposed shoreline stabilization measures.

Our Analysis

Construction of the proposed riprap stabilization would take place during the fall, which would minimize effects to littoral-zone habitats and water quality during the spawning seasons of resident fish.

The proposed shoreline stabilization measures at Old Salem Park, Parks Ferry Park, Long Shoals Boat Ramp, and Armour Bridge would protect these sites from further erosion. Implementing such measures also would conserve soil resources, maintain bank fishing and other shoreline recreational uses, and reduce sedimentation and turbidity in adjacent waters. These measures, either alone or in combination with seawalls and native vegetation plantings, would have the added benefit of increasing habitat complexity of the littoral-zone⁴⁷ for fish and other aquatic organisms (e.g., mussels and aquatic invertebrates), when compared to existing shorelines that are eroding or otherwise have no vegetation or habitat features (Georgia Power, 2016a; Purcell *et al.*, 2010). This would make the shoreline more desirable habitat for littoral-zone fish and invertebrates.

⁴⁷ The littoral zone is defined as that part of a lake or river that is close to the shoreline. The littoral zone typically extends from the highwater mark, which is rarely inundated, to the biologically productive shoreline areas that are permanently submerged.

Pond 2 Repair

During early stages of the pre-filing process for the Wallace Dam Project, Georgia DNR raised concerns about streambank erosion occurring along the project tailrace in vicinity of the Pond 2 water control structure (figure 5).⁴⁸ To address the active erosion area, Georgia Power proposes to repair the eroded shoreline next to Pond 2 and inspect the water level control structure for the waterfowl refuge in cooperation with Georgia DNR.

Our Analysis

The specific BMPs Georgia Power intends to implement include: (1) installing a turbidity curtain; (2) installing riprap to protect the repaired pipe outlet; and (3) revegetating the area using grass mats or other grass seeding methods (e.g., hydroseeding). Implementing these measures, in cooperation with Georgia DNR, would (a) remediate the undercutting of the bank currently taking place next to the Pond 2 dike, (b) conserve soil resources, (c) assist Georgia DNR in identifying needed repairs to the water level control structure, (d) maintain waterfowl refuge habitat within Oconee WMA, and (e) protect water quality and aquatic habitat in the tailrace area.

⁴⁸ The erosion cut is located on the steep, vegetated dike that creates the pond, at the location of the water level control structure for the waterfowl refuge area.



Figure 5. Location of the Pond 2 Waterfowl Management Area in the Oconee WMA Downstream from Wallace Dam. (Source: Georgia Power, 2018; as modified by staff).

Erosion and Sediment Control Management Plan [4(e) Condition 20]

As discussed above, Georgia Power completed a shoreline reconnaissance survey of past and on-going erosion areas around Lake Oconee and the Wallace Dam tailrace, and inventoried potential sources of erosion and sedimentation with the project boundary (Georgia Power, 2016a). The 146 sites surveyed and inventoried included sites at the three Forest Service recreation areas (i.e., Redlands, Swords, and Dyar Pasture). The majority of the shoreline in the study area was found to have stable or moderately stable banks, and exhibit low potential for erosion. Redlands, Swords, and Dyar Pasture Recreation Areas were classified as having moderately stable shorelines, with wave action and recreation access being the most likely source of erosion at the sites.

Forest Service 4(e) Condition 20 requires Georgia Power to develop and implement an Erosion and Sediment Control Management Plan for the project. The plan would include: (1) methods for initial and periodic inventory and monitoring of the entire project area and project-affected National Forest System lands; (2) criteria for ranking and treating erosion sites; (3) erosion control measures that (a) incorporate current standards, (b) follow Forest Service regulations and guidance, (c) are customized to site-specific conditions, and (d) are approved by Forest Service; (4) a schedule for treatment (e.g., repair, mitigate, monitor) of erosion sites; (5) effectiveness monitoring of completed erosion control measures after implementation; (6) protocols for emergency erosion and sediment control; (7) a process for documenting and reporting inventory and monitoring results, including periodic plan review and revision;⁴⁹ and (8) site-specific, temporary erosion control measures for individual construction projects.

Our Analysis

Implementing an erosion and sediment control plan for the project, with the components outlined in Condition 20, would help protect water quality, aquatic and riparian habitats, fish and other aquatic organisms, upland habitat(s) and associated wildlife, recreation use and access, and cultural resources at the project. Developing an inventory of sites along Lake Oconee's shoreline, along with periodic monitoring, would provide Georgia Power valuable information regarding where erosion is occurring and where protective measures may be needed. Including criteria for ranking and treating sites would give Georgia Power the information it needs to establish priority sites that may need immediate attention. Periodic monitoring of the lake's shoreline would allow Georgia Power to determine the effectiveness of measures that have been implemented to minimize erosion and the release of sediment into project water(s). Having a plan that

⁴⁹ Documentation would include a Forest Service-compatible GIS database for maps keyed to a narrative description of detailed site-specific, erosion treatment measures and sediment monitoring results.

includes measures for emergency erosion and sediment control would facilitate Georgia Power's response to unanticipated instances where a high volume of run-off leads to significant erosion and sedimentation along the lake's shoreline. Overall, a plan would provide Georgia Power a comprehensive approach to effectively minimize erosion, sedimentation, and mass movement of soil into Lake Oconee during periods of ground-disturbance (e.g., construction of the forebay oxygen line diffuser system and recreation facilities), as well as during other activities associated with public use of project land(s) and waters.

3.3.2 Water Resources

3.3.2.1 Affected Environment

Water Quantity

Stream Flow

Georgia Power calculated a daily inflow record at Wallace Dam using data from the two nearest U.S. Geological Survey (USGS) stream gages (Oconee River at Penfield and Apalachee River at Bostwick), and applying a ratio of the remainder of the ungaged drainage area (Georgia Power, 2015a, 2016b). Monthly minimum, mean, and maximum inflows at Wallace Dam for the years 1997 through 2016 are provided in table 1. The annual flow duration curve is shown in figure 6, and the monthly flow duration curves are provided in the *Water Resources Study Report* (Georgia Power, 2016b). Mean flows ranged from a low of 1,003 cfs in August to a high of 3,577 cfs in March. The highest mean monthly flows occurred from December through April. The lowest mean monthly flows occurred from August through October. The average annual discharge at Wallace Dam is approximately 2,037 cfs.

Table 1. Daily minimum, mean, and maximum calculated inflow by month at Wallace Dam; 1997 through 2016. (Source: Georgia Power, 2019a).

Month	Minimum Calculated Inflow (cfs)	Mean Calculated Inflow (cfs)	Maximum Calculated Inflow (cfs)
January	1,046	2,829	6,527
February	1,048	3,447	9,586
March	1,627	3,577	7,240
April	764	2,731	7,318
May	523	1,932	5,202
June	386	1,495	4,299
July	263	1,476	6,100
August	180	1,003	3,122
September	179	1,151	5,052
October	146	1,316	5,693
November	288	1,924	7,982
December	673	2,700	8,054

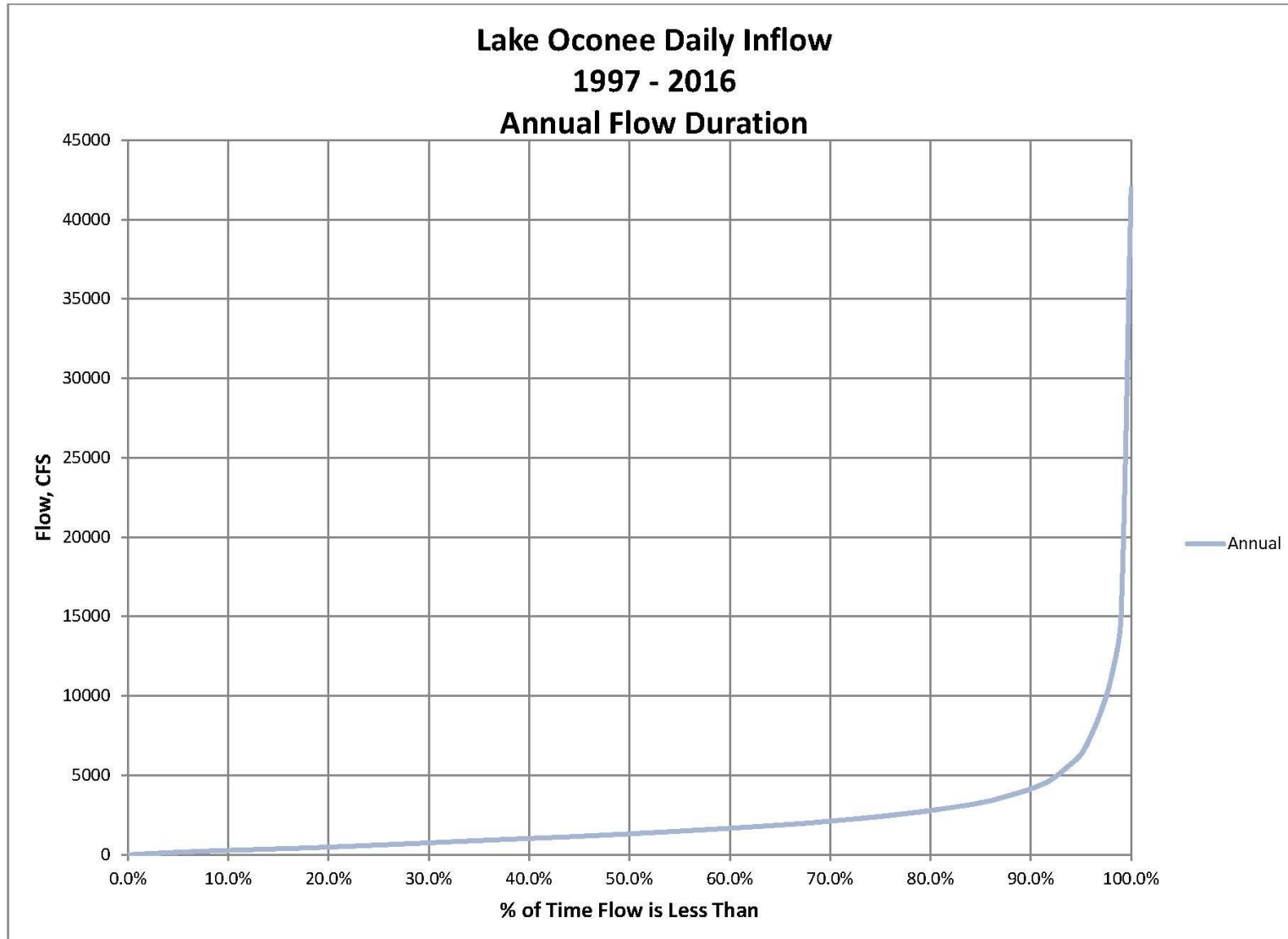


Figure 6. Wallace Dam Pumped Storage Project Annual Flow Duration Curve. (Source: Georgia Power, 2016b).

Water Withdrawals

Surface water withdrawals supply the vast majority of water uses in the project vicinity (Jacobs, 2017). Two local governments/water utilities withdraw surface water from Lake Oconee within the project boundary (Georgia EPD, 2016a); the City of Greensboro and the City of Madison.

The City of Greensboro in Greene County is permitted to withdraw 3.31 million gallons per day (mgd), with a monthly average of 3.00 mgd. The Greensboro intake is in the Oconee River embayment toward the upstream end of Lake Oconee. The City of Madison in Morgan County is permitted for maximum daily and monthly withdrawals of 2.0 mgd. The Madison intake is in the Apalachee River embayment toward the upstream end of Lake Oconee. Piedmont Water Resources in Greene County has also been permitted for maximum daily and monthly withdrawals of 2.0 mgd, but does not have an intake on Lake Oconee at this time (Georgia EPD, 2017).

Treated Wastewater Discharges

In 2016, there were four water treatment plants, 10 land application permits, four private/industrial permits, and 18 National Pollutant Discharge Elimination System permitted discharges in the four nearest counties upstream of Lake Oconee: Greene, Morgan, Oconee, and Clarke Counties (Georgia EPD, 2016a). The addition of nutrients, particularly phosphorus, to the reservoir contributes to Lake Oconee's trophic status of mesotrophic conditions described below (Georgia Power, 2016b, 2017c).

Water Quality

Water Use Classifications

Georgia EPD (2015) classifies the water uses of Lake Oconee and the Wallace Dam tailrace area as Recreation and Drinking Water. These classifications also support the Fishing use. In addition to general criteria applicable to all waters, specific criteria apply to these water uses, including numeric criteria for bacteria (fecal coliform), DO, pH, and temperature (table 2). The applicable DO numeric criteria are a daily average of 5.0 milligrams per liter (mg/L) and no less than 4.0 mg/L at all times.

Table 2. Summary of state water quality criteria applicable to the Wallace Dam Project. (Source: Georgia EPD, 2015).

Parameter	Georgia (2015) Water Quality Criteria
Turbidity	Free from turbidity that results in a substantial visual contrast in a water body due to a man-made activity
pH	6.0 to 8.5 standard units

Parameter	Georgia (2015) Water Quality Criteria
DO	Daily average ≥ 5.0 mg/L, and > 4.0 mg/L at all times ^a
Temperature	≤ 90 °F (32.2 degrees Celsius)
Fecal Coliform	For fishing and drinking water uses: during the months May through October – geometric mean ≤ 200 col./100 mL and during the months November through April - $\leq 1,000$ col./100 mL and any single sample $\leq 4,000$ col./100mL ^b

Note: mg/L – milligrams per liter; col./100 mL = colonies per 100 milliliters

^a DO criteria applicable at a depth of 1 m below the water surface or at mid-depth for water less than 2 m deep.

^b Based on ≥ 4 samples collected from a given sampling site over a 30-day period at intervals not less than 24 hours.

Attainment Status

LAKE OCONEE – Georgia EPD (2016b) currently lists Lake Oconee as “assessment pending,” relative to its attainment status because of occasional pH excursions outside the numeric criterion range of 6.0 to 8.5 at one of three stations monitored by Georgia EPD.⁵⁰ Georgia Power’s monthly water quality sampling at nine stations in Lake Oconee during 2015-2016 found rare instances of pH above 8.5 (less than 1.5 percent of measurements) (Georgia Power, 2016b). Georgia EPD’s most recent Triennial Review for Water Quality Standards (Georgia EPD, 2018a) proposed a revised pH standard for Lake Oconee and Lake Sinclair from 8.5 to 9.5. This is consistent with other lakes in the region (Georgia EPD, 2018b), and should result in Lake Oconee meeting its designated uses.

WALLACE DAM TAILRACE – Georgia EPD (2016b) currently lists the Wallace Dam tailrace area (Lake Sinclair) as supporting its designated uses.

TRIBUTARIES TO LAKE OCONEE – Consistent with the section 303(d) listings for impaired waters, numerous tributary streams to Lake Oconee upstream of the project boundary are listed as not supporting their designated uses due to fecal coliform violations and/or fish community impacts (Georgia EPD, 2016b; Georgia Power, 2016b;

⁵⁰ Due to Georgia EPD staff resource management changes, this sampling was recently suspended.

Jacobs, 2017).⁵¹ Non-point sources, including urban runoff from upstream communities, are the likely causes of impairment to these streams.

Cattle farming in the Lake Oconee watershed, resulting in the introduction of fecal coliform and nutrients, contributes to the impairment of main tributaries entering the lake (Bachoon *et al.*, 2009). In 2013, Georgia EPD described impending changes to its rules for specific numeric criteria for Lake Oconee, including those for chlorophyll-*a*⁵² and nutrients, to reduce nutrient over-enrichment of the lake. In April 2018, Georgia EPD (2018b) described its proposed revised water quality criteria for Lake Oconee,⁵³ including chlorophyll-*a*, total nitrogen, and total phosphorus, as follows:

- Chlorophyll-*a* – for the months April through October, the average of monthly mid-channel photic zone composite samples shall not exceed the chlorophyll-*a* concentration at the following locations more than once in a 5-year period: Oconee River Arm at Hwy 44 - 26 µg/L;⁵⁴ Richland Creek Arm - 15 µg/L; and Upstream from the Wallace Dam forebay - 18 µg/L.
- Total nitrogen – Not to exceed a growing season average of 2 mg/L in the photic zone.⁵⁵
- Total phosphorus – Not to exceed a growing season average of 0.2 mg/L in the photic zone.

⁵¹ Sixteen miles of the Oconee River, and 35 miles of the Apalachee River immediately upstream of Lake Oconee, are impaired due to fecal coliform violations. Segments of Richland Creek, Sugar Creek, Fishing Creek, and several other tributaries upstream of Lake Oconee also do not support their designated uses.

⁵² Chlorophyll-*a* is a green pigment found in algae and green plants that is vital for photosynthesis, and serves as an indicator of nutrient levels in a waterbody.

⁵³ To date, Georgia EPD has developed chlorophyll-*a* standards for six lakes in Georgia, including Lanier, Allatoona, Jackson, West Point, Carters, and George. Georgia EPD's proposed revised water quality criteria for Lake Oconee have not yet gone into effect. Nonetheless, for the 5-year period examined, Lake Oconee met the proposed criteria.

⁵⁴ µg/L = micrograms per liter.

⁵⁵ The photic zone is the lighted region in a body of water that extends vertically from the surface to the depth at which light is insufficient to enable photosynthesis to exceed respiration of phytoplankton.

Water Quality of Lake Oconee

Georgia Power (2016b) conducted water quality monitoring in Lake Oconee from August 2015 through August 2016. Monitoring included monthly vertical profile measurements of water temperature, DO, pH, specific conductivity, and turbidity at 1-meter intervals throughout the water column at nine stations (figure 7). Surface grab samples were collected quarterly at six stations, and analyzed for a range of water chemistry parameters, including alkalinity, turbidity, hardness, total phosphorus, nitrate, nitrite, ammonia, chlorophyll-*a*, fecal coliform, biochemical oxygen demand, and chemical oxygen demand. In addition, Georgia Power (2016b) conducted hourly measurements of vertical profiles in Lake Oconee over the course of two day-night sampling events in summer 2016 to represent normal summer generation and pumpback operation. Lake Oconee water quality monitoring, including vertical profiles and water chemistry, continued quarterly from fall 2016 through summer 2017 (Georgia Power, 2017c).

QUARTERLY WATER CHEMISTRY – Quarterly water chemistry data indicated good overall water quality conditions in Lake Oconee for the duration of the 2-year study (Georgia Power, 2016b, 2017c). As with historical data, chlorophyll-*a*, total phosphorus concentrations, turbidity, and fecal coliform densities were usually higher at upstream or tributary stations (*see* Table 4 in Georgia Power (2016b) and Table 3 in Georgia Power (2017c)), indicating likely influences from upstream urban runoff and other nonpoint sources. For example, from 2013 to 2016,⁵⁶ average chlorophyll-*a* concentrations ranged from 7.86 µg/L at Station OC1 to 19.7 µg/L at Station OC9; average fecal coliform levels ranged from 3.0 col./100mL at Station OC1 to 19.6 col./100 mL at Station OC7 and 15.5 col./100 mL at Station OC9; average total phosphorus concentrations ranged from .029 mg/L at Station OC1 to 0.068 at Station OC8 and 0.064 mg/L at Station OC8; and average turbidity ranged from 9.06 at Station OC1 to 21.09 at Station OC7 and 27.49 at Station OC8 (measured in Nephelometric Turbidity Units).

Trophic state index (TSI) is monitored in Lake Oconee and other Georgia lakes to assess the degree of eutrophication.⁵⁷ Figure 6 in Georgia Power (2017c) shows the TSI scores for Lake Oconee from 1979 to 2005, and from 2014 to 2017. The scores, which generally ranged from 50 to 60, indicate mesotrophic conditions approaching eutrophic conditions.

⁵⁶ Georgia Power combined data from 2013 and 2014, with the data collected in 2015 and 2016, as part of the relicensing studies, to develop the summary presented in Georgia Power (2016b, 2017c).

⁵⁷ The Carlson TSI interrelates Secchi disc transparency (measure of water clarity), chlorophyll-*a*, and total phosphorus to derive numerical classification of trophic conditions (Carlson, 1977). Higher TSI scores indicate enriched trophic conditions.

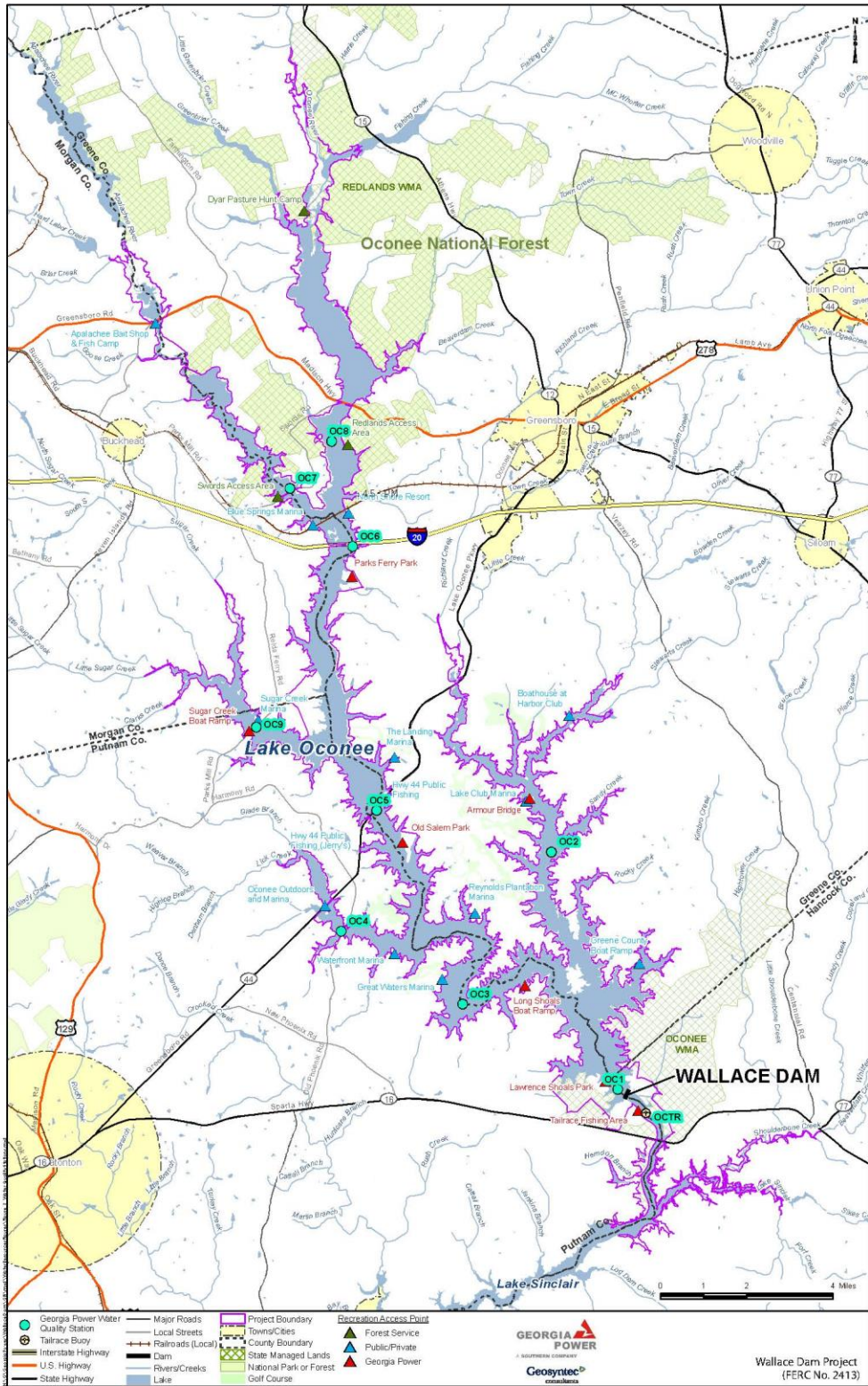


Figure 7. Georgia Power Water Quality Monitoring Stations. (Source: Georgia Power, 2016b).

VERTICAL PROFILE MEASUREMENTS – Monthly water quality vertical profiles recorded for Lake Oconee from June 2015 through August 2016 document the extent of mixing in Lake Oconee that occurs as a result of pumpback operation. Mean water temperature (all data by monitoring station across all depths) ranged from 70.3°F (Station OC5) to 74.3°F (Station OC6). Temperature at Station OC1 averaged 71.8°F. Mean temperature (for data collected at depths less than or equal to 3.3 feet)⁵⁸ was slightly less variable, ranging from 70.7°F (Station OC9) to 74.1°F (Station OC2); temperature at Station OC1 averaged 72.9°F. Mean DO (all data by monitoring station across all depths) ranged from 6.1 mg/L (Stations OC1 and OC2) to 7.9 mg/L (Station OC8). Mean DO (for data collected at depths less than or equal to 3.3 feet) ranged from 7.5 mg/L (Station OC1) to 8.6 mg/L (Station OC9). Table 3 in Georgia Power (2016b) provides the complete summary of the vertical profile measurements by station, including minimum, mean, and maximum values for water temperature, DO, specific conductance, pH, and Secchi depth transparency.

Southeastern reservoirs typically exhibit summertime thermal stratification, with warmer temperatures near the surface, a sharp decrease in temperature at mid-depths, and cooler waters at the bottom. For example, the monthly temperature profiles at Station OC1 (figure 8) show that the water column remained well mixed for most of the year, with little variation from the surface to the bottom. However, some thermal stratification was observed in the late spring and early summer (March-April 2016, June 2015, and June 2016). The monthly DO profiles at Station OC1 exhibited a similar pattern of relatively uniform values for most of the year, indicative of a well-mixed water column. However, there was a more pronounced gradient of declining DO values with increasing depth observed in June 2015, June and July 2016, and to a lesser extent in March and April 2016. Depending on environmental conditions, DO could drop to below 5 mg/L within 10 feet of the water's surface, and could get as low as 2 mg/L or lower at greater depths. Similar, but more pronounced, trends in water temperature and DO gradients were observed at Stations OC2 through OC9 (*see* Figures 5b through 5i in Georgia Power, 2016b).

⁵⁸ Georgia EPD (2015) applies the DO criteria specified in individual water use classifications at a depth of 3.3 feet (1 meter) below the water surface where depth is equal to, or greater than, 6.6 feet (2 meters). All nine Lake Oconee monitoring stations exceeded 6.6 feet in depth.

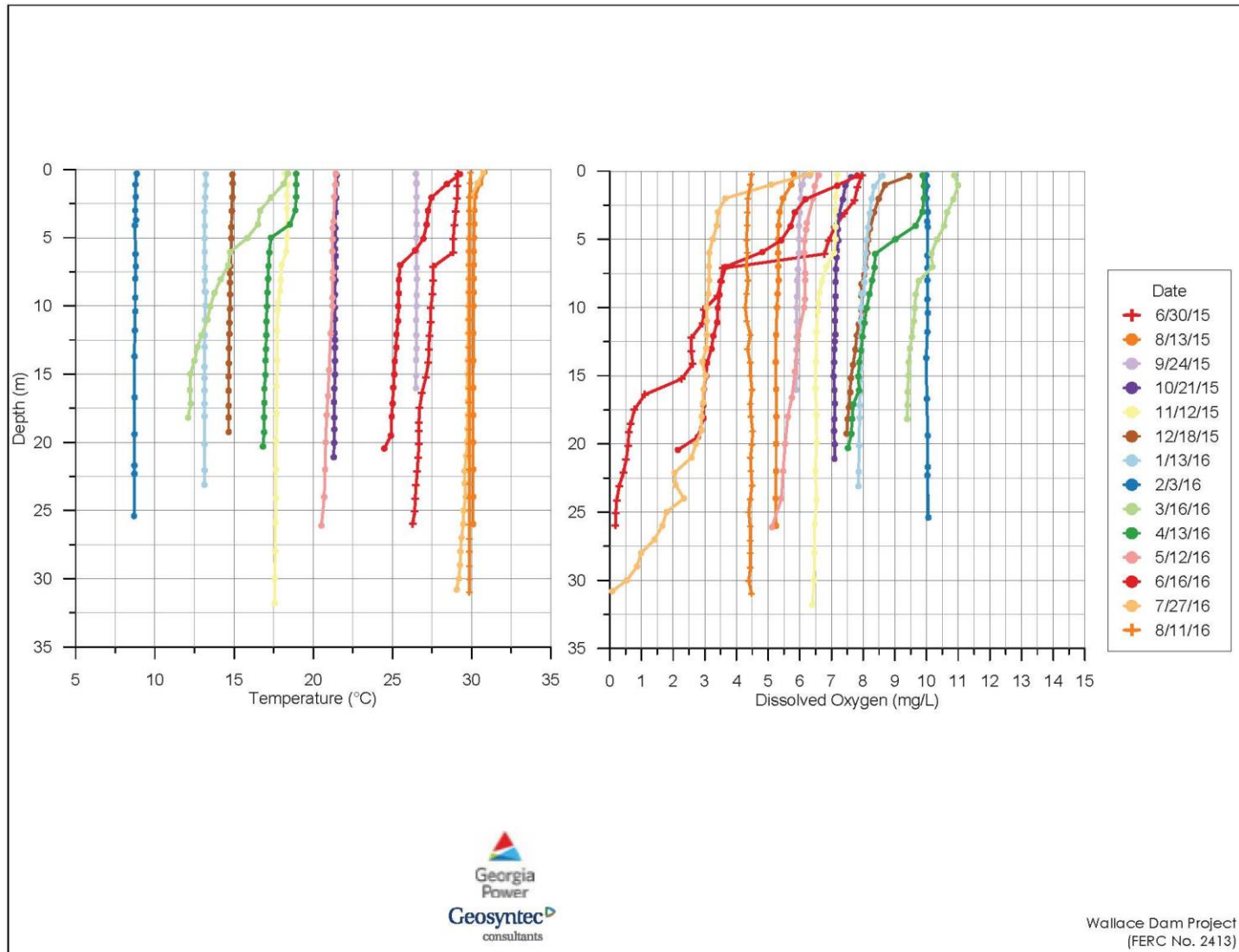


Figure 8. Monthly Vertical Temperature and DO Profiles at Lake Oconee Station OC1.
(Source: Georgia Power, 2018).

Seasonal water quality vertical profiles of Lake Oconee collected from 2003-2017 also indicate that vertical stratification becomes most developed in the spring and early summer, as surface temperatures rise, and cooler water is still available (Figures 6a through 6i in Georgia Power (2016b); and Figures 5a through 5i in Georgia Power (2017c)). By August, the water column exhibits warmer temperatures, and only narrow temperature variation(s) from the surface to the bottom. With regard to DO concentration, stratification is most evident in the spring, and, depending on the hydrological conditions in the Oconee River Basin, the summer. DO in deeper portions of the lake can drop to 5 mg/L or less during these periods. The effects of mixing on reduced temperature and DO variation were most evident in the forebay, at other mainstem reservoir stations, and the tributary embayments closest to Wallace Dam. Figure 9 shows the seasonal vertical profile data for water temperature and DO at Station OC1 from 2003 through 2017. The water temperature and DO gradients observed at Stations OC2 through OC9 were similar to the profile data for Station OC1, but more pronounced.

HOURLY VERTICAL PROFILES – Georgia Power conducted two lake-wide sampling events to measure hourly vertical profiles of DO and water temperature over the course of a normal summer operating day with hydropower peaking followed by pumpback operation. The two 24-hour sampling events were conducted on July 27-28 and August 15-16, 2016. Vertical profile information was collected at Stations OC1, OC2, OC3, OC4, OC5, and OC9 (*see* figure 7).

The hourly monitoring events conducted in Lake Oconee indicated that temporary stratification of water temperature and DO develops in the forebay and other mainstem locations during the quiet period(s) following pumpback operation and during generation (Georgia Power, 2016b; *see* Figures 10a through 10g and 11a through 11g). However, once pumpback operation begins, the water column becomes completely mixed in the forebay, as water is pumped in from Lake Sinclair (figure 10). Under the fully mixed conditions (2 am to 6 am), the DO concentration at OC1 during the July and August sampling events were about 3.6 mg/L and 5.3 mg/L, respectively, and water temperature averaged about 86°F during both sampling events. For both sampling events, average water temperature and DO in the forebay matched closely the water temperature and DO conditions values recorded at Station OCTR (Wallace Dam tailrace) during the same time period. Similar, but less complete, effects of mixing occurred at other mainstem reservoir sampling stations. Tributary locations, especially in Richland Creek, remain stratified throughout the generation and pumpback cycle (figure 11), with respect to DO concentrations and temperature, indicating that dam operations have little short-term effect on water quality in Richland Creek.

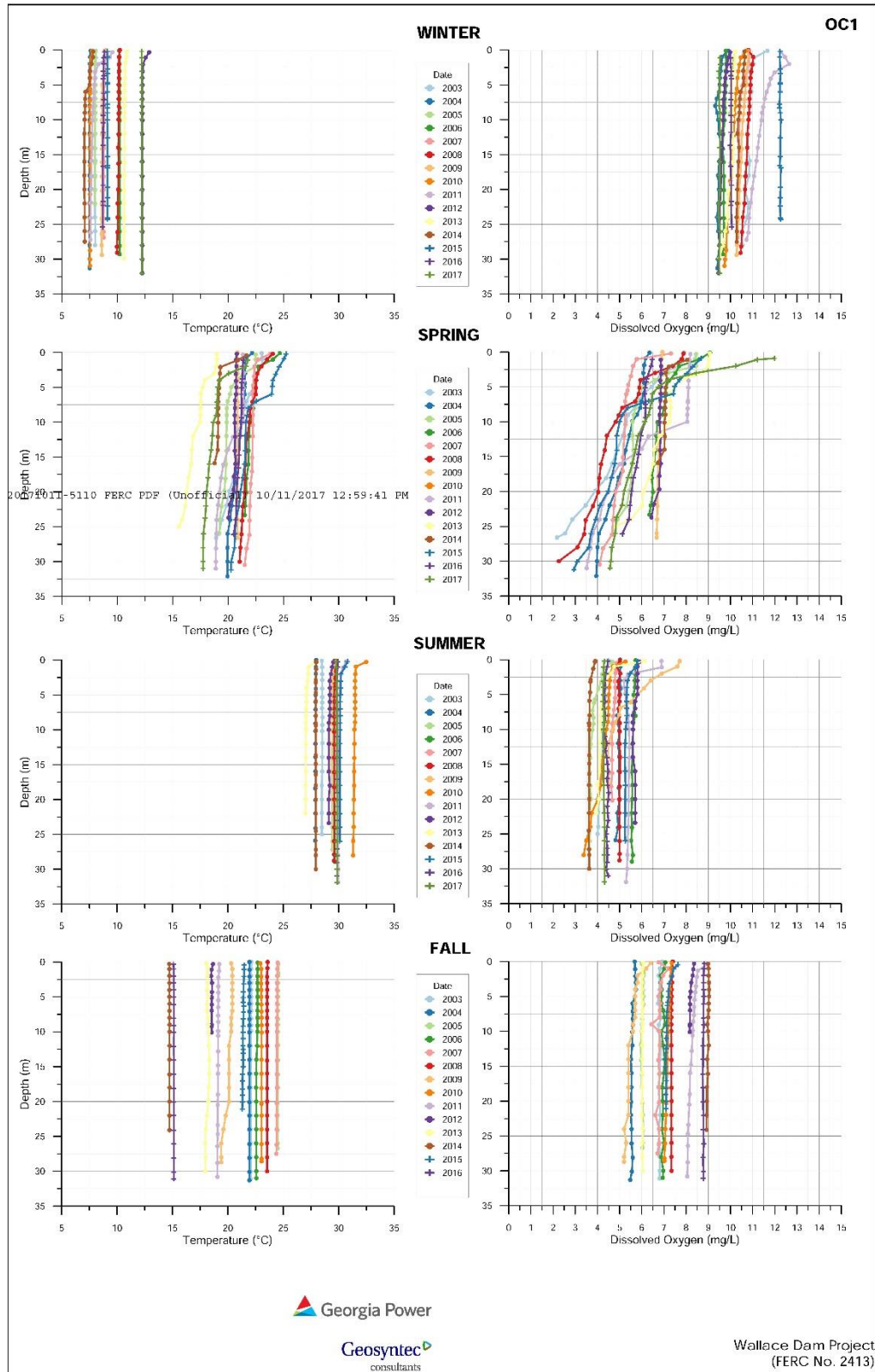


Figure 9. Seasonal Vertical Temperature and DO Profiles at Lake Oconee Station OC1, 2003 to 2016. (Source: Georgia Power, 2016b).

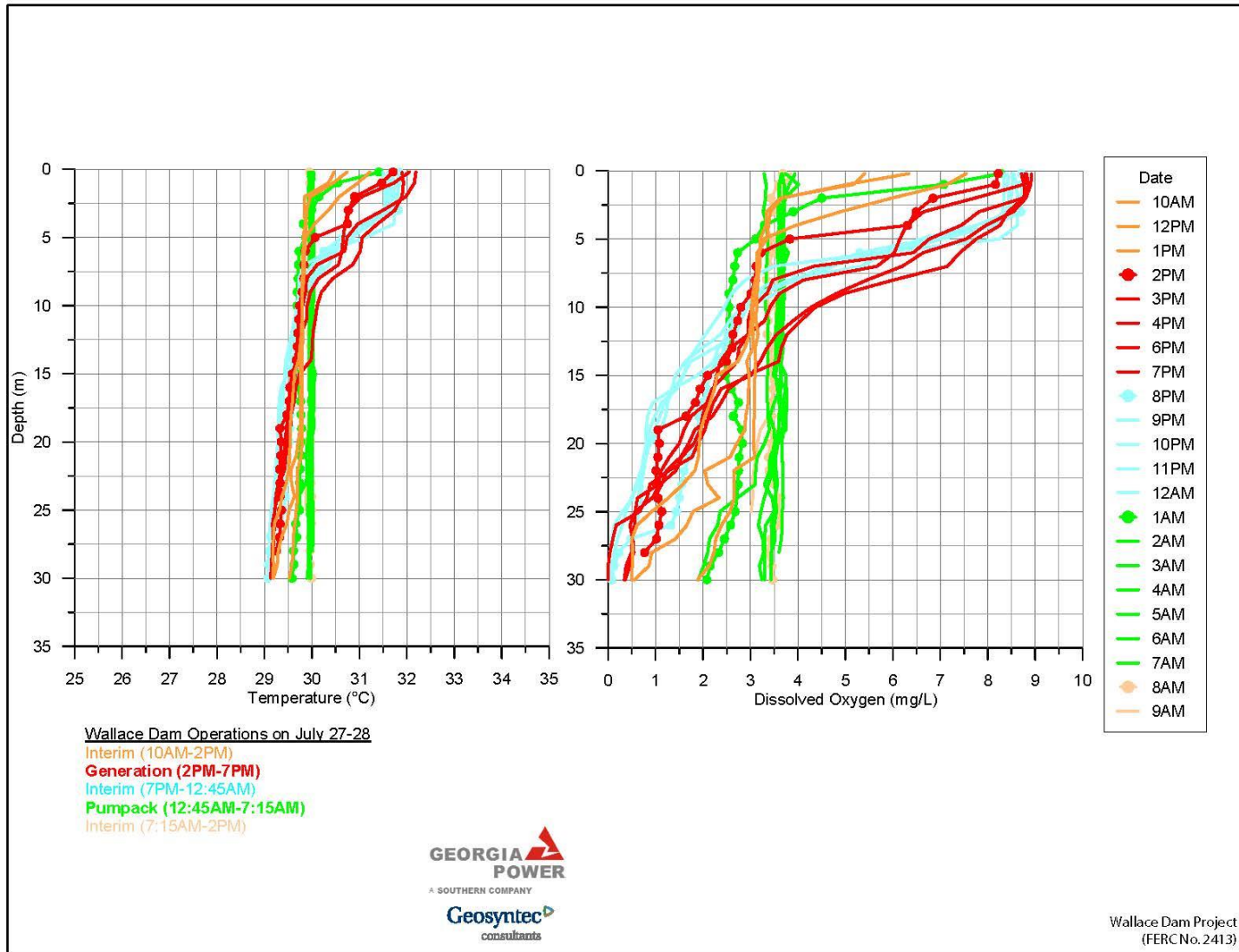


Figure 10. 24-Hour Vertical Water Temperature and Dissolved Oxygen Profiles in July from Lake Oconee Station OC1. (Source: Georgia Power, 2016b).

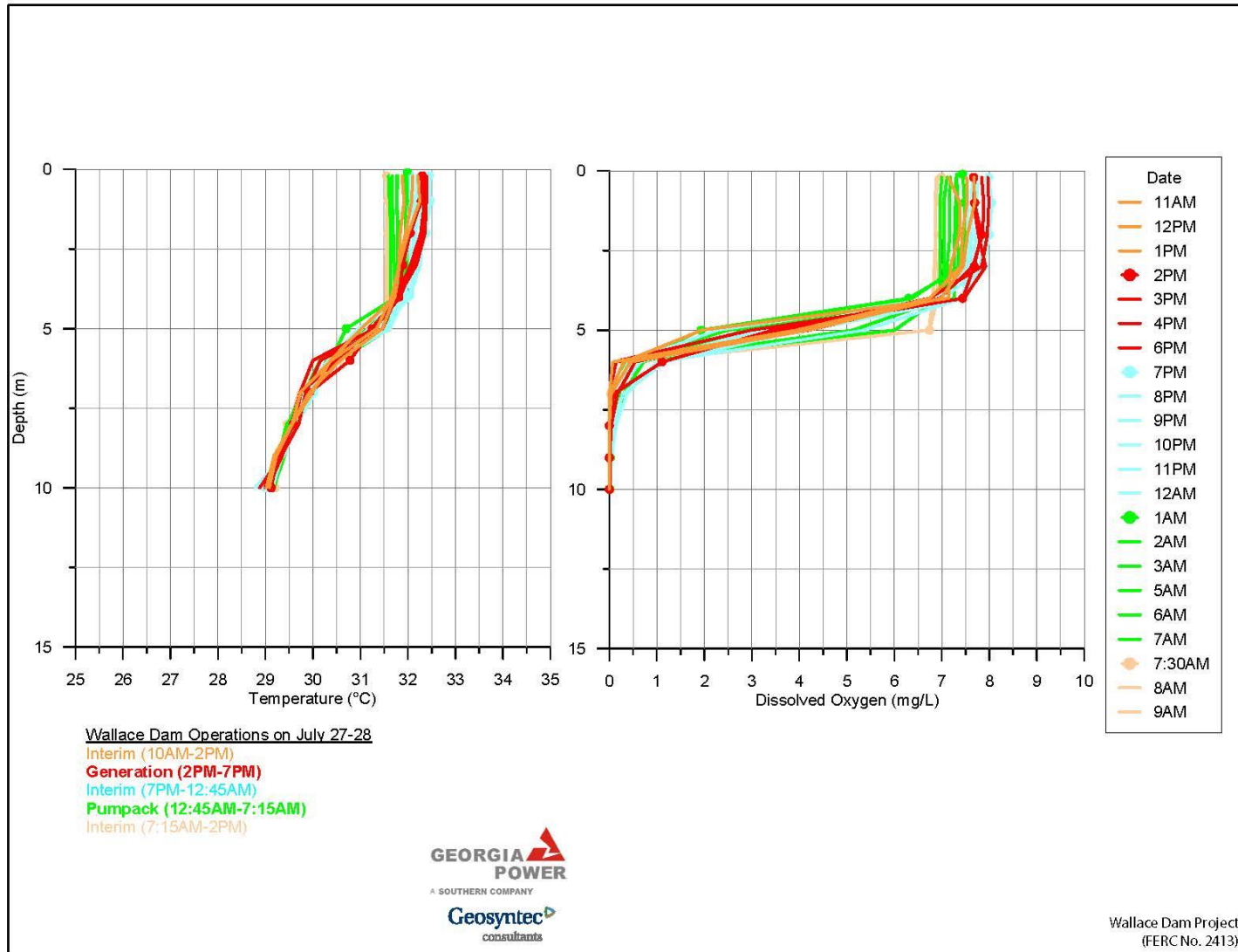


Figure 11. 24-Hour Vertical Water Temperature and Dissolved Oxygen Profiles in July from Lake Oconee Station OC2. (Source: Georgia Power, 2016b).

Water Quality of Wallace Dam Tailrace

Georgia Power (2016b, 2017c) conducted continuous DO and water temperature monitoring in the Wallace Dam tailrace (Station OCTR) from July 2015 through September 2017 to characterize the effects of continued project operation on water quality. Water quality data were recorded every 60 minutes. The continuous monitoring data were aligned with real-time project operational data from the same periods, which indicated how the turbines were being operated (e.g., generation, pumpback, number of units). In addition, Georgia Power conducted hourly measurements of DO and water temperature in the tailrace area over the course of two day-night events in August 2016.

CONTINUOUS WATER QUALITY MONITORING – The tailrace monitoring data indicated similar overall seasonal patterns in both seasons of study (figure 12). As average water temperature increased in spring and summer, average DO values decreased. As water began cooling in late summer and early fall, average DO values increased. Lower DO concentrations in summer months are expected as warmer temperatures decrease oxygen solubility in water, and the growing season contributes additional biomass to the water column, increasing biological oxygen demand.

Tailrace DO values below 4.0 mg/L occurred throughout much of the summer. These DO depressions were correlated with generation (figure 13). In summer 2016, tailrace DO depressions occurred almost exclusively in June and July (*see* Figures 13a through 13ae in Georgia Power, 2016b). In summer 2017, DO depressions began in May and extended into August (*see* Figures 3a through 3ab in Georgia Power, 2017c). Pumpback operation and photosynthesis during interim⁵⁹ daytime periods on the same days corresponded with increases in tailrace DO values, usually to above 4.0 mg/L. The low DO values during generation corresponded with low DO levels in the forebay of Wallace Dam at depths of 6.6 to 23 feet and greater.

Table 3 summarizes the water quality data collected in the Wallace Dam tailrace, over the two years (by water year⁶⁰) of monitoring (2015-2017). In water year 2016 (October 1, 2015, through September 30, 2016), DO values less than 4.0 mg/L occurred in 8.6 percent of the hourly readings (Georgia Power, 2017c). In water year 2017, 14.0 percent of the DO readings were less than 4.0 mg/L. Sixty-nine days of water year 2016 (19 percent) and 93 days of water year 2017 (25 percent) had daily average DO values less than 5.0 mg/L. Outside of the months of May through August, tailrace minimum DO values were always higher than 4.0 mg/L (figure 12).

⁵⁹ The term “interim,” as used here refers to that period between pumpback operation at night and the beginning of generation the following day.

⁶⁰ “Water Year” is defined as October 1 to September 30.

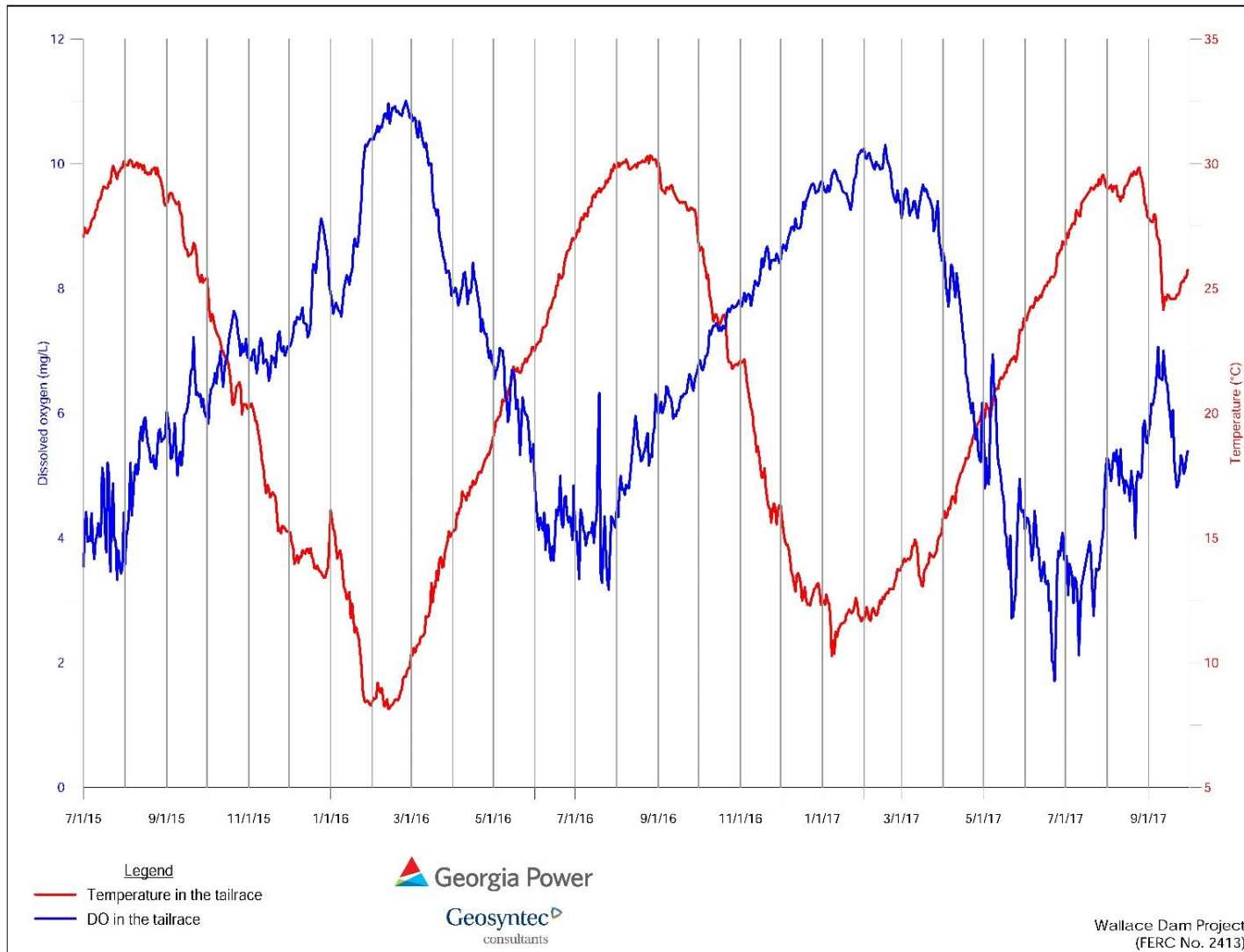


Figure 12. Daily Average Water Temperature and Dissolved Oxygen in the Wallace Dam Tailrace, 2015-2017. (Source: Georgia Power, 2017c).

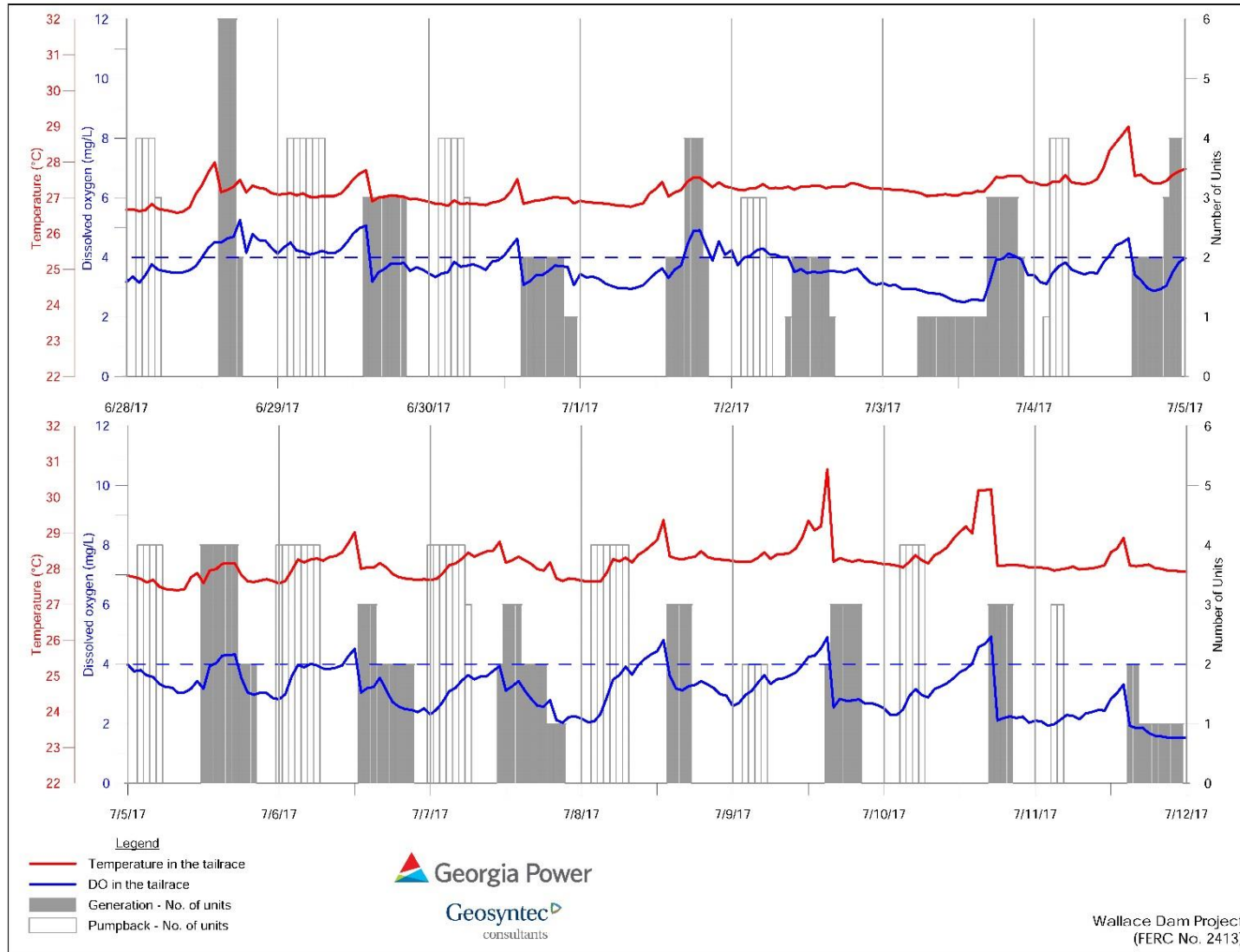


Figure 13. Correlation between Project Operation and Water Quality Changes in the Wallace Dam Tailrace, June 28, 2016 through July 12, 2017. (Source: Georgia Power, 2017c).

Table 3. Summary of Continuous Water Quality Data Collected in the Wallace Dam Tailrace. (Source: Georgia Power, 2017c).

Attribute	Year 1	Year 2
	10/1/15 – 9/30/16	10/1/16 – 9/30/17
No. of hourly readings	8,803	8,712
Days of missing data	3	11
Average Temperature (°F)	68.4	69.1
Average DO (mg/L)	7.0	7.0
No. of hourly DO readings < 4 mg/L	755	1,216
Percent of hourly DO readings < 4 mg/L	8.6%	14.0%

HOURLY WATER QUALITY MONITORING – Two hourly tailrace transect monitoring events were completed to characterize variation in tailrace water quality over the course of a normal cycle of generation and pumpback operation on a summer day (Georgia Power, 2016b).⁶¹ The first event was conducted on August 4, 2016, and the second event was conducted on August 25, 2016. During the first event, the Wallace Dam forebay was well mixed from top to bottom, with less than 0.4 mg/L change in DO. During the second event, there was a 1.7 mg/L change in DO from the lake’s surface to the bottom, indicating a slight amount of stratification occurring at the time of sampling.

The hourly tailrace monitoring indicated water quality to be relatively uniform across the tailrace channel during each event. DO values decreased after generation began and remained low throughout the interim and pumpback periods (table 4; *see* also Figures 14a through 14i and 15a through 15i in Georgia Power (2016b)). During the August 4, 2016, hourly monitoring event, DO dropped to below 4.0 mg/L on a number of occasions (*see* Table 5 in Georgia Power, 2016b). DO recovery began during the daylight interim period, consistent with daytime photosynthesis in upper Lake Sinclair.

Although DO depressions occurred daily in the tailrace during summer generation, overall water quality conditions are good and support an aquatic community typical of southeastern reservoirs and the designated uses of the tailrace reach. In addition, the tailrace supports an important fishery and other recreational opportunities.

⁶¹ The tailrace was divided into five reaches, beginning at Wallace Dam and extending downstream to the end of the project boundary at the Georgia Hwy 16 Bridge.

Table 4. Summary of Wallace Dam Tailrace Dissolved Oxygen Data. (Source: Georgia Power, 2016b; as modified by staff).

Hour	Date	Operation	OCTR (mg/L)	Reach 1		Reach 2		Reach 3		Reach 4		Reach 5											
				N	Mean DO (mg/L)	N	Mean DO (mg/L)	N	Mean DO (mg/L)	N	Mean DO (mg/L)	N	Mean DO (mg/L)										
AUGUST 4, 2016																							
11pm	8/3/16	Interim	4.44	112	4.21	86	4.18	72	4.21	84	4.26	90	4.12										
12am	8/4/16	Interim	4.4	120	4.15	72	4.17	80	4.15	93	4.22	104	4.09										
1am	8/4/16	Pumpback	4.34	137	4.16	91	4.09	97	4.14	112	4.16	110	4.18										
2am	8/4/16	Pumpback	4.29	137	4.15	87	4.20	102	4.27	102	4.21	96	4.21										
3am	8/4/16	Pumpback	4.37	156	4.21	70	4.25	70	4.25	70	4.29	69	4.39										
4am	8/4/16	Pumpback	4.63	Hourly readings not collected during this period.																			
5am	8/4/16	Pumpback	4.48																				
6am	8/4/16	Pumpback	4.68																				
7am	8/4/16	Pumpback	4.81																				
8am	8/4/16	Pumpback	5.0																				
9am	8/4/16	Pumpback	5.17																				
10am	8/4/16	Interim	4.97	Hourly readings not collected during this period.																			
11am	8/4/16	Interim	5.28																				
12pm	8/4/16	Interim	5.77																				
1pm	8/4/16	Interim	6.11																				
2pm	8/4/16	Interim	6.46											132	5.76	81	6.03	73	6.09	82	6.00	82	6.06
3pm	8/4/16	Generation	6.57											124	5.32	82	6.03	87	5.96	109	6.34	87	5.91
4pm	8/4/16	Generation	4.86	133	5.05	73	4.95	82	4.93	73	5.00	92	5.15										
5pm	8/4/16	Generation	4.51	140	4.24	64	4.25	76	4.27	89	4.33	83	4.36										
6pm	8/4/16	Generation	4.5	138	4.27	73	4.24	73	4.17	81	4.23	86	4.21										
7pm	8/4/16	Generation	4.67	127	4.34	58	4.35	85	4.31	84	4.41	85	4.32										
8pm	8/4/16	Generation	4.59	Hourly readings not collected during this period.																			
9pm	8/4/16	Generation	4.93																				
10pm	8/4/16	Generation	5.11																				

Hour	Date	Operation	OCTR (mg/L)	Reach 1		Reach 2		Reach 3		Reach 4		Reach 5	
				N	Mean DO (mg/L)	N	Mean DO (mg/L)	N	Mean DO (mg/L)	N	Mean DO (mg/L)	N	Mean DO (mg/L)
AUGUST 24, 2016													
11pm	8/24/16	Interim	4.74										
12am	8/25/16	Interim	4.5	<i>Hourly readings not collected during this period.</i>									
1am	8/25/16	Interim	4.57										
2am	8/25/16	Pumpback	4.4										
3am	8/25/16	Pumpback	4.52										
4am	8/25/16	Pumpback	4.99										
5am	8/25/16	Pumpback	5.0	196	4.98	102	5.05	102	5.14	107	5.25	35	5.35
6am	8/25/16	Pumpback	5.05	152	5.17	90	5.26	103	5.46	97	5.59	66	5.70
7am	8/25/16	Pumpback	4.79	115	5.34	78	5.40	75	5.49	89	5.60	91	5.69
8am	8/25/16	Pumpback	5.33	115	5.40	72	5.41	73	5.51	83	5.66	93	5.69
9am	8/25/16	Pumpback	5.32	104	5.48	62	5.44	69	5.60	67	5.74	85	5.76
10am	8/25/16	Interim	5.52	99	5.62	57	5.58	65	5.72	65	5.88	75	5.99
11am	8/25/16	Interim	5.74	106	5.76	55	5.78	63	5.97	61	6.08	87	6.20
12pm	8/25/16	Interim	5.82	93	5.78	63	5.93	62	5.77	57	5.81	81	5.82
1pm	8/25/16	Generation	4.85	108	5.02	52	5.02	63	5.01	54	5.09	88	5.19
2pm	8/25/16	Generation	4.89	111	5.25	54	5.16	67	5.13	62	5.08	92	5.08
3pm	8/25/16	Generation	5.31										
4pm	8/25/16	Generation	5.71	<i>Hourly readings not collected during this period.</i>									
5pm	8/25/16	Generation	5.66										
6pm	8/25/16	Generation	5.43										
7pm	8/25/16	Generation	5.46										
8pm	8/25/16	Generation	5.16										
9pm	8/25/16	Generation	5.06										
10pm	8/25/16	Interim	5.11										

Water Quality along Project Transmission Line

The Wallace Dam transmission line is located entirely within the upper Oconee River Basin. The headwaters and small streams crossed by the ROW, including Jenkins Branch, Crooked Creek, Turkey Creek, and Rooty Creek, all drain south to Lake Sinclair (*see* figure 3). The water quality of these streams is affected by non-point source runoff from rural and urban land uses. Turkey Creek and Rooty Creek contribute to the total maximum daily load for fecal coliform in the Oconee River Watershed (EPA, 2002).

Fish and Aquatic Organisms

The Wallace Dam Project is located on the upper Oconee River in the Piedmont of the larger Altamaha River Basin. The impounded waters of Lake Oconee dominate aquatic habitats within the project boundary, and, therefore, the principal fisheries inhabiting project waters are reservoir fisheries. Wallace Dam discharges directly into Lake Sinclair, which also supports a reservoir fishery. The Sinclair Project impounds 29.7 miles of river and separates Wallace Dam from the lower free-flowing reach of the Oconee River. The Oconee River flows 143 miles from Sinclair Dam through the Fall Line Hills District and into the Coastal Plain to join the Ocmulgee River and form the Altamaha River.

The upper Oconee River Basin principally supports warm-water fisheries. Free-flowing streams in the project area are the Oconee River, Apalachee River, and other tributaries entering Lake Oconee.

The upper Oconee River in the vicinity of the Wallace Dam Project, including the free-flowing tributaries mentioned above, supports about 57 species of fish (*see* Table 4 in Volume 2 of the license application; Georgia Power, 2018). The families with the most species include minnows, catfishes, sunfishes, suckers, and perches. Standardized surveys conducted by Georgia DNR have documented the occurrence of at least 28 species of fish within Lake Oconee (Georgia DNR, 2014a). Several other non-game species not targeted by the surveys also likely reside there. The principal sport fishes inhabiting Lake Oconee include largemouth bass, black crappie, striped bass, white bass-stripped bass hybrids (hybrid bass), white bass, channel catfish, blue catfish, flathead catfish, and a variety of sunfishes. Nine of the species are believed to be introduced and non-native to the Oconee River Basin (Lee *et al.*, 1980), which include threadfin shad, common carp, blue catfish, flathead catfish, white bass, green sunfish, spotted bass, white crappie, and yellow perch.

Lake Oconee

Lake Oconee covers 19,050 acres and has 374 miles of shoreline (*see* figure 3). The bottom is mostly clay with rocky outcroppings in some areas in the lower end of the

reservoir, particularly around the confluence of the Oconee River and Richland Creek. Standing timber and fish plots (stands topped out below the surface) are distributed throughout Lake Oconee, which provide cover for black crappie and other sunfishes, and serve as nursery habitat for forage species, including gizzard shad and threadfin shad (Van den Avyle and Petering, 1988). When Lake Oconee was constructed, about 1,250 acres of timber were left standing in flooded channels and smaller inlets as wildlife habitat. Fifty timber stands, totaling about 235 acres, were cut off 10 feet below the full-pool surface as submerged habitat for reservoir fish. Other important fish habitat structures in Lake Oconee include anchored fish attractors, artificial reefs, native aquatic vegetation, sunken trees, spawning gravel, and riprap.

Based on a shoreline reconnaissance survey of Lake Oconee and the Wallace Dam tailrace, the most frequently observed sources of littoral-zone fish cover, in descending order, were overhanging vegetation, docks and piers, riprap, emergent vegetation, and large woody debris (Georgia Power, 2016a, 2016c). On the basis of proportional length, riprap was the predominant source of shoreline fish cover, followed by overhanging vegetation and docks and piers. Riprap was most prevalent in the lower reservoir, middle reservoir, and Richland Creek sections of Lake Oconee, where residential and resort development are widespread and riprap is commonly used to stabilize shorelines. Overhanging vegetation was the predominant cover type in the less developed upper reservoir section.

Lake Oconee supports a popular fishery for largemouth bass, black crappie, striped bass, hybrid bass, channel catfish, blue catfish, and a variety of other species (Georgia DNR, 2017b). The lake has numerous public access areas that provide for a wide range of boat- and bank-fishing opportunities, as well as tournament fishing. Tournament fishing is popular and primarily targets largemouth bass. For the years 1996 through 2014, the average tournament bass weight on Lake Oconee (1.8 to 2.1 pounds) ranked among the top five reservoirs in Georgia in 17 of the 19 years (Georgia Bass Chapter Federation, 1996-2014). The average annual size of the largest bass reported in Lake Oconee tournaments during those years weighed from 3.5 to 4.6 lbs.

Georgia DNR stocks Lake Oconee annually with striped bass and hybrid bass. Since 2011, stocking numbers have transitioned away from a predominance of striped bass to that of hybrid bass, based on angler preferences for hybrid bass (Georgia DNR, 2017b). Current stocking rates are about 15 hybrid bass and five striped bass per acre.

Lake Oconee also provides a popular year-round catfish fishery. Blue catfish and flathead catfish were introduced in the mid-1990s, and their populations expanded rapidly (Homer and Jennings, 2011). Anglers now have the opportunity to catch trophy-size catfish, with some blue catfish and flathead catfish exceeding 40 pounds (Georgia DNR, 2017b).

Wallace Dam Tailrace

From Wallace Dam, the Oconee River flows directly into Lake Sinclair, a 15,330-acre reservoir. Shorelines in the tailrace area are primarily forested downstream to the end of the project boundary. The Lake Sinclair fishery is dominated by many of the same reservoir species found in Lake Oconee (*see* Table 4 in Volume 2 of the license application; Georgia Power, 2018). Lake Sinclair supports a popular fishery for largemouth bass, hybrid bass, striped bass, channel catfish, blue catfish, black crappie, bluegill, and redbreast sunfish (Georgia DNR, 2017b). The tailrace area also supports at least four species of native freshwater mussels, as described below.

Freshwater Mussels

The Altamaha River Basin is inhabited by a freshwater mussel fauna consisting of about 18 species, seven of which are endemic to the basin (Johnson *et al.*, 2012; Wisniewski *et al.*, 2005). Two freshwater mussel surveys were conducted in summer 2016; one in Lake Oconee and the other in the Wallace Dam tailrace (Dinkins, 2016a, 2016b). The surveys documented the occurrence of four native freshwater mussel species within the project boundary, none of which are listed as federally threatened or endangered, or state protected. The four species found in both Lake Oconee and the project tailrace were:

- Altamaha slabshell – endemic;
- Inflated floater – endemic;
- Paper pondshell; and
- Variable spike.

The Lake Oconee mussel survey yielded 355 live specimens. All four species were found in the main channel and tributary embayments. The vast majority of mussels (98.3 percent) were found downstream of I-20. The most common species was Altamaha slabshell, which composed 71 percent of the live native mussels found in Lake Oconee, followed in relative abundance by inflated floater, paper pondshell, and variable spike. The largest number of live mussels (168) was found at a main-channel site located 1.2 miles upstream of Wallace Dam, near the reservoir forebay. This was the only site where boulders were present and the only site where all four species were found together in Lake Oconee.

The Wallace Dam tailrace survey yielded 1,479 live specimens of the same four species. The Altamaha slabshell composed 97.5 percent of all live native mussels found, and was followed in relative abundance by variable spike, inflated floater, and paper pondshell, respectively. The vast majority of the mussels found in the tailrace area (98.2 percent) occurred in the main channel. The largest number of live mussels (501)

was found in the main channel about 984 feet downstream from the powerhouse, along the east bank.

Migratory Fish

The Wallace Dam Project is located approximately 310 river miles upstream of the Atlantic Ocean (*see* figure 4) and 35 river miles upstream of the Fall Line Hills District. Sinclair Dam poses a barrier to the upstream migration of diadromous⁶² and other migratory riverine fishes into the project area.

Eight highly migratory and/or diadromous species presently occur in portions of the Altamaha River Basin, including six anadromous species,⁶³ one catadromous species,⁶⁴ and one migratory riverine species:

- Shortnose sturgeon – anadromous; federally endangered;
- Atlantic sturgeon – anadromous; federally endangered;
- American shad – anadromous;
- Blueback herring – anadromous;
- Hickory shad – anadromous;
- Striped bass – anadromous or highly migratory;
- American eel – catadromous; and
- Robust redhorse – highly migratory riverine.

Of the eight species, striped bass and American shad are the only species presently known to occur within the Wallace Dam Project boundary. Striped bass occur as a land-locked population maintained by stocking, with no evidence or expectation of successful natural reproduction upstream of Wallace Dam. Georgia DNR began stocking Lake Oconee with American shad in 2015, based on historical evidence that the species formerly occurred as far upstream in the Oconee River as Athens-Clarke County (Georgia DNR, 2014b). Successful natural reproduction of American shad is not expected to occur upstream of Wallace Dam. Downstream in the river basin, American

⁶² Diadromous species migrate between freshwater and marine/estuarine environments to complete their life cycles.

⁶³ Anadromous species migrate from marine/estuarine to freshwater environments to spawn.

⁶⁴ Catadromous species migrate from freshwater to marine environments to spawn.

shad migrate upstream as far as Sinclair Dam, and likely spawn in portions of the lower Oconee River.

American eels presently range upstream in the Oconee River Basin as far as Sinclair Dam, although a relatively recent occurrence is known from Hard Labor Creek upstream of Lake Oconee (*see* Table 4 in Volume 2 of the license application; Georgia Power, 2018) (Georgia DNR, 2014c). No American eels have been reported from annual Georgia DNR fishery surveys of Lake Oconee (Georgia DNR, 2014a).

Shortnose sturgeon and Atlantic sturgeon, both listed as federally endangered species, use portions of the Altamaha River and lower Ocmulgee River and/or Oconee River downstream from Sinclair Dam for spawning runs. Critical habitat has been designated for Atlantic sturgeon, which includes the lower Oconee River downstream from Sinclair Dam, but not the Oconee River upstream of Sinclair Dam or Wallace Dam (NMFS, 2017).

Blueback herring and hickory shad are currently limited in distribution to the Altamaha River and Ocmulgee River (Georgia DNR, 2014d; Straight *et al.*, 2009).

Robust redhorse, a Georgia endangered species, is a migratory riverine species that inhabits the Oconee and Ocmulgee Rivers. As discussed in more detail below, it inhabits the Oconee River downstream from Sinclair Dam and a tributary to Lake Sinclair.

State Protected Aquatic Species and Species of Concern

Georgia Power identified and evaluated federally and state protected species, federal candidate species, and other species of concern with known records of occurrence in the project vicinity (Georgia Power, 2016c, 2016d). Four Georgia protected fish and freshwater mussel species potentially occur in the project vicinity, including:

- Atlantic pigtoe – Georgia endangered;
- Robust redhorse – Georgia endangered;
- Altamaha shiner – Georgia threatened; and
- Goldstripe darter – Georgia rare.

State protected species in Georgia are listed as endangered, threatened, rare, or unusual, in descending order of rarity. None of the four species are presently known to occur within the project boundary.

The Atlantic pigtoe, although reported for Hancock County, does not occur in the Oconee River Basin, but inhabits the adjacent Ogeechee River Basin. The goldstripe darter occupies spring-fed headwater creeks in the Coastal Plain downstream in the basin.

The robust redhorse is currently undergoing a status review by FWS to determine if listing as a threatened or endangered species is warranted (FWS, 2011). The robust redhorse is a migratory riverine sucker that occurs in large rivers of the Atlantic slope in Georgia, South Carolina, and North Carolina (Freeman *et al.*, 2016a; Rhode *et al.*, 2009). It occurs in the Oconee and Ocmulgee Rivers in the Altamaha River Basin, typically inhabiting main-channel, free-flowing rivers in riffles, runs, and pools (Freeman *et al.*, 2016a; Rhode *et al.*, 2009). The species inhabits the Oconee River downstream from Lake Sinclair and a tributary of Lake Sinclair,⁶⁵ but has not been found upstream of Wallace Dam (Freeman *et al.*, 2016a). Focused survey efforts in the Wallace Dam tailrace in 2014 and 2015 did not detect any robust redhorse (Robust Redhorse Conservation Committee's Oconee Technical Working Group, 2014, 2015). In addition, no robust redhorse were collected or observed in Spring 2012 and Spring 2013 electrofishing surveys upstream of Lake Oconee (Zelko, 2012, 2013).

Of the state protected aquatic species, only the Altamaha shiner presently occurs in the Oconee River Basin upstream of Wallace Dam (Georgia Power, 2016c). This species is endemic to the Piedmont of the upper Altamaha River Basin in north-central Georgia. The Altamaha shiner inhabits rocky and sandy pools in creeks and small rivers. There are no known occurrence records of the species from Lake Oconee within the project boundary. However, since 2010, the Altamaha shiner has been reported from tributary streams upstream of Lake Oconee and outside of the project boundary (Freeman *et al.*, 2016b). The nearest collections documented since 2010 were from the lower Apalachee River upstream of Lake Oconee. The most recent occurrence records from Richland Creek, Oconee River, and Hard Labor Creek, just upstream of Lake Oconee, are over 11 years old.

Transmission Line

Fish and aquatic resources inhabiting the headwaters and small streams crossed by the Wallace Dam transmission line likely include several of the same fish species listed for smaller tributaries to Lake Oconee (*see* Table 4 in Volume 2 of the license application; Georgia Power, 2018).

⁶⁵ The occurrences of robust redhorse in the upper end of Lake Sinclair and the Little River (a tributary to Lake Sinclair) are attributed to fish that escaped from a hatchery on the tributary (Zelko, 2012).

3.3.2.2 Environmental Effects

Hazardous Substances Plan [4(e) Condition 11]

Construction of new project facilities, modification of existing project facilities, and routine and non-routine maintenance could affect water quality if pollutants (e.g., fuels, lubricants, herbicides, pesticides, and other hazardous materials) are discharged into project waterways. To minimize the potential for contamination on project lands and waters, 4(e) Condition 11 would require Georgia Power to develop and implement a Hazardous Substance Plan for locations on, or directly affecting, Forest Service lands.

Condition 11 stipulates that no hazardous substances are to be stored on National Forest System lands without prior approval of the Forest Service. As part of any request to store hazardous substances, Georgia Power would be required to submit a Spill Prevention and Cleanup Plan for Forest Service approval. The plan would contain, at a minimum: (1) the licensee's procedures for reporting and responding to releases of hazardous substances; (2) a provision to maintain, in the project area, a cache of spill cleanup equipment; (3) a schedule to periodically inform Forest Service of the location of the spill cleanup equipment, and of the location, type, and quantity of oil and hazardous substances stored in the project area; and (4) a provision to notify Forest Service immediately of the nature, magnitude, time, date, location, and action taken for any spill. The plan would also include a monitoring component that details the corrective measures taken for a spill, and a provision to submit a weekly report during any construction activities that documents the results of monitoring.

Georgia Power does not propose to implement a hazardous substances plan for the project, but does not oppose the 4(e) condition (Georgia Power, 2019b).

Our Analysis

The plan included in Condition 11 would help to minimize or prevent the likelihood of accidental spills and address any discharges of hazardous substances to Forest Service lands, as well as project lands and waters. Specifically, this plan would address the prevention of hazardous substance spills, ensure protocols and equipment are in place to contain any spills, and ensure appropriate notification procedures are followed.

Condition 11 does not identify specific measures to be taken by Georgia Power, but rather would require Georgia Power to consult with federal, state, and local agencies in developing the plan, including identifying the specific measures to be taken to address hazardous materials. Nonetheless, we would expect that any measures included in the plan would assist Georgia Power in effectively managing risk associated with the project's use of hazardous materials. Storage locations for hazardous materials should be

identified, and staff should receive training in how to manage and clean up hazardous material spills. Finally, there should be measures in the plan that address consultation, reporting, and notification processes.

Project Operation

Georgia Power proposes to continue operating the Wallace Dam Project in a pumped storage mode for the generation of peaking power. Georgia Power would continue to implement the drought management plan approved by the Commission on April 27, 2007. According to the plan, flows from Lake Oconee would be used during drought(s) to support Georgia Power's downstream Sinclair Project's minimum flow requirements. No other minimum flows are proposed at the project.

Georgia Power would continue to operate Lake Oconee, under normal operations, between elevations 435.0 feet and 433.0 feet, and continue to monitor compliance with project operation as it has in the past. The average daily fluctuation would continue to be about 1.5 feet, with maximum daily fluctuations being 2 feet, or less, 100 percent of the time. This proposal excludes dam maintenance and emergency drawdowns. In addition, Georgia Power proposes to consult with Georgia DNR prior to non-emergency drawdowns below 433.0 feet,⁶⁶ and to notify FWS and the Commission at least 10 days in advance of such events. In the case of an emergency drawdown,⁶⁷ Georgia Power proposes to notify Georgia DNR, FWS, and the Commission within 10 days of the incident.

No entity recommended changes to Georgia Power's proposal for operating the Wallace Dam Project.

⁶⁶ As defined by Georgia Power, non-emergency drawdowns include periodic, scheduled drawdowns for Wallace Dam maintenance activities.

⁶⁷ For example, an emergency drawdown would be either a plant-specific emergency, such as failure of a spillway gate or other dam safety feature, where the reservoir level falls below 433 feet, or a system operating emergency.

Our Analysis

Reservoir Elevations

NORMAL OPERATIONS

Georgia Power's operational proposal includes continuing to maintain Lake Oconee elevations within a 2-foot daily fluctuation range (between 435.0 feet and 433.0 feet) to support the pumpback operation at Wallace Dam. With the exception of drought years, there is little seasonal variation in the reservoir operating levels. For the years 1997 through 2016, Lake Oconee was below elevation 433.0 feet about 5 percent of the time (total hours) and above 435.0 feet about 14 percent of the time.⁶⁸

Continuing to operate Lake Oconee within the current elevation range of 2 feet enables Georgia Power to optimize the generating capacity of the project to meet peak power demand. In addition, Georgia Power's current operation of the Wallace Dam Project supports a diverse assemblage of fish, mussels, and other aquatic organisms, as well as a healthy and balanced fish community typical of southeastern Piedmont reservoirs. Because there would be no change to how the project is operated, we do not expect any changes in Lake Oconee's aquatic community. Moreover, the proposed 2-foot operating range would: (1) protect the various permitted intake structures on the lake; (2) protect and maintain the integrity of reservoir shorelines, and minimize erosion and sedimentation (*see* section 3.3.1, *Geological and Soil Resources*); and (3) maintain (a) existing wetlands and associated wildlife habitat (*see* section 3.3.3, *Terrestrial Resources*), and (b) quality boating and recreational access to Lake Oconee (*see* section 3.3.5, *Recreation and Land Use*).

LAKE ELEVATIONS DURING DROUGHT (OR LOW IN-FLOW) PERIODS

In drought years, the maximum normal elevation of Lake Oconee may be drawn down below 435.0 foot seasonally in the summer or fall due to the combination of low inflows and downstream flow supplementation releases (*see* discussion below concerning Wallace Dam's role in meeting the Sinclair Project's minimum flow requirements). For example, in 2016, the low level was about 4.25 feet below the full pool elevation of

⁶⁸ The project's turbines are large and pass from 7,960 cfs to 8,250 cfs, depending on whether they are conventional or pump-back turbines. They cannot operate below a minimum gate setting without causing damage to the units. Therefore, during rising flow conditions, the reservoir elevation rises slightly until either the inflows subside, or there is enough flow to add more turbine(s). When Lake Oconee is receiving inflows exceeding the capacity of the generating units (48,000 cfs), pumpback operation is discontinued.

435.0 feet. During these periods, however, the daily fluctuations typically remain within 2 feet, as long as the pumpback operation continues.

Drawing down the elevation of Lake Oconee during droughts could potentially affect the use of littoral zone habitat by aquatic organisms, depending upon the timing of such drawdowns. At Lake Oconee, low water levels typically occur only in drought years from mid-summer to fall. This time period falls after the spring and early summer spawning seasons of resident sport fishes, such as bluegill and catfish, which spawn in early to middle summer. However, such a drawdown would reduce the area of available littoral-zone habitat for reservoir fish (primarily rearing of young fish),⁶⁹ and their access to aquatic invertebrates and vegetation. Effects to Lake Oconee habitat would be offset by maintaining consistent littoral-zone habitat in Lake Sinclair and using storage in Lake Oconee to maintain aquatic habitat conditions in the Oconee River downstream from Sinclair Dam during drought periods. Therefore, continuing to operate the project at lower impoundment surface elevations, but with consistent 2-foot fluctuations in lake levels, during droughts is not expected to significantly affect the fish community and other aquatic organisms inhabiting Lake Oconee and the Oconee River.

In addition to the potential effects on aquatic habitat and organisms, drawdowns that are the direct result of drought could affect access for recreational boating and angling opportunities at Lake Oconee. Sustained summer drawdowns also could: (1) expose freshwater mussels that inhabit sandy substrates in shallow areas of the lake to physiological stress or predation due to a mussel's limited ability to retreat into receding waters; (2) reduce native aquatic vegetation in littoral-zone habitats, allowing exotic invasive aquatic plants to colonize or spread; (3) subject emergent wetlands in Lake Oconee, and associated habitats used by amphibians, reptiles, waterfowl, river otters, beavers, and other wildlife, to desiccation; and (4) dewater and alter wetland habitats during the growing season which may reduce foraging habitat and cover for a variety of wildlife species residing in, or migrating through, the project area. The time of year, length, and magnitude of the drought would dictate the severity of these effects.

Consultation on Reservoir Drawdowns

To ensure there are no adverse effects associated with non-emergency drawdowns below 433.0 feet, Georgia Power proposes to consult on the timing, duration, and elevation of the non-emergency drawdowns. In addition, Georgia Power proposes to

⁶⁹ Young fish would become susceptible to stranding in shallow water and exposed to greater risk of predation as they move to deeper waters lacking vegetation and other protective cover. The increased mortality rates of young fish could substantially reduce the year-class strength of some populations of sport fish, which could negatively affect the quality of the reservoir fishery.

continue its practice of consulting with state and federal agencies prior to implementing drawdowns below 433.0 feet that are associated with droughts and other low-flow events. For emergency drawdowns, advance notification may not always be possible; therefore, timely notifying Georgia DNR, FWS, and the Commission is needed to ensure effects on aquatic resources are minimized.

Georgia Power's proposed provisions associated with non-emergency, emergency, and drought/low-flow drawdowns at Lake Oconee are a continuation of Georgia Power's current management of lake levels at the project. Therefore, there would be no change to the existing environmental conditions. Georgia Power would be able to continue operating the project to meet system needs for its customers, while balancing other non-developmental and environmental needs. Existing littoral-zone habitat would be protected, as would existing recreation access and municipal drinking water supplies.

Project Operation Compliance

The Wallace Dam Project is manually operated from a control room in the powerhouse, which is staffed 24 hours per day, 7 days per week. Remote monitoring of headwater flow gages located on the Oconee and Apalachee Rivers⁷⁰ provides the system operator advance coordination of reservoir inflows into, and outflows from, the project. Georgia Power calculates inflow and outflow for the Wallace Dam Project using these headwater gages and the changes in storage in Lake Sinclair (Georgia Power, 2015c; *see* Appendix B, Additional Information Response #5, pages 4 and 5). Georgia Power also monitors and records headwater elevations by digitally and physically recording readings from a staff gage and transducer installed at Wallace Dam. Based on transducer readings, an elevation is interpolated and digitally transmitted to the powerhouse control room, where it is electronically recorded, on at least an hourly time step. Georgia Power Plant operators also physically record headwater elevation every hour, which is documented in electronic plant log sheets. These data are made available to the Commission, state and federal agency staff, and other stakeholders upon request.

Georgia Power's proposed project operation monitoring and data reporting provisions would help Georgia Power and the Commission ensure that the project is operated in accordance with the operational requirements of any new license issued for the project. These provisions would provide a mechanism for reporting operations data to other agencies and stakeholders, as well as the Commission.

⁷⁰ Georgia Power uses a Commission-approved inflow calculator to estimate daily flows available for generation at Wallace Dam. Flows measured at USGS gages 02218300 (Oconee River) and 02219000 (Apalachee River) are added together and multiplied by a factor of 1.613 to account for additional drainage flowing into the Lake Oconee between the gages and the dam.

Downstream Minimum Flow Releases

Wallace Dam discharges directly into the headwaters of Lake Sinclair. Consequently, the Wallace Dam Project has no minimum flow requirements. The normal minimum pond level at Lake Sinclair is 338.2 feet, and the pump units at Wallace Dam begin to cavitate at elevation 337.2 feet. Thus, Lake Sinclair must remain within its normal operating range in order for Georgia Power to operate the Wallace Dam Project in a pumpback mode without damaging the pump units.

The license for the downstream Sinclair Project includes a minimum flow requirement of 250 cfs, or inflow, whichever is less. This minimum flow is designed to protect fish (e.g., the rare robust redhorse) and aquatic habitat in the Oconee River downstream from Sinclair Dam. When Lake Sinclair's calculated inflow drops below 250 cfs, Georgia Power uses the Wallace Dam Project to support the minimum flow requirements of the Sinclair Project by releasing water from Lake Oconee for the continued release downstream of Lake Sinclair.⁷¹ From 2004 through 2016, storage from Lake Oconee was used in this manner on a total of 561 days, about 12 percent of the total days [4,745] during the period, or about 43 days per year.

Georgia Power proposes to continue the practice of releasing flows from the Wallace Dam Project, when necessary, to ensure sufficient flows are available to meet the downstream minimum flow requirements at the Sinclair Project. This measure would continue to enhance aquatic habitat and protect fish and aquatic organisms in the Oconee River downstream by: (1) maintaining adequate flow in the free-flowing river reach downstream from Sinclair Dam on a seasonal basis, especially during summer, low-flow periods, and droughts; and (2) moderating fluctuations of Lake Sinclair. In addition, water supplies for the Greensboro, Georgia would be protected.

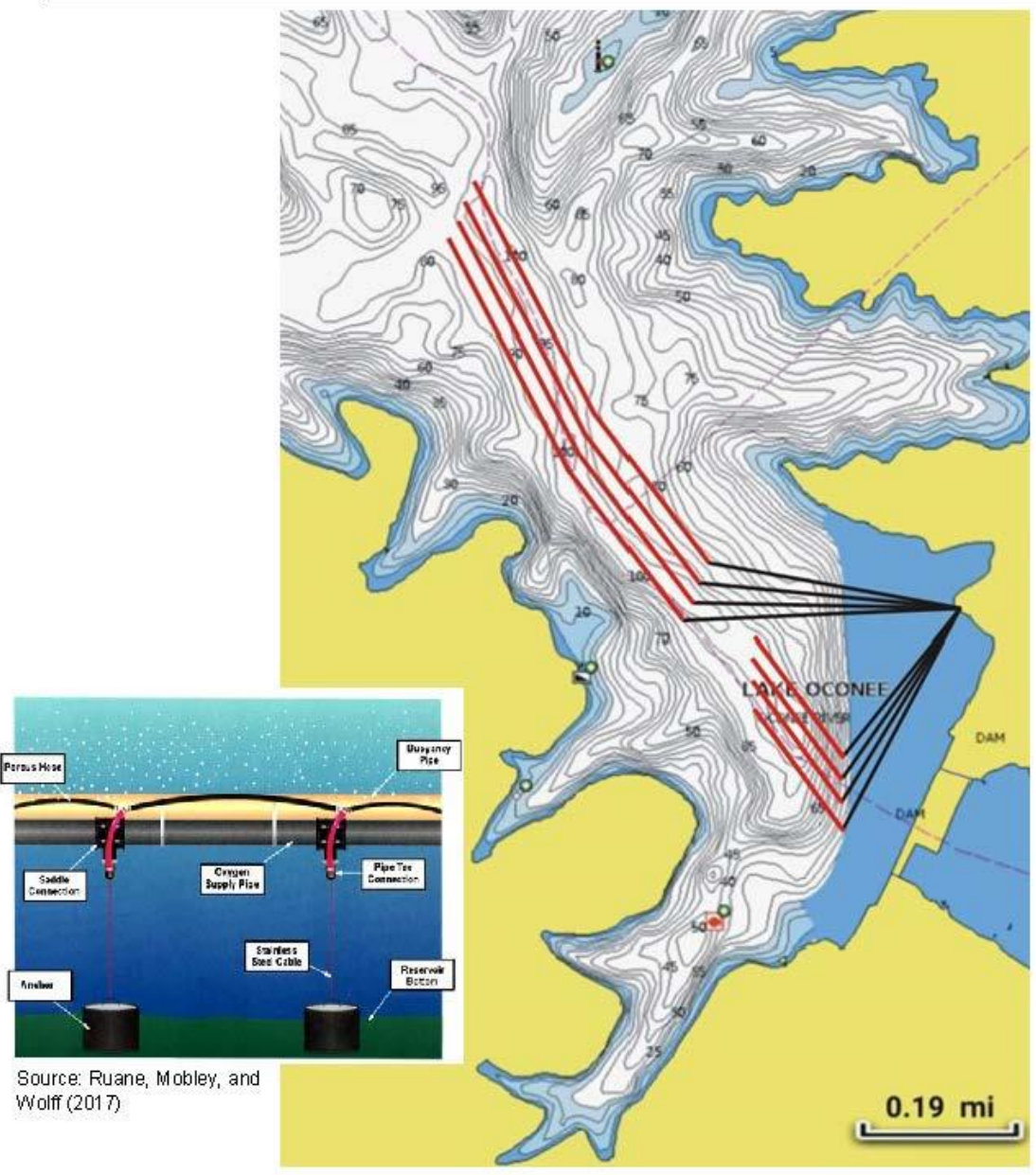
⁷¹ The Commission required Georgia Power to file, for Commission approval, a drought contingency plan for the Wallace Dam and Sinclair Projects, specifying the circumstances under which water withdrawals from Lake Oconee would be curtailed to protect downstream water uses and provide minimum flows during low flow periods. *See Georgia Power Co.*, 99 FERC ¶ 61,333, *order on reh'g*, 101 FERC ¶ 61,053 (2002). On April 27, 2004, Commission staff approved a Drought Contingency Plan for the two projects. *See Georgia Power Co.*, 107 FERC ¶ 62,081 (2004). Since that time, Georgia Power has used storage from Lake Oconee to supplement flow releases from the Sinclair Project to provide no less than 250 cfs downstream in the Oconee River.

Tailrace and Forebay Water Quality

Georgia Power's water quality studies indicate that DO concentrations drop below 4.0 mg/L in the project tailrace under hot, low-flow conditions in the summer months. Georgia DNR expressed concern with such DO conditions in the tailrace, and identified the need to enhance tailrace DO levels. To address this issue, Georgia Power conducted an aeration methods study to identify and evaluate technically feasible and cost-effective aeration methods for increasing summer DO levels in the tailrace (Georgia Power, 2017a).⁷² Based on the study's findings, Georgia Power proposes to install and operate a forebay oxygen line diffuser system in Lake Oconee to enhance summer DO concentrations in the Wallace Dam tailrace area (figures 14 and 15). Georgia Power also proposes to continuously monitor DO in the Wallace Dam tailrace during the period May through September for 3 years following the installation of the oxygen diffuser system, and develop three annual reports and one final 3 three-year monitoring report of the results. The purpose of the monitoring would be to verify summer DO levels in the tailrace resulting from the proposed oxygen diffuser system. Georgia Power also would consult annually with Georgia DNR to review and report on available fisheries population monitoring data. The purpose of consulting with Georgia DNR is to identify any changes or trends in the health of the fishery relative to operation of the proposed oxygen diffuser system.

Georgia DNR did not comment on Georgia Power's proposed measures to enhance DO conditions in the project's tailrace or the 3 years of post-installation monitoring. However, Georgia DNR recommends that Georgia Power annually consult with Georgia DNR's Wildlife Resources Division regarding its fisheries population monitoring data to ensure there are no inadvertent adverse effects to fish populations as a result of the proposed DO enhancement measures. Georgia Power proposes to undertake such consultation.

⁷² To perform the aeration methods assessment, Georgia Power contracted with R.J. Ruane, M.H. Mobley, and P.J. Wolff. Their report (Ruane *et al.*, 2017) is provided as an appendix to the study report (Georgia Power, 2017a).



Source: Ruane, Mobley, and Wolf (2017)

Conceptual Design of Forebay Oxygen Line Diffuser System
Wallace Dam Project
(FERC No. 2413)

Figure 14. Conceptual Design of Forebay Oxygen Line Diffuser System for the Wallace Dam Project. (Source: Ruane *et al.*, 2017).

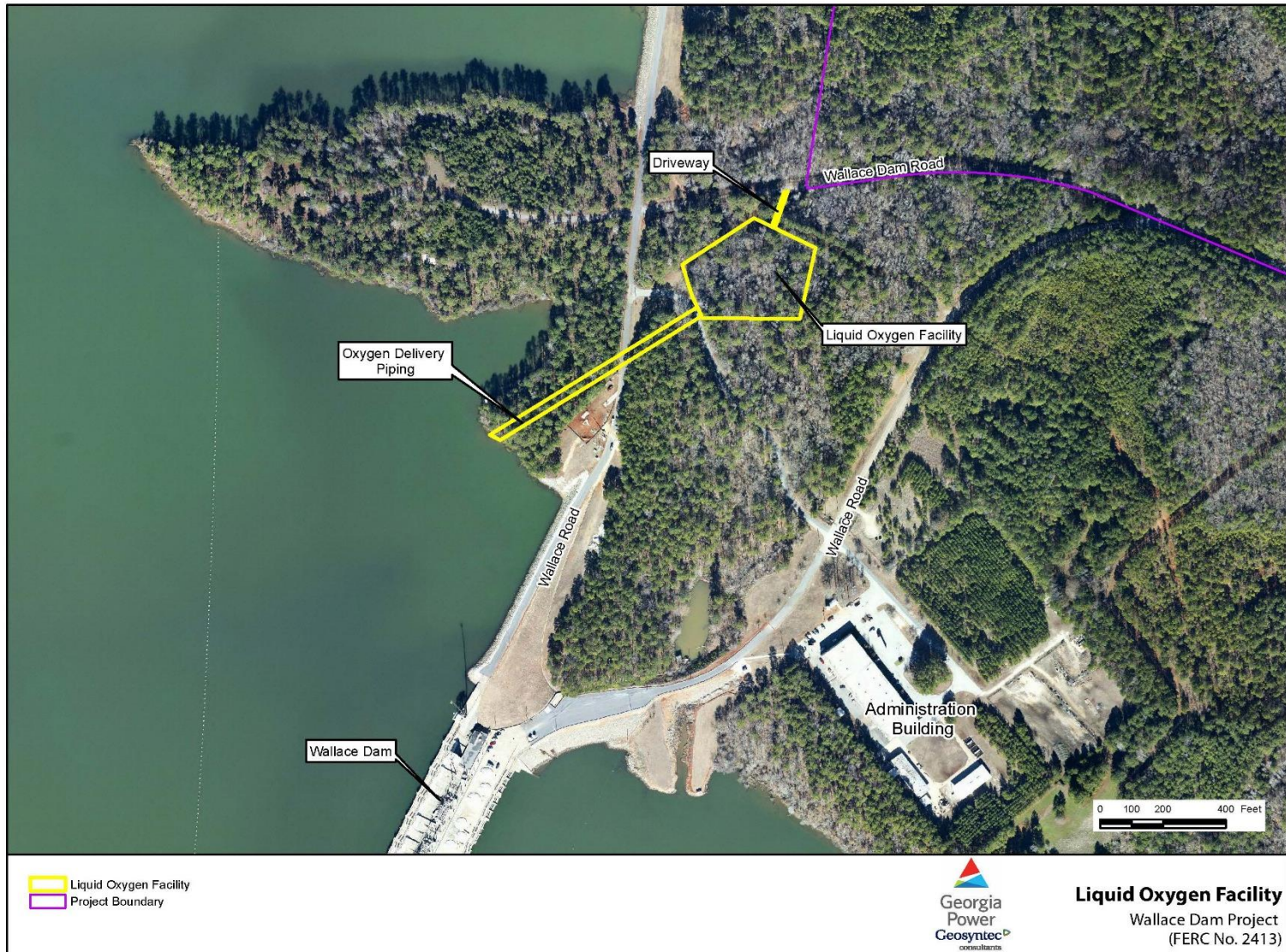


Figure 15. Location of Proposed Liquid Oxygen Facility at the Wallace Dam Project.
 (Source: Georgia Power, 2018).

Our Analysis

DO Enhancement Measures

Georgia Power designed its aeration methods study to: (1) characterize and model the water withdrawal zone at the turbine intakes; (2) screen a full range of aeration alternatives for technical feasibility and efficacy; (3) model turbine aeration to assess the potential for turbine venting and the addition of forced air; and (4) model in-lake aeration approaches. Based on the assessment, two alternatives were identified as being technically feasible, including a forebay oxygen line diffuser system and draft tube aeration using compressed air. Ruane *et al.* (2017) developed conceptual designs for the two alternatives to further evaluate and compare installation and annual operation costs, the practicality of the system deployment, and other potential issues associated with system operation.

Ruane *et al.* (2017) found that the forebay oxygen line diffuser system was the most technically feasible and cost-effective approach for enhancing summer DO concentrations in the Wallace Dam tailrace.⁷³ Oxygen diffuser systems are designed to place oxygen in the intake withdrawal zone of a reservoir to meet a target DO concentration in the dam releases. Diffuser lines, consisting of porous hose weighted to sink to depth, are used to spread oxygen bubbles over a large area to obtain high oxygen transfer efficiencies. The diffusers are supplied with oxygen from an on-shore liquid oxygen storage facility. As bubbles rise in the water column, they oxygenate water in the withdrawal zone above. The system would be designed so that a sufficient volume of enhanced-DO water passes through the turbines and into the tailrace to meet the DO target. This type of system is currently being successfully implemented at 15 hydropower projects across the United States, including 11 facilities in the southeast, including the Corps-owned J. Strom Thurmond Lake and Richard B. Russell Lake on the Savannah River (Georgia Power, 2018).

Georgia Power proposes to install and operate an oxygen diffuser system in Lake Oconee to enhance summer DO in the Wallace Dam tailrace. The analysis shows that a diffuser system with a maximum oxygen capacity of 200 tons per day would be required for worst-case conditions, but the average amount used would be 60 tons per day (Ruane *et al.*, 2017). As shown in figure 14, the conceptual design includes two sets of diffuser lines to provide operational flexibility for oxygen placement in the forebay. The two sets of diffuser lines would be installed in sequence, and extend longitudinally about 0.7 mile

⁷³ The study found that the cost of installing draft tube aeration using compressed air would be substantially higher (\$15,190,000 versus \$4,699,000 for an oxygen diffuser system), and there would be limitations for the system (e.g., dissolved gas issues, reduced generating efficiency, and turbine maintenance issues).

upstream of Wallace Dam. The upstream set of diffusers would be operated to inject a low level of oxygen continuously to maintain an oxygenated forebay volume during non-generation. The set of diffusers closer to the dam would be operated to boost oxygen output during generation. The diffuser lines would be placed at various levels above the bottom to efficiently aerate the withdrawal zone. The system would operate in the months of May through October, when needed, and it would be operated to achieve an instantaneous target DO of 4.0 mg/L, and a daily average target of 5.0 mg/L in the Wallace Dam tailrace.

Operating the proposed DO enhancement system would increase summer DO concentrations in the Wallace Dam tailrace, and downstream through the upper reach of Lake Sinclair by providing more oxygenated habitat in the tailrace and Lake Sinclair. The increased DO would improve water quality, fisheries and other aquatic organisms, and recreational angling opportunities in the tailrace and Lake Sinclair, as well as support applicable water quality standards throughout the hottest months of the year. The summer DO improvements would enhance an already healthy and balanced community of fish and freshwater mussels in the tailrace. Aquatic habitat in the tailrace for sport fishes, freshwater mussels, and other aquatic organisms would be enhanced by reducing the potential for chronic stress from low DO, which otherwise could result in avoidance of the tailrace and/or reduced feeding, growth, and survival. Summer recreational fishing opportunities also would be improved due to increased activity and feeding behavior of sport fishes.

Operating the oxygen line diffuser system also would increase summer DO levels in the forebay withdrawal zone of Lake Oconee, which covers about 275 acres of the forebay in Lake Oconee. Rising bubbles from diffuser lines near the bottom would increase DO levels in the water column; thereby, enhancing conditions for species occupying open waters of the forebay. Although the Lake Oconee fishery is balanced and healthy, and there is no evidence of summer DO stress (Georgia Power, 2016c), the increased DO levels would improve water quality in the forebay and likely contribute positively to feeding, growth, and survival. The fishes most likely to benefit from increased DO in the forebay area include: (1) schooling forage fish (e.g., threadfin shad, gizzard shad, and stocked American shad); (2) pelagic sport fish such as the hybrid bass and striped bass (when temperatures are suitable); and (3) larger catfish and bass that feed in the lower mainstem reservoir. Native freshwater mussels occupying benthic habitats within and near the forebay also could benefit from increased DO. The 2016 mussel survey found the largest number of live mussels at a mid-channel site with boulders, located about 1.2 miles upstream of Wallace Dam.

Installation of the proposed forebay oxygen line diffuser system would require the construction of an onshore liquid oxygen facility (Ruane *et al.*, 2017). Georgia Power proposes to construct the facility on 3 acres on the northeast side of Wallace Dam (*see* figure 15). The facility would include a driveway, liquid oxygen tanks, a vaporizer

system, oxygen flow control valves, and piping leading to Lake Oconee. Land disturbing activities associated with construction of the liquid oxygen facility could result in erosion of the upland area and sedimentation along the lake's shoreline. Turbidity could also increase locally. As discussed in section 3.3.1.2, *Geology and Soils – Environmental Effects*, Georgia Power's proposal to implement appropriate BMPs would minimize local effects on water quality and aquatic organisms in the lake. Effects on vegetation and wildlife are discussed in section 3.3.3.2, *Terrestrial Resources – Environmental Effects*.

Georgia DNR expressed concern that improved DO conditions in the project tailrace and forebay, following the installation of the forebay oxygen line diffuser system, could potentially increase fish entrainment at Wallace Dam because of the potential to attract additional fish into the area.⁷⁴ While there is the potential for increasing entrainment, the likelihood that this would occur is low.

As discussed below, there is no existing evidence indicating that current levels of fish entrainment significantly affect the fish community in Lake Oconee or the Wallace Dam tailrace (Georgia Power, 2018). While DO would be enhanced over a relatively large area of open-water habitat in the lower end of Lake Oconee and in the headwaters of Lake Sinclair, summer water temperatures would remain warm throughout the DO-enhanced area. This would continue to limit the suitability of habitat in the area during the summer, especially for striped bass. For sport-fish species like catfish and largemouth bass, the risk of entrainment would likely remain low, due to the species' propensity for avoiding the intake area(s) and their size/swimming capability (*see* discussion below). The improved DO conditions will likely enhance aquatic habitat and could increase fish recruitment leading to higher levels of entrainment. However, such improved conditions are not expected to significantly increase the risk of entrainment, or affect fish populations in Lake Oconee or the Wallace Dam tailrace.

Georgia DNR monitors the Lake Oconee and Lake Sinclair fishery on a regular basis.⁷⁵ This data could provide useful information on whether or not enhancing DO in the Lake Oconee forebay and the Wallace Dam tailrace would attract fish to the forebay and tailrace areas and, thereby, cause more fish than what occurs currently to be entrained. Georgia Power proposes to monitor, for a 3-year period, DO and water temperatures in the Wallace Dam tailrace, and consult with Georgia DNR in preparing annual water quality monitoring reports. Having Georgia Power consult with Georgia DNR regarding any of Georgia DNR's available fisheries data as part of the process could help to identify any potential effects of increased attraction to the forebay and tailrace resulting from improved DO conditions in the lower reaches of Lake Oconee and upper reaches of Lake Sinclair. Georgia Power could include this fisheries data, if

⁷⁴ See Georgia DNR's February 19, 2018 Comments at 3.

⁷⁵ See Georgia DNR's April 23, 2019 Comments at 1.

collected by Georgia DNR, with its water quality monitoring results, along with any recommendation(s) for changes to project features and/or operations to mitigate any discovered adverse effects associated with increased attraction to the forebay and tailrace areas.

Tailrace DO Monitoring

Georgia Power proposes to continuously monitor DO in the Wallace Dam tailrace using an automatic probe that records measurements at 60-minute intervals at Station OCTR in the tailrace. Station OCTR is the same monitoring location used by Georgia Power for its baseline water quality monitoring efforts from 2015 to 2017 (Georgia Power, 2016b and 2017b).

Georgia Power's aeration methods study predicts that use of a forebay oxygen line diffuser system can maintain DO values in the tailrace above 4.0 mg/L, and the daily average of 5.0 mg/L (Georgia Power, 2017a; Ruane *et al.*, 2017). However, this assessment is based on modeling, not data collected in the tailrace. The proposed 3 years of additional summer DO monitoring in the tailrace would allow Georgia Power to verify the performance of the forebay oxygen line diffuser system over a range of summer hydrological conditions, and to identify necessary adjustments to the system.

Georgia Power's proposal to prepare an annual report of the summer tailrace monitoring data at the end of each summer monitoring period, and a final report at the end of 3 years, would provide a mechanism for Georgia Power to evaluate the effectiveness of the forebay oxygen line diffuser system. Georgia Power also would be able to determine if the project maintains DO levels consistent with Georgia's numeric DO criteria. Providing a final report to the Commission at the end of 3 years would allow the Commission to assess what, if any, additional measures may be needed to ensure DO remains above 4.0 mg/L instantaneously and 5.0 mg/L as a daily average. Georgia DNR's recommendation that Georgia Power annually consult with the Georgia DNR regarding its fisheries population monitoring data could help to identify if: (1) there are any inadvertent adverse effects to fish populations resulting from the DO enhancement measures; and (2) the oxygen diffuser system increases the potential for fish impingement and entrainment. However, the degree to which Georgia Power and Georgia DNR would meet these goals would depend on how well Georgia DNR's data isolates effects specifically related to the DO enhancement measures.

Summer Habitat for Sport Fishes

During pre-filing consultation, Georgia DNR expressed interest in the effects of continued project operation on summer reservoir water quality and habitat for sport fish

species, such as largemouth bass and striped bass.⁷⁶ To address this concern, Georgia Power assessed the availability of suitable summer water quality for sport fish species in Lake Oconee (Georgia Power, 2016c).

Our Analysis

Lake Oconee

Georgia Power's assessment used water quality data collected by Georgia Power, standardized fisheries survey data for Lake Oconee collected by Georgia DNR, and species-specific water quality preferences criteria reported in the scientific literature. Vertical water temperature and DO profile data collected during the warmest months of the year were analyzed for the spatial and temporal extent of mixing that occurs in Lake Oconee from pumpback operation and generation cycles. Based on mixing tendencies and patterns, the Oconee Lake was divided into three areas for analysis of the fisheries data: mainstem reservoir, tributary embayments, and upstream reservoir. Multiple years of fish survey data were analyzed to compare population characteristics of representative sport fishes in the three defined areas of the reservoir. The primary species of interest were largemouth bass, striped bass, black crappie, bluegill, and hybrid bass. Summer habitat suitability was evaluated for largemouth bass and striped bass in Lake Oconee using scientific literature on the range of water temperature, DO concentrations, and life history of each species.

Most sport fish species residing in Lake Oconee are capable of tolerating high water temperatures and occasionally low DO levels in summer. Fishery survey data for Lake Oconee, standardized by Georgia DNR, reaffirmed that there is an overall healthy and balanced fish community in Lake Oconee (Georgia Power, 2016c). Recent and historic water quality monitoring data show that although pumpback operation causes mixing of the entire water column of the lower mainstem reservoir by August, water temperature and DO conditions remain within acceptable ranges for most of the resident sport fish species.

Striped bass is the one exception. Summer temperature profiles for Lake Oconee show the limiting nature of habitat suitability for striped bass, as reflected in low catch rates and low relative condition of the population based on length-weight relationships (Georgia Power, 2016c). Summer water temperatures exceeding 84.2°F throughout the reservoir in many summers is likely the principal factor limiting survival and growth of the population. Juvenile striped bass prefer temperatures around 79°F (Coutant *et al.*,

⁷⁶ See Georgia DNR's June 19, 2015 Comments.

1984). Adult striped bass prefer temperatures around 77°F, or less,⁷⁷ and begin to die above 82.4-84.2°F (Crance, 1984; Coutant, 1985, 2013). Although suitable DO conditions are available throughout much of the reservoir through the middle of summer, by late July and August water temperatures are often higher than is suitable for adult striped bass habitat.⁷⁸ Thus, the data show that naturally high water temperatures throughout Lake Oconee, as opposed to low DO concentrations, limit the availability of suitable summer habitat for striped bass (Georgia Power, 2016c). Hybrid bass, which are now stocked in greater numbers than striped bass, exhibit a wider tolerance range to temperature than striped bass. Hybrid bass can tolerate a temperature range of 39.2-91.4°F, although optimal growth is between 77.0-80.6°F (Hodson, 1989). Thus, hybrid bass are more capable of withstanding warmer water temperatures than striped bass.

Summer water quality conditions in Lake Oconee support largemouth bass survival and growth based on the documented temperature and DO concentration tolerances (*see* Table 10 in Georgia Power, 2016c).⁷⁹ The catch rates, relative condition, and length-frequency distribution of largemouth bass in Lake Oconee indicate an overall healthy population. In addition, the weight of bass caught in fishing tournaments at Lake Oconee compares favorably to other Georgia reservoirs.

Wallace Dam Tailrace

Continuous DO measurements in the Wallace Dam tailrace were below 4.0 mg/L instantaneously, and daily average values were below 5.0 mg/L in parts of three consecutive summers, 2015-2017 (Georgia Power, 2016b, 2017b). Low DO concentrations occurred daily during periods in May, June, July, and/or August, with instantaneous values occasionally falling below 2.0 mg/L. Although most sport fish species that inhabit Lake Oconee and the Wallace Dam tailrace are warmwater, habitat-generalist species capable of tolerating high water temperatures and DO levels below 4.0 mg/L for short periods (*see* Table 10 in Georgia Power, 2016c), prolonged exposure

⁷⁷ “Optimal” habitat for adult striped bass is defined as DO greater than 4.4 mg/L and water temperature ranging from 62.2 to 77.4°F, and “sub-optimal” adult habitat is defined as DO less than 4.4 mg/L and water temperature less than 62.2°F and greater than 77.4°F.

⁷⁸ “Suitable” habitat for adult striped bass is defined as DO greater than 4.0 mg/L and water temperature ranging from 59 to 80.6°F, and “unsuitable” adult habitat is defined as DO less than 3.4 mg/L and water temperature less than 55.8°F and greater than 83.8°F.

⁷⁹ The reported critical thermal maximum temperature for largemouth bass is as low as 92.1°F up to 104.2°F. Largemouth bass tend to avoid water with DO levels around 2.0 mg/L, but is not an absolute barrier. Critical levels range from 0.92 to 1.4 mg/L, depending on water temperature (77°F to 95°F).

to low DO concentrations may lead to stress and result in avoidance of the low DO area or may compromise growth and survival of some species and life stages (Georgia Power, 2016c; and references cited therein). Nonetheless, observations indicate that resident fishes in upper Lake Sinclair are likely to use tailrace habitat(s) in the summer despite warm temperatures and daily DO depressions below 4.0 mg/L.

Historical Georgia DNR electrofishing data, collected annually in September, shows that sportfish (e.g., largemouth bass, bluegill, redbreast sunfish, and black crappie) abundance immediately downstream from the Wallace Dam tailrace does not differ considerably from other locations in Lake Sinclair. In addition, native mussel species inhabit the reach. The August 2016 tailrace mussel survey found four native species of mussels, with the greatest numbers occurring a short distance downstream from the powerhouse. Thus, the tailrace supports self-sustaining population of aquatic species indicative of a balanced community, and the tailrace offers a variety of recreational angling opportunities.

Georgia Power's proposal to continue operating the project in a pumpback mode for the generation of peaking power would not adversely affect the availability of summer habitat for striped bass in the Wallace Dam tailrace and Lake Oconee, or the use of that habitat by striped bass beyond existing limitations.⁸⁰ Continuous tailrace monitoring data indicate that the tailrace is unlikely to provide suitable adult striped bass habitat for much of the summer due to water temperatures exceeding 84.2°F (Georgia Power, 2016b, 2017b). As discussed above, Georgia Power's proposal to install and operate a forebay oxygen line diffuser system to enhance summer DO concentrations in the tailrace would improve overall summer sportfish habitat in the tailrace (and in the forebay) throughout the hottest months of the year. However, naturally highwater temperatures would continue to limit the availability of suitable summer habitat for striped bass in the tailrace and Lake Oconee.

Fish Impingement and Entrainment

Water intake structures at hydropower projects can injure or kill fish that are either impinged on intake screens/trash racks, or entrained through turbines. Larger aquatic organisms (typically fish and larger invertebrates) can be trapped against the intake screens or trash racks by the water flowing into a penstock. This process is known as impingement, and can cause physical stresses and/or suffocation that can lead to death of some organisms (EPRI, 2003).

⁸⁰ Striped bass are pelagic fish that move freely between habitats to seek cooler, more suitable summer habitat where available.

If fish are able to pass through screens or trash racks (i.e., entrained), fish injury or mortality can result from collisions with turbine blades, or exposure to pressure changes, shear forces in turbulent flows, and water velocity accelerations created by turbines (Knapp *et al.*, 1982). The number of fish entrained and at risk of turbine mortality at a hydroelectric project is dependent upon site-specific factors, including physical characteristics of the project, as well as the size, age, and seasonal movement patterns of fish present within the impoundment (EPRI, 1992). Fish that are entrained and killed are removed from the river population and no longer available for recruitment to the fishery.

The Wallace Dam Project is composed of a single powerhouse, with two conventional units and four pump-back units. The intakes are protected by steel trashracks, with bar rack spacing that varies from 5.5 inches for the conventional units (Units 3 and 4) to 10.5 inches for the pump-back units (Units 1, 2, 5, and 6) (Georgia Power, 2019a). The steel trashracks in front of the downstream draft tubes consist of vertical bars with a clear bar rack spacing of 10.5 inches, with openings at each end of 16.5 inches. Georgia Power proposes no changes in the physical characteristics of these trash racks, or in how it operates the Wallace Dam Project. No agency or other entity raised a concern with fish impingement or entrainment at the project (except in regards to the oxygen line diffuser system, which is discussed above), though the two factors were identified during pre-filing consultation as issues to be addressed.

Our Analysis

The fishery in Lake Oconee is a typical southeast fishery, which included species of shad, bullhead and catfish, temperate bass (i.e., striped bass, hybrid bass, and white bass), sunfish, crappie, and blackbass (i.e., spotted and largemouth) (*see* Table 4 in Volume 2 of license application; Georgia Power, 2018). In addition, longnose gar, carp, and several species of *Moxostoma* (i.e., sucker, redhorse, and jumprock) are present in the project reservoir.

Fish Impingement

Fish can become impinged on the bars of a trash rack if they are unable to overcome the approach velocity⁸¹ and are unable to pass between the trash rack bars due to their larger body size. Fish that are wider than the trash rack bar spacing and have

⁸¹ Approach velocity is the calculated water flow velocity component perpendicular to the trash rack face. It is calculated by dividing the maximum flow per unit by the open area of the trash rack.

burst swim speeds⁸² lower than approach velocities would be susceptible to impingement. Thus, determining the risk of impingement for fish in the project impoundment requires some understanding of approach velocities at the intake and draft tube trash racks at Wallace Dam, as well as the widths and burst swim speeds of fish in the impoundment.

Georgia Power estimated the approach velocities for the intakes and draft tubes (Georgia Power, 2019a). The estimated approach velocity for the intakes varied from 4.3 to 4.5 feet per second (fps),⁸³ and the estimated approach velocity for the draft tube bar racks was 3.9 fps.⁸⁴ These values exceed the approach velocity typically recommended by resource agencies to minimize fish entrainment and impingement at a hydropower project (FWS, 2019b; *see* page 9-6). Nonetheless, there is no evidence in the record to suggest that fish impingement is a problem at the Wallace Dam Project. The width of the bar racks at the powerhouse intakes and draft tubes (for pump-back operation) would allow passage of nearly all sizes of fish inhabiting Lake Oconee. Only the largest fish would be excluded and these fish would have burst swimming speeds that would allow them to avoid encountering the bar racks. Moreover, there are no records of fish being caught of the trash racks and succumbing because they could not escape. Therefore, fish impingement is not expected to result in any significant effects at the project.

Fish Entrainment and Turbine Mortality

Entrainment can occur if fish are able to pass between trash rack bars, and do not behaviorally avoid entrainment. With the trash rack designs employed at the project, the majority of fish inhabiting the reservoir, regardless of size, could pass through the intake structures and be subject to turbine mortality. As discussed below, most entrained fish would be small.

⁸² Burst swimming speed is the maximum swimming speed that can only be sustained for a few seconds. It is usually used to escape danger (Murray, 1974).

⁸³ The maximum flow for units 1, 2, 5, and 6 (pumpback units) is 7,960 cfs, and the open area of the trash racks is 1,863 ft². The maximum flow for units 3 and 4 (conventional units) is 8,250 cfs, and the open area of the trash racks is 1,834 ft².

⁸⁴ The maximum flow for units 1, 2, 5, and 6 in pumpback operation is 6,500 cfs, and the open area of the bar racks is 1,662 ft².

SIZE DISTRIBUTION OF FISH ENTRAINED

Common trends and data from studied hydroelectric sites, including 11 projects in the southeastern United States,⁸⁵ indicate that small and/or young-of-year fish less than 6 inches long compose the majority of fish entrained by the Wallace Dam Project, whether by generation or pumpback operations (Georgia Power, 2016c).⁸⁶ Based on a review of EPRI (1997), entrainment of fish less than 4 inches long averaged 68.4 percent, and entrainment of fish less than or equal to 6 inches averaged 85 percent. At the Richard B. Russell Project, fish less than or equal to 6 inches in length composed 89 percent of the entrainment during conventional generation, with fish under 4 inches composing 71 percent of the total entrainment. Given this size range, most of the fish entrained are likely to be sunfishes, shad, catfishes, yellow perch, suckers, minnows, and a few other species.

Sampling of pumpback entrainment at the Jocassee and Richard B. Russell facilities showed similar findings, with respect to the numerical dominance of small fish (*see* Table 14 in Georgia Power, 2016c; and included references). At Lake Jocassee, 71 percent of fish entrained during generation were under 6 inches, and 86 percent of fish entrained by pump-back were under 6 inches (Degan and Mueller, 2013). At Richard B. Russell Lake, 94 percent of the 1996 pumpback net sample was less than 5.4 inches long; 90 percent were 1.5 to 3.4 inches long (Nestler *et al.*, 1999). Only 0.2 percent of entrained fish were longer than 8.4 inches. Size trends were consistent during hydroacoustic sampling of pumpback operation at Richard B. Russell in 2017. Fish 3.1 inches long and smaller composed 85.7 percent of entrained fish in the spring, 90.8 percent in the summer, 93 percent in the fall, and 98.5 percent in the winter (Aquacoustics, 2018). Less than 3 percent of the entrained fish in any season were greater than 4.7 inches long. Because of physical, operational, and biological similarities with the Richard B. Russell and Jocassee facilities, Wallace Dam pumpback entrainment is likely to be similarly dominated by small and young-of-year fish.

With regard to clear bar spacing and size of fish entrained, existing studies show no consistent associations or relationships between trash rack bar sizing and the size of entrained fish (FERC, 1995; Winchell, 2000). The steel trash racks at Wallace Dam

⁸⁵ The 11 projects included nine sites in South Carolina and Georgia, and included two pumped storage facilities located on the nearby Savannah River Basin (i.e., the Corps' Richard B. Russell Project and Duke Energy Carolina, LLC's Jocassee Development [licensed as part of the Keowee-Toxaway Project No. 2503]).

⁸⁶ Younger individuals generally have high rates of mortality, even in the absence of hydropower operations. Fish populations have generally evolved to withstand losses of these smaller and younger individuals with little or no effect to long-term population sustainability.

consist of vertical bars with a clear spacing between the bars greater than 9.5 inches. Virtually all species and size classes of fish residing in Lake Oconee and Lake Sinclair are narrow enough in body dimensions to pass through the racks. Nevertheless, field studies across a wide range of trash rack spacing indicate that the vast majority of entrained fish are much smaller than the size of fish that would physically be excluded from passing through the trash racks (FERC, 1995; EPRI, 1997). This suggests that smaller fish, whether due to greater abundance, higher susceptibility, or lower burst swimming speeds are likely to be entrained regardless of trash rack bar spacing.

SPECIES COMPOSITION OF FISH ENTRAINED

Entrainment studies at other southeastern hydroelectric sites (e.g., Richard B. Russell and Jocassee) indicate that entrainment at Wallace Dam is likely to be numerically dominated by species of shad (threadfin shad and gizzard shad), sunfishes, and/or catfishes (Georgia Power, 2016c). At sites where high densities of shad exist, shad may dominate entrainment composition, especially where over-winter survival of shad populations is variable due to cold-weather conditions. Where shad densities are lower, or in years following a severe winter kill when standing stocks of shad are low, sunfishes, catfishes, and other species likely compose a larger proportion of entrained fish.

At Richard B. Russell Lake, entrainment during generation and pumpback was numerically dominated by threadfin shad and blueback herring.⁸⁷ Summer abundance was over 10 times the spring abundance, and the length frequency distribution of threadfin shad indicated that 98 percent of the fish were spawned that year. At Lake Jocassee, threadfin shad and blueback herring were the dominant forage species, and corresponded in size with the entrained fish.⁸⁸ Threadfin shad and gizzard shad exist in Lake Oconee and Lake Sinclair, and are likely entrained in high numbers, but proportional to the size of the lake and fish population(s).

Aside from threadfin shad, a substantial proportion of entrained fish at the Wallace Dam Project likely consists of small or young-of-year sport-fish species, including bluegill, black crappie, other sunfishes, and catfishes. The sunfish, catfish, and perch families commonly composed over 50 percent of entrainment in sites in the EPRI database. Notably, however, largemouth bass, one of the region's premier sport fish, was

⁸⁷ Blueback herring do not exist in Lake Oconee or Lake Sinclair, and, therefore, are not considered further in our analysis. See Table 4 in Volume 2 of license application (Georgia Power, 2018).

⁸⁸ Hydroacoustic monitoring was used to estimate entrainment numbers and sizes of fish, while reservoir fish sampling was used to document the species occurring in the reservoir (Degan and Mueller, 2013).

absent from the top five entrained species at southeastern projects (Georgia Power, 2016c). Similarly, striped bass and hybrid bass were not entrained in great numbers. For example, at Richard B. Russell Lake, the relative abundance of sport fish species in pump-back entrainment was low; 0.03 percent for largemouth bass, 0.02 percent for striped bass, and 0.01 percent for hybrid bass. Thus, these species, which are popular sport fishes, are likely to occasionally be entrained at Wallace Dam, but do not appear to be especially susceptible to entrainment.

SEASONAL DISTRIBUTION OF ENTRAINMENT AND EFFECTS OF PUMPBACK OPERATION

Total monthly generation at the Wallace Dam Project is usually highest during the summer months, when energy demand is high (*see* Table 5 in Volume 2 of license application; Georgia Power, 2018). Pumpback duration would also be highest during these summer months to meet the generation demand, and because mean monthly inflow is lower during summer months, requiring extended pumpback to refill Lake Oconee. Based on this seasonal operation, peak entrainment rates during generation at Wallace Dam likely occur in the spring and summer for most species, when young fish are most abundant and tend to be dispersing between habitats, but entrainment rates for shad may peak in the fall and winter (Georgia Power, 2016c), when the water cools, shad become less active, and are more susceptible passive movement through the project intakes.

Records of Wallace Dam hourly operation by month for the water years 2016 and 2017⁸⁹ show that generation occurs primarily in the afternoon and early evening hours, and pumpback occurs primarily between midnight and the early daylight hours (*see* Tables 6 and 7 in Volume 2 of license application; Georgia Power, 2018). Wallace Dam operation hours by unit for the water years 2016 and 2017 indicate that Units 3 and 4 (non-reversible modified propeller units) tend to be used most frequently for generation. Of course, the reversible units (Units 1, 2, 5, and 6) are used for pumpback operation (*see* Tables 8 and 9 in Volume 2 of license application; Georgia Power, 2018). Pumpback hours are distributed relatively evenly across all four units.

Annual pumpback entrainment at Richard B. Russell was calculated to be on the order of 1.7 times higher than generation entrainment (Nestler *et al.*, 1999; *see* Georgia DNR's February 19, 2018, PLP Comments). Monthly entrainment rates during pumpback in 2015-2017 ranged from a low of 147 fish per hour in March to a high of 7,631 fish per hour in October (*see* Table 10 in Volume 2 of license application; Georgia Power, 2018). The highest pumpback entrainment rates occurred from July to December, reflecting a preponderance of small threadfin shad and blueback herring spawned earlier in the year. Calculated annual pumpback entrainment at Jocassee was about 2.7 times

⁸⁹ A water year is the 12-month period October 1 through September 30.

higher than generation entrainment (*see* Table 11 in Volume 2 of license application; Georgia Power, 2018). Monthly entrainment rates during generation ranged from a low of 55 fish per hour in June to a high of 189 fish per hour in January, while monthly pumpback entrainment ranged from 61 fish per hour in February to 468 fish per hour in July. Like at Richard B. Russell Lake, pumpback entrainment rates at Jocassee were highest from July to December, after the spawning seasons of threadfin shad and blueback herring.

Entrainment of striped bass, hybrid bass, and white bass is likely to be highest in early summer, as the water column warms and fish actively seek cooler water deeper in the forebay. However, the forebay mixes completely in the summer as a result of pumpback operation; thus, eliminating cooler layers of water near the intakes that may serve as cool-refugia for striped bass and hybrid bass. Lake Sinclair populations may become more susceptible to entrainment by pumpback operation in early spring, when upstream migrant adults tend to congregate in the Wallace Dam tailrace area. However, these fish are also larger adults, and, thus, more capable of escaping intake velocities near the draft tubes.

Based on Georgia Power's use of the Wallace Dam Project's units, and the studies conducted at the Richard B. Russell and Jocassee impoundments, where the majority of entrained fish are threadfin shad and blueback herring, more fish are likely to be entrained during pumpback than during generation at Wallace Dam. Factors likely contributing to higher entrainment rates during pumping include the shallower depth and narrower width of the tailrace area, closer proximity of shallow-water habitats, and the seasonal behavior and diurnal activity of some fish. In contrast, the open forebay and deep-water location of the Lake Oconee intake is relatively distant from shoreline and littoral-zone habitats.

WALLACE DAM ENTRAINMENT EXTRAPOLATION

To estimate the potential order of magnitude annual and seasonal entrainment occurring at the Wallace Dam Project, Georgia Power extrapolated monthly entrainment rates from both the Richard B. Russell and Jocassee impoundment sites using Wallace Dam monthly operations data for the water years 2016 and 2017. Georgia Power compared the operational and physical characteristics of the three pumped storage developments (*see* Table 12 in Volume 2 of license application; Georgia Power, 2018).

We have reviewed Georgia Power's analysis and concur with the conclusions. The Wallace, Richard B. Russell, and Jocassee developments have similar configurations on larger streams and use four reversible units of similar hydraulic capacities, with the pumpback being used to augment conventional hydropower. All three sites are in southeast Atlantic Coast river basins above the Fall Line, within 110 miles of one

another. Therefore, they overlap in fish species composition.⁹⁰ In addition, monthly operational and hydroacoustic entrainment sampling data are readily available for use; from 2012-2013 for Lake Jocassee (Degan and Mueller, 2013) and 2015-2017 for Richard B. Russell Lake (Aquacoustics, 2018).⁹¹

Georgia Power provided the monthly hours of generation and pumping for the Wallace Dam Project, for water years 2016 and 2017 (*see* Table 13 in Volume 2 of license application; Georgia Power, 2018). The average monthly operations data for both years were applied to the monthly Richard B. Russell Lake pumpback entrainment rates (*see* Table 10 in Volume 2 of license application; Georgia Power, 2018) to derive estimates of monthly pumpback entrainment at the Wallace Dam Project. Total annual pumpback entrainment is estimated to be on the order of 12.4 to 19.4 million fish, with the majority of entrained fish being young clupeids (shad) (table 5).

Table 5. Extrapolated Wallace Dam Pumpback Entrainment Estimates Using Richard B. Russell Monthly Pumpback Entrainment Rates and Wallace Dam Average Monthly Pumping Operation. (Source: Georgia Power, 2018).

Month	Russell Entrainment Rate (Fish per hour) ^a			Wallace Dam Average Pumping, 2016-2017 (Hours) ^b	Wallace Dam Entrainment Extrapolation (Number of fish) ^c		
	2015	2016	2017		2015	2016	2017
January	1,207	NP	1,972	171	178,490	--	291,618
February	498	NP	676	280	120,796	--	163,972
March	147	NP	334	420	53,476	--	121,504
April	NP	NP	410	443	--	--	157,548
May	1,958	1,682	395	431	730,954	627,919	147,460
June	663	2,453	1,702	486	279,112	1,032,672	716,514

⁹⁰ The entrainment extrapolation from these sites assumes that the pelagic fish community at Wallace Dam is dominated by shad, is similar in density and susceptibility to entrainment as the pelagic fish communities at the Richard B. Russell and Jocassee sites, and that seasonal variation in entrainment is similar. However, the Richard B. Russell and Jocassee reservoirs support large populations of blueback herring, while Lake Oconee does not (shad species in Lake Oconee include threadfin shad and gizzard shad). Based on this difference in the species of clupeid present, the entrainment estimates extrapolated to the Wallace Dam Project may be conservatively high. Moreover, information on species and size class entrained at Richard B. Russell and Jocassee is limited (Aquacoustics, 2018; Degan and Mueller, 2013).

⁹¹ The entrainment sampling at both sites was performed by Aquacoustics.

July	1,217	3,714	3,096	606	638,641	1,948,983	1,624,678
August	2,655	3,798	2,589	818	1,882,218	2,692,529	1,835,428
September	3,738	5,382	2,588	844	2,733,834	3,936,194	1,892,767
October	7,330	7,631	2,522	654	4,156,232	4,326,904	1,430,016
November	4,927	7,178	6,983	420	1,792,916	2,612,045	2,541,086
December	--	5,636	3,720	460	--	2,245,078	1,481,847
Total				6,031	12,566,66	19,422,325	12,404,437

^a Source: Aquacoustics (2018)

^b Source: Southern Company Generation Hydro Services

^c Calculated as: Entrainment rate x average pumping x 0.867 (ratio of Wallace Dam to Russell pumpback hydraulic capacity)

^d NP = no pumping.

Georgia Power also applied the operational data for the Wallace Dam Project to the monthly Lake Jocassee pumpback entrainment rates (*see* Table 11 in Volume 2 of license application; Georgia Power, 2018) to derive estimates of monthly pumpback entrainment at Wallace Dam. Using the Lake Jocassee rates, total annual pumpback entrainment is estimated to be on the order of 2.5 million fish (table 6). Based on actual Wallace Dam generation and pumping hours for 2016-2017, the estimate includes about 800,000 fish entrained during generation and 1,700,000 entrained during pumpback operation.

Table 6. Extrapolated Wallace Dam Pumpback Entrainment Estimates Using Richard B. Russell Monthly Pumpback Entrainment Rates and Wallace Dam Average Monthly Pumping Operation. (Source: Georgia Power, 2018).

Month	Jocassee Entrainment Rate (Fish per hour) ^a		Wallace Dam Average Operation, 2016-2017 (Hours) ^b		Wallace Dam Entrainment Extrapolation (Number of fish)	
	Generation	Pumping	Generation	Pumping	Generation	Pumping
January	189	187	428	171	80,821	31,907
February	162	61	379	280	61,378	17,072
March	102	121	434	420	44,294	50,790
April	133	82	510	443	67,847	36,357
May	157	80	430	431	67,530	34,460
June	55	160	485	486	26,682	77,720
July	96	468	543	606	52,104	283,374
August	109	425	683	818	74,406	347,650
September	106	329	702	844	74,359	277,635
October	89	400	608	654	54,068	261,700
November	187	331	592	420	110,634	138,979

December	105	237	695	460	72,936	108,931
Total			6,487	6,031	787,057	1,666,574

^a Source: Degan and Mueller (2013)

^b Source: Southern Company Generation Hydro Services

Annual entrainment at Wallace Dam, based on extrapolating entrainment data from the Richard B. Russell and Jocassee facilities, falls within a broad range: from 800,000 to 8.3 million fish entrained during generation; and from 1.7 to 19.4 million fish entrained during pumpback operation. Although similar operational characteristics exist between the projects, the Wallace Dam Project differs from Richard B. Russell in having a much smaller total reservoir area (*see* Table 12 in Volume 2 of license application; Georgia Power, 2018), lacking a blueback herring population with high reproductive capacity, and providing warmer summer habitat in the tailrace area that is less attractive for prey or sport fish than the cool, hypolimnetic releases from thermally stratified Russell Lake.⁹² Moreover, fish biomass has been documented to be much higher in the Richard B. Russell tailrace than in the Wallace Dam tailrace, where the warmer temperatures, lower DO levels, and higher turbidity may have been less attractive as habitat for prey and sport fish, such as striped bass and hybrid bass (Schreiner, 1990).⁹³ Relative to Lake Jocassee, the Wallace Dam Project has a larger, but more similar, total reservoir area. Lake Oconee differs from Jocassee, however, in lacking a blueback herring population and being a more productive reservoir, containing shallower and warmer water. Based on these comparisons, annual fish entrainment may be higher at Wallace Dam than the Jocassee facility, and is more likely to fall within the lower ranges predicted for generation and pumpback at the Richard B. Russell facility.

⁹² The forebay of Russell Lake undergoes thermal stratification that maintains releases of cooler water into the tailrace area through the summer. As summer progresses and water temperatures increase in open-water habitats of the downstream reservoir, blueback herring seek refuge and concentrate in the upper part of the lake and in the Russell tailrace area (Isely and Tomasso, 1998); thereby, increasing their risk of entrainment. Conversely, the forebay of Wallace Dam becomes well mixed during the summer from pump-back operation, resulting in warm temperatures in both the reservoir and tailrace, which results in no cool water refuge in the Wallace Dam tailrace.

⁹³ Georgia Power proposes to install a forebay oxygen line diffuser system in the Lake Oconee forebay area. This is expected to increase DO in the forebay and Wallace dam tailrace. As discussed previously in the EA, this proposal is not expected to substantially affect overall fish entrainment at the Wallace Dam Project, due to the continued marginal water temperatures in the tailrace.

WALLACE DAM TURBINE PASSAGE MORTALITY

Georgia Power compared relevant physical, operational, and turbine characteristics between the conventional and reversible pump-back units (*see* Table 2 in Volume 2 of license application; Georgia Power, 2018). We have reviewed Georgia Power's analysis and concur with the conclusions. The two conventional units, located in the center of the powerhouse, are modified-propeller turbines (similar in design to Kaplan turbines⁹⁴), which are considered fish-friendly in design. The four pump-back units, of which two are located on each side of the conventional units, are Francis turbines that are large in size and have some favorable characteristics (e.g., slow rotational speeds; large rated flow, openings, and passageways which reduce the probability of blade strikes and collisions) that could enhance turbine passage survival. The powerhouse intakes are generally characterized by an open forebay relatively distant from littoral-zone fish habitats and intakes located deep in the water column; all characteristics favorable to reducing fish entrainment.

The results of turbine passage survival studies conducted at similar hydropower projects indicate that the vast majority of entrained fish at the Wallace Dam Project, because of their small size, are likely to survive turbine passage into downstream aquatic habitats. The mortality of these smaller fish is expected to be relatively low because they are less prone to mechanical injury from turbine passage than larger fish. Trends in turbine passage survival with turbines similar to those at Wallace show average immediate survival rates at Wallace Dam in the range of 91 to 95 percent for small fish and 83 to 88 percent for moderate-sized and large fish, depending on the unit type (Georgia Power, 2016c).

Assuming the magnitude of total annual entrainment at Wallace Dam is twice that predicted for the Jocassee facility (5 million fish),⁹⁵ that 75 percent of all entrained fish are small fish (less than or equal to 6 inches), that turbine-passage survival rates are 93 percent for small fish and 85 percent for larger fish, then total annual entrainment mortality could be on the order of 450,000 fish. If total annual entrainment is on the order of 19 million fish (based on Richard B. Russell entrainment rates), then total annual entrainment mortality would be on the order of 1.7 million fish. Regardless of this range in potential fish mortality, there have been no reported fish kills at the Wallace Dam

⁹⁴ Kaplan turbines are propeller-type turbines having adjustable blades that can be pivoted on the runner hub to maintain efficiency under different flow rates and flow angles.

⁹⁵ Georgia DNR, in its February 19, 2018 Comments on the PLP, expressed concern that using entrainment rates from Jocassee would underestimate entrainment at the Wallace Dam Project.

Project, nor is there any evidence to suggest that mortality which is occurring has an impact on the Lake Oconee or Lake Sinclair fishery.

Striped bass and hybrid bass, species that Georgia DNR expends considerable resources managing at Lake Oconee, may occasionally become entrained at the Wallace Dam Project. However, entrainment data from other southeastern sites with striped bass populations suggest that numbers of entrained striped bass are likely to be small. Stocked fingerlings and small juveniles would be susceptible to entrainment at Wallace Dam during generation, because these young fish likely school in open waters and may exhibit downstream migratory behavior as juveniles. They become vulnerable to entrainment as they approach the dam. However, because of their small body size, the large majority would be expected to survive turbine passage and add to the fishery in Lake Sinclair. Adult striped bass and hybrid bass, while large and potentially subject to higher turbine mortality rates if entrained, are (a) not inclined to move downstream (Georgia Power, 2016c), and (b) have much stronger swimming capabilities for avoiding entrainment. In addition, summer habitat conditions are sub-optimal for adult fish in the lower end of Lake Oconee near the dam. As stated above, by late August in most years, temperatures throughout the water column become unsuitably warm for adult striped bass.

Georgia DNR states that reduced trashrack spacing has been used effectively at Richard B. Russell Lake to reduce fish entrainment.⁹⁶ We would agree that retrofitting or replacing the existing trashracks with ones having narrower clear bar spacing (e.g., 2-inch clear spacing) would most likely reduce entrainment at Wallace Dam; thereby, reducing overall turbine-related fish mortality at the project. However, though successful at Richard B. Russell Lake, the need for physically modifying the trashracks at Wallace Dam has not been established. Unlike at Richard B. Russell, the warm water in the Wallace Dam tailrace does not provide a cool-water refuge. In addition, the post-installation sampling at Richard B. Russell was likely influenced by measures designed to redistribute fish away from the draft tubes (e.g., sound repulsion and lighting systems). Also, reducing the clear spacing between the bar racks is likely to increase impingement mortality, as it did at Richard B. Russell Lake, which could negate benefits of the narrower bar rack spacing.

⁹⁶ In 1993, the Corps installed a veneer with 2-inch spacing across on the downstream draft tubes at the Richard B. Russell Project, which resulted in significantly lower entrainment rates of larger fishes. Entrainment rates for fish greater than 14.5 inches drop from 200 fish to about 10 fish per 6-hour pump cycle, and the entrainment rates for fish greater than 8.5 inches decreased from nearly 1,600 fish to around 50 fish per 6-hour pump cycle. *See* Georgia DNR's February 19, 2018 Comment letter.

Fish Passage

Shortnose sturgeon, Atlantic sturgeon, American shad, blueback herring hickory shad, striped bass, American eel, and robust redhorse (a migratory riverine species) occur in portions of the Altamaha River Basin, including the lower portion of the Oconee River. Striped bass and American shad are presently known to occur within the Wallace Dam Project boundary, but movement of migratory stocks of these species and the others is hindered by the downstream Sinclair Dam. The Wallace Dam Project is located 310 river miles upstream of the Atlantic Ocean (*see* figure 4), and 35 river miles upstream of the Fall Line District and 29.7 river miles upstream of Sinclair Dam (*see* figure 1). Sinclair Dam and the miles of reservoir habitat it creates impede upstream migration of diadromous and migratory riverine fish species into the project area.

Georgia Power does not propose any measures related to fish passage at the Wallace Dam Project. No agencies or other entities recommend such measures. However, Interior reserved its authority to prescribe fishways for the aforementioned diadromous and migratory riverine fish species.

Our Analysis

Georgia Power's proposal to continue operating the Wallace Dam Project as a pumped storage facility would have little or no additional effect on upstream passage of diadromous and migratory riverine species. Striped bass and American shad stocked in Lake Oconee would continue to have the ability to pass downstream through the Wallace Dam powerhouse into Lake Sinclair, and, as discussed previously, most of these fish are expected to survive turbine passage and contribute to the downstream fishery. There is no evidence that either species could successfully reproduce upstream of Wallace Dam or that suitable spawning and rearing habitats are available. Therefore, upstream passage at Wallace Dam currently is not a factor in their ability to complete their life cycles in the Altamaha River Basin. In addition, coastal runs of shortnose sturgeon, Atlantic sturgeon, American shad, blueback herring, hickory shad, striped bass, and American eel would be limited in the upstream extent of their natural migrations in the Oconee River by the Fall Line and Sinclair Dam. Potential effects of continuing to operate the project on the robust redhorse are described below.

Upstream migration of shortnose sturgeon, Atlantic sturgeon, American shad, blueback herring, hickory shad, striped bass, and American eel to the Wallace Dam Project area is not a priority at this time, nor is providing passage for robust redhorse. Should this change in the future, Interior, on the behalf of FWS, has requested reservation of its authority to prescribe fishways in the future. Including this reservation would allow the Commission, Interior, and Georgia Power to re-evaluate passage needs as conditions change.

Effects of Project Operation/Maintenance on Special Status Species

Fluctuating water levels can affect habitat availability and use of the habitat by Altamaha shiner and the Robust Redhorse. To limit such affects, Georgia Power proposes to continue operating the reservoir within the elevation ranges of 433.0 feet and 435.0 feet 100 percent of the time, with an average daily fluctuation of 1.5 feet. In maintaining pumpback operation, Georgia Power would also continue to limit the fluctuation of the downstream Lake Sinclair to no more than 2 feet. In addition, Georgia Power proposes to continue using storage in Lake Oconee during droughts and other low-flow periods to provide supplemental flow releases to meet the Sinclair Project's minimum flow requirement of 250 cfs. There would be no changes in existing operating conditions. No entities recommend that Georgia Power operate the project differently.

Forest Service 4(e) conditions 13, 14, 19, and 22 would require Georgia Power to implement five measures to help minimize the effects of project operation and maintenance, as well as recreation, on environmental resources in the project vicinity, including special status aquatic species. Each condition is summarized as follows.

1. 4(e) Condition 13 would require Georgia Power to annually consult with Forest Service. The goal of the meeting would be to share information, including O&M activities, the results of any monitoring performed the previous year; review any non-routine maintenance planned for the upcoming year; discuss any foreseeable changes to project facilities or features; discuss any revisions needed to existing management plans; and discuss any needed protection measures for newly listed special status species.
2. 4(e) Condition 14 would require Georgia Power to establish a Consultation Group, and to meet annually with the group. Georgia Power would organize and host meetings of the Consultation Group, which would be open to representatives from Forest Service, resource agencies, and other interested stakeholders. The primary purpose of the group would be to provide a forum for Georgia Power to consult with resource agencies and other interested stakeholders regarding the previous calendar year's license activities and review plans for the upcoming year, review plans for upcoming monitoring activities, and review current lists of special status species.
3. 4(e) Condition 19 would require Georgia Power to prepare and submit a Biological Evaluation for Forest Service approval, prior taking actions to construct new project features on project land owned by the Forest Service and

that may affect special status species⁹⁷ or their critical habitat on Forest Service land. Condition 19 also would require Georgia Power to: (a) annually review the special status species list in consultation with Forest Service; and (b) should any new special status species be likely to occur on Forest Service land, develop and implement a study plan to assess the effects of the project on the species and develop appropriate protection measures.

4. 4(e) Condition 22 would require Georgia Power to provide annual employee environmental awareness training. The goal of this training would be to: (a) familiarize the licensee's operation and maintenance staff with special status species, noxious weeds, and sensitive areas that are known to occur within, or adjacent to, the project boundary on Forest Service lands; and (b) the procedures for reporting occurrences to Forest Service or other appropriate agency(ies). Georgia Power would direct its staff and contractors to avoid disturbance to sensitive areas.

Our Analysis

Two Georgia state protected aquatic species (i.e., Altamaha shiner and robust redhorse) are known to occur in the Oconee River Basin. Given that Georgia Power is not proposing to change how it operates the project, the nature of the riparian habitat along Lake Oconee and the transitional habitats of the lake's headwaters would not be adversely affected. This would maintain the existing daily and seasonal availability of suitable habitat for fish and mussels.

The Altamaha shiner inhabits small tributaries and rivers, and is often found in small pools with rocky to sandy substrates (*see* Table 16 in Volume 2 of license application; Georgia Power, 2018). It is known to inhabit several tributaries upstream of Lake Oconee, including the North Oconee River, the Middle Oconee River, the upper Oconee River, the Mulberry River, the Apalachee River, Hard Labor Creek, Richland Creek, and the Little River (Freeman *et al.*, 2016a). The species is not known to occur within Lake Oconee, the project boundary, or any other area affected by the project.

The robust redhorse, a federal species of concern that is being reviewed for listing under the ESA, occupies a variety of riverine habitats, from shallow riffles to deep flowing water with moderately swift current (*see* Table 16 in Volume 2 of license application; Georgia Power, 2018). In the Oconee River Basin, it is known to inhabit the

⁹⁷ The review of special status species would include federally listed and proposed species, Forest Service or Southern Region-Regional Forester sensitive species, National Forest Watch List species, and state protected species that may occur on Oconee National Forest land in the project area that may be directly affected by project operation.

Little River (a tributary to Lake Sinclair) and the lower Oconee River downstream from Sinclair Dam. There are no known occurrences upstream of Wallace Dam or in Lake Oconee.

There is no evidence in the record to suggest that the 2-foot fluctuation in Lake Sinclair, which is part of the Wallace Dam pumpback operation, adversely effects robust redhorse that inhabit the Little River. With regard to the lower Oconee River population, it has declined from 400-600 adults in the 1990s, to less than 100 adults since the implementation of the flow regime at Sinclair Dam in 1996.⁹⁸ The licensed flow regime at the Sinclair Project⁹⁹ was designed to benefit all stages of robust redhorse, as well as other aquatic species. The continued decline of robust redhorse following implementation of the flow regime suggests that flow, along with some other factor (e.g., competition or predation by invasive species, deterioration of spawning [gravel] habitats [related to flow], trophic shift in the fish community, or a fish pathogen), may be limiting the lower Oconee River robust redhorse population. Georgia Power and the resource agencies continue to evaluate the lower Oconee River population of robust redhorse and the specific cause of the species decline.¹⁰⁰

The Wallace Dam Project does not affect the flow regime in the lower Oconee River, except during periods of low-flow and drought. The proposed continued use of Lake Oconee storage to provide supplemental flow(s) to meet the Sinclair Project's 250-cfs minimum flow requirement during droughts and other low-flow periods would continue to protect robust redhorse and its habitat downstream from Sinclair Dam during the critical summer months when weather conditions are hot and river discharge is low. Aquatic habitat in the lower Oconee River would not be altered from its present condition.

Based on our review of the species and their habitat needs, continued operation and maintenance of the project, as proposed by Georgia Power, is not expected to affect the state protected aquatic species and species of concern described above.

Forest Service 4(e) Conditions 13, 14, 19, and 22 would provide a number of benefits to environmental resources, including special status species, within the project boundary and vicinity. For example, organizing a Consultation Group and holding an annual meeting with the group would provide a forum for Georgia Power to meet and discuss implementation of the project license, and any on-going effects on environmental

⁹⁸ See Georgia Power's April 25, 2016 letter in the Sinclair Project No. 1951 docket at 11-12; <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14215601>.

⁹⁹ *Id.* at 10, see Table 1.

¹⁰⁰ *Id.* at 12 and 15.

resources in the project area, including any special status species. In addition, employee environmental awareness training would provide a mechanism for Georgia Power's staff to: (1) become familiar with special status species identification and sensitive area locations within the project boundary; and (2) stay informed of any changes in the occurrence or distribution of special status species since the preceding year.

Consultation prior to new construction and non-routine maintenance would help protect special status species and their habitats over the term of the license. In addition, annual review of sensitive species lists would help identify newly listed species that could be evaluated as potentially affected by the project. This measure could reduce the possibility that newly added species would be affected by project operations and maintenance activities.

Aquatic Invasive Species Management

Aquatic non-native invasive, or nuisance, species, such as the common carp, spotted bass, flathead catfish, zebra mussel, Asiatic clam, and Kentucky crayfish,¹⁰¹ can compete for habitat resources with native species and have the potential to affect aquatic communities both directly and indirectly. Spotted bass, flathead catfish, and carp are known to occur in Lake Oconee and/or Lake Sinclair; and bass and catfish are sport fish that provide important angling opportunities at the lakes. The clam and crayfish were not documented during relicensing studies, but are known to occur in Lake Sinclair and the Little River (a tributary of Lake Sinclair). Zebra mussels have not been documented in Lake Oconee, Lake Sinclair, or affected stream reaches; the closest known populations are in Tennessee and Alabama waterways, but the species continues to move south and east via people and boats.

To minimize the threats associated with aquatic invasive species, Forest Service 4(e) Condition 18 would require Georgia Power to develop and implement an *Aquatic Invasive Species Management and Monitoring Plan*. The plan would consist of: (1) a public education program; (2) implementing BMPs; (3) monitoring and reporting; and (4) reviewing and updating the plan, as necessary. The public education program would include appropriate signage and information pamphlets at designated public boat access

¹⁰¹ See (1) https://www.lakeoconeebreeze.net/news/outdoors/another-invasive-species-can-be-added-to-the-list/article_96405208-83f9-5643-ae33-690e35a55e4f.html; (2) https://www.lakeoconeebreeze.net/news/outdoors/non-native-species-causing-problems-in-georgia/article_6a828ddd-0ef3-5634-96be-2b7123ae6efb.html; (3) https://georgiawildlife.com/sites/default/files/wrd/pdf/management/ANSPlan_Final_rev.pdf; and (4) <https://georgiawildlife.com/aquatic-nuisance-species>.

sites, as well as aquatic invasive species information made available on the project's website. BMPs would include: (1) developing a list of invasive species with potential to be introduced and identifying control points; (2) control or preventative measures; (3) monitoring of invasive species to ensure BMPs are being followed; and (4) actions to be taken if an invasive species is found. The monitoring program would encompass Lake Oconee boating access sites, and the upper reaches of Lake Sinclair. The plan would be revised as conditions change.

Georgia Power is a member of Georgia's Aquatic Nuisance Species Advisory Committee.¹⁰² In addition, Georgia Power currently manages aquatic invasive species in its 15 reservoirs in Georgia, including Lake Oconee and Lake Sinclair.¹⁰³ Georgia Power has implemented a reservoir marina operator notification program, and occasionally issues flyers to residents regarding aquatic invasive species. Georgia Power also surveys Lake Oconee and Lake Sinclair for nuisance aquatic plant species, and performs routine herbicide applications, as needed. Georgia Power proposes no other measures related to aquatic invasive species management at Lake Oconee, but does not oppose the requirements of Condition 18.

Our Analysis

The Wallace Dam Project area supports popular recreational angling and boating opportunities, and, consequently, provides frequent opportunities for boats and trailers to inadvertently transfer aquatic invasive species into Lake Oconee and Lake Sinclair. Educating the public on practices to reduce the spread of aquatic invasive species, by providing signage and informational flyers at public recreational access sites and on Georgia Power's project website, as stipulated by Forest Service, would help reduce the risk of transporting aquatic invasive species from infected waterbodies.

Condition 18 would require Georgia Power to develop BMPs to prevent the introduction of aquatic invasive species into project-affected waters. The listed BMPs, as described above, would help minimize the introduction and potential spread of aquatic invasive species. Additionally, including access restrictions and consultation with the appropriate agencies as a default action to be taken if aquatic invasive species are discovered would help minimize the potential spread of any discovered species compared to not having a default action. Including annual employee training to identify aquatic invasive species would increase the potential for incidental observations of non-native species.

¹⁰² See https://georgiawildlife.com/sites/default/files/wrd/pdf/management/ANSPlan_Final_rev.pdf.

¹⁰³ See <https://www.gainvasives.org/NonGov/GaPower/>.

Early detection is a critical component in effectively managing the spread of aquatic invasive species, and routine monitoring, as stipulated in Condition 18, would provide a means for early detection. As mentioned previously, invasive mollusks have not been reported in Lake Oconee, but Asiatic clams are known to occur in Lake Sinclair and zebra mussels have been found in nearby Alabama and Tennessee waterways. Recording incidental observations of non-native species during project activities in Lake Oconee and the Wallace Dam tailrace, and immediately (within 3 days) reporting any observations to Forest Service, FWS, and Georgia DNR would also provide a means for effectively detecting, and taking proactive measures to address, aquatic invasive species.

Conditions involving aquatic invasive species are not static. Invasive species can be transported easily by people or boats, and once established, spread quickly. Having the ability to review, update, and/or revise the Aquatic Invasive Species Management and Monitoring Plan would allow Georgia Power and the resource agencies to adjust management and control policies as conditions change.

The plan included in Condition 18 would address aquatic invasive species that occur, or have the potential to be introduced into project-affected waters within the project boundary, including the species described above, as well as aquatic plant species (e.g., hydrilla, water hyacinth, alligatorweed, *Lyngbya*,¹⁰⁴ and giant salvinia¹⁰⁵), which we discuss in section 3.3.3, *Terrestrial Resources*. Assessing the vulnerability of project waters, early detection, applying BMPs, and public education on aquatic invasive species would provide appropriate management of aquatic invasive species at the Wallace Dam Project.

3.3.2.3 Cumulative Effects

Water Quantity and Quality

Georgia Power operates the Wallace Dam Project as a peaking and pumped-storage facility. Daily reservoir fluctuations average about 1.5 feet, and are 2.0 feet or less 100 percent of the time. By consistently operating Lake Oconee within a relatively narrow and highly predictable range of reservoir elevations, operation of the project

¹⁰⁴ *Lyngbya* is a blue-green algae that can form dense mats that often break free from the bottom and float to the surface. It is known to occur in Lake Sinclair. See https://www.lakeoconeebreeze.net/news/outdoors/non-native-species-causing-problems-in-georgia/article_6a828ddd-0ef3-5634-96be-2b7123ae6efb.html.

¹⁰⁵ Giant salvinia is native to South American. Its rapid growth, vegetative reproduction, and tolerance to environmental stress make it an aggressive, competitive species known to affect aquatic environments, water use, and local economics. See <https://georgiawildlife.com/aquatic-nuisance-species>.

maintains the existing benefits afforded to the public water supply intakes in the reservoir, as well as the reservoir's designated recreation uses.

Historically, quarterly water monitoring data collected by Georgia Power have indicated good overall water quality conditions in Lake Oconee (Georgia Power, 2015a). However, historical water quality monitoring and the 2-year study conducted as part of the relicensing documented that Lake Oconee receives water from the upstream watersheds that is high in nutrients. The main streams entering Lake Oconee and numerous other upstream tributaries are not currently supporting their designated uses, primarily due to impaired biological communities (fish or macroinvertebrates) or due to high fecal coliform levels (Jacobs, 2017). The surrounding agricultural land uses upstream of Lake Oconee are likely a major contributor to the nutrient-enriched waters entering the lake, and the water quality conditions that result in summer DO depressions in the Wallace Dam tailrace.

Georgia Power's proposal to install and operate a forebay oxygen line diffuser system would reduce effects of nutrient enrichment originating in the upstream watershed, and benefit downstream water quality, fish populations and other aquatic organism, and recreation opportunities by supporting applicable water quality standards through the hottest months of the year. Pending nutrient criteria (Georgia EPD, 2018b) for Lake Oconee will also bring about improved water quality. The state water plan has targeted both Lake Oconee and Lake Sinclair for the implementation of management practices to reduce nutrient loading in the upstream watershed (Jacobs, 2017). Reduced nutrient loading, combined with the addition of oxygen to the forebay, would increase the assimilative capacity of Lake Oconee for any incoming oxygen demand.

As outlined above, the proposed Wallace Dam Project would have a beneficial cumulative effect on the Oconee River in providing a popular fishery and recreation destination. In addition, the project would protect and enhance the river's designated uses within Lake Oconee and downstream from the project to the free-flowing Oconee River downstream from the Sinclair Project.

Fish Resources

Historically, native species of fish and freshwater mussels, such as the robust redbreast and Atlantic pigtoe inhabited the Oconee River Basin. However, the construction of dams on the Oconee River, including Wallace Dam, fragmented and altered the riverine habitats, as well as reduced the connectivity of mainstem riverine habitats to larger tributary systems, which led to a decline of native species in the river. Mainstem impoundments may impede the ability of tributary populations of fish and mussels to recolonize from upstream and downstream tributary systems after local disturbances. Cumulative effects of these past actions combined with other anthropogenic disturbances within tributary watersheds (e.g., point and nonpoint sources)

may threaten the persistence of some native species. Moreover, dam construction may have fragmented and eliminated historic spawning habitat for some diadromous species, such as striped bass and American shad.

Wallace Dam is located upstream of the fall line that posed a natural obstacle to the upstream migration of some diadromous and other highly migratory species. The fall line area delimits the historic distribution of many species or life stages of fish and mussels preferring either Piedmont or Coastal Plain habitats. Sinclair Dam, located downstream from Wallace Dam, would continue to regulate the river flow, and it and Barnett Shoals Dam upstream of Lake Oconee would continue to impede fish migration and limit tributary connectivity irrespective of the continued operation of the Wallace Dam Project.

Georgia Power's proposal to continue operating the project to supplement flows during drought to support the downstream Sinclair Project minimum flows would continue to provide minimum flows for aquatic habitat for riverine species of fish and mussels, and for migratory and diadromous fishes in the Oconee River downstream from Sinclair Dam. The Oconee River downstream from Sinclair Dam provides habitat for the Georgia-endangered robust redhorse, hosts spawning runs of diadromous fishes, and has been designated as critical habitat for the federally endangered Atlantic sturgeon.

The cumulative effects of Georgia Power's licensing proposal on diadromous fish migrations would be negligible, if any. There are no fish passage facilities at Sinclair or Barnett Shoals Dams. The striped bass and American shad stocked upstream of Wallace Dam, although part of restoration efforts for each species, are not expected to result in establishing reproducing populations upstream of Wallace Dam, due to lack of sufficient length of free-flowing river upstream for drifting early life stages (Crance, 1984).

Cumulative entrainment mortality effects for the fish species inhabiting the Oconee River are likely to be relatively minor. Only a small proportion of the fish entrained during generation and pumpback operation would likely be killed by turbine passage, and the losses of these mostly small and young-of-year fish would be of minor significance to the existing fisheries resources (*see* discussion above). Georgia Power is not proposing to change how it operates the Wallace Dam Project; therefore, no changes to the recreational fishery in Lake Oconee and Lake Sinclair are expected. Moreover, Lake Oconee sustains a healthy and popular recreational fishery.

Through its participation in the Robust Redhorse Conservation Committee (RRCC),¹⁰⁶ Georgia Power cooperates with FWS and Georgia DNR in implementing measures and other activities to manage and foster survival of the species in the Oconee River.¹⁰⁷ Georgia Power's voluntary release of flow from Lake Oconee to protect habitat in the lower Oconee River during droughts and low-flow periods, coupled with the activities of the RRCC, would facilitate the RRCC's efforts to restore, protect, and enhance the survival of robust redhorse populations in the Altamaha River Basin, including the Oconee River.

3.3.3 Terrestrial Resources

3.3.3.1 Affected Environment

Vegetation

The Wallace Dam Project is located within the Southern Outer Piedmont Ecoregion where typical land cover includes pine plantations, deciduous forest, mixed forest, and pasture, and land uses include agricultural production (e.g., hay, cattle, dairy products, hogs, and orchards) (Griffith *et al.*, 2001). There are approximately 25,660 acres within the project boundary, including the 19,050-acre Lake Oconee (Georgia Power, 2016d, 2016e), and the remaining 6,610 acres of land surrounding the lake (includes wetland and upland areas). The dominant terrestrial vegetative community types observed within the project boundary during Georgia Power's 2016 Terrestrial Resources Study include mixed pine-hardwood forest, pine plantation/pine forest, and floodplain and riparian forest (Georgia Power, 2016e). Collectively, these three community types cover about 65.3 percent of the area within the project boundary. Developed and agricultural land covers 19.5 and 11.5 percent of the land within the

¹⁰⁶ See <http://www.robustredhorse.com/> and Georgia Power's April 25, 2016 letter in the Sinclair Project docket. The discovery of robust redhorse in the Oconee River in 1991 led to the establishment of the RRCC, a multi-stakeholder partnership (i.e., among state and federal resource agencies, private industry, and the conservation community), codified under a Memorandum of Understanding in 1995. The RRCC was designed to restore the robust redhorse throughout its currently accepted historic range by implementing research and conservation measures, enhancing recruitment in existing populations, and re-establish robust redhorse populations in appropriate river systems within the species' former range.

¹⁰⁷ See <http://www.robustredhorse.com/>. The RRCC, through its executive committee, manages the on-going activities that implement research and management decisions. Technical working groups were created to focus on specific populations, with the expectation of developing river basin management plans, including one for the Oconee River.

project boundary, respectively. The remaining 3.7 percent of the land within the project boundary includes the transmission line easement, which consists mostly of herbaceous habitat types, but also includes mesic slope forest and dry oak/pine forest, scrub-shrub and emergent wetlands, and granite outcrops. Although small in area of coverage, granite outcrops provide unique habitats that often harbor sensitive plant species.

Mixed pine-hardwood forest is the most common community type within the project boundary, occupying about 2,473 acres, or 34 percent of land within the project boundary. It occurs on much of the narrow strip of land between Lake Oconee and the project boundary, and at recreation facilities and on adjacent public lands. The overstory is dominated by loblolly pine, mockernut and pignut hickories, southern red oak, sweetgum, and tuliptree. Understory species include blackgum, flowering dogwood, southern sugar maple, eastern redbud, hawthorn, sparkleberry, and black cherry. Dominant herbaceous species include Christmas fern, woodoats, partridge berry, violets, and greenbriers.

Floodplain and riparian forest occur along streams and rivers, occupying 997 acres, or 13.7 percent of lands within the project boundary. Canopy species include sweetgum, American sycamore, sugarberry, red maple, black willow, black walnut, green ash, box elder, and water oak. Understory species often include ironwood, hop hornbeam, Carolina silverbells, and hazel alder, and herbaceous species include greenbrier, Christmas fern, violets, common sneezeweed, false nettle, and butterweed.

Pine plantations and pine forests occupy 445 acres, or 6 percent of the land within the project boundary and occupy 17.7 percent of land within 2,000 feet of the project boundary. This community type is dominated by loblolly pine in the overstory and various oaks and hickories, sweetgum, and tuliptree in the understory. Pine plantations managed with prescribed burns, such as those in the Oconee National Forest and Redlands WMA, provide a relatively open understory. While sparsely distributed, herbaceous and shrub species include beautyberry, blackberries, greenbrier, muscadine, St. John's wort, Virginia creeper, American pokeweed, cinquefoil, sumacs, and lyreleaf sage.

Granite outcrops occupy about 17 acres (0.23 percent) within the project boundary. These areas contain exposed granite and rocks with widely scattered patches of vegetation that varies from moss and lichens to herbs, shrubs, and trees. Ephemeral pools that form in shallow depressions in the granite can support sensitive plant species adapted to this unique microhabitat. For example, stitchwort, elf orpine, toadflax, and Piedmont quillwort, as well as pool sprite, a federally endangered plant species, were observed within the depressions of the granite outcrops at the Wallace Dam Project. Federally listed species are discussed further in section 3.3.4, *Threatened and Endangered Species*. The largest granite outcrop within the project boundary is the Eatonton Outcrop, located within the Oconee WMA adjacent to Lawrence Shoals Park.

The property is managed by Georgia DNR and protected from foot traffic and recreational activity.

Vegetation in the project transmission line right-of-way (ROW) corridor consists mainly of herbaceous and shrub vegetation in upland habitats, and herbaceous wetlands at some of the perennial and intermittent stream crossings. Upland vegetation in the ROW includes grasses, goldenrods, thoroughworts, groundsel/ragworts, plantains, clovers, tick-trefoils and other early successional species. Herbaceous wetland vegetation in the ROW includes arrow arum, devil's beggartick, stiff marsh bedstraw, and sedges. There are numerous stream crossings within the ROW, including Jenkins Branch, Crooked Creek, Turkey Creek, and Rooty Creek, all of which drain south to Lake Sinclair.

Wetlands

Georgia Power's April-June 2016 field reconnaissance surveys documented approximately 337 forested, scrub-shrub, and emergent/herbaceous wetlands covering approximately 911 acres (12.4 percent) of land within the project boundary, with 53 species of wetlands plants at Lake Oconee and its surrounding wetland, riparian, and littoral habitats¹⁰⁸ (Georgia Power, 2016e) (table 7).¹⁰⁹ Wetlands and stream crossings compose about 15 acres within the project ROW (Georgia Power, 2019a). Wetland plants observed within the project boundary consisted primarily of native species adapted to hydric conditions. However some of the observed plants are identified by the Georgia Exotic Pest Plant Council (Georgia Pest Council)¹¹⁰ as non-native invasive species that adversely affect native species in the communities in which they occur.

¹⁰⁸ Littoral wetland habitats are located along shorelines of lakes and other waterbodies, typically extending from the shore to a depth of 2 meters (6.6 feet) below low water, or to the maximum extent of non-persistent emergent plants, if they grow at depths greater than 2 meters (Cowardin *et. al.*, 1979).

¹⁰⁹ In addition to the wetlands listed in table 7, Georgia Power identified 30 areas of submerged timber stands that cover 933 acres. *See* section 3.3.2, *Water Resources*, for additional detail about the history and function of these submerged stands.

¹¹⁰ The Georgia Pest Council is a state council formed to facilitate awareness and management of exotic pest plants.

Table 7. Wetlands identified at the Wallace Dam Project during Georgia Power’s 2016 Terrestrial Resource Study. (Source: Georgia Power as modified by staff).

Wetland Type	Wetland Codes	Number of Areas Found in Project Boundary	Wetland Area (acres)	Percent of Land Within Project Boundary
Palustrine Forested Wetlands	PFO1A, PFO1Ah, PFO1C, PFOCb, & PFO1Ch	126	651	8.9
Palustrine Scrub-shrub Wetlands	PSS1Ah, PSS1Cb, PSS1Ch, PSS3Ah	128	117	1.6
Emergent/herbaceous Wetlands	PEM1Ad, PEM1Ah, PEM1Cb, PEM1Ch, PEM1Fb, & PEM1Fh	83	143	1.9
Totals		337	911	12.4

Forested wetlands are the dominant vegetated wetland type, occupying about 651 acres (8.9 percent) of land within the project boundary. They occur primarily along the rivers and larger tributary streams to Lake Oconee, particularly within the floodplains of the Oconee and Apalachee Rivers and larger tributary streams, including Richland Creek, Sugar Creek, Beaverdam Creek, and Lick Creek. Downstream from Wallace Dam, forested wetlands occur within the project boundary along Shoulderbone Creek, Sikes Creek, and Herndon Branch. Dominant overstory vegetation in forested wetlands includes sugarberry, water hickory, green ash, willow oak, blackgum, red maple, box elder, and American sycamore. Understory species include persimmon, rusty blackhaw, switchcane, black willow, and ironwood and herbaceous species include broadbeech fern, netted chainfern, common lady-fern, sensitive fern, and lizard’s tail.

Scrub-shrub wetlands cover 117 acres (1.6 percent) of land within the project boundary and they occur in areas between forested wetlands and emergent wetlands or open water (Georgia Power, 2016e) (table 7). They also occur on small islands formed from sediment deposition in the upper reaches of the reservoir and along the edges of beaver ponds. Dominant woody vegetation in scrub-shrub wetlands include buttonbush, alder, silky dogwood, black willow, and Virginia willow.

Emergent and herbaceous wetlands cover 143 acres (1.9 percent) of land within the project boundary (Georgia Power, 2016e) (table 7). These areas are scattered around the reservoir in shallow coves; on shallow, sediment-deposition flats in the upper reaches of the reservoir; in the Dyar Pasture Recreation Area waterfowl pond/wetland; in areas flooded by beaver dams; and in small areas along the fringe of the reservoir. Common vegetation in emergent and herbaceous wetlands include lizard's tail, marshpepper knotweed, rice cutgrass, false nettle, sedges, devil's beggartick, softrush, pennywort, alligatorweed, and parrotfeather. Alligatorweed and parrotfeather are non-native invasive aquatic plants and are discussed in greater detail below (Georgia Pest Council, 2018).

Non-native Invasive Vegetation

A total of 23 non-native, invasive plants were observed within the project boundary during the 2016 Terrestrial Resource Study (table 8). Generally, these plant species were observed to be sparsely distributed throughout the project boundary. Table 8 identifies the habitat types where these species were observed during the 2016 Terrestrial Resource Study. The project recreation facilities did not contain dominant stands of non-native invasive plants. However, exceptions include some areas that contain dominant stands of Chinese privet, Japanese stiltgrass, and alligatorweed (Georgia Power, 2016e). These three species are all ranked by the Georgia Pest Council as Category 1 non-native, invasive plants, which means that they have been determined to be a serious problem in Georgia natural areas because they have extensively invaded native plant communities and displaced native species.¹¹¹

Chinese privet is a semi-evergreen shrub or small tree that is native to Japan, South Korea, China, Western Asia, Europe, and Morocco (Swearingen *et al.*, 2010). This species tolerates a wide range of environmental conditions and has been widely planted as ornamental hedging. Prolific fruit production, subsequent consumption and dispersal by birds and other wildlife, as well as vegetative spread (i.e., root suckers) allow Chinese privet to readily invade and form dense thickets in fields, roadsides, and shady forests, especially in stream floodplains (Invasive.org, 2018). Approximately 122 acres of land within the Wallace Dam Project boundary are dominated by Chinese privet. The vast majority of this land is in the floodplain of the Oconee River at the upstream end of the project. One small population was also documented within the floodplain of the upper reaches of Richland Creek within the project boundary.

Japanese stiltgrass is an annual grass native to Japan, Korea, China, Malaysia, and India. A prolific seed producer, this species commonly invades stream banks, floodplains, ditches, emergent and forested wetlands, mesic woodlands, forest edges, trails, early successional fields, uplands, thickets, and ROW corridors. Japanese stiltgrass

¹¹¹ Georgia Pest Council's threat categories and definitions are provided in the footnotes of table 8.

tolerates both full sun and deep shaded conditions and thrives in rich soils that are high in nitrogen. Its seeds are dispersed in water (e.g., stormwater runoff, and flow of streams and floodwaters), in soil and gravel (e.g., on tires of mowing equipment, bikes, ATVs), as well as on animals' feet and people's shoes (Swearingen *et al.*, 2010). Approximately 6 acres of land within the project boundary are dominated by Japanese stiltgrass. Specifically, Japanese stiltgrass was documented in five small floodplain locations around Lake Oconee.

Alligatorweed is an emergent or rooted floating plant that is native to South America. This species invades aquatic areas and adjacent uplands. Alligatorweed forms thick mats that can displace native vegetation and wildlife habitat, clog waterways, restrict oxygen levels of water, increase sedimentation, interfere with irrigation, and prevent drainage (Invasive.org, 2018). Approximately 51 acres of emergent and herbaceous wetlands within the Wallace Dam Project boundary are dominated by alligatorweed. The largest population occurs within the Dyar Pasture Recreation Area waterfowl pond/wetland, which includes over 30 acres of emergent, scrub-shrub, and forested wetlands. Alligatorweed is the dominant emergent wetland species present within the open area of the pond/wetland. Smaller, scattered patches of alligatorweed occur along the edges of sediment-deposition islands in the upstream end of Lake Oconee. Georgia Power spot-treated this area of the lake with herbicide during the summer of 2016 to control alligatorweed.

Table 8. Non-native invasive botanical species observed during the 2016 Terrestrial Resource Study, their associated habitats at the Wallace Dam Project, and the Georgia Exotic Pest Plant Council's threat categories.

(Sources: Georgia Power (2016), and Georgia Pest Council (2019), as modified by staff).

Common Name (<i>Scientific name</i>)	Habitat Type ^a												Georgia Pest Council Threat Category ^b
	Mixed Pine- Hardwood	Floodplain & Riparian Forest	Utility Easements	Developed Areas	Mesic Slope Forest	Planted Pine/Pine Woodlands	Herbaceous/ Emergent Wetland	Granite Outcrop	Dry Pine/ Oak Forest	Forested Wetland	Scrub/ Shrub Wetland	Agricultural	
Trees and Shrubs													
Chinese privet (<i>Ligustrum sinense</i>)	X		X		X	X		X					Category 1
Tree-of-heaven (<i>Ailanthus altissima</i>)				X								X	Category 1
Autumn olive (<i>Elaeagnus umbellata</i>)	X			X								X	Category 1
Chinaberry (<i>Melia azedarach</i>)			X	X				X					Category 1
Mimosa (<i>Albizia julibrissin</i>)	X		X	X	X							X	Category 1
Multiflora rose (<i>Rosa multiflora</i>)						X						X	Category 1
Trifoliolate orange (<i>Poncirus trifoliata</i>)		X											Category 3
Cherokee rose (<i>Rosa laevigata</i>)			X										Category 4

Common Name (<i>Scientific name</i>)	Habitat Type ^a												Georgia Pest Council Threat Category ^b
	Mixed Pine- Hardwood	Floodplain & Riparian Forest	Utility Easements	Developed Areas	Mesic Slope Forest	Planted Pine/Pine Woodlands	Herbaceous/ Emergent Wetland	Granite Outcrop	Dry Pine/ Oak Forest	Forested Wetland	Scrub/ Shrub Wetland	Agricultural	
Vines													
Kudzu (<i>Pueravia lobata</i>)			X									X	Category 1
Japanese honeysuckle (<i>Lonicera japonica</i>)	X	X	X	X	X	X							Category 1
Hairy clustervine (<i>Jacquemontia tamnifolia</i>)			X										Category 4
Herbs													
Japanese stiltgrass (<i>Microstegium vimineum</i>)	X	X	X	X	X	X		X			X		Category 1
Bush lespedeza (<i>Lespedeza bicolor</i>)	X												Category 1
Sericea lespedeza (<i>Lespedeza cuneata</i>)					X	X		X				X	Category 1
Cornflower (<i>Centaurea cyanus</i>)			X										Category 3
Johnson grass (<i>Sorghum halepense</i>)			X	X								X	Category 3

Common Name (<i>Scientific name</i>)	Habitat Type ^a												Georgia Pest Council Threat Category ^b
	Mixed Pine-Hardwood	Floodplain & Riparian Forest	Utility Easements	Developed Areas	Mesic Slope Forest	Planted Pine/Pine Woodlands	Herbaceous/ Emergent Wetland	Granite Outcrop	Dry Pine/ Oak Forest	Forested Wetland	Scrub/ Shrub Wetland	Agricultural	
Bull thistle (<i>Cirsium vulgare</i>)			X			X						X	Category 4
Wild garlic (<i>Allium vineale</i>)	X	X		X								X	Category 4
Spiny/prickly sowthistle (<i>Sonchus asper</i>)	X		X									X	Category 4
Korean clover (<i>Kummerowia stipulacea</i>)			X									X	Category 4
Common mullein (<i>Verbascum thapsus</i>)			X										Category 4
Aquatic plants													
Alligatorweed (<i>Alternanthera philoxeroides</i>)							X						Category 1
Parrotfeather (<i>Myriophyllum aquaticum</i>)							X						Category 2

Common Name (<i>Scientific name</i>)	Habitat Type ^a												Georgia Pest Council Threat Category ^b
	Mixed Pine- Hardwood	Floodplain & Riparian Forest	Utility Easements	Developed Areas	Mesic Slope Forest	Planted Pine/Pine Woodlands	Herbaceous/ Emergent Wetland	Granite Outcrop	Dry Pine/ Oak Forest	Forested Wetland	Scrub/ Shrub Wetland	Agricultural	
Floating primrose-willow (<i>Ludwigia peploides</i>)							X						--

^a Habitat types were defined by Georgia Power as part of its 2016 Terrestrial Resource Study.

^b Georgia Pest Council’s Threat Categories are defined as follows:

Category 1: [Non-native invasive]¹¹² plant that is a serious problem in Georgia natural areas by extensively invading native plant communities and displacing native species.

Category 2: [Non-native invasive] plant that is a moderate problem in Georgia natural areas through invading native plant communities and displacing native species, but to a lesser degree than category 1 species.

Category 3: [Non-native invasive] plant that is a minor problem in Georgia natural areas, or is not yet known to be a problem in Georgia but is known to be a problem in adjacent states

Category 4: [Non-native invasive] plant that is naturalized in Georgia but generally does not pose a problem in Georgia natural areas or a potentially invasive plant in need of additional information to determine its true status.

¹¹² Georgia Pest Council uses the term “exotic” in its definitions of the invasive plant threat categories. The terms “exotic” and “non-native invasive” are synonyms.

Wildlife

Lake Oconee, the adjoining Oconee WMA and Oconee National Forest, and the project transmission line ROW provide habitat for many wildlife species. Common mammals observed at the project during Georgia Power's 2016 field surveys include white-tailed deer, raccoon, gray squirrel, eastern chipmunk, nine-banded armadillo, striped skunk, eastern cottontail, gray fox, fox squirrel, hispid cotton rat, and coyote. Mammals observed in wetland, littoral, and open-water habitats include American beaver, muskrat, and northern river otter. Non-native, invasive wild boar were also observed within the project boundary (Georgia Power, 2016e).

At least 115 bird species use wetland and upland habitats in the project area. Numerous species seasonally migrate through the area while many others reside locally and breed in the area. Neotropical migrant songbirds include over 20 species of warblers observed during the 2016 Terrestrial Resource Study. Common resident breeding birds include northern cardinal, American crow, blue jay, Carolina chickadee, Carolina wren, mourning dove, and red-bellied woodpecker. Raptors include red-tailed hawk, red-shouldered hawk, broad-winged hawk, turkey vulture, black vulture, Mississippi kite, osprey, bald eagle, great horned owl, and barred owl. Waterfowl include wood duck, blue-winged teal, mallard, red-breasted merganser, and Canada goose. Wading bird observations included great blue heron, great egret, green heron, and little blue heron, but no wading bird rookeries were observed. One island in the Richland Creek embayment contained four great blue heron nests (Georgia Power, 2016e).

Waterfowl habitat within the Wallace Dam Project boundary includes about 49 acres of waterfowl conservation area at the Forest Service's Dyar Pasture Recreation Area near the upstream end of Lake Oconee (figure 16) and three smaller waterfowl impoundments downstream from Wallace Dam in the Oconee WMA (Ponds 2, 3, and 4; figure 17).¹¹³ The Dyar Pasture waterfowl conservation area includes over 30 acres of emergent, scrub-shrub, and forested wetlands that serve as waterfowl habitat and a bird sanctuary. Georgia DNR uses a dike and outlet structure to manage the water levels in the pond at Dyar Pasture for the Forest Service (Georgia Power, 2016e).

¹¹³ Pond 1 on figure 17 is outside of the Wallace Dam Project boundary.

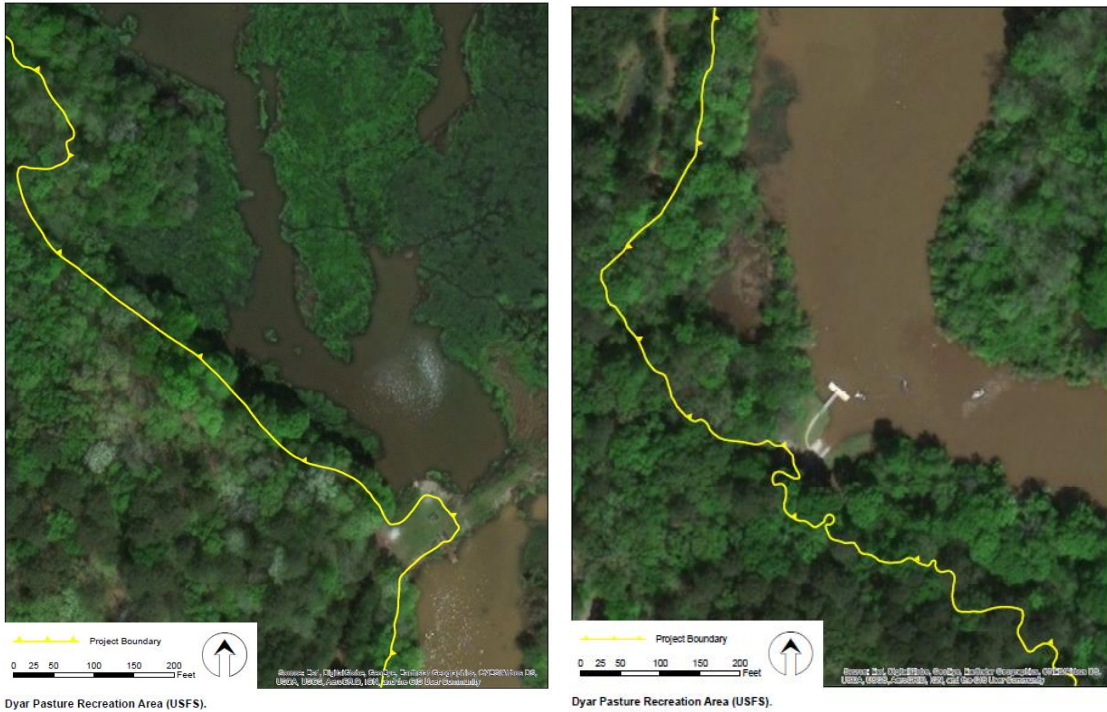


Figure 16. Waterfowl habitat at Dyar Pasture Recreation Area.
(Source: Georgia Power, 2019a.)

Georgia DNR also manages waterfowl Ponds 2 and 3 downstream from Wallace Dam, but no longer actively manages Pond 4. The control structure at Pond 2 is currently non-operational because of erosion of the dike and other maintenance issues. Pond 2 encompasses about 13 acres and is vegetated by mid-successional stands of green ash, red maple, river birch, and blackgum. It is managed as a waterfowl refuge area, with no hunting allowed. Pond 3 is actively managed as a seasonally flooded agricultural field covering about 25 acres. Black willow, box elder, and red maple occupy higher elevations around the pond. Pond 3 is available for public wildlife viewing, bird observations, and educational purposes, while hunting is allowed by quota only.¹¹⁴

¹¹⁴ A quota hunt allows a predetermined number of hunters to participate in order to conserve wildlife and their habitats, and to provide a high quality, safe hunting experience (Georgia DNR, 2019).

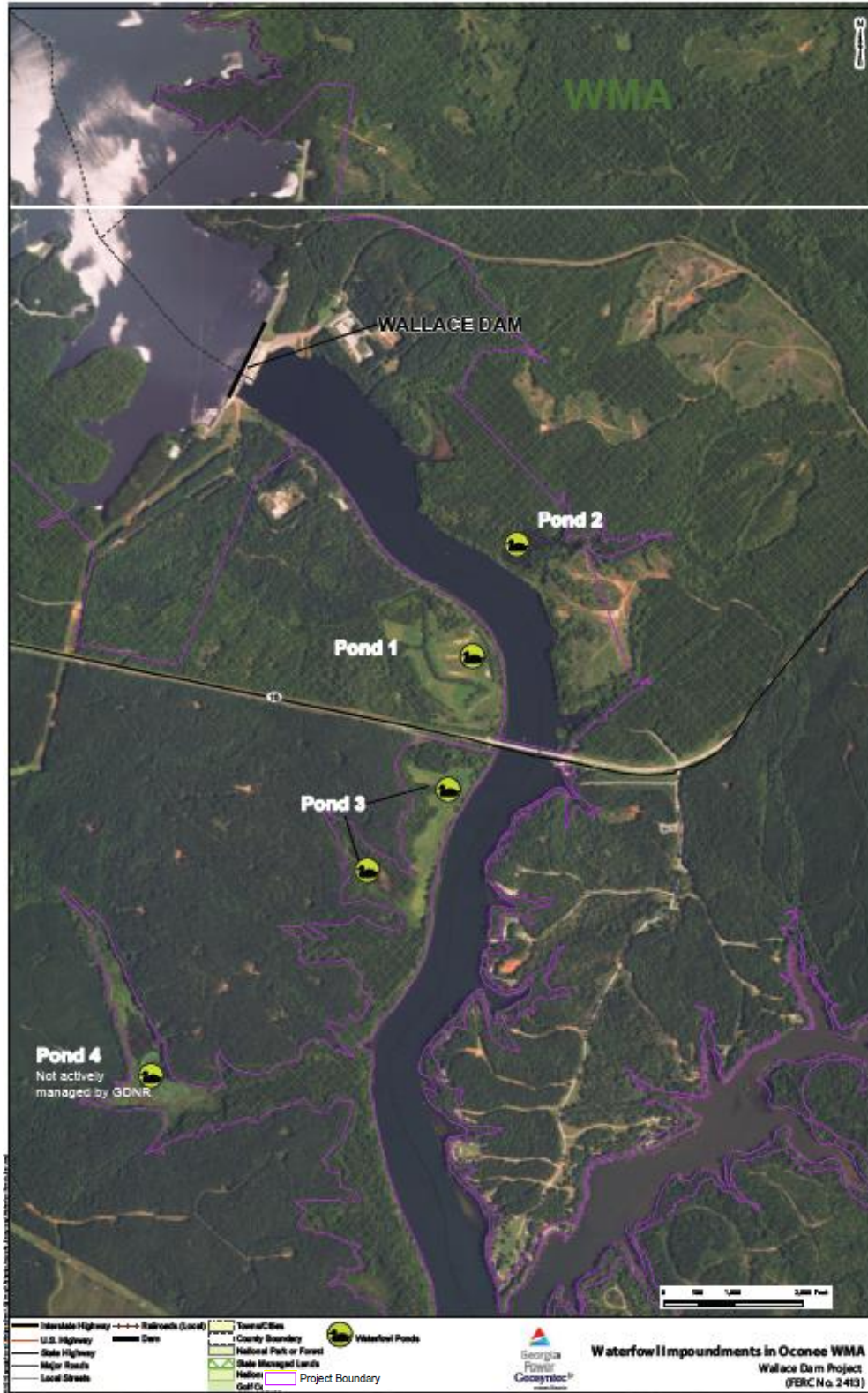


Figure 17. Location of waterfowl Ponds 2, 3, and 4 within the Wallace Dam Project boundary downstream from Wallace Dam. (Source: Georgia Power, 2018; as modified by staff.)

Pond 4 is about 54 acres and has scrub-shrub and emergent wetlands with areas of open water. Common vegetation includes black willow, silky dogwood, and alder. Hunting is allowed on Pond 4. Recent Georgia DNR annual aerial surveys of these ponds have recorded an average of 400 ducks, including ring-necked duck, green-winged teal, mallard, wood duck, gadwall, and northern shoveler.

Common amphibian and reptile species in the project area include southern leopard frog, Cope's gray treefrog, southern cricket frog, southern toad, American bullfrog, green anole, five-lined skink, black racer, northern water snake, eastern copperhead, and eastern kingsnake (Georgia Power, 2016e). Turtles that commonly occur in Lake Oconee and tributary streams include pond slider and river cooter.

Wildlife species observed along the project transmission line ROW include Northern bobwhite quail and Bachman's sparrow, a state listed rare species that is discussed further below.

Special Status Terrestrial Species

Georgia Power (2016d) identified and evaluated federally and state protected species and other species of interest with known records of occurrence in the four-county project vicinity. Seven federally listed species potentially occur within the project vicinity, including the endangered red-cockaded woodpecker, black-spored quillwort, mat-forming quillwort, harperella, and Michaux's sumac; and the threatened wood stork and little amphianthus, which is also known as pool sprite.¹¹⁵ Pool sprite presently occurs on granite outcrop habitat within the Wallace Dam Project boundary. Federally listed species are discussed further in section 3.3.4, *Threatened and Endangered Species*. Thirteen other Georgia protected plant and wildlife species potentially occur in the project vicinity (table 9).

¹¹⁵ Georgia Power's documents refer to *Amphianthus pusillus* as "pool sprite," while FWS and NatureServe use the common name "little amphianthus."

Table 9. Special status terrestrial species documented in Greene, Hancock, Morgan, or Putnam Counties and/or at the Wallace Dam Project. (Sources: Georgia Power, 2016d, as modified by staff; NatureServe (2019); and Georgia DNR (2013)).

Common Name (<i>Scientific Name</i>)	Federal Status	State Status/ Rank	Occurrence Counties/Project Occurrence Data	Habitat/Distribution Notes	Suitable Habitat at the Project
Reptiles					
Southern hognose snake (<i>Heterodon simus</i>)	--	T/ S1S2	Hancock Co./ No records in project vicinity.	Well-drained, dry, sandy soils where longleaf pine and/or scrub oaks are the characteristic woody vegetation. Also found in wiregrass, fallow-fields, and fire-maintained areas.	Yes
Spotted turtle (<i>Clemmys guttata</i>)	--	U/ S3	Hancock Co. (Georgia DNR, 2013) (NatureServe, 2019).	Heavily vegetated swamps, marshes, bogs, small ponds, and tidally influence freshwater wetlands; nest and possibly hibernate in surrounding uplands.	Yes
Birds					
Bald eagle (<i>Haliaeetus leucocephalus</i>)	BGEPA	T/ S3	Greene, Morgan, Hancock, and Putnam Co./ Observed during field surveys; Georgia DNR data.	Widespread distribution and large numbers of occurrences in North America. Nests and perches in tall living trees, especially pines, in mature forests near large open water where foraging occurs (NatureServe, 2019).	Yes
Red-cockaded woodpecker (<i>Picoides borealis</i>) ¹¹⁶	E	E/ S2	Putnam Co./ Georgia DNR data.	Large expanses of mature, open pine forest, particularly longleaf, slash, or loblolly pine; nests in old living pines.	No

¹¹⁶ Some taxonomic authorities place this species in the genus *Picoides* and others place it in the genus *Leuconotopicus*.

Common Name (Scientific Name)	Federal Status	State Status/ Rank	Occurrence Counties/Project Occurrence Data	Habitat/Distribution Notes	Suitable Habitat at the Project
Wood stork (<i>Mycteria americana</i>)	T	E/ S3	-/FWS data.	Forages in freshwater marshes depressions, swamps, lagoons, ponds, flooded fields and ditches, as well as brackish wetlands. Nests in canopies of cypress trees, mangroves, or dead hardwoods over or adjacent to shallow water bodies (NatureServe, 2019).	Yes
Bachman's sparrow (<i>Peucaea aestivalis</i>)	--	R/ S2	Hancock Co./ Calls identified at six locations along project transmission line ROW during field surveys.	Open and mature pinewoods with well-developed grass/herb layer and only patchy areas of shrubs or hardwoods in the midstory. Also uses clearcuts, utility ROWs, and early succession stage of old fields with dense ground cover. Historically inhabited longleaf pine woodlands with regular wildfires (NatureServe, 2019).	Yes
Plants					
Little amphianthus, or Pool sprite (<i>Amphianthus pusillus</i>)	T	T/ S2	Greene, Putnam, and Hancock Co./ Observed during field surveys; Georgia DNR data.	Shallow, flat-bottomed depressions on granite outcrops, with thin gravelly soils and winter through spring inundation.	Yes
Black-spored quillwort (<i>Isoetes melanospora</i>)	E	E/ S1	Greene Co./ No records in project vicinity.	Shallow, temporarily flooded, flat bottomed pools formed by natural erosion on granite outcrops.	Yes
Mat-forming quillwort (<i>Isoetes tegetiformans</i>)	E	E/ S1	Greene, Putnam, and Hancock Co./ Georgia DNR data.	Shallow pools formed by natural erosion on granite outcrops.	Yes

Common Name (Scientific Name)	Federal Status	State Status/ Rank	Occurrence Counties/Project Occurrence Data	Habitat/Distribution Notes	Suitable Habitat at the Project
Harperella (<i>Ptilimnium nodosum</i>)	E	E/ S1	Greene, Putnam, and Hancock Co./ Georgia DNR data.	Granite outcrop seeps.	Yes
Michaux's sumac (<i>Rhus michauxii</i>) ¹¹⁷	E	E/ S1	Newton Co./ No records in project vicinity.	Dry, open, rocky, or sandy woodlands over magnesium- and iron-rich bedrock; on ridges and river bluffs.	Yes
Carolina trefoil (<i>Acmispon helleri</i>)	--	E/ S1	Greene Co./ No records in project vicinity.	Openings in post oak and blackjack oak woodlands with clay soils, over bedrock high in iron and magnesium; clearings, roadsides, and right-of-ways.	Yes
Sun-loving draba (<i>Draba aprica</i>)	--	E/ S1S2	Putnam Co./ Georgia DNR data.	A perennial herb that inhabits shallow soils on and around granite outcrops, usually near the edges of groups of eastern red cedar trees.	Yes
Dwarf hatpins (<i>Eriocaulon koernickianum</i>)	--	E/ S1	Greene and Hancock Co./ No records in project vicinity.	Seepage areas and wet depressions on granite outcrops, often with horned bladderwort.	Yes
Oglethorpe oak (<i>Quercus oglethorpensis</i>)	--	T/ S2	Greene and Putnam Co./ Georgia DNR data.	Wet clay soils of upland seepage swamps, stream terraces, and moist hardwood forests.	Yes
Bay star-vine (<i>Schisandra glabra</i>)	--	T/ S2	Morgan Co./ No records in project vicinity.	Moist, deciduous hardwood forests on lower slopes, stream terraces, and floodplains.	Yes

¹¹⁷ Michaux's sumac was added to Georgia Power's list of special status species during the study phase at the request of FWS. See FWS October 26, 2015 Comments at 2; <https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14023806>.

Common Name (Scientific Name)	Federal Status	State Status/ Rank	Occurrence Counties/Project Occurrence Data	Habitat/Distribution Notes	Suitable Habitat at the Project
Granite stonecrop (<i>Sedum pusillum</i>)	--	T/ S3	Greene Co./ No records in project vicinity.	Granite outcrops, usually in mats of moss beneath red cedar trees.	Yes
Ovate catchfly (<i>Silene ovata</i>)	--	R/ S1S2	Hancock Co./ No records in project vicinity.	Mesic ¹¹⁸ deciduous or beech-magnolia forests over limestone; boulder, high elevation oak forests.	No
Silky camellia (<i>Stewartia malacodendron</i>)	--	R/ S2	Hancock Co./ No records in project vicinity.	Rich ravine and slope forests; lower slopes of sandhills above bogs and creek swamps.	No
Piedmont barren strawberry (<i>Waldsteinia lobata</i>)	--	R/ S2	Morgan Co./ No records in project vicinity.	Stream terraces, floodplain forests, and rocky lower slopes with oak-hickory-pine forests.	Yes
Pink ladyslipper (<i>Cypripedium acaule</i>)	--	U/ S4	Greene and Morgan Co. (NatureServe, 2019); Putnam Co., ¹¹⁹ Historic location in project vicinity; Georgia DNR data.	Bogs, swamps, as well as drier oak or coniferous woodlands in acidic soil (NatureServe, 2019).	Yes

-- — Not listed

¹¹⁸ Mesic habitats have a moderate or well-balanced supply of moisture.

¹¹⁹ County occurrence documented in Georgia DNR's coordinate data provided as appendix A of Georgia Power's Rare, Threatened, and Endangered Species Study Report (Georgia Power, 2016d).

Federal Status

E — Listed Endangered; a species that may become extinct or disappear from a significant part of its range if not immediately protected.

T — Listed Threatened; a species that may become endangered if not protected.

BGEPA — Protected by the Bald and Golden Eagle Protection Act

State Status

E — Listed Endangered; a species which is in danger of extinction throughout all or part of its range.

T — Listed Threatened; a species which is likely to become an endangered species in the foreseeable future throughout all or parts of its range.

R — Listed Rare; a species which should be protected because of its scarcity.

U — Listed Unusual, and thus deserving of special consideration (e.g., plants subject to commercial exploitation).

S1 — Critically imperiled in Georgia because of extreme rarity or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state.

S2 — Imperiled in Georgia because of rarity due to very restricted range, very few populations, steep declines, or other factors making it very vulnerable to extirpation from state.

S3 — Vulnerable in the state due to a restricted range, relatively few populations, recent and widespread declines, or other factors making it vulnerable to extirpation.

S4 — Apparently Secure; Uncommon but not rare; some cause for long-term concern due to declines or other factors.

S#S# — A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species or ecosystem.

Georgia DNR data on state protected plants include records of occurrences of sun-loving draba and Oglethorpe oak. Sun-loving draba was documented on the granite outcrop in the Oconee WMA, within the project boundary and next to Lawrence Shoals Park. Oglethorpe oak occurs in limited areas on both sides of Lake Oconee in Green and Putnam Counties. However, neither of these species were observed during the field reconnaissance surveys. None of the other state listed plant species were observed within the project boundary during the field reconnaissance surveys (table 9).

In addition, four Georgia protected wildlife species (two reptiles and two birds) potentially occur in the project vicinity (table 9). The two state protected birds presently occur within, and adjacent to, the project boundary, including bald eagles¹²⁰ and Bachman's sparrows. Bald eagles currently reside at the project year-round and were observed in scattered locations around Lake Oconee during the reconnaissance survey (Georgia Power, 2016d and 2016e). Based on 2016 data from Georgia DNR, at least two active bald eagle nests were located within the project boundary and five others were either abandoned or of undetermined status. A total of five eaglets successfully fledged during 2016 from nests surrounding Lake Oconee. During the field reconnaissance survey, the calls of Bachman's sparrows were identified at six locations along the project transmission line ROW. The two state protected reptiles, southern hognose snake and spotted turtle, are not presently known to occur within the project boundary. In Georgia, both species historically occurred primarily south of the project in the Coastal Plain (NatureServe, 2019).

Vegetation and Wildlife Management on Georgia Power Lands

Regular Vegetation Management at Project Facilities

Georgia Power maintains vegetation at the project facilities such as the powerhouse, dam, and most project buildings as manicured lawns with some limited landscaped areas that contain trees and/or shrubs. Vegetation in the project transmission line ROW is managed according to guidance in Southern Company's Transmission Vegetation Management Program, which includes an integrated vegetation management philosophy, as well as NERC's vegetation management requirements. A variety of mechanical and chemical methods (e.g., mowing, grinding, pruning, manual cutting, herbicide applications, growth regulators, and establishment of native vegetation) are used to maintain predominantly shrub and herbaceous vegetation in the ROW. Taking into account that some common vegetation can grow very quickly (e.g., 15 to 20 feet within

¹²⁰ Bald eagles are also federally protected under the Bald and Golden Eagle Protection Act.

three growing seasons 6- to 8-months-long each), and that lateral (side) growth tends to be slower than vertical growth rates, Georgia Power mows every 6 years, prunes lateral limbs to the edge of the ROW every 10 years, and applies herbicides once or twice during the 6-year mowing cycle to control re-sprouting. Vegetation inspections are conducted once annually, and if necessary, additional vegetation management is done to ensure adequate clearance for the transmission line conductors (Georgia Power, 2015c).

Forest Stand Management

The Wallace Dam Project includes about 1,136 acres of forested land in addition to the shoreline buffer, small access areas adjacent to the shoreline, and some forested islands in Lake Oconee. A certified forester manages these lands using various silvicultural practices,¹²¹ in accordance with Georgia Power's forestry and timber management program and the Forest Management Plan. Georgia Power's management objectives for the forested land within the project boundary are conservation, shoreline buffer for water quality protection, timber production, wildlife habitat, recreation, cultural site protection, and aesthetics. Some of the most common silvicultural BMPs used at the project to achieve these objectives include: (1) using maps and reconnaissance to identify water courses (including perennial and intermittent streams) and potentially sensitive sites to plan silvicultural activities; (2) designating streamside management zones¹²² to protect water quality; (3) minimizing stream crossings; (4) maintaining a 100-foot-wide vegetated shoreline buffer with limited harvesting, and no harvesting within 25 feet of the lake shoreline; and (5) designing and installing firebreaks, roads, and loading areas to prevent erosion and protect water quality (Georgia Power, 2019a).

Georgia Power's forester actively manages the following tracts inside the project boundary for timber production and also to maintain forage and cover for wildlife: Area A-1 (125 acres); Area A-2 (471 acres); Area B-3 (87 acres);

¹²¹ Silvicultural practices are techniques for managing the growth and composition of forest vegetation for an array of objectives, such as wildlife habitat, timber harvests, water resources, recreation, etc. (Forest Service, 2019).

¹²² Streamside management zones are buffer strips adjacent to perennial or intermittent streams or other bodies of water that are designated and managed with special considerations to protect water quality. See Georgia Forestry Commission's *Georgia's Best Management Practices for Forestry* (Georgia Power, 2019a).

Area B-5 (79 acres); and 764 acres within the Oconee WMA (figure 18).¹²³ On these tracts, Georgia Power implements long rotation¹²⁴ management of both loblolly and shortleaf pines on the uplands, while promoting the growth of mixed hardwood forests (e.g., southern red oak, water oak, willow oak, cherrybark oak, hickories, maples, tulip poplar, flowering dogwood, winged elm, sweetgum, green ash, box elder, and river birch) in the streamside management zones. The mast-producing¹²⁵ hardwoods are generally not harvested once established to provide forage for wildlife. A few upland stands have been regenerated to improved loblolly pine (i.e., selectively bred for improved timber production). The forested shorelines are infrequently thinned to encourage regeneration of shade-tolerant species. Areas A-2, B-3, and B-5 also are designated as future recreation sites. Therefore, Georgia Power considers aesthetics and safety, in addition to forest and wildlife management, when managing these areas. This management entails removing some mature pines to foster growth of hardwoods and sub-canopy trees such as dogwoods (Georgia Power, 2015c).

¹²³ The estimated acreages of managed forest tracts within these areas varied in Georgia Power's filings (Georgia Power, 2015c, 2018, and 2019a).

¹²⁴ The end of the long rotation cycle for Georgia Power's timber management areas is age 35 or above, with stand thinning beginning around age 16 and continuing every 10 years, and prescribed burning (where practicable) every three to five years after thinning until the final harvest.

¹²⁵ Mast is the botanical term for nuts, seeds, buds, or fruits of trees and shrubs that are eaten by wildlife. Examples of mast-producing trees are oaks, hickories, and beech trees that produce nuts (i.e., acorns, hickory nuts, and beechnuts).

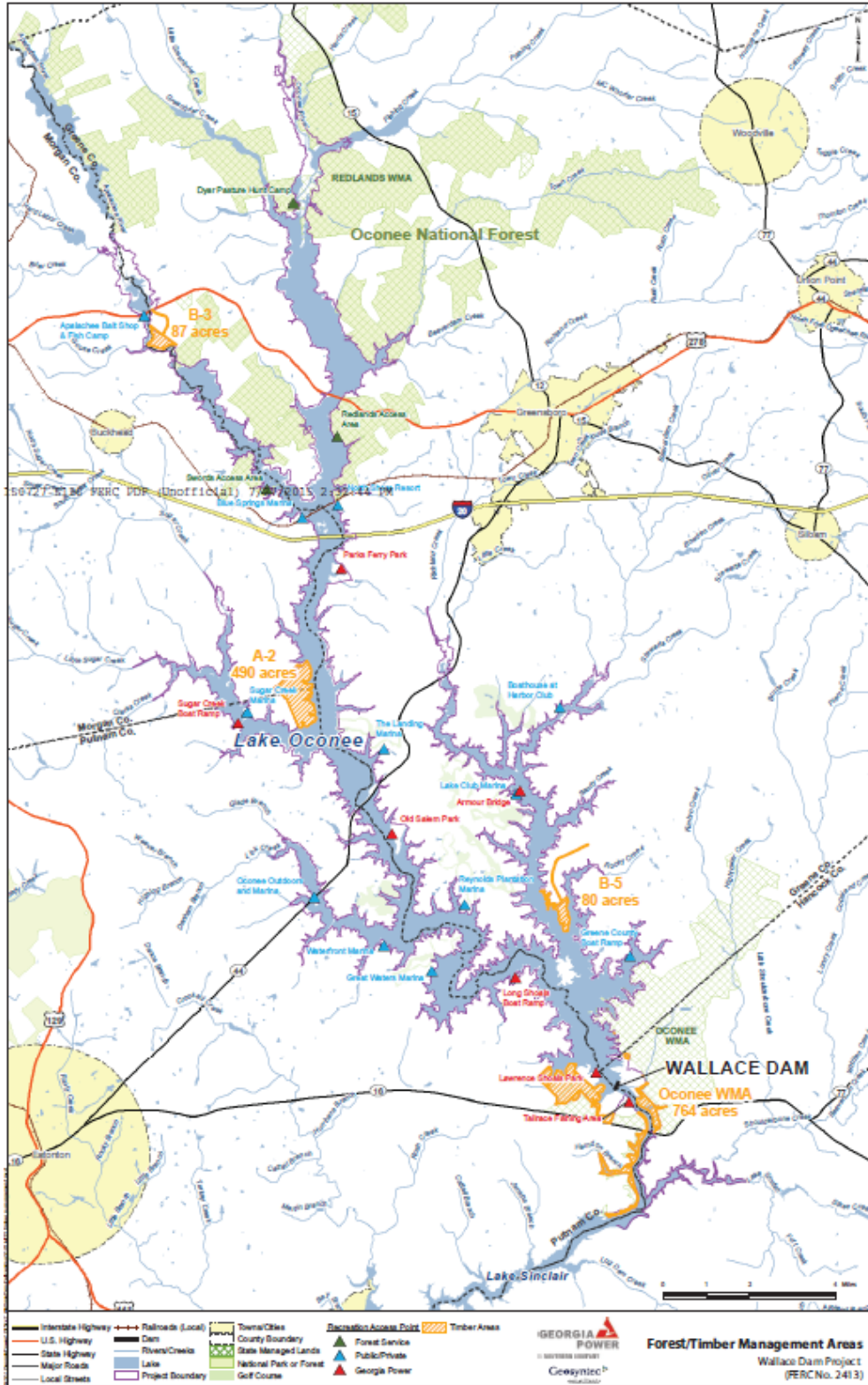


Figure 18. Forest and timber management areas within the Wallace Dam Project. (Source: Georgia Power (2015c); as modified by staff.)

Non-Native, Invasive Vegetation Management

Georgia Power conducts some non-native invasive vegetation management activities at the project. In order to prevent infestations of nuisance invasive aquatic plants that could affect public access to the reservoir or Wallace Dam operation, Georgia Power monitors for invasive aquatic vegetation during routine activities on the reservoir, and periodically treats them within Lake Oconee. For example, Georgia Power has treated small areas (i.e., 1 acre or less) of alligatorweed and parrotfeather in the past 11 years. Floating primrose-willow, an invasive aquatic plant from South America, was detected at Oconee Lake in 2014, but had not been treated as of mid-2015.

In addition, Georgia Power administers a shoreline aquatic vegetation management program for homeowners through its website.¹²⁶ This program allows property owners to apply for an Individual Aquatic Herbicide Treatment Permit for nuisance aquatic vegetation. If approved by Georgia Power, the permit allows the homeowner to contract the work using a state-certified, commercial applicator of aquatic pesticides.

Georgia Power also manages terrestrial non-native invasive plants through participation in the Georgia Pest Council and coordination with the Georgia Forestry Commission. Information about non-native invasive plant infestations and species of concern shared by Georgia Pest Council is directed to the Georgia Power forester, who visually monitors for occurrences of invasive plants at the project. If these species spread and/or threaten to adversely affect timber or facilities, Georgia Power treats them with an approved herbicide (Georgia Power, 2015c; 2017).

Wildlife Management

Georgia Power implements BMPs to protect wildlife on project lands that were developed by, or in consultation with, Georgia DNR, Georgia Forestry Commission, FWS, and other resource agencies and stakeholders. These BMPs include the Georgia DNR's Forestry Wildlife Partnership guidelines, Georgia Forestry Commission's BMPs for blending forest and wildlife management on forested project lands, Georgia Power's Avian Protection Plan, and the Project WINGS (Wildlife Incentives for Nongame and Game Species) program.

¹²⁶ Georgia Power's aquatic vegetation management program can be accessed at: <http://georgiapowerlakes.com/oconeesinclair/aquatic-vegetation-management/>.

Georgia DNR's Forestry Wildlife Partnership is a comprehensive wildlife management program that supports restoration and maintenance of critical characteristics of natural ecosystems. Landowner partners are encouraged to implement a Wildlife Conservation Plan, provide education and outreach, enhance wildlife conservation, protect sensitive sites, and promote wildlife recreation (Georgia Power, 2019a; Georgia DNR, 2006).

Georgia Power also implements the Georgia Forestry Commission's BMPs for blending forest and wildlife management. These BMPs include: (1) comparing current habitat conditions and those on adjacent land to wildlife management objectives before making land management decisions; (2) using widths for streamside management zones (riparian buffers) that would benefit wildlife; (3) managing for diverse forest types and age classes to enhance wildlife habitat quality; (4) maintaining mature mast producing hardwoods in groups or stands; (5) leaving corridors of trees connecting mature forest stands to provide food, cover, and travel avenues for wildlife while adjacent stands are regenerating; (6) leaving snags, dead and down woody debris, brush piles, or windrows¹²⁷ throughout timber harvest areas to provide ground cover for small game and non-game wildlife and birds; (7) using prescribed fire to improve and maintain rare plant and animal ecosystems; and (8) using wildlife-friendly plantings for log decks, roads, and skid trails following logging operations.

Georgia Power's Avian Protection Program specifies procedures to be followed by all Georgia Power employees to maintain compliance with the Migratory Bird Treaty Act, the Bald and Golden Eagle Protection Act, and the ESA, as it applies to avian species. This plan establishes a company policy of not disturbing wildlife and includes guidance pertaining to: (1) active nests; (2) injured birds; (3) handling live or dead birds or their nests only in accordance with permits issued by the FWS; (4) not disturbing live or dead birds, or nests of threatened and endangered avian species; (5) appropriate remedial actions for avian interactions; (6) reporting any protected, threatened, endangered, or migratory species (including eggs or chicks) suspected to be in an area that project operations would impact; and (7) reporting immediately any woodpecker nest cavities found in live pine trees that are subject to project operations.

Georgia Power also participates in the Project WINGS (Wildlife Incentives for Nongame and Game Species) program. This program is a ROW management campaign that encourages the design of new wildlife habitats beneath electrical

¹²⁷ A windrow is logging debris and unmerchantable woody vegetation that is piled into rows to decompose or be burned (Georgia Power, 2019a).

transmission lines with the goal of establishing more natural, wildlife-friendly communities (Georgia Power, 2015c).

3.3.3.2 Environmental Effects

Project Operation and Maintenance

Terrestrial resources may be affected by proposed project operation and maintenance activities, including fluctuating water levels associated with pumpback operation, reservoir drawdowns, and vegetation and shoreline management. As stated in section 2.2.2, *Proposed Project Operation*, and discussed in section 3.3.2, *Water Resources*, Georgia Power proposes to continue to operate the reservoir between 433.0 feet and 435.0 feet 100 percent of the time, with a 1.5-foot average daily fluctuation, except for dam maintenance and emergency drawdowns. Georgia Power proposes to consult with Georgia DNR prior to any non-emergency drawdown below 433.0 feet (at least 10 days in advance), and notify Georgia DNR, FWS, and the Commission within 10 days after any emergency drawdown. In addition, Georgia Power proposes to continue to implement its drought protocol, using storage in Lake Oconee to meet the Sinclair Project's 250-cfs minimum flow requirement. No changes are proposed for the operation and maintenance of the pond at Dyar Pasture Recreation Area. With the exception of repairs to the outflow structure and associated dike at Pond 2, no changes are proposed for the operation and maintenance of Ponds 2, 3, and 4 downstream from Wallace Dam.

No stakeholders recommend changes to Georgia Power's proposed operation of the Wallace Dam Project.

Our Analysis

Operation and maintenance of the project reservoir can affect wetlands, riparian habitat, and associated wildlife by modifying the natural flows through the river basin and maintaining segments of streams as regulated lacustrine¹²⁸ waterbodies instead of free-flowing riverine environments. However, the existing wetlands at the project developed under the hydroperiod¹²⁹ established by the existing pumped-storage mode. Vegetation in the project wetlands is adapted to the 1.5- to 2-foot fluctuations associated with the natural inflows to the project reservoir and the regulated pump-back and outflows from the project, and would

¹²⁸ Lacustrine refers to permanently or temporarily flooded lakes and reservoirs.

¹²⁹ A hydroperiod is the seasonal pattern of water levels within a wetland.

not be affected any differently by continued project operation during any new license term for the project.

While Georgia Power's proposal does not include regular drawdowns of Lake Oconee for homeowner and shoreline maintenance, planned dam maintenance activities may require drawdowns. For dam maintenance and any other non-emergency drawdowns of the reservoir below elevation 433.0 feet, Georgia Power's proposal to consult with Georgia DNR, and notify FWS and the Commission of the drawdown schedule, in advance would allow stakeholders to discuss and address any potential concerns related to wetlands, riparian habitat, and other terrestrial resources at the project.

Similarly, notifying Georgia DNR, FWS, and the Commission of any emergency operating conditions, within 10 days after the incident would allow stakeholders to document and address any potential adverse effects of emergency operations on terrestrial resources. During several recent drought years, Georgia Power implemented its drought protocol, and the drawdowns of Lake Oconee were up to 4.25 feet below the normal full pond elevation (i.e., 430.75 feet). This type of drought-related drawdown would be limited to the driest months of drought years and are necessary to support the downstream Sinclair Project's minimum flow requirement, which also protects aquatic resources downstream, as discussed in section 3.3.2, *Water Resources*. Minimizing reservoir drawdowns to the extent feasible would benefit project wetlands and associated wildlife by maintaining the existing frequency and duration of inundation within the reservoir and flows downstream from the project dam.

The project reservoir provides habitat for a variety of wildlife that occur in wetland, riparian, littoral, and open-water habitats, as evidenced by the species observed during the applicant's 2016 field surveys. Some of the existing wetlands within, and adjacent to, Lake Oconee are influenced by beaver activity in the project area. Continuing the existing reservoir operating regime with minimum downstream flows, would not affect existing wetland habitats and associated wildlife. Maintaining the existing frequency and duration of reservoir elevations and downstream flows would preserve wetland habitats and associated wildlife species, such as beavers, muskrats, northern river otter, osprey, bald eagle, several species of herons and egrets, many species of waterfowl, pond slider, river cooter, southern leopard frog, southern cricket frog, southern toad, American bullfrog, and northern water snake that are known to occur at the Wallace Dam Project.

Management of Dyar Pasture and Ponds 2, 3, and 4

Terrestrial resources may be affected by ongoing management of the waterfowl ponds within the project boundary, including the pond at Dyar Pasture

Recreation Area, and Ponds 2, 3, and 4 downstream from Wallace Dam. No changes are proposed for the operation and maintenance of the pond at Dyar Pasture. As outlined in section 3.3.3.1, *Terrestrial Resources- Affected Environment*, Georgia DNR uses a dike and outlet structure at the Dyar Pasture pond to manage the area for the Forest Service as waterfowl habitat and a bird sanctuary. Georgia DNR also actively manages Ponds 2 and 3 located within the Oconee WMA downstream from Wallace Dam, but no longer actively manages Pond 4. Georgia DNR's management activities include flooding the ponds in the fall before winter waterfowl migration, keeping them full during the winter, draining them during the spring, and planting them with grain crops that serve as forage for waterfowl during the spring and summer. With the exception of repairs to the outflow structure and associated dike at Pond 2, no changes are proposed for the operation and maintenance of Ponds 2, 3, and 4.

No stakeholders recommend changes to ongoing operation and maintenance of the pond at Dyar Pasture, or Ponds 2, 3, and 4.

Our Analysis

The Dyar Pasture waterfowl conservation area near the upstream end of Lake Oconee, and Ponds 2, 3, and 4 downstream from Wallace Dam also provide habitat for a variety of wildlife. However, the pond at Dyar Pasture is infested with alligatorweed, a non-native invasive plant, and active management of Pond 2 is currently hindered by erosion of the dike and other maintenance issues at the water control structure. Non-native invasive plant management is discussed in more detail below (*see discussion of Non-Native, Invasive Vegetation Management*).

The dike at Pond 2 is very steep along its entire length and its slopes are covered by trees and other vegetation, which have the potential to continue to compromise the structural integrity of the dike. Georgia Power's proposal to work with Georgia DNR to repair the eroded portion of the Pond 2 dike, and inspect the water level control structure on the eastern shore of the Wallace Dam tailrace area, would prevent further erosion and allow for restoration of riparian vegetation that would not undermine the stability of the dike. The repairs would also facilitate resumed management (i.e., seasonal flooding, draining, and planting) of Pond 2 as refuge habitat for waterfowl such as ring-necked duck, green-winged teal, mallard, wood duck, gadwall, and northern shoveler. Other wildlife that use wetland, riparian, littoral, and open-water habitats would also benefit from the repairs at Pond 2. Ongoing management of these ponds would also facilitate continued public enjoyment of the Dyar Pasture Recreation Area and Oconee WMA through wildlife viewing, educational programs, and hunting (i.e., where permitted at Ponds 3 and 4).

Vegetation Management

Georgia Power proposes to continue to manage vegetation at the Wallace Dam Project as it has historically. Regular vegetation management activities at the project include mechanical and chemical treatments within the ROW and at other project facilities, implementation of Georgia Power's Forest Management Plan and other forestry and timber management policies, and management of both aquatic and terrestrial non-native, invasive vegetation (Georgia Power, 2015c, 2019a), as described in section 3.3.3.1, *Terrestrial Resources - Affected Environment*.¹³⁰

Forest Service 4(e) Conditions 12, 13, 14, 18, 19, 20, 21, and 22 would require Georgia Power to implement measures to minimize the potential effects of project operation, maintenance, and construction on botanical resources in the project area. The conditions would require Georgia Power to: (1) implement Pesticide-Use Restrictions on national forest system lands (Condition 12); (2) consult annually with the Forest Service and establish a Consultation Group (Conditions 13 and 14, respectively); (3) develop invasive species management plans (Condition 18);¹³¹ (4) review special status species lists annually and consult with resource agencies if new listed species are adversely affected by the project (Condition 19); (5) develop an Erosion and Sediment Control Plan (Condition 20); (6) develop a Fire Management and Response Plan (Condition 21); and (7) conduct annual employee training on special status species, noxious weeds, and environmentally sensitive areas within, or adjacent to, the Wallace Dam Project boundary on national forest system lands (Condition 22). These measures are summarized in detail in section 2.2.4, *Modifications to Applicant's Proposal – Mandatory Conditions*.

Georgia Power does not oppose Forest Service's 4(e) conditions (Georgia Power, 2019b).

¹³⁰ Management of aquatic non-native, invasive fauna is discussed further in section 3.3.2.2, *Water Resources– Environmental Effects*.

¹³¹ Forest Service's recommended plan for managing terrestrial invasive vegetation includes provisions for general vegetation management and protection of special status species.

Our Analysis

Regular Vegetation Management at Project Facilities

Continuing to implement Georgia Power's Transmission Vegetation Management Program in the project transmission line ROW and other regular vegetation management surrounding the powerhouse, dam, and other project buildings would maintain the existing, early succession vegetation that is compatible with power generation and transmission land uses at the project. Occasionally, maintenance and vegetation management is required within the riparian buffer of stream channels crossing the project transmission line ROW. Wetlands in the vicinity of the Wallace Dam transmission line are primarily palustrine forested, scrub-shrub, and emergent wetlands associated with small tributary streams (e.g., Jenkins Branch, Crooked Creek, Turkey Creek, and Rooty Creek) that drain south to Lake Sinclair. According to Georgia Power's Transmission Vegetation Management Program, in all cases where herbicides are used around waterways or wetlands, only herbicides labeled for these areas are used. In addition, heavy equipment is restricted from wet areas to minimize the potential for rutting (Georgia Power, 2015c). Continuing to implement these BMPs for vegetation management in, or adjacent to, wetlands and streams would prevent soil and disturbance and erosion, and minimize potential adverse effects on low-growing wetland vegetation, such as scrub-shrub and herbaceous species which would be compatible with the transmission line corridor land use.

Forest Service 4(e) Condition 12, regarding pesticide-use restrictions on national forest system lands, applies to pesticide applications (i.e., to control undesirable woody and herbaceous vegetation, aquatic plants, insects, rodents, non-native fish, etc.) on lands within the national forest or in areas affecting national forest land. Georgia Power would be required to request the Forest Service's permission prior to using pesticides in these areas. Any request to use pesticides would include: (1) a determination as to whether pesticide applications are essential for use on national forest system lands; and (2) the specific proposed locations, herbicides, timeframes for application, application rates, dose and exposure rates, and safety risk. The project dam, powerhouse, and transmission line ROW are not located within, or adjacent to, the Oconee National Forest or other national forest lands. However, implementing this measure would allow Georgia Power to coordinate with the Forest Service on any pesticide applications that would occur in areas within, or adjacent to, the Oconee National Forest to protect vegetation and wildlife, including any sensitive species, from potential adverse effects of these chemicals.

Forest Service 4(e) Condition 18 would require Georgia Power to develop a Vegetation and Invasive Weed Management Plan with provisions for both regular

vegetation management and non-native, invasive plant management.¹³² The regular vegetation management provisions of the plan would include: (1) revegetation implementation and monitoring; (2) treatment protocols for vegetation management (e.g., hazardous fuels reduction and hazard tree management); (3) pesticide/herbicide use approval and restrictions; and (4) annual reporting guidelines. Georgia Power's general vegetation management at the powerhouse, dam, and other project buildings is not as well defined as the Transmission Vegetation Management Program for the transmission line ROW. Thus, developing a plan that defines both general vegetation management and non-native invasive plant management would facilitate coordinated vegetation management in the project area that meets Georgia Power and resource agencies' goals and objectives for the lands they each maintain. Non-native invasive vegetation management is discussed further below.

Forest Service 4(e) Conditions 13, 14, 19, and 22 would, in part, require consultation regarding vegetation management and, thereby ensure that requirements are communicated to, and implemented correctly by, Georgia Power's staff. Establishing a Consultation Group and consulting annually with Forest Service would allow Georgia Power and Forest Service to coordinate vegetation management efforts and ensure that national forest system lands are maintained in accordance with Forest Service policies and practices. Annually reviewing and updating lists of special status species, as well as conducting annual employee training on special status species, non-native invasive vegetation, and environmentally sensitive areas within, or adjacent to, the project boundary on national forest system lands, would facilitate avoidance of sensitive species and areas at the project during regular vegetation management activities.

Forest Stand Management

Ongoing forest management, as discussed in section 3.3.3.1, *Terrestrial Resources - Affected Environment*, would continue to be overseen by Georgia Power's certified forester in accordance with Georgia Power's existing forestry policies and practices. Continuing these management activities would ensure that the forests in the project boundary are sustainably maintained and continue to provide multiple uses and benefits such as conserving forest resources, providing shoreline buffer(s) for water quality protection, allowing for some timber production, protecting wildlife habitat, and providing recreation opportunities such as wildlife viewing, throughout any new license term.

¹³² The plan also includes a provision for special status species management, which is discussed in more detail in the Special Status Species discussion below.

Forest Service 4(e) Conditions 20 and 21, which would require Georgia Power to develop an Erosion and Sediment Control Plan and a Fire Management and Response Plan, respectively, align with Georgia Power's silvicultural approach to forest management at the project. However, the Georgia Forestry Commission's BMPs for Forestry, which Georgia Power currently uses, include a robust set of measures to prevent erosion and sedimentation, and it also contains some BMPs for prescribed burns. Nevertheless, erosion and sedimentation could occur during and/or after Georgia Power's forest management activities, and fire hazards could be created during project operation and maintenance or project-related recreation. Implementing an Erosion and Sediment Control Plan would facilitate the timely identification and treatment of erosion, and control sedimentation within the project boundary and on project-affected land in the Oconee National Forest, and would prevent associated damage to forest vegetation, wildlife, and their habitats.

The Fire Management and Response Plan required by Forest Service 4(e) Condition 21 would include provisions for: (1) preventing potential fires (e.g., through fuels treatment/vegetation management, regular maintenance to prevent spread of potential project-induced fires, and reviewing fire risks associated with recreation); (2) emergency response preparedness; (3) reporting any fires to the Forest Service; and (4) investigation of fires related to project operations. Fire management and response is a key element of forest management and is consistent with Georgia Power's current silvicultural BMPs (e.g., Georgia Forestry Commission's *Georgia's Best Management Practices for Forestry*, sections 5.4, 5.5, 6.1, and 6.2). Having a formal plan to manage fire hazards and respond to forest fires would be prudent to ensure public safety at the project and to protect terrestrial resources from potentially catastrophic fires that could spread to land adjacent to the project boundary.

Forest Service 4(e) Condition 22 is a silvicultural BMP as well as a regular vegetation management BMP. The annual personnel training would facilitate appropriate treatment of special status species, noxious weeds, and environmentally sensitive areas within or adjacent to the project boundary on national forest system lands during forest management activities. Implementing this measure would facilitate the fulfillment of both Georgia Power's and the Forest Service's objectives for forest management.

Non-Native, Invasive Vegetation Management

Non-native, invasive plant species are scattered throughout the project area (*see* table 8), and a few species dominate some areas of various floodplains around Lake Oconee (i.e., Chinese privet Japanese stiltgrass) and the pond at Dyar Pasture Recreation Area (i.e., alligatorweed), as discussed in section 3.3.3.1, *Terrestrial*

Resources - Affected Environment. If left untreated, these invasive plant species would likely spread vegetatively or be dispersed by wind, water, wildlife, and/or recreation activities. Infestations of invasive plants could threaten native plants and wildlife at the Wallace Dam Project by altering ecosystem structure and function.

Georgia Power's proposal to continue to manage non-native invasive vegetation project as it has historically would address some aquatic and terrestrial occurrences at the project. Monitoring aquatic invasive plants during routine activities on Lake Oconee, and periodically treating plants found with the lake, would minimize potential infestations that could affect public access to the reservoir or Wallace Dam operation. By continuing to administer a shoreline aquatic vegetation management program on Georgia Power's website, homeowners could continue to identify and treat invasive aquatic vegetation adjacent to their property. This permit system for applying aquatic herbicides minimizes the potential environmental effects of these treatments given that the permits require that a state-certified, commercial applicator apply pesticides approved for use in/near water. Non-native, invasive aquatic vegetation that is not affecting recreation and/or project operation, and that is not treated under Georgia Power's shoreline aquatic vegetation management program, would not be managed by Georgia Power.

Georgia Power's proposal to address terrestrial non-native invasive plants through participation in the Georgia Pest Council and coordination with the Georgia Forestry Commission would provide for some ongoing management of these species. Currently, treatment of non-native invasive terrestrial plants appears to be limited to occurrences that would adversely affect timber or facilities within the project boundary (Georgia Power, 2015c; 2017). A comprehensive management plan would be more effective in preventing the spread of non-native invasive plants, and also in identifying and treating known occurrences of these species at the project.

Forest Service 4(e) Condition 18 would require Georgia Power to implement an Aquatic Invasive Species Management and Monitoring Plan, as well as a Vegetation and Invasive Weed Management Plan. The Aquatic Invasive Species Management and Monitoring Plan would include a provision to avoid the release of non-native plants and animals into a waterbody. Aquatic invasive plant species, such as alligatorweed, may be spread or introduced inadvertently into Lake Oconee and/or the project tailrace area through various project operation, maintenance, and recreational activities. Continuing Georgia Power's existing educational efforts, as well as monitoring and treatment of aquatic invasive species would help control aquatic invasive species at the project. Implementing an Aquatic Invasive Species Management and Monitoring Plan, as discussed in

section 3.3.3.2, *Water Resources - Environmental Effects*, would be a comprehensive, systematic plan, and it is likely to be more effective in minimizing the introduction and potential spread of aquatic invasive plant species and associated adverse effects to native aquatic species.

The Vegetation and Invasive Weed Management Plan would address the management of terrestrial, non-native invasive plants within the project boundary and adjacent to project features directly affecting national forest system lands, including project roads and facilities. The plan would include the following elements related to non-native, invasive plants: (1) methods for managing non-native, invasive plant species (e.g., frequency of surveys, guidelines for prevention, treatment, internal education, monitoring, reporting, and guidelines for conducting weed risk assessment for new project feature development); (2) methods to ensure early detection and treatment of non-native, invasive plants; (3) guidelines for treatment of non-native invasive plant populations on federal lands within the project boundary;¹³³ (4) guidelines for conducting Georgia Power's inspections of equipment and vehicles for non-native, invasive plants; (5) a list of target non-native, invasive plants agreed to, and approved by, Forest Service; (6) pesticide/herbicide use approval and restrictions; and (7) reporting guidelines for the annual meeting.¹³⁴

Implementing the Vegetation and Invasive Weed Management Plan would provide a mechanism to minimize the potential introduction and spread of non-native, invasive plants on national forest system lands within, and adjacent to, the project boundary during project operation and maintenance, construction of recreation amenities, and project-related recreation activities. For example, implementing the plan could facilitate treatment of the alligatorweed infestation within the pond at the Dyar Pasture Recreation Area and minimize the potential for this species to spread within the project area, or to other water bodies. The methods included in Forest Service's plan Georgia Power's current terrestrial invasive vegetation management practices. Developing methods for routine monitoring and BMPs for Georgia Power's operation and maintenance activities would provide a means for early detection and effective treatment of non-native, invasive plants throughout the project area. Implementing BMPs such as appear

¹³³ Non-native, invasive plant treatments would extend up to ¼ mile beyond the project boundary in areas where the populations are determined to be project-related. If project-related noxious weed populations extend more than ¼ mile from the project boundary, Georgia Power would consult with Forest Service to determine the appropriate treatment methods, if necessary.

¹³⁴ We assume that Forest Service is referring to the annual meeting of the Consultation Group that would be required by Condition 14.

to be more comprehensive and systematic than inspecting equipment and vehicles for non-native invasive plant material would also minimize the potential spread of these species to new areas within and outside of the project boundary. Managing non-native, invasive species would also benefit native species and improve the quality of recreation access and aesthetics at the project. Regularly reviewing, updating, and/or revising the plan would allow Georgia Power and the agencies to adjust management and control policies based on the results of routine monitoring.

Forest Service 4(e) Condition 22 would require Georgia Power to conduct annual employee training on identification of noxious weeds. This would increase the ability of Georgia Power staff to make incidental observations of non-native species during Georgia Power's operation and maintenance activities.

Shoreline Management

Ongoing project operation and maintenance could affect terrestrial resources on Lake Oconee shorelines. Georgia Power proposes to manage the shoreline of Lake Oconee in accordance with its proposed SMP, which incorporates Georgia Power's original shoreline management policies and permitting program, as well as a proposed Shoreline Buffer Zone Management Plan. Georgia Power also proposes to promote stewardship of the vegetation buffers around the reservoir by developing web-based and printed educational materials on topics including shoreline vegetation, buffers, pet waste, lawn care practices, native vegetation, and debris disposal. In addition, Georgia Power proposes to implement BMPs and environmental protection measures associated with its Shoreline Stabilization Plan and Recreation and Land Use Plan (Georgia Power, 2018, 2019a).

Our Analysis

Lake Oconee has 374 miles of shoreline, which extends about 39 miles upstream on the Oconee River from the Wallace Dam. In addition, the project boundary extends downstream from Wallace Dam about 4 river miles, and includes mostly thin strips of land along each side of the narrow upper reach of Lake Sinclair (Georgia Power, 2018). The SMP would govern the construction of shoreline erosion control structures (e.g., riprap, seawalls) and other structures, grading and clearing (including tree removal), excavation, effluent control, public landings and marinas, docks, safety hazards, and miscellaneous uses of the reservoir and shorelines. Georgia Power's SMP would protect the vegetative buffer surrounding the lake by prohibiting residential structures within the project boundary and clearing within 25 feet of the shoreline or county setbacks, whichever is greater, without prior consent.

Continuing to implement Georgia Power's shoreline management guidelines and permitting system, as part of the proposed SMP, which includes a Shoreline Buffer Zone Management Plan,¹³⁵ would help minimize shoreline vegetation disturbance from residential development, recreation uses, and other activities during any new license term. Existing vegetation and wildlife would be preserved by Georgia Power's proposal to maintain vegetative buffers that range from 25- to 200-foot-wide around the reservoir without residential structures and use of permits for shoreline uses (e.g., tree removal, land disturbance, and dredging activities). The proposed Shoreline Buffer Zone Management Plan would ensure the preservation of a 65-foot buffer on the shoreline of forestry Tract A (i.e., the Reynolds Trace or land owned by Reynolds Corporation), just north of Area A-1, by implementing restrictions on vegetation management, construction, and public uses. In addition, developing educational materials for Lake Oconee residents and recreationists on various environmental stewardship topics would encourage the public to help preserve shoreline vegetation and wildlife habitat.

Installing riprap at four project recreation sites, as described in the proposed Shoreline Stabilization Plan, and constructing the enhanced recreation amenities, as described in the proposed Recreation and Land Use Plan, would temporarily disturb upland and riparian vegetation and associated wildlife in the vicinity of these sites (*see* sections 3.3.1, *Geologic and Soil Resources*, and 3.3.5, *Recreation and Land Use*). However, these disturbances would be short in duration and confined to small and/or previously disturbed or developed areas. Georgia Power would monitor these shoreline areas to ensure that the stabilization measures and other erosion control BMPs are effective, and would replenish riprap and/or maintain the BMPs as needed, until shoreline vegetation is established. Implementing the proposed Shoreline Stabilization Plan, and the BMPs associated with construction of the enhanced recreation amenities, would help minimize damage to shoreline vegetation by controlling erosion and containing recreation activities to the footprints of the designated project recreation sites.

Wildlife Management on Georgia Power Lands

Wildlife in the project area could be affected by Georgia Power's forestry and shoreline management practices or ongoing operation and maintenance of the project transmission line. Georgia Power proposes to continue to protect wildlife and wildlife habitat in the project area by implementing Georgia DNR's Forestry Wildlife Partnership guidelines, Georgia Forestry Commission's BMPs for blending forest and wildlife management on forested project lands, an Avian

¹³⁵ The Shoreline Buffer Zone Management Plan was filed as attachment D-1 of the license application.

Protection Plan, Project WINGS (Wildlife Incentives for Nongame and Game Species) program, and the proposed Shoreline Management Plan.

Forest Service 4(e) Conditions 11, 12, 18, 19, 20, 21, and 22 would require Georgia Power to implement measures that would wildlife at the project. Specifically, these conditions would require Georgia Power to: (1) develop a Hazardous Substances Plan; (2) develop pesticide-use restrictions on national forest system lands; (3) develop a Vegetation and Invasive Weed Management Plan; (4) annually review special status species lists and consult with resource agencies if new listed species would be adversely affected by the project; (5) develop an Erosion and Sediment Control and Management Plan; (6) develop a Fire Management and Response Plan; and (7) conduct annual employee training on special status species, noxious weeds, and environmentally sensitive areas within, or adjacent to, the Wallace Dam Project boundary on national forest system lands. These measures are summarized in detail in section 2.2.4, *Modifications to Applicant's Proposal – Mandatory Conditions*, and also described with respect to effects on aquatic species in section 3.3.2.2. No other wildlife protection measures are proposed or recommended.

Georgia Power does not oppose Forest Service's 4(e) conditions (Georgia Power, 2019b).

Our Analysis

The Wallace Dam Project provides habitat for numerous species of wildlife. Wildlife species adapted to both edge and forested habitats occur within the project area. Species that prefer upland grasses and herbaceous habitats, and/or scrub-shrub and wetland vegetation are likely prevalent within the 15.67-mile-long transmission line ROW.

Continuing the existing land management practices would benefit wildlife species at the project during any new license term. By continuing to follow Georgia DNR's Forestry Wildlife Partnership guidelines, Georgia Power would help counteract the losses and degradation of wildlife habitat that occur with development in the project area by enhancing wildlife conservation practices on project lands. Georgia Power's forestry practices are also designed to benefit wildlife. Georgia Forestry Commission's standard BMPs for timber harvesting, site preparation, tree regeneration, and within stand treatments include methods for enhancing wildlife habitat (*see* section 3.3.3.1, *Terrestrial Resources - Affected Environment*). Georgia Power uses these BMPs on forested project lands such as

the Oconee WMA and Areas A-2, B-3 and B-5, as described above.¹³⁶ Continuing to implement these forestry BMPs would maintain and enhance existing wildlife habitats in the project area. Continuing to implement Georgia Power's Avian Protection Plan would minimize potential effects of project operation and maintenance on avian species at the project.

As for Project WINGs, no stakeholders have applied for grants to develop wildlife-friendly communities within the Wallace Dam transmission line ROW to date (Georgia Power, 2015c). However, continuing to participate in this program would allow stakeholders an opportunity to apply for such projects in the future. Also, Georgia Power could implement unique or special vegetation management techniques in the transmission line ROW, as appropriate, to protect any new wildlife habitat created through the program during any new license term.

Under Georgia Power's proposed Shoreline Management Plan, undeveloped lands within the project boundary, and lands adjacent to the project shoreline, are managed primarily to provide a buffer for water quality protection, visual aesthetics, and wildlife habitat. Wildlife habitat enhancements within the project area include managing pine stands, hardwood stands, and mixed hardwood/pine stands to promote healthy forest and timber production while incorporating wildlife management techniques. Georgia Power maintains a 25- to 200-foot minimum buffer around major streams and the project reservoir. Other wildlife management initiatives at the project include installing wood duck boxes and nesting platforms, and revegetating shorelines with water willow plants and bald cypress trees (Georgia Power, 2015c). Continuing to implement these shoreline management practices would maintain or enhance existing wildlife habitats at the project.

Implementing Forest Service 4(e) Conditions 11, 12, 18, 19, 20, 21, and 22 would provide indirect benefits for wildlife and their habitats at the project by minimizing the potential effects of project operation, maintenance, and construction on wildlife resources in the project vicinity. Developing a Hazardous Substances Plan and Pesticide-Use Restrictions on national forest system lands would help protect wildlife from unnecessary exposure to pesticides and other hazardous substances that may be used at the project. Managing non-native, invasive species would benefit native wildlife by controlling species that could change the structure and function of their habitats (e.g., invasive species can reduce populations of native species that provide forage and shelter for native wildlife species). Annually reviewing the lists of special status species and

¹³⁶ Areas A-2, B-3, and B-5 are also designated as future recreation sites as mentioned above, and described in section 3.3.5, *Recreation and Land Use*.

consulting with resource agencies and conducting annual employee training on special status species, noxious weeds, and environmentally sensitive areas would facilitate protection of wildlife, their habitats, and any newly listed native wildlife species that may be adversely affected by the project, as discussed below. Developing an Erosion and Sediment Control Plan and a Fire Management and Response Plan would provide a mechanism for Georgia Power to minimize potential damage to wildlife habitats from erosion and wildfires or accidental fires.

Special Status Species

While suitable habitat exists in the project boundary for the majority of the special status species that Georgia Power reviewed during relicensing studies (*see* table 9), only three special status species (i.e., pool sprite, bald eagle, and Bachman's sparrow) are currently known to occur at the Wallace Dam Project. Pool sprite is a federally listed species and is discussed in more detail in section 3.3.4, *Threatened and Endangered Species*. To conserve and protect bald eagle habitat within the project boundary, Georgia Power proposes to continue to implement its existing Avian Protection Plan and forestry policies, and to cooperate with Georgia DNR's regular monitoring of bald eagles at Lake Oconee. In addition, Georgia Power proposes to preserve and enhance vegetation and wildlife, including special status species, by continuing to implement its forest management policies and manage shorelines in accordance with its proposed Shoreline Management Plan. For example, Georgia Power establishes special management areas on project land, including within the transmission ROWs, to ensure the protection of rare, threatened, and endangered species during vegetation management activities.

Forest Service 4(e) Conditions 18, 19, and 22 would require Georgia Power to implement measures that would minimize the potential effects of project operation and maintenance, new facility construction, and project recreation on special status species in the Oconee National Forest, or in the project area that may be directly affected by the project. Specifically, these conditions would require Georgia Power to: (1) develop a Vegetation and Invasive Weed Management Plan, with provisions for special status species management; (2) annually review special status species lists and consult with resource agencies if new listed species would be adversely affected by the project; and (3) conduct annual employee training on special status species, noxious weeds, and environmentally sensitive areas within, or adjacent to, the Wallace Dam Project boundary on national forest system lands. These measures are summarized in detail in section 2.2.4, *Modifications to Applicant's Proposal – Mandatory Conditions*, and also described with respect to effects on aquatic species in section 3.3.2.2, *Water Resources*. No other measures are proposed or recommended to protect special status plants and wildlife.

Georgia Power does not oppose Forest Service's 4(e) conditions (Georgia Power, 2019b).

Our Analysis

Although the bald eagle has recovered in the lower 48 states and has been removed from the federally threatened species list under the ESA, it remains protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. Georgia Power would continue to avoid disturbance to bald eagles and their active nest sites through its BMPs for land management activities in the project area. Under the Avian Protection Plan, Georgia Power would continue to implement FWS's National Bald Eagle Management Guidelines (FWS, 2007a) pertaining to prescribed distance buffers, natural or landscape buffers, and activity-specific guidelines, where applicable. For example, Georgia Power would avoid disturbance to an active bald eagle nest located about 4,300 feet northeast of the site for the proposed liquid oxygen facility during construction. The terrain and forest vegetation would shield construction activity from the view of the nest. Georgia Power would apply FWS's bald eagle nest protection measures to any additional or alternate nests that may become established prior to, or during, construction. In addition, Georgia Power's forest managers and natural resource specialists would continue to cooperate with Georgia DNR's regular monitoring of bald eagles at Lake Oconee by sharing information about eagle nest locations within and adjacent to the project boundary. These proposed measures would help protect bald eagles, and their habitats in the project area throughout any new license term.

Bachman's sparrow calls were heard in several locations adjacent to the project transmission line ROW during Georgia Power's 2016 field surveys. Suitable habitat for Bachman's sparrow was observed on land adjacent to the project transmission line ROW during the surveys. This species is known to nest on the ground, usually under shrubs, palmettos, or within clumps of grass and nests are often at least partially covered by a dome of woven grasses. Bachman's sparrow's diet is mostly insects and spiders during summer, and seeds, especially grass seeds, during winter (Audubon, 2019). Given the mostly herbaceous composition of the vegetation within the project transmission line ROW, it likely provides suitable nesting and foraging habitat for Bachman's sparrows. This species was not observed within the footprint of the project transmission line ROW during Georgia Power's 2016 surveys, but its use of potential habitat may be difficult to detect because nests are hidden under shrubs/in clumps of grass. In addition, Bachman's sparrows are extremely secretive when not calling – they tend to hide within undergrowth vegetation, and can easily be overlooked (Audubon, 2019). Georgia Power's proposal to continue to establish special management areas during vegetation management activities, as well as

implementing the protection measures in its Avian Protection Plan, would help minimize potential effects to Bachman's sparrows and their potential habitat within the project boundary.

Implementing Georgia Power's proposed environmental measures would likely minimize potential effects to any special status species that may become established in the project boundary. Managing shorelines in accordance with the proposed Shoreline Management Plan would maintain vegetative buffers and wildlife habitat around Lake Oconee. Continuing to establish special management areas during project operation and maintenance activities would help avoid or minimize potential effects to special status species and sensitive areas as well.

Based on our review of the species and their habitat needs, continued project operation and maintenance, as proposed by Georgia Power, would not be expected to adversely affect any state protected plant and wildlife species and species of concern described in table 9.

Forest Service 4(e) Condition 18 would require Georgia Power to develop a Vegetation and Invasive Weed Management Plan that includes provisions for management of both special status species and sensitive areas (i.e., in addition to vegetation management) located within the project boundary and adjacent to project features directly affecting national forest system lands, including project roads, facilities, and distribution and transmission lines. Specifically, the plan would include: (1) special status species management (i.e., protection, monitoring, frequency of surveys, internal education, reporting, and adaptive management); and (2) sensitive area protection, including guidelines for conducting activities that reduce the effects to sensitive resources. As discussed above, Georgia Power has mechanisms to protect special status species and sensitive areas. However, Forest Service's recommended measures represent a more comprehensive management approach that could result in more effective detection and protection of these resources, at least for those special status species and/or sensitive areas that occur within the project boundary on, or adjacent to, Forest Service lands.

Forest Service 4(e) Condition 19 would require Georgia Power to: (1) annually review special status species lists in consultation with the Forest Service; (2) if any new special status species are likely to occur on Forest Service land, develop and implement a study plan to assess potential project effects on the species and develop appropriate protection measures; and (3) prepare a Biological Evaluation for Forest Service approval prior to constructing any new project features that may affect special status species or their critical habitat on national forest system lands. Georgia Power's annual review of sensitive species lists would help identify any newly listed species, as well as evaluate and minimize any

potential project-related effects. Consultation and preparation of Biological Evaluations, prior to new construction, operation, and maintenance activities that may affect new special status species would help identify measures to protect these species and their habitats over the term of any new license.

As discussed in section 3.3.3.2, *Water Resources—Environmental Effects*, Forest Service 4(e) Conditions 13, 14, and 22 would also benefit terrestrial special status species in the project area. Annual meetings of a Consultation Group (Conditions 13 and 14) would provide a forum for Georgia Power to meet and discuss any ongoing project-related effects on special status species. However, Forest Service 4(e) Conditions 18 and 19 include provisions for annual consultation and reporting regarding special status species. Implementing these conditions would allow Georgia Power to inform Georgia DNR, FWS, and Forest Service of project activities, and for these resource agencies to comment on monitoring results and make recommendations regarding any measures to protect special status species. Providing environmental awareness training would allow Georgia Power’s staff to identify and avoid any special status species and/or sensitive areas within the project boundary.

Construction and Use of Liquid Oxygen Facility

Georgia Power proposes to construct and operate a liquid oxygen facility on the northeast side of Wallace Dam (*see* figure 15). The facility would include a driveway, liquid oxygen tanks, a vaporizer system, oxygen flow control valves, and a corridor of piping leading to Lake Oconee. Georgia Power would operate the system from May through October, when needed, to achieve the DO targets in the tailrace.

The proposed location for the facility is an upland area, and no wetlands or streams would be directly impacted by construction or operation. Construction of the facility would involve the permanent removal of about 3 acres of mixed pine-hardwood forest and could result in erosion of the area after it is cleared. Construction and operation of the facility could also temporarily disturb or permanently modify vegetation and wildlife habitat adjacent to the proposed footprint of the facility. No stakeholders oppose the construction and operation of the facility.

Our Analysis

The permanent removal of three acres of forest for the proposed liquid oxygen facility would result in the loss and fragmentation of some mixed pine-hardwood habitat, and could temporarily or permanently displace wildlife that use the area for shelter, foraging, or hunting. Wildlife displaced during construction

could relocate into adjacent mixed-pine hardwood forest and pine forest that would remain contiguous to the cleared area. Sufficient suitable habitat is expected to be available to assimilate any temporarily displaced animals.

Georgia Power's proposal to use silt fences and other BMPs during construction, and then revegetate the area with grasses would minimize soil disturbance and erosion, as discussed in section 3.3.1.2, *Geologic and Soil Resources – Environmental Effects*. While revegetating the area with turf grasses would reduce the likelihood of erosion, the permanent opening in the forest would fragment the interior forest community, promote species that thrive in edge habitats, and would make the forest edges more vulnerable to invasive plant colonization. The potential effects of creating the permanent gap in the forest could be further minimized by implementing Georgia Power's applicable shoreline and forestry policies, objectives, and BMPs, such as minimizing the number, length, and width of access roads during construction.¹³⁷ Implementing these measures would benefit the vegetation and wildlife in the forested areas adjacent to the proposed facility by containing some of the permanent effects of construction to the immediate footprint of the facility and minimizing the area of temporary disturbance.

After construction, the new environmental conditions near the Liquid Oxygen Facility could have ongoing effects on vegetation and wildlife. Vegetation adjacent to the cleared footprint of the facility would be within the new forest edge habitat. Plants within forest edge habitats are exposed to increased sunlight, wind, pollution, disturbance associated with regular vegetation management activities, and increased potential for invasive plant colonization and subsequent competition with these species for light, moisture, and nutrients. Wildlife that depend on interior forest conditions could experience competition with wildlife adapted to maintained forest edge habitats. Such wildlife species would likely permanently relocate to other nearby larger intact forest tracts.

Delivering liquid oxygen and refilling tanks could also affect terrestrial resources. Generally, operation of the facility would produce a constant noise level of about 50 to 60 decibels, with lower noise levels outside of the facility

¹³⁷ See Section 3.0, *Road Location, Construction, Stream Crossings, Maintenance, Retirement* of Georgia Forestry Commission's BMPs for Forestry (Georgia Power, 2019a).

footprint.¹³⁸ Refilling the oxygen tank takes about one hour and could increase the noise level to a range of 95 to 110 decibels (i.e., delivery truck alone, and the truck with back up beeper, respectively), but the site would be designed to enable trucks to fill the tanks and pull straight through the site without having to reverse. The maximum estimated number of refills required is approximately 64 trucks annually (Georgia Power, 2019a).¹³⁹ Operational noise would be limited to the summer and generated by periodic vehicle traffic to and from the facility, the offloading of liquid oxygen from trucks using valves and pipes, and the expansion and contraction of the vaporizer system. Once the liquid oxygen facility becomes operational, some animals would likely adjust to these noise disturbances and resume use of adjacent habitats. The noise levels described above are not anticipated to adversely affect wildlife. In addition, forested vegetation around the site would serve as a buffer zone that would protect potentially affected wildlife by shielding/screening the visual disturbances and muffling noise disturbances during operation of the Liquid Oxygen Facility.

Regular vegetation management (e.g., mowing) and exposure to regular tanker truck deliveries of liquid oxygen would also expose the forest edges to equipment and vehicles that may carry invasive plant seeds or fragments during the summer. The potential invasive plant colonization within the forest habitat around the facility could stress and outcompete native vegetation and reduce the quality of the habitat for native wildlife. These effects could be minimized by Georgia Power's implementation of applicable shoreline and forestry policies, objectives, and BMPs to conserve the surrounding forested area as vegetated buffer for wildlife habitat. In addition, Georgia Power could use measures described in Forest Service's recommended Vegetation and Invasive Weed Management Plan (Condition 18) to detect and manage non-native invasive plants that may colonize the new forest gap. Implementing this measure would help minimize the potential for non-native species to invade the remaining interior forest through the new edge habitat surrounding the facility during construction, operation, and maintenance.

¹³⁸ A loud noise is produced if the system releases pressure from the liquid oxygen tanks. However, it is not anticipated that releasing pressure from the tanks would be required because Georgia Power proposes to operate the system continuously during the months that it operates.

¹³⁹ This estimate assumes that approximately 1,470 tons of liquid oxygen would be used annually, and that each delivery truck would hold 23 tons of liquid oxygen.

Construction of Project Recreation Sites

Construction of Georgia Power's three proposed new recreation sites and various amenities at four existing project recreation sites could affect shoreline vegetation and associated wildlife. Georgia Power's proposed new recreation sites include Area C-5 Bank Fishing Access, Jerry's Hwy 44 Bank Fishing Access, and Georgia Highway 16 Bridge Boat Ramp. At six of its existing project recreation sites, Georgia Power proposes to construct a variety of new amenities such as new docks, fishing piers, upgraded wells, restrooms, beach houses, guest relations gate houses, and entrance upgrades, as discussed further in section 3.3.5, *Recreation and Land Use*. Georgia Power proposes to implement BMPs to minimize the environmental effects associated with this construction.

Our Analysis

Building the new project recreation sites would involve the permanent modification of 1.21 acres in the footprints of the proposed parking lots and piers, and temporary disturbance of 0.3 acres (combined).¹⁴⁰ To minimize the effects of construction, Georgia Power would implement BMPs including: (1) using existing access roads as construction entrances; (2) installing double row silt fences for grading activities necessary for the parking areas; and (3) using grass mats or other grass seeding methods to establish vegetation in temporarily disturbed areas of both sites. The proposed new recreation sites would be located immediately adjacent to existing paved roads and/or other development, which has limited the existing vegetation at these sites. Trees that would be cut for the proposed walkway to the pier at Area C-5 would be topped and the roots would be left intact to further minimize potential soil disturbance near the shoreline (Georgia Power, 2019a).¹⁴¹ Implementing the proposed BMPs would help Georgia Power contain the effects of construction primarily to previously disturbed areas within the footprints of the proposed parking lots and piers.

¹⁴⁰ Georgia Power did not provide estimates for the areas of temporary and permanent disturbance for the proposed Georgia Highway 16 Bridge Boat Ramp. However, the proposed facilities appear to be similar to type and size of the facilities proposed for Area C-5. Therefore, we assume similar areas of disturbance in these combined estimates of temporary and permanent disturbance.

¹⁴¹ We assume that Georgia Power also proposes to implement this measure at the proposed Georgia Highway 16 Bridge Boat Ramp site to minimize the effects of construction on terrestrial resources.

At the six existing project recreation sites, the areas of permanent modification for the new or upgraded amenities would include 0.78 acres at Old Salem Park, 0.24 acres at Parks Ferry Park, 0.06 acres at Sugar Creek Boat Ramp, and 0.01 acres at Armour Bridge. An additional 0.81 (Old Salem Park), 0.36 (Parks Ferry Park), 0.15 (Sugar Creek Boat Ramp), and 0.11 acres (Armour Bridge) would be temporarily disturbed.¹⁴² Similar to the BMPs proposed for construction of the new recreation sites, Georgia Power would install silt fences and use grass mats or other grass seeding methods to establish vegetation in temporarily disturbed areas (Georgia Power, 2019a). Most of the new amenities would be built in areas that have been previously disturbed to create the existing recreation sites. Trees that would be trimmed at Long Shoals Boat Ramp could be topped, leaving the roots intact, as proposed at Area C-5, to further minimize potential soil disturbance near the shoreline. This BMP, along with Georgia Power's proposed BMPs would contain the potential construction-related effects on terrestrial resources to the footprints of the new amenities.

3.3.4 Threatened and Endangered Species

3.3.4.1 Affected Environment

On January 19, 2017, October 4, 2018, and June 9, 2019, FWS's IPaC system indicated that six federally-listed threatened and endangered species may occur within the project boundary, or be affected by the project, including two birds, the red-cockaded woodpecker and wood stork; and four plants, little amphianthus (also known as pool sprite), black spored quillwort, mat-forming quillwort, and harperella (FWS, 2017a, 2018, and 2019a). In addition, Georgia Power included a fifth plant, Michaux's sumac, in its review of federally listed species at FWS's request (Georgia Power, 2016d). No critical habitat for any federally listed threatened and endangered, or proposed species occurs within project-affected lands (FWS, 2017a, 2018, and 2019a).

Animals

Red-cockaded Woodpecker

Red-cockaded woodpeckers are a relatively small (18- to 20-cm-long with a 35 to 38 cm wingspan) species of woodpecker that inhabits open, mature, and old

¹⁴² Georgia Power did not provide estimates for the areas of temporary and permanent disturbance for the proposed replacement of amenities at Lawrence Shoals Park or Long Shoals Boat Ramp, but we assume these areas would be negligible because the new structures would use the same foundation and footprint of the existing facilities.

growth pine forests, which formerly covered much of the southeastern United States (U.S.). This species usually lives in groups consisting of a breeding pair and zero to four helpers, which assist the breeding pair with incubating eggs, feeding the nestlings and fledglings, and defending territories. Family groups of red-cockaded woodpeckers require large continuous tracts of suitable habitat, typically occupying a home range of 100 to 400 acres. Suitable roosting/nesting habitat generally consists of open pine forests and savannahs with large, old pines and minimal hardwood trees.¹⁴³ Roosting/nesting cavities are excavated from living trees, especially old growth trees that are susceptible to red-heart disease. Suitable foraging habitat is found in open-canopy mature pine forests having low densities of small pines, mid-story vegetation, or hardwood over-story (NatureServe, 2019).

It is estimated that 97 percent of this species' preferred habitat has been lost due to logging, agriculture, and fire suppression, which has caused similar sharp declines in the historic red-cockaded woodpecker population. Currently, the total population is estimated to be between 15,000 and 16,000 individuals, living in approximately 5,600 colonies scattered across 11 states, with Florida, Georgia, South Carolina, and North Carolina having the largest populations (NatureServe, 2019). In Georgia, there are five remaining red-cockaded woodpecker population centers, one of which is the Piedmont Recovery Unit (FWS, 2003), which includes a population on Oconee National Forest in Putnam County located about 8 miles west of Lake Oconee. In addition, the Forest Service manages 8.3 acres in the Sugar Creek Watershed Management Area specifically for red-cockaded woodpecker habitat (Forest Service, 2004a, 2004b). Currently, this species is not known to inhabit pine forests within the project boundary. FWS has not designated critical habitat for red-cockaded woodpeckers (FWS, 2019c).

Ongoing threats to the population include short-rotation timber management, hardwood encroachment in old growth pine forest habitat, forest fragmentation, intra- and inter-species competition for existing suitable nesting cavities and nest predation, and loss of old growth/cavity trees during hurricanes and southern pine beetle infestations (NatureServe, 2019).

¹⁴³ Nesting cavities are almost always the cavity of the breeding male in family groups, but every member of a family group usually has a separate roosting cavity (NatureServe, 2019).

Wood Stork

Wood storks are large wading birds, with a head-to-tail length of 33 to 45 inches and a wingspread of 59 to 65 inches. This species is mostly white, with iridescent black primary and secondary wing feathers and a short black tail (FWS, 1997). The U.S. breeding population of wood stork was listed as endangered in 1984,¹⁴⁴ but after documenting increases in breeding population and range, FWS reclassified the population from endangered to threatened on July 30, 2014. The range of this population includes Alabama, Florida, Georgia, Mississippi, North Carolina, and South Carolina (FWS, 2014a). The center of the breeding range has shifted north since the 1970s, and recent breeding has occurred in Florida, Georgia, and South Carolina (NatureServe, 2019). No critical habitat has been designated for wood stork (FWS, 2019d).

Wood storks are colonial nesters and feeders, and often breed in rookeries with other species of wading birds in a wide variety of freshwater and estuarine wetlands. The breeding season varies throughout the range (NatureServe, 2019). In Georgia and South Carolina, wood storks tend to lay eggs from March through May and fledging occurs in July and August. Individuals from colonies in Florida, Georgia, and South Carolina generally disperse after the breeding season, across the coastal plain and coastal marshes in the Southeast. Foraging occurs in shallow, open water and wetland depressions where prey concentrations are high enough to ensure successful feeding. Wood storks locate small prey fish by opening their bills partially and then probing and sweeping sideways through the water (FWS, 1997).

Ongoing threats to wood stork recovery include loss of foraging habitat, water level manipulations that affect natural hydrological conditions, predation, and human disturbance (FWS, 2014a). FWS's recovery plan for the U.S. breeding population of wood stork identifies four primary recovery actions including: (1) protecting currently occupied habitat; (2) restoring and enhancing habitat; (3) conducting applied research necessary to accomplish recovery goals; and (4) increasing public awareness (FWS, 1997).

¹⁴⁴ Based on genetic information, satellite-telemetry studies, and other marking studies, FWS concluded that the U.S. breeding population is a distinct population segment because it is markedly separated from populations in South America, Central America, Mexico, Cuba, and Hispaniola.

Plants

Pool Sprite, or Little Amphianthus

Pool Sprite, or little amphianthus, is a small aquatic or semiaquatic, annual plant (4 to 8 mm long leaves) that grows exclusively in vernal pools on granite outcrops of the southeastern Piedmont. It has 3- to 4-mm-long white flowers that either float or are submersed in the vernal pools (NatureServe, 2019). Flowering typically occurs in February or March and continues until the habitat becomes desiccated later in the spring (Georgia Power, 2018). Seed dispersal mechanisms are unknown, but may include runoff of seeds from vernal pools during heavy rains and transport by wildlife that use the granite outcrops (NatureServe, 2019). The seeds remain dormant until suitable moisture and light conditions for germination occur, generally in late autumn (Georgia Power, 2018). Depending on environmental conditions, pool sprite can complete its life cycle within 3 to 4 weeks in the spring (NatureServe, 2019).

Approximately 90 percent of the known populations of pool sprite occur in Georgia, but its range also includes the Piedmont regions of Alabama and South Carolina (NatureServe, 2019). In Georgia, pool sprite is found in about seven preserves and parks. One or two large populations (15 to 20 pools) exist in Greene and Hancock Counties (FWS, 2008). In addition, pool sprite has been documented at the Eatonton Outcrop in the Oconee WMA in Putnam County (FWS, 2008; Georgia DNR, 2010, as cited in Georgia Power, 2018), which is located within the Wallace Dam Project boundary next to Lawrence Shoals Park. The outcrop has many pools occupied by pool sprite (FWS, 2008). Populations of pool sprite were observed in two depressions at this outcrop site during the field reconnaissance survey during the spring of 2016¹⁴⁵ (Georgia Power, 2016d). FWS has not designated critical habitat for pool sprite (FWS, 2019e).

Black-Spored Quillwort

Black-spored quillwort is a perennial fern ally¹⁴⁶ that is endemic to temporary granite outcrop pools in Georgia and is historically known to occur in South Carolina. The pools are small depressions that usually contain about 2 centimeters of soil and may dry out during the summer. Black-spored quillwort

¹⁴⁵ Georgia Power conducted field surveys for rare, threatened, and endangered species on April 25-29, May 9-12, and June 20-23, 2016.

¹⁴⁶ Fern allies are a large group of vascular plants that are not flowering plants or true ferns, but like ferns, they produce and disperse spores instead of seeds (Biocyclopedia, 2019).

is associated with other rare and endangered granite outcrop endemics, such as pool sprite. While other quillworts produce whitish spores, as its name indicates, this species produces dark spores in early May to June (NatureServe, 2019).

The extant populations occur in 12 locations in Georgia, including in Butts, Dekalb, Greene, Gwinnett, Heard, and Jackson Counties. Ongoing threats include habitat destruction due to quarry operations, trash dumping, fires, vandalism (e.g., spray painting), and disturbances related to heavy recreation use. In addition, few of the extant populations are protected and this species is very slow to recover in disturbed habitat (NatureServe, 2019). FWS has not designated critical habitat for this species (FWS, 2019f).

Mat-forming Quillwort

Mat-forming quillwort is a perennial fern ally endemic to shallow, flat bottomed depressions in granite outcrops in Georgia (NatureServe, 2019). Rain water collects in the depressions of granite outcrops, forming vernal pools where this species can form dense mats. Mat-forming quillwort prefers vernal pools located near the top of granite outcrops, with a complete rock rim and about 2 cm of gravelly soil. This species produces spores erratically from May through October. The primary ongoing threat to this species is loss of habitat caused by quarrying activities. Other threats include recreation-related impacts (e.g., damage to plants/habitat from foot and vehicular traffic, dumping trash, and use of granite depressions as fire pits) (FWS, 2008).

Historically known to occur in 13 populations in Georgia, they are all located on porphyritic¹⁴⁷ granite outcrops in Columbia, Hancock, Putnam, and Greene Counties (FWS, 2008). The majority of these sites contain only one or two pools with mat-forming quillwort. In 2010, Georgia DNR's Wildlife Resources Division and FWS biologists planted four plugs of mat-forming quillwort that were raised off-site in rainwater pools at the Eatonton Outcrop in the Oconee WMA (Georgia DNR, 2010, as cited in Georgia Power, 2018), within the project boundary. However, this species was not observed during the spring 2016 field surveys (Georgia Power, 2016d). FWS has not designated critical habitat for this species (FWS, 2019g).

¹⁴⁷ Porphyritic describes a coarse texture of igneous rocks in which large crystals are embedded in a finer grained mass of crystalline rock.

Harperella

Harperella is an annual herb with shallow roots and stems that can grow up to 3-feet-tall. This species occurs in wet savannas, on the edge of cypress ponds in the Coastal Plain, and in seeps on granite outcrops in the Piedmont. Harperella can reproduce vegetatively (especially during wet years) and via seeds (especially during dry years). Flowering occurs mostly in July and August. Ongoing threats to harperella include habitat degradation (e.g., changes to the hydrological regime, erosion and siltation, reduced water quality, and trampling via foot and vehicle traffic) and habitat loss caused by development (e.g., land use conversion, including development of recreation sites). Other potential threats to this species could include competition with non-native invasive plants such as Japanese stilt grass and severe flooding, drought, or ice scour (NatureServe, 2019).

Populations of harperella are thought to be extant in eight states, including Alabama, Arkansas, Georgia, Maryland, North Carolina, South Carolina, Virginia, and West Virginia (NatureServe, 2019). Only two sites with small populations of harperella are currently known in Georgia, including one in Greene County. The species is not presently known to occur within the Wallace Dam Project boundary. Harperella was not detected during the spring 2016 field surveys (Georgia Power, 2016d). FWS has not designated critical habitat for this species (FWS, 2019h).

Michaux's sumac

Michaux's sumac (or dwarf sumac) is a low-growing, shade-intolerant, dioecious,¹⁴⁸ colonial shrub. This species grows in dry, open, woodlands with sandy or rocky soil. Fire, mowing, or some other form of disturbance may be essential for maintaining the open habitat preferred by Michaux's sumac. Without periodic disturbance, this type of habitat is gradually overtaken and eliminated by shrubs and trees. Ongoing threats to this species include loss of habitat and a low reproductive capacity caused by the geographic isolation of small populations of either all male or all female plants (NatureServe, 2019).

Historically, Michaux's sumac occurred in the lower Piedmont and upper Coastal Plain in North Carolina, South Carolina, and Georgia, but the current extent of this species' range includes North Carolina, Virginia, and Georgia (NatureServe, 2019). Of the four known extant occurrences of the species in Georgia, none are within the four counties occupied by the project (FWS, 2014b). The nearest occurrence is located in Newton County, about 30 miles west of the project. Michaux's sumac was not observed during the 2016 field surveys

¹⁴⁸ Dioecious plants have male and female flowers on different individuals.

(Georgia Power, 2016d). FWS has not designated critical habitat for this species (FWS, 2019i).

3.3.4.2 Environmental Effects

Fluctuating reservoir levels, shoreline and vegetation management, construction of the proposed liquid oxygen facility, as well as construction of new recreation sites and amenities could affect the quality, availability, and use of plant and wildlife habitats, including for federally listed species at the Wallace Dam Project. Georgia Power proposes to minimize the environmental effects of the project by continuing to operate the reservoir between elevations 433.0 feet and 435.0 feet 100 percent of the time, by continuing to implement its drought protocol, and by using storage in Lake Oconee to meet the Sinclair Project's 250-cfs minimum flow requirement. In addition, Georgia Power proposes to avoid or minimize environmental effects to plants and wildlife and their habitats by implementing BMPs and other environmental protection measures associated with its regular vegetation management, Avian Protection Plan, construction of the Liquid Oxygen Facility, Shoreline Management Plan, and Recreation and Land Use Plan.

Forest Service 4(e) Conditions 11, 12, 13, 14, 18, 19, 20, 21, and 22 would require Georgia Power to implement measures that could minimize the potential effects of project operation and maintenance, construction of the proposed Liquid Oxygen Facility, and installation of new recreation sites and amenities on special status species, including federally listed species and their habitats. These conditions would require Georgia Power to develop a Hazardous Substances Plan; implement Pesticide-Use Restrictions on national forest system lands; annually consult with the Forest Service and establish a Consultation Group; develop aquatic and terrestrial invasive species management plans; annually review special status species lists and consult with resource agencies if new listed species are adversely affected by the project; develop an Erosion and Sediment Control Plan; develop a Fire Management and Response Plan; and conduct annual employee training on special status species, noxious weeds, and environmentally sensitive areas within or adjacent to the Wallace Dam Project boundary on national forest system lands. These measures are summarized in detail in section 2.2.4, *Modifications to Applicant's Proposal – Mandatory Conditions*, and described with respect to effects on aquatic and terrestrial species in sections 3.3.2 and 3.3.3, *Water Resources* and/or *Terrestrial Resources*, respectively.

Georgia Power does not oppose Forest Service's 4(e) conditions (Georgia Power, 2019b).

Our Analysis

The federally listed species discussed below could benefit from the implementation of Forest Service 4(e) Conditions 11, 12, 13, and 14. Developing a plan for handling hazardous substances and getting approval from the Forest Service for any pesticide-use on national forest system lands would benefit all vegetation and wildlife, including federally listed species, by minimizing the potential for unnecessary/accidental exposure to, and adverse effects of, toxic chemicals. Consulting annually with the Forest Service and establishing a Consultation Group would provide a forum for Georgia Power to meet and discuss implementation of the project license, and any ongoing effects on federally listed species, among other potential environmental effects.

Red-cockaded woodpecker

While family groups of red-cockaded woodpeckers occur within 8 miles of the project, they do not currently inhabit pine forests within the project boundary. This species is not expected to colonize the forests in the project boundary because stands of large pines are relatively small and isolated and do not currently provide sufficient suitable nesting habitat to maintain a red-cockaded woodpecker family group. Typically, about 150 acres of suitable habitat are required by each family group. Most of the forest tracts that Georgia Power manages at the project are less than 150 acres. Only Area A-2 and the Oconee WMA are greater than 150 acres. While Georgia Power's timber harvesting rotation of approximately 35 years and regular thinning of hardwood species and/or prescribed burning in some timber stands may create suitable foraging conditions for red cockaded woodpeckers, the rotation is unlikely to be long enough for pines to reach the optimal age and ideal conditions for red-cockaded woodpeckers to establish nest cavities (Georgia Power, 2019a).

Continuing to implement Georgia Power's Avian Protection Plan would minimize potential adverse effects of project operation and maintenance activities on birds, including red-cockaded woodpeckers. This plan includes provisions to train personnel to report all avian interactions using an Avian Interaction Report Form and to avoid adverse avian interactions. It prohibits personnel from handling nests, eggs, or young of federally listed species, including red-cockaded woodpeckers and wood storks, except in cases of imminent danger. The plan also includes a provision to explore opportunities for monitoring and enhancement of avian populations and/or cooperative projects with state and federal resource agencies and other interested organizations or institutions.

Existing populations of red-cockaded woodpecker would benefit from current and proposed forest management plans on federal lands in the region.

FWS and Forest Service plan to continue to manage portions of its forests in the Piedmont National Wildlife Refuge and the Oconee National Forest for red-cockaded woodpecker habitat as they work toward FWS's population goal for the area (i.e., 250 breeding groups in the Piedmont Recovery Unit) (Forest Service, 2011). In addition, Forest Service 4(e) Conditions 18, 19, 20, 21, and 22 could provide benefits to red-cockaded woodpeckers. Developing plans to manage non-native invasive plants, control erosion, and manage fire would help to maintain the ecosystem structure and function of existing pine forest tracts that could serve as potential foraging habitat for red-cockaded woodpeckers in the future. Annual reviews of potential project-related effects would help Georgia Power identify any new occurrences of red-cockaded woodpeckers in the project area, and train their staff accordingly to further avoid potential adverse interactions with this species.

Given that: (1) red-cockaded woodpeckers are not currently known to occur at the project, but they occur in the project vicinity; (2) the majority of the forest tracts in the project boundary are lacking this species' preferred nesting trees, but suitable foraging habitat may be present; and (3) potential effects to this species could be avoided or minimized through implementation of Georgia Power's Avian Protection Plan and Forest Service's 4(e) conditions, we find that relicensing the project is not likely to adversely affect the red-cockaded woodpecker.

Wood Stork

Transient occurrences of wood storks have been sighted in shallow freshwater ponds/wetlands of Oconee National Forest within the project boundary during the post-breeding dispersal season. Wood storks primarily occur in the Coastal Plain physiographic province and are not known to breed in the Piedmont province, where the project is located. Georgia Power proposes to continue to cooperate with Georgia DNR to allow ongoing management/preservation of Ponds 2, 3, and 4, and the pond at Dyar Pasture Recreation Area for waterfowl habitat. For example, repairing the outlet structure and controlling erosion at Pond 2 would allow Georgia DNR to restore the seasonal water levels in the pond, which could provide potential foraging habitat for wood storks. Ongoing management and/or preservation of these shallow waterbodies would maintain potential foraging habitat for transient/post-breeding wood storks in the future. In addition, as stated above, Georgia Power would continue to implement its Avian Protection Plan, which would minimize potential adverse interactions of personnel with federally listed species, including wood storks, in the project area during routine operation and maintenance activities.

Post-breeding wood storks that may use the project in the future would also benefit from the implementation of Forest Service 4(e) Conditions 18, 20 and 22.

Developing plans to manage non-native invasive plants and control erosion would help to maintain the ecosystem structure and function of the existing shallow water ponds and wetlands that could continue to serve as potential foraging habitat for wood storks in the future. Annual reviews of potential project-related effects would help Georgia Power identify any new occurrences of wood storks in the project area, and train their staff accordingly to further avoid potential adverse interactions with this species.

Given that: (1) wood storks are transient visitors and not currently known to breed at the project; (2) it is anticipated that the shallow ponds within the project boundary would continue to be maintained by Georgia DNR for waterfowl; (3) and potential effects to this species could be avoided or minimized through implementation of Georgia Power's Avian Protection Plan and Forest Service's 4(e) conditions, we find that relicensing the project is not likely to adversely affect the wood stork.

Pool Sprite (Little Amphianthus), Mat-Forming Quillwort, and Black-Spored Quillwort

The Eatonton Outcrop in the Oconee WMA is the largest granite outcrop within the project boundary and it is the only habitat at the project known to support federally listed plant species. Pool sprite was observed during Georgia Power's 2016 field surveys within shallow depressions on this granite outcrop where vernal pools form after rainfall. In addition, four plugs of mat-forming quillwort were transplanted by Georgia DNR and FWS biologists in 2010 in the rainwater pools of the outcrop. However, mat-forming quillwort was not observed during the field surveys of the outcrop in the spring of 2016, and, therefore, it is unknown whether or not a viable population exists at the project. Black-spored quillwort is historically known from 15 sites in central Georgia, including Greene County, but currently exists at only eight sites in Georgia, none of which occur in the project boundary (FWS, 2008). Black-spored quillwort was also not observed during the 2016 surveys, but this species can be difficult to detect because its leaves die quickly and leave no trace of the plant above the soil after the pools/substrate dries. In addition, black-spored quillworts are known to hybridize with more common members of its genus. There is potential that other rare plant species endemic to granite outcrop habitats could also occur on the Eatonton Outcrop.

Georgia DNR's current management of the outcrop protects and maintains this important habitat within the project boundary. Signs are posted to warn visitors to stay away from the outcrop's sensitive areas. This signage is an important way to minimize the potential adverse effects of popular recreation activities on these types of outcrops. Trampling by hikers and other recreation

activities described above can threaten the persistence of individuals/populations and degrade the suitability of the outcrop habitat for them. Informal access to the outcrop may play a role in the lack of observed occurrences of the planted mat-forming quillwort. The spring 2016 field survey did not identify any dominant stands of terrestrial non-native invasive plants that threaten the native plant populations at the project outcrops. Nevertheless, many invasive plants are known to occur in the project area. Deterring or prohibiting recreation on the outcrops would help minimize the potential introduction and/or spread of invasive plants near/on the outcrops that could stress existing populations of pool sprite and other special status plants.

Pool sprite is typically found with occurrences of mat-forming quillwort and/or black-spored quillwort and the Eatonton Outcrop may have supported one of these quillwort species at one time with the pool sprite population (i.e., before the mat-forming quillwort was planted by Georgia DNR and FWS in 2010) (FWS, 1993). Occurrences of these species can be difficult to detect and new clumps of these species could be observed in the future at Eatonton Outcrop, or at other granite outcrops within the project boundary. Potential adverse effects to these species and their habitat at the project could be further minimized by implementing Forest Service 4(e) Conditions 18, 20 and 22. Developing plans to manage non-native invasive plants and control erosion would help to prevent potential future smothering of these species' granite outcrop habitat with invasive plants and/or eroded soil. Annual reviews of potential project-related effects would help Georgia Power identify any new occurrences or new project-related effects to these species in the project area, and training personnel about these species would facilitate avoidance of these habitats during regular operation and maintenance activities.

Given that: (1) pool sprite occurs at Eatonton Outcrop and mat-forming quillwort was planted there; (2) the granite outcrop species can be difficult to detect; (3) populations of rare plants at Eatonton Outcrop could be subject to ongoing effects of informal recreation activities; and (4) potential effects to these species could be avoided or minimized through Georgia Power's avoidance of effects to sensitive areas during operation and maintenance activities, ongoing Georgia DNR management of Eatonton Outcrop, as well as the implementation of Forest Service's 4(e) conditions, we find that relicensing the project is not likely to adversely affect the pool sprite, mat-forming quillwort, and black-spored quillwort.

Harperella

Only two sites with small populations of harperella are currently known in Georgia, including one in Greene County. While potentially suitable habitat for

harperella exists within the Wallace Dam Project boundary, this species is not presently known to occur at the project. It was not detected during the spring 2016 field surveys (Georgia Power, 2016d). Georgia Power's proposal to continue existing project operations and signage to deter recreationists from hiking near Eatonton Outcrop, and Georgia DNR's ongoing management of the ponds at the project would help to preserve potentially suitable habitat for this species.

Any harperella that may become established at the project in the future would benefit from the implementation of Forest Service 4(e) Conditions 18, 20 and 22. Non-native, invasive Japanese stiltgrass is known to occur in a number of locations within the project boundary and could occupy potentially suitable habitat for this species. Developing plans to manage non-native invasive plants and control erosion would help minimize encroachment and/or smothering of potential harperella habitat (or plants that may become established) by Japanese stiltgrass and other invasive plants and prevent habitat degradation from erosion. Annual reviews of potential project-related effects to special status species would help Georgia Power identify any new occurrences of harperella in the project area, and train their personnel to avoid disturbance to any new locations of this species during regular operation and maintenance activities.

Given that harperella is not currently known to occur within the project boundary, we find that relicensing the project would have no effect on this species.

Michaux's Sumac

While potentially suitable habitat for Michaux's sumac exists within the project boundary, this species is not presently known to occur at the project. It was not detected during the spring 2016 field surveys (Georgia Power, 2016d). The nearest known occurrence is located in Newton County, about 30 miles west of the project. Georgia Power's proposal to continue existing regular vegetation management and forest management activities would involve regular disturbances (i.e., mowing, prescribed fire) that would remove some shrubs and trees, and could, thereby, maintain potentially suitable habitat (dry, open, woodlands with sandy or rocky soil) for Michaux's sumac. However, the low reproductive capacity caused by the geographic isolation of small populations of either all male or all female plants, and the distance of the closest known occurrence of this species, makes colonization of suitable habitat in the project area unlikely.

Nevertheless, Michaux's sumac that may become established at the project in the future would benefit from the implementation of Forest Service 4(e) Conditions 18, 20 and 22. Developing plans to manage non-native invasive plants and control erosion would help minimize encroachment and/or smothering of potential Michaux's sumac habitat (or plants that may become established) by

invasive plants and prevent habitat degradation from erosion. Annual reviews of potential project-related effects to special status species would help Georgia Power identify any new occurrences of Michaux's sumac in the project area, and train their personnel to avoid potential disturbance to this species during regular operation and maintenance activities.

Given that Michaux's sumac is not currently known to occur within the project boundary, we find that relicensing the project would have no effect on this species.

3.3.5 Recreation and Land Use

3.3.5.1 Affected Environment

Regional Recreation Resources

The Oconee River offers a variety of recreation opportunities. Within a 60-mile radius of the Wallace Dam Project, there are 9 state parks, national forests, wildlife management areas, county parks, marinas, and other hydropower projects that provide for fishing, boating, camping, picnicking, hiking, and wildlife viewing.

Other recreation lands adjacent to the project include portions of two WMAs. The Redlands WMA is located on Forest Service lands, within the Oconee National Forest, north of Interstate 20, while the Oconee WMA is located on pockets of land adjacent to Wallace Dam (*see* figure 19, and discussed in greater detail, below). The Oconee WMA, comprising 5,375 acres, is owned by Georgia Power and leased at no cost to Georgia DNR for hunting and other outdoor recreation, with 150 acres reserved as the Dan Denton Waterfowl Refuge.

The Rock Hawk Effigy and trail system are located between Lawrence Shoals Park and the waterfowl impoundments within the Oconee WMA just downstream from Wallace Dam. In partnership with the Historic Piedmont Scenic Byway Commission and Georgia DNR, Georgia Power maintains over 15 miles of hiking and biking trails and interpretive signage, portions of which are located inside the project boundary at Lawrence Shoals Park. The Rock Hawk Effigy is located outside of the project boundary.

Project Recreation Sites

Georgia Power's Recreation Plan, under the current license, includes seven project recreation sites (table 10) that Georgia Power owns, operates, and maintains: (1) Lawrence Shoals Park; (2) Old Salem Park; (3) Parks Ferry Park;

(4) Sugar Creek Boat Ramp; (5) Armour Bridge; (6) Long Shoals Boat Ramp; and (7) Tailrace Fishing Area. These recreation sites provide public access to project lands and waters and offer a variety of amenities, including day-use areas at all seven facilities. Six of the facilities provide boat ramps, picnic tables, and restrooms; three provide full-service campgrounds and swimming beaches. Six of the facilities are located on Lake Oconee, and one is on the west shoreline of the tailrace area. Georgia Power proposes a Recreation and Land Use Plan to update and supersede the Recreation Plan.

Lake Oconee is used frequently for fishing tournaments. Tournament fishing occurs between March and November. Participation ranges from approximately 10 to 25 boats for monthly events, to approximately 150 boats for large, annual events.

In response to public requests, Georgia Power has made a number of improvements to its project recreation sites, including:

- Added restrooms and picnic areas at all boat ramp sites;
- Improved the campground restrooms and bathhouses;
- Added additional campsites at the campgrounds;
- Made improvements to the playgrounds and beach areas; and
- Upgraded water and electric service at campgrounds to accommodate larger recreational vehicles.

Non-Project Recreation Sites

In addition to the project recreation sites, fourteen privately-owned and operated facilities provide access to the reservoir. These include marinas, campgrounds, boat ramps, and resorts (table 11).

Table 10. Existing Georgia Power operated project recreation sites within the Wallace Dam Project boundary.
 (Source: Georgia Power, 2018; as modified by staff).

Recreation Site	County	Acreage	Address	Amenities
Armour Bridge	Greene	10.72	Brown's Ford Road, Greensboro	Boat ramp (2 lanes), 40 parking slots, dock, picnic tables, fishing, restroom, public access within Reynolds Lake Oconee
Lawrence Shoals Park	Putnam	83.58	123 Wallace Dam Road, Eatonton	Boat ramp (2 lanes), 68 parking slots, 3 docks, full-service campground, nature trails, swimming beach, restrooms, picnic tables, picnic pavilion, barrier-free access, playground
Long Shoals Boat Ramp	Putnam	12.06	Long Shoals Road, Eatonton	Boat ramp (2 lanes), 34 parking slots, dock, picnic tables, fishing, restroom, barrier-free access
Old Salem Park	Greene	83.34	1530 Old Salem Road, Greensboro	Boat ramp (2 lanes), 123 parking slots, 3 docks, full-service campground, swimming beach, restrooms, picnic tables, picnic pavilion, playground
Parks Ferry Park	Greene	90.98	1491 Parks Mill Road NE, Greensboro	Boat ramp (2 lanes), 74 parking slots, dock, full-service campground, swimming beach, restrooms, picnic pavilion, playground
Sugar Creek Boat Ramp	Putnam	10.39	Parks Mill Road, Buckhead	Boat ramp (2 lanes), 37 parking slots, dock, picnic tables, fishing, restroom, barrier-free access
Tailrace Fishing Area	Putnam	<0.1	Wallace Dam Road West	Fishing platform, parking

Table 11. Non-Project Recreation Sites. (Source: Georgia Power, 2018; as modified by staff).

Park/Facility	County	Acreage	Address	Amenities
Apalachee Bait Shop & Fish Camp	Morgan	10.98	1010 Apalachee River Rd., Madison	Boat launch, primitive campsites, restrooms
Blue Springs Marina	Morgan	6.21	1291 Blue Springs Drive, Buckhead	Food, gas, restaurant, marina, restrooms
Greene County Boat Ramp	Greene	0.55	SE End of Howard Lewis Rd., White Plains	Boat launch, dock
Great Waters Marina	Putnam	1.86	154 Oakton South, Eatonton	Reynolds Lake Oconee – dry-slip boat storage, pontoon boat rentals, on-demand launching, marina stores, fuel
Hwy 44 Public Fishing (Tract C-5)	Greene	10.30	136 Clack Cir., Eatonton	Shoreline fishing
Hwy 44 Public Fishing (Jerry's)	Putnam	3.06	1054 Greensboro Rd., Eatonton	Gas, store
Lake Club Marina	Greene	4.77	Brown's Ford Rd., Greensboro	Reynolds Lake Oconee – indoor/outdoor pools, food, children's area, beach access, boat ramps and docks
The Landing Marina	Greene	2.65	1021 Long Cove Dr., Greensboro	Reynolds Lake Oconee – dry-slip boat storage, pontoon boat rentals, on-demand launching, marina stores, fuel
Boathouse at Harbor Club	Greene	6.40	3991 Walker Church Rd., Greensboro	Food, full-service campground, gas, marina, picnic, restrooms

Park/Facility	County	Acreage	Address	Amenities
North Shore Resort	Greene	53.46	2541 Carey Station Road, Greensboro	Full RV accommodations, rental units, picnic pavilions, 2 swimming pools, fishing, swimming, boat ramp, game courts, playground, RV storage
Oconee Outdoors and Marina	Putnam	2.80	891 Greensboro Road, Eatonton	Full-service marina with dry storage, fishing, boat ramps
Reynolds Plantation Marina	Greene	7.88	100 Linger Longer Road, Greensboro	Reynolds Lake Oconee – dry-slip boat storage, pontoon boat rentals, on-demand launching, marina stores, fuel
Sugar Creek Marina	Putnam	11.42	353 Parks Mill Road, Buckhead	Gas, marina, picnic, restrooms
Waterfront Marina	Putnam	8.12	144 Collis Marina Road, Eatonton	Food, full-service campground, gas, marina, picnic, restrooms

Project Lands Reserved for Future Recreational Use

Georgia Power's Recreation Plan for the Wallace Dam Project includes the following ten areas that are within the project boundary and reserved for future recreation development (figure 19):

- Area A-1: a heavily forested 138-acre tract located on a peninsula formed by the confluence of Richland Creek and the Oconee River in Greene County.
- Area A-2: a heavily forested 465-acre tract located at the confluence of Sugar Creek and the Oconee River in Putnam and Morgan Counties.
- Tract B: a 561-acre area next to Lawrence Shoals Park in Putnam County that Georgia Power conveyed to the State of Georgia. The area includes undeveloped shoreline and associated buffer and a unique granite outcropping (Eatonton Outcrop) that supports two federally protected plant species. It also contains several miles of multi-use and foot trails that connect with Lawrence Shoals Park and the Rock Hawk Effigy and trail system located outside of, and partly inside of, the project boundary.
- Area B-3: a heavily forested 107-acre tract located on the Apalachee River in Greene County approximately 0.5 river mile below U.S. Highway 278.
- Area B-5: a heavily forested 106-acre tract located on a peninsula formed by the confluence of Richland Creek and Rocky Creek tributaries in Greene County.
- Area C-2: a 9-acre tract located on Lick Creek at Georgia Highway 44 in Putnam County.
- Area C-4: a moderately forested 8-acre tract located on the Apalachee River in Greene County.
- Area C-5: a moderately forested 10-acre tract located on the Oconee River at Highway 44 in Greene County.
- Area C-6: a 5-acre tract located on Richland Creek at Georgia Highway 44 in Greene County.

- Area C-7: a 9-acre site located on Beaverdam Creek approximately 2 miles above its confluence with Richland Creek in Greene County.

Forest Service Recreation Areas

The Forest Service Oconee Ranger District owns and operates three recreation areas located on Oconee National Forest lands north of Interstate 20 that provide direct access to the reservoir (figure 19). A portion of each recreation area is contained within the Wallace Project boundary. These recreation areas are not project recreation areas and are not included in the existing license for the Wallace Project. The recreation areas are located within the Redlands WMA and provide direct access to the northern-most reaches of Lake Oconee. They offer motorized boating access at eight boat lanes and extensive parking facilities including over 100 parking spaces at each of the larger facilities.

Dyar Pasture Recreation Area

The Dyar Pasture Recreation Area is a 241.1-acre area located off Copeland Road in Greene County. The recreation area provides access to the upper reaches of Lake Oconee and the Oconee River upstream. The Forest Service provides an unimproved parking area for 5-7 vehicles, a two-lane boat ramp, a boat dock, picnic facilities, shoreline access for fishing, nature trails, and a restroom. Additionally, Dyar Pasture Recreation Area contains a 49.26-acre waterfowl conservation area within the Wallace Dam project boundary, offering opportunities for wildlife viewing. A total of 84.93 acres of the recreation area are located within the project boundary. The boat ramp, boat dock, and shoreline are within the project boundary, while the parking and additional recreation amenities are outside the project boundary.

Redlands Recreation Area

The Redlands Recreation Area is a 1,393.7-acre site located off Highway 278 in Greene County. The recreation area provides access to the upper reaches of Lake Oconee, north of Interstate 20. The Forest Service provides a parking area with space for 100 vehicles with boat trailers, a three-lane boat ramp, boat dock, picnic facilities, shoreline access for fishing, and a restroom. Only a portion of the recreation area, 8.03 acres, is located within the project boundary. The boat ramp, boat dock, and shoreline are within the project boundary, while the parking and additional recreation amenities are outside the project boundary.

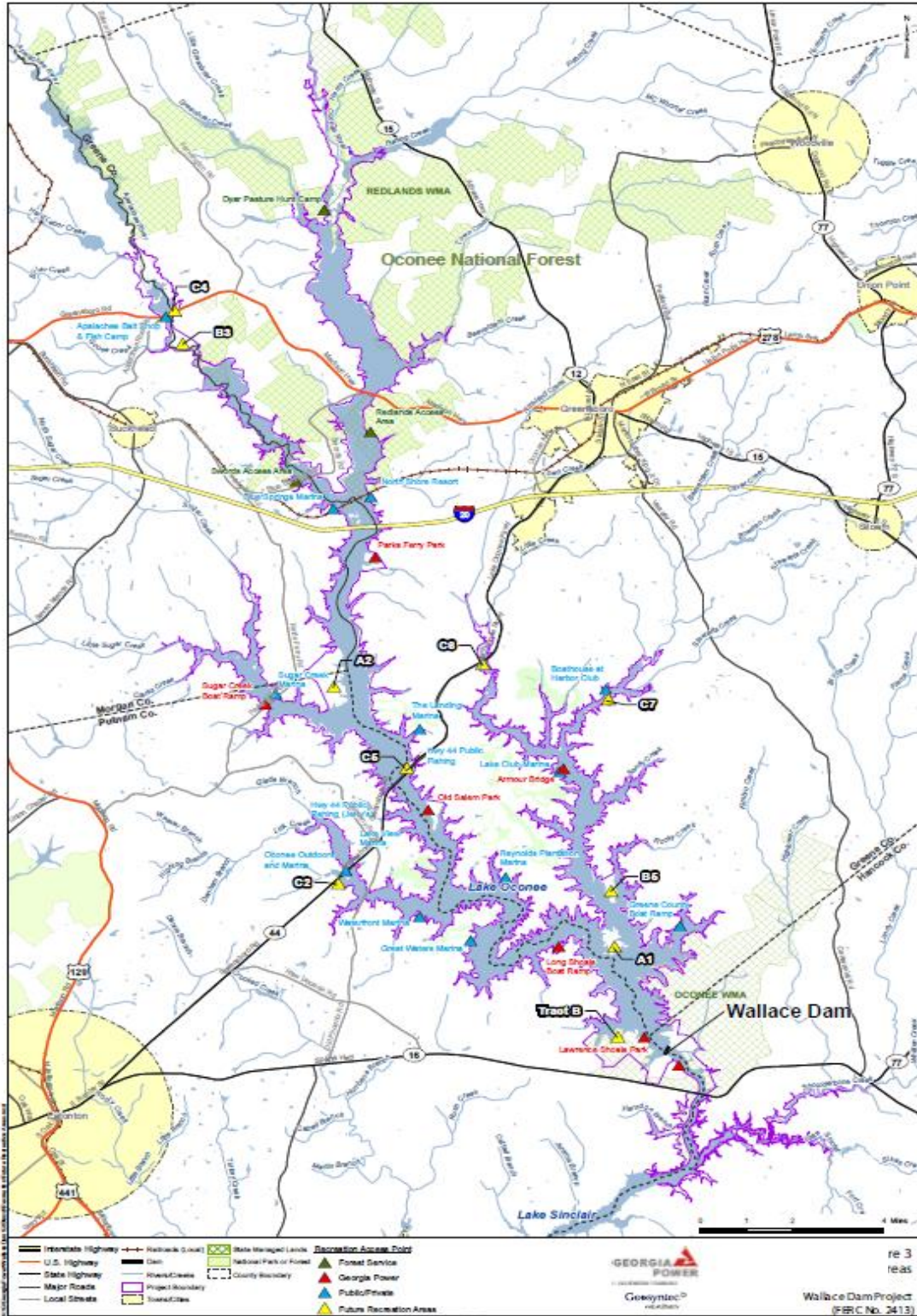


Figure 19. Recreation Areas on Lake Oconee. (Source: Georgia Power, as modified by staff).

Swords Recreation Area

The Swords Recreation Area is a 314.9-acre park located off Blue Springs Road in Morgan County. The recreation area provides access to Lake Oconee, north of Interstate 20, including the Apalachee River embayment. The Forest Service provides a parking area for 100 vehicles with boat trailers, a three-lane boat ramp, boat dock, picnic facilities, shoreline access for fishing, and a restroom. Only 7.23 acres are located within the project boundary. The boat ramp, boat dock, and shoreline are within the project boundary, while the parking and additional recreation amenities are outside the project boundary.

Recreational Use

Georgia Power assessed recreational use at the project using a combination of data from a recent Licensed Hydropower Recreation Development Report (FERC Form 80) submittal, customer satisfaction surveys of campground customers, user surveys at Georgia Power boat ramps and popular bank fishing areas, and written, phone, and mailed questionnaires with various user groups.

Georgia Power administered recreation surveys to 166 users at the three Georgia Power boat ramps within the project boundary (Sugar Creek, Armour Bridge, Long Shoals) during five survey events between March and June 2016. Over 23 percent of the boat ramp users were from the four counties occupied by the project (Greene, Hancock, Morgan, and Putnam). The highest proportion of users surveyed was from Putnam County (10 percent) followed by Dekalb (8 percent) and Morgan (8 percent) Counties. The five most common reasons cited by users for visiting Lake Oconee were boat fishing (47 percent), pleasure boating (13 percent), tournament fishing (9 percent), bank fishing (8 percent), and jet skiing (4 percent). The average length of a visit to the lake, via Georgia Power's boat ramps, was 6.5 hours for an average party size of 3.08. Visitor use surveys indicated that facilities are aging and in need of replacement/remodeling and there are opportunities for beneficial amenities at existing sites. Visitors frequently requested improved boat docks, restrooms, boat ramps, parking, trash pickup, and lighting. The survey results suggest that the sites are not overcrowded.

Georgia Power also administered recreation surveys to 77 users at 14 bank fishing locations on Lake Oconee during the same survey events in 2016. Of those visiting Lake Oconee for bank fishing, 36 percent were from Hancock, Morgan, Newton, and Putnam Counties. Bank anglers averaged 5.6 hours per visit and 3.1 visits per month, with the highest visitation in the spring. The mostly commonly requested improvements desired by bank anglers were additional bank

fishing access/piers, installation or improvement of restrooms, improved lighting, and additional trash cans.

A total of 19 mailed, self-administered questionnaires were also completed by user groups including bass fishing clubs, property and homeowner associations, waterfront businesses, and local business associations, and federal, state, and local agencies. In general, the groups perceived the quality of the existing access and facilities on the lake to be good, or adequate. The primary recommendations were for lake tours, more public access points, easier boat launches, safer access, a public boat ramp on the Richland Creek arm, a large tournament-fishing boat ramp, and improved accessibility for restrooms and boat ramps.

In 2014, 398 campground users were surveyed. The majority of campground users noted that the registration process is easy, the Wallace Dam Project parks and restrooms are clean, park hosts are courteous and respectful, and camping facilities meet their needs at the Wallace Dam Project. The primary user recommendations related to improving the cleanliness of the restroom facilities at Lawrence Shoals and Parks Ferry Parks, and keeping the parks open later in the year (October/November).

Estimated annual recreation use was approximately 605,000 total visits to Lake Oconee in 2015, of which 471,900 were for day use and 133,100 were for night (including overnight) use. An estimated 169,247 of these visits (28 percent) occurred at the seven project recreation facilities. Georgia Power observed a 9-percent increase in its attendance records between 2014 and 2015.

Future Use

As discussed above, about 89 percent of the project's recreation users were from a 24-county area. The population of the 24-county area is projected to increase by 5 percent (2015-2020), 10 percent (2020-2030), 8 percent (2030-2040), and 7 percent between 2040 and 2050. Future population growth in the area is anticipated to continue to be driven primarily by the popularity of Lake Oconee as a recreation and retirement destination (Georgia Power, 2016f).

Overall recreation use at the project is forecasted to increase by 33 percent between 2015 and 2050. Future recreational use is projected to be approximately 805,369 in 2050 (table 12). The State Comprehensive Outdoor Recreation Plan for Georgia (Georgia DNR, 2016) includes two relevant strategies for future use: (1) commit to marketing natural and recreation resources to increase tourism; and (2) identify and prioritize key natural lands for acquisition

Table 12. Estimated annual recreational use (recreation visits) between 2015 and 2050. (Source: Georgia Power, 2016f; as modified by staff).

Recreation Site	2015	2020	2030	2040	2050
Lawrence Shoals, Old Salem, and Parks Ferry	79,670	83,952	92,097	99,106	106,010
Long Shoals, Sugar Creek, and Armour Bridge	80,588	84,919	93,158	100,248	107,231
Wallace Dam Tailrace	8,989	9,472	10,391	11,182	11,961
Georgia Power Project Recreation Use	169,247	178,343	195,646	210,536	225,202
Non-Georgia Power Recreation Use	435,753	459,174	503,723	542,060	579,818
Total	605,000	637,517	699,369	752,596	805,019

Analysis of future demand indicates that the existing parking facilities at Long Shoals, Sugar Creek, and Armour Bridge boat ramps have adequate capacity for current and future average use (Georgia Power, 2016f).

Land Use

Land use within the project boundary is primarily open water, with land amounting to 28 percent of the total area within the project boundary. Deciduous or pine forest covers 12 percent of the total area, and forested wetlands cover 5 percent of the total area. Less than 2 percent of the project lands are being used for low- or high-intensity urban purposes. Sixty-three percent of the lands within 2,000 feet of the project are forested, while approximately 1 percent is in low- or high-intensity urban uses. Most of these urban uses are clustered near the central portion of the reservoir along Lake Oconee Parkway (Georgia Hwy 44). Except for limited pockets of urban land around Eatonton and Milledgeville, most of the lands around the project contain forest, row crop/pasture, or are clearcut or sparsely vegetated.

Land use in the vicinity of the Wallace Dam transmission line is predominantly undeveloped, forested/timberlands or agricultural land used for dairy or poultry farming. The remaining areas are occupied by aquatic or wetland features, a few residential properties, and small roads. The only urban area near the transmission line right of way is Eatonton.

Shoreline Management

Georgia Power manages the shoreline of Lake Oconee in accordance with its existing Shoreline Management Program, which is shared between Lake Oconee and Lake Sinclair. This program was developed from standard land use article 56C, which was incorporated into the Wallace Dam Project license in 1990. Georgia Power's current Shoreline Management Program includes three elements: (1) a Leasing and Permit Program; (2) Shoreline Management Guidelines; and (3) a Compliance Program.

Georgia Power's leasing and permitting program establishes what actions adjacent landowners can take on shoreline property within the project boundary. Georgia Power requires adjacent landowners to obtain permits prior to construction, or other ground-disturbing activity, such as grading, or tree removal within the project boundary. All granted permits must adhere to completion dates, and any changes must be approved by the Georgia Power Land Management Office.

The Shoreline Management Guidelines advise landowners on allowable uses within the project boundary for permitted activities and activities that do not require permits. The guidelines include an array of vegetative buffer safeguards, including minimum structure setbacks, clearing setbacks, silt screen requirements, non-conforming

structure requirements, and tree disposal and lawn clipping disposal prohibitions. The guidelines also specify construction requirements for seawalls, docks, boathouses, residential construction, outside sitting areas (i.e. gazebos), boatlifts, outbuildings, and small-scale dredging. Georgia Power routinely performs inspections at renewal and transfer of lease lots and weekly by surveying the project shoreline. Georgia Power also performs random inspections to monitor compliance.

One important element of Georgia Power’s Shoreline Management Program is the protection of shoreline resources as part of a forested buffer. The buffer, however, does not apply to National Forest land at the project. The buffer strip is generally 25 feet wide along the entire shoreline, and expands to widths of 200 feet across the reservoir from certain recreation areas (Table 13). The buffer strip is 100 feet wide to protect Area A-1’s viewshed, and 200 feet wide to protect Area A-2’s viewshed and the Forest Service Area viewsheds. Also, as established as part of a land exchange approved in 1996, a 65-foot-wide buffer zone is required along the shoreline of the property that was conveyed to Reynolds Corporation, north of Area A-1 (Figure 20).

Table 13. Buffer widths for various areas at the Wallace Project.
 (Source: Georgia Power, 2016, as modified by Staff).

Property	Buffer Width
Georgia Power fee-simple	25 feet
Reynolds Corporation	65 feet
WMA lands, Area B-5, Area C-1	100 feet
Area A-1 viewshed	100 feet
Area A-2 viewshed	200 feet
Forest Service	200 feet

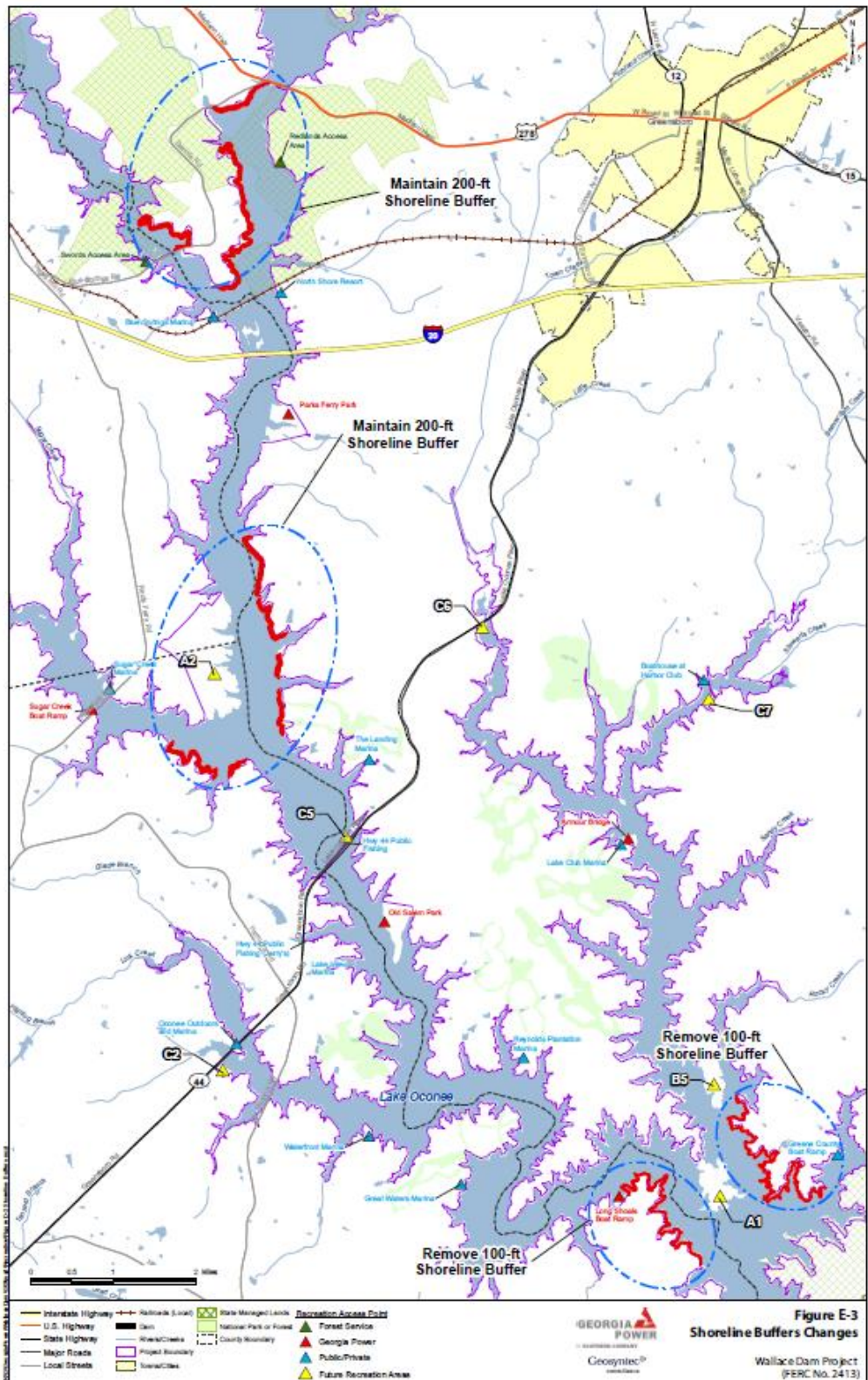


Figure 20. Viewshed Buffers at the Wallace Project. (Source: Georgia Power, 2016; as modified by Staff).

3.3.5.2 Environmental Effects

Recreation and Land Use

Georgia Power proposes to implement the improvements detailed in its draft Recreation and Land Use Plan, filed on January 22, 2019, and summarized in table 14.¹⁴⁹ The plan includes provisions to develop three new project recreation sites: (1) the 0.69-acre Jerry's Highway 44 Bank Fishing Access; (2) the 10-acre Area C-5 Bank Fishing Access; and (3) the Georgia Highway 16 Bridge Boat Ramp. Under the proposal, the current Tailrace Fishing Area site would be closed, and would be replaced by the new Georgia Highway 16 Bridge Boat Ramp. On balance, the number of project recreation sites would increase from seven to nine. The Recreation and Land Use Plan provides for the continued operation and maintenance of the remaining existing and the proposed project recreation sites.

Georgia DNR expresses support for Georgia Power's proposed recreation enhancements. However, Georgia DNR states that additional public boating access capacity, including more parking and at least three boat ramps, is needed to support larger events, and requests that Georgia Power consult with Georgia DNR to identify the appropriate timing and location for these measures. In its reply comments, Georgia Power responded by stating that the Recreation and Land Use Study documented a forecasted increase in recreation use of 33 percent by 2050. If private facilities close in the future or demand for public boating access begins to regularly exceed the use capacities of existing facilities, Georgia Power proposes to consult with Georgia DNR to develop a plan to ensure that appropriate public boating access for fishing tournaments remains available year-round. Georgia Power notes that future options from adding ramp lanes and parking could occur at Sugar Creek Boat Ramp and/or Parks Ferry Park.

¹⁴⁹ Georgia Power's license application included two separate plans: a Recreation and Land Use plan and a Recreation Enhancement Measures Plan. In a November 21, 2018 additional information request, staff directed Georgia Power to combine these two plans. Georgia Power's January 22, 2019 response included a revised Recreation and Land Use Plan that combined the information from the two original plans.

Table 14. Proposed measures for the Wallace Dam Project recreation sites. (Source: Georgia Power, 2018).

Recreation Site	Measures (Schedule) ^a
Lawrence Shoals Park	Replace two campground restrooms. (2022) Replace courtesy dock and restroom at boat ramp. (2022) Replace guest relations gate house. (2022) Replace pavilion and dedicated pavilion restroom. (2022) Replace beach house. (2022) Install improved lighting. (2022) Upgrade water supply well system. (2022)
Old Salem Park	Replace two existing group docks and install third group dock. (2021) Replace courtesy dock and restroom at boat ramp. (2021) Replace guest relations gate house and reconfigure park entrance. (2021) Replace pavilion and dedicated pavilion restroom. (2021) Replace beach house. (2021) Install improved lighting. (2021) Upgrade water supply well system. (2021) Provide for year-round operation of boat ramp. (2021)
Parks Ferry Park	Replace two existing campground restrooms. (2023) Replace guest relations gate house and reconfigure park entrance. (2023) Replace pavilion and dedicated pavilion restroom. (2023) Replace beach house. (2023) Install improved lighting. (2023) Upgrade water supply well system and replace underground water and electrical service. (2023) Provide for year-round operation of boat ramp. (2023)
Sugar Creek Boat Ramp	Construct new barrier-free fishing pier. (2021) Upgrade existing courtesy dock. (2021) Replace vault toilet with flush toilet. (2021) Install improved lighting. (2021)

Recreation Site	Measures (Schedule) ^a
Armour Bridge	Upgrade existing courtesy dock. (2022) Replace vault toilet with flush toilet. (2022) Install improved lighting. (2022)
Long Shoals Boat Ramp	Upgrade existing courtesy dock. (2023) Trim vegetation along shoreline to provide additional bank fishing access. (2023) Install improved lighting. (2023)
Proposed Area C-5 Bank Fishing Access	Construct new barrier-free fishing pier and new gravel parking area. (2021) Install new or improved lighting. (2021)
Proposed Jerry’s Highway 44 Bank Fishing Access	Construct new barrier-free fishing pier and new gravel parking area. (2021) Install new or improved lighting. (2021)
Georgia Highway 16 Bridge Boat Ramp (Tailrace)	Construct new barrier-free fishing pier. (2021) Install vault toilet. (2021)
Tailrace Fishing Area	Close existing facility (2021)

^a Georgia Power’s measures also include monitoring and routine maintenance, such as trash pick-up, mowing, and cleaning. Georgia Power also proposes to install shoreline stabilization consisting of riprap at Old Salem Park, Parks Ferry Park, Long Shoals Boat Ramp, and Armour Bridge.

Our Analysis

The recreation measures described in Georgia Power’s Recreation and Land Use Plan would enhance recreation by: (1) better accommodating vehicles with boat trailers; (2) reconfiguring entrances and gate houses, and allowing year-round boat ramp access for boat-fishing and tournament fishing; (3) adding and improving bank fishing access; (4) improving access for the disabled by providing barrier-free fishing piers; (5) installing signage; and (6) replacing or installing water, electric, and lighting infrastructure. The number of project recreation facilities would increase from seven to nine facilities. Moreover, Georgia Power’s proposed recreation measures would: (1) help meet a need for protecting natural resources; (2) preserve high-quality outdoor recreation opportunities identified in the State Comprehensive Outdoor Recreation Plan for Georgia; and (3) meet a need for existing and future recreational use and demand.

Constructing the new project recreation facilities (i.e., the Area C-5 Bank Fishing Access, the Jerry’s Highway 44 Bank Fishing Access, and the Highway 16 Bridge Boat Ramp) would allow for increased bank fishing access to Lake Oconee, which was requested during the relicensing process. Constructing the Highway 16 Bridge Boat Ramp prior to closing Tailrace Fishing Area would minimize the effects of closing a

project recreation site on recreation use and opportunities downstream from Wallace Dam.

As discussed in section 3.3.1, *Geologic and Soil Resources*, Georgia Power also proposes to install riprap at Old Salem Park, Parks Ferry Park, Long Shoals Boat Ramp, and Armour Bridge, as part of the proposed Recreation and Land Use Plan. Installing riprap would protect the sites from further erosion. Protecting these sites would help to maintain bank fishing and other shoreline recreational uses at these sites.

Construction of the proposed recreation facilities and enhancements could cause temporary disturbances in the form of construction-related noise and limited recreation access at the project recreation facilities. Construction would be limited to the direct project recreation facility areas. Georgia Power proposes a three-year staggered construction timetable for the enhancements, and also proposes to construct the enhancements during fall and winter when recreation use is lowest. Using a staggered construction timeline and limiting construction to low-use times would reduce construction-related effects on recreation use.

The new project recreation facilities would help to absorb a portion of the forecasted increase in recreation use. Georgia Power's proposal to consult with Georgia DNR to develop options for increasing boating capacity for large events in the future if demand for increased boating access arises, which is not currently in the proposed Recreation and Land Use Plan, addresses Georgia DNR's concern regarding access for large events. Georgia Power's list of future options for adding ramp lanes and parking at the Sugar Creek Boat Ramp and/or Parks Ferry Park is reasonable, as there appears to be sufficient land available at both of these sites for future lane expansion and increased parking. The proposal, however, does not identify a threshold for recreation use that would trigger consultation with Georgia DNR. Including this provision, along with a recreational use threshold for consultation, in any revised Recreation and Land Use Plan required under a new license would provide for a more inclusive Recreation and Land Use Plan that addresses all of the concerns raised in the proceeding.

Deferred Recreation Measures [4(e) Condition 24]

Forest Service 4(e) Condition 24 is specific to recreation. The condition addresses deferred maintenance at the three Forest Service recreation areas located within the Oconee National Forest: Redlands Recreation Area, Swords Recreation Area, and Dyar Pasture Recreation Area. The condition calls for a 25-year refurbishment plan to replace the amenities at each of the recreation areas, including the boat docks, boat ramps, fishing

piers, toilets, parking lots, and other associated amenities such as information boards and trash receptacles. Georgia Power does not oppose the proposed condition.¹⁵⁰

Our Analysis

These areas provide a total of eight boat lanes and 200 paved parking slots. The measures in Condition 24 would provide for a multi-year refurbishment of each of the three sites. Over the course of 25 years, the boat docks, boat ramps, fishing piers, toilets, parking lots, bank rip-rap, information boards, interpretive signs and trash receptacles at each site would be replaced, or otherwise improved. The refurbishment of the three non-project recreation areas, and the on-going maintenance of the sites, would assist in absorbing use from the project recreation facilities.

Future Recreation Areas

In Georgia Power's current recreation plan (Exhibit R), ten areas are reserved for future recreation development. These areas are designated as A, B, or C areas. Georgia Power has reserved the large tracts of land (Area A-2 and Tract B) for future state parks;¹⁵¹ These areas were reserved to be developed intensively as recreation demand increased and funds became available. Areas B-3 and B-5 are reserved for general outdoor recreation, subject to substantial development for a variety of recreational uses; and C-Areas for reservoir access with limited day use facilities. Development goals for each reserved area are described in table 15.

¹⁵⁰ See Georgia Power's June 7, 2019 Filing at 3.

¹⁵¹ Area A-1 is no longer proposed for future use as a state park. In 1996, the Commission approved the exchange of 558 acres of Area A-1 for a 421-acre parcel of non-project lands, which became Tract B. To offset the difference in area between the two parcels, the Commission required Georgia Power to add two supplemental parcels totaling about 135 acres to Tract B. Tract B was then placed in the project boundary and reserved for a future state park. The remainder of Area A-1 stayed in the project boundary as land reserved for future recreational use, per the revised Exhibit R.

Table 15. Future Recreation Areas at the Wallace Dam Project. (Source: Georgia Power, 2016; as modified by Staff.)

Development Type	Reserved Area
High Density Recreation (state parks)	A-2, Tract B
General Outdoor Recreation	B-3, B-5
Reservoir Access	C-2, C-4, C-5*, C-6, C-7
Future Recreational Use	A-1 Remainder

*Georgia Power proposes to develop area C-5 for bank fishing.

Area A-2 (465-acres) is located at the confluence of Sugar Creek and the Oconee River in Putnam and Morgan Counties (*see* figure 19). In 1974, prior to construction of the Wallace Dam Project, Georgia Power acquired by condemnation 176.8 acres of Area A-2 from Ms. Dorothy D. Bell. Ms. Bell’s daughters, Ms. Barbara Bell Tyson and Ms. Miriam Bell Foster (Bell sisters), filed comments noting that it is unlikely that Area A-2 will be developed as a state park in the future, and requesting the return of the land previously owned by their mother.¹⁵² Georgia DNR continues to express interest in reserving Area A-2 for future development, most recently in a May 21, 2019 meeting with Georgia Power, and remains interested in developing a state park on Lake Oconee (Georgia Power, 2019b). Noting its large size and close proximity to Interstate 20, Georgia Power proposes to continue to reserve Area A-2 within the project boundary for future recreational development.

Our Analysis

As discussed previously, the 24-county area surrounding Lake Oconee is expected to grow over the next 50 years. Developments like the globally recognized Ritz-Carlton Reynolds resort and club and the large, master-planned Reynolds golf and lakefront community are expected to result in higher levels of recreation use in the future. Overall recreation use is projected to increase by 33 percent by 2050, mainly due to future population increase in the 24-county area from which about 89 percent of the recreation users originate.

Area A-2 remains the largest area reserved for future recreation use located within close proximity to Interstate 20 (about 4 miles). While the counties closest to the project do attract recreational use, the larger percentage of recreational use of the project comes from a 24-county area, spanning Interstate 20 to the north and south. Further, recreation users also visit from Kentucky, Florida, North Carolina, South Carolina, and Tennessee.

¹⁵² See letters filed March 26, 2019, December 12, 2017 (Congressman Jody Hice on behalf of Mrs. Tyson), and June 15, 2015.

Reserving lands near Interstate 20 for future recreation use would benefit visitors from the 24-county area and out-of-state visitors.

Regarding the Bell property, specifically, the 176.8-acre tract formerly owned by the Bell family contains about 30 percent of the Lake Oconee shoreline located in Area A-2, and the entire shoreline of the Sugar Creek embayment located within Area A-2. Removing nearly 177 acres from Area A-2 would reduce the size of tract A-2 by nearly 40 percent, to 288 acres. Area A-2 is currently designated for intensive (state park) recreation development, which typically would accommodate large numbers of visitors, and, therefore, require a large area to offer the recreation facilities that the public expects, or demands. Only seven parks in Georgia's state park system, of 46 parks, are less than 500 acres in size (Georgia DNR, 2019). In total, Area A-2 is 465 acres.

Continuing to reserve Area A-2 and other designated areas for future recreation development would allow for growth in quality recreation opportunities to occur in the future at pace with growth in population.¹⁵³ These areas could help disperse use, and ease potential crowdedness at existing recreation areas resulting from the projected increase in recreation use.

Shoreline Management

Under a new license, Georgia Power proposes a revised SMP which incorporates the elements of the current Shoreline Management Program, in accordance with Georgia Power's *Shoreline Management Guidelines for Georgia Power Lakes*, and a Shoreline Buffer Zone Management Plan. The SMP would promote the maintenance of vegetative buffers around the reservoir to protect water quality, aquatic habitat, and cultural and aesthetic resources. Area A-1 is no longer slated as a future state park; therefore, Georgia Power proposes to modify the requirement for its 100-foot viewshed buffer, reverting the buffer requirement to 25-feet. No other entities recommended measures related to shoreline management at the project.

Our Analysis

Georgia Power's proposed SMP seems to adequately reflect the need to balance residential development with maintaining areas for natural resource protection and recreation at the project. Under Georgia Power's proposed SMP, there would be no

¹⁵³ Even if Georgia Power had proposed to change the classification of Area A-2, including the Bell property, from future recreation to another use, or removed it from the project boundary entirely, the Commission could not compel Georgia Power to convey that land to another entity.

change to Georgia Power's existing permitting or leasing program. The existing Shoreline Management Guidelines would not change.

Georgia Power's current shoreline buffer guidelines range from 25 feet to 200 feet. The 25-foot shoreline buffer is in place for most of the residential tracts at the project. Georgia Power's Shoreline Management Guidelines would ensure that development of these tracts would continue in a planned manner. Under Georgia Power's proposal, the SMP would incorporate a Shoreline Buffer Zone Management Plan. This plan was required by the Commission as part of a land exchange between Georgia Power and the Reynolds Corporation, in 1996. It ensures that there is a 65-foot-wide shoreline buffer zone for the portion of Area A-1 owned by the Reynolds Corporation. The 65-foot-wide shoreline buffer zone would ensure that the shoreline around the Reynolds Corporation lands, including the resort and six golf courses is protected. Area A-1's original 100-foot-wide buffer requirement was due to its future planned use as a state park. However, this tract of land is no longer slated as a future state park. Removing the 100-foot-wide buffer for Area A-1 would result in the buffer reverting to the standard 25-foot width. This reduction would result in a more limited protected area, and would allow for more development to occur closer to the shoreline, but would still be within Georgia Power's standard protected buffer width. Area A-2's original 200-foot-wide would be retained, as this tract of land is still being reserved for a future state park. The area-specific vegetative buffer zones would continue providing many environmental benefits, and would protect the aesthetic resources along Lake Oconee in a manner appropriate to the intended use of the area including the shoreline.

Georgia Power also proposes management of submerged timber in its Shoreline Management Program. The original license required that 1,250 acres of timber be left uncut in Lake Oconee for fish and wildlife habitat. Georgia Power would consult with Georgia DNR if hazards are identified, and determine the area, or areas to be cut. Trees would be cut to a depth of 10 feet below the surface, and floating logs would be removed.

Implementing the proposed SMP would allow Georgia Power to continue to control the use of project lands and waters for non-project use, and protect environmental, recreational, and aesthetic resources at the project. Under the SMP, Georgia Power would continue monitoring project lands to ensure that no unauthorized uses occur within the project boundary, and to resolve any issues that may arise with respect to unauthorized structures. The proposed SMP includes a provision for reviewing the plan every 10 years to determine its adequacy and the need for modifications or updates. The 10-year update period would allow Georgia Power to continue to specify land use for the project shoreline and provide sufficient time for development to occur in a manner consistent with the plan.

The proposed SMP, while providing for revisions at 10-year intervals, does not include a reporting requirement. Requiring a report to be filed at each 10-year review,

that includes agency comments and recommended measures, would allow for agencies to provide input on the adequacy of the plan, and suggest effective methods of addressing any inadequacies. In addition, the proposed SMP generally describes the provisions of Georgia Power's *Shoreline Management Guidelines for Georgia Power Lakes* and the *1993 Dredge Permitting Procedures*. However, those two documents are not attached to the proposed SMP. Including current copies of the documents in a revised SMP would more clearly communicate the requirements to stakeholders and facilitate compliance, and also provide more effective protection of shoreline resources.

Project Boundary Clarification

As discussed in section 2.1.1, *Existing Project Features - Project Boundary and Surrounding Non-Project Lands*, the project boundary encloses all project features and recreation facilities around Lake Oconee and Wallace Dam. The project boundary also extends downstream from Wallace Dam, within Lake Sinclair, for about 1.3 river miles to the Georgia Highway 16 Bridge to enclose the project's tailrace. The project boundary continues downstream from there for several miles along both the east and west shorelines of Lake Sinclair and the Shoulderbone Creek embayment, enclosing a narrow strip of land and Ponds 2, 3, and 4, which are managed as waterfowl habitat.

Georgia Power has made no proposal to modify the project boundary south of the Highway 16 Bridge. Lands within the project boundary would be managed in accordance with Georgia Power's proposed Shoreline Management Plan.

Our Analysis

In general, Georgia Power's existing project boundary adequately encloses all features necessary for operation of the project, project recreation, and protection of environmental and cultural resources. This includes both the excavated tailrace, which extends into Lake Sinclair, and the three ponds managed for waterfowl habitat. However, the project purpose of the upland areas around Lake Sinclair and the Shoulderbone Creek Embayment (with the exception of Ponds 2, 3, and 4) is unclear. These lands, which are primarily forested and undeveloped are not identified as needed for recreation access or protection of environmental or cultural resources. We recommend that Georgia Power clarify the purpose that these lands serve for the Wallace Project in any comments it may provide on this EA.¹⁵⁴

¹⁵⁴ The upland areas south of Highway 16 may serve a project purpose for the Lake Sinclair Project No. 1951, which is the lower reservoir for the Wallace Project. If these lands are needed for operation of the Sinclair Project, provide recreation access, or

3.3.6 Cultural Resources

3.3.6.1 Affected Environment

Section 106 of the NHPA requires that the Commission take into account the effects of its actions on historic properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on the undertaking.¹⁵⁵ Historic properties are those that are listed or eligible for listing in the National Register. The regulations implementing Section 106 of the NHPA also require that the Commission seek concurrence with the SHPO on any finding involving effects or no effects on historic properties, and consult with interested Indian tribes or Native Hawaiian organizations that attach religious or cultural significance to historic properties that may be affected by an undertaking. In this document, we also use the term “cultural resources” for properties that have not been determined eligible for listing in the National Register. Cultural resources represent things, structures, places, or archaeological sites that can be either prehistoric or historic in origin. In most cases, cultural resources less than 50 years old are not considered historic.

Area of Potential Effects (APE)

Pursuant to section 106, the Commission must take into account whether any historic property could be affected by the issuance of a proposed license within a project’s APE. The APE is determined in consultation with the SHPO and is defined as the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist.¹⁵⁶ The APE for the project is defined as: (1) lands within the project boundary that include shoreline areas of Lake Oconee at, or below, the low daily pool elevation of 433.5 feet; (2) upland areas around Lake Oconee owned by Georgia Power; (3) a strip of land owned in fee simple by Georgia Power around the entire shoreline; (4) access areas owned by

protect environmental or cultural resources at the Sinclair Project, we recommend that Georgia Power describe any such benefits, as well.

¹⁵⁵ An undertaking means “a project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a Federal agency, including those carried out by or on behalf of a Federal agency; those carried out with Federal financial assistance; and those requiring a Federal permit, license, or approval.” 36 C.F.R. § 800.16(y). Here, the undertaking is the potential issuance of a new license for the Wallace Dam Project.

¹⁵⁶ 36 C.F.R. § 800.16(d).

Georgia Power; and (5) lands around the powerhouses, dam, dikes, spillways, and support buildings. The Georgia SHPO concurred with the APE, via a telephone conference of the Cultural Resources Work Group,¹⁵⁷ on February 18, 2016.

Prehistoric and Historic Background

The prehistoric and historic background in Georgia is generally divided among several stages, or periods. The primary periods are (a) Paleo-Indian (10,000 to 8,000 BC), (b) Archaic (8,000 to 1,000 BC), (c) Woodland (1,000 BC to AD 1,000, and (d) Mississippian (1,000 to 1,600 AD).

The Paleo-Indian Period represents initial colonization, early hunting, and gathering. Population density was low during the Paleo-Indian Period, and social structure likely consisted of small mobile groups following a hunting and gathering subsistence pattern. The Archaic Period represents development of regional territories, a shift in hunting smaller prey (such as deer, and turkey), gathering, and use of cultivated plants. The Woodland Period represents agricultural communities and development of pottery. The Mississippian Period represents large villages, ceremonial mounds, and trade networks. Generally speaking, research has shown that each period or stage is marked by climate change and/or technological changes that are reflected in soils, pollen, and artifacts including tools and pottery.

On August 6, 1969, the Commission issued an original license to Georgia Power for the construction, operation, and maintenance of the Wallace Dam Project. The original project works included a combined pumped storage and conventional development with four pump-turbine units and two conventional units with a total installed capacity of 324 MW.

Archaeological and Historic-era Properties

In 1988, Brockington and Associates (Brockington) performed a cultural resource inventory and evaluation study of a 770-acre recreational tract of land located within the Wallace Dam Project, in Greene County. The Brockington study found a total of 52 cultural resources representing seven major types of cultural property. Ten of the 52 newly located properties were recommended eligible for the National Register. This group of properties included one prehistoric quarry, six Lamar¹⁵⁸ open properties, one Lamar overhang, and two historic structural ruins. In 1995, Brockington performed a cultural resources re-verification study in order to evaluate 33 previously recorded sites within the project boundary. The re-verification assessment resulted in 28 of 33 sites

¹⁵⁷ Filed as privileged information on March 4, 2016.

¹⁵⁸ A phase in the Late Mississippian Period (AD 1350-1540).

being re-verified; three of which were recommended for continued monitoring as they are either eligible or recommended potentially eligible for the National Register.

Southeastern Archaeological Services, Inc. (SAS) performed an archaeological survey of the undeveloped property for Reynolds Plantation. The SAS survey of the 1,860-acre property documented 161 field sites and 41 low density artifact occurrences that depict an area that was intensively use over the period from 9000 BC to AD 1600. The majority of the sites were determined ineligible for the National Register, however, two sites were recommended eligible and 29 sites were determined to be potentially eligible and warranting further assessment. The eligible sites were primarily old home sites and habitation sites, while the majority of the potentially eligible sites were old home sites, lithic or pottery scatters, and one old sawmill site. In 2001, SAS performed an archaeological survey on a 610-acre tract known as the Lake Oconee Village, located in Greene County, and additional testing on five Reynolds Plantation sites to establish eligibility for the National Register. The survey resulted in the discovery of 25 archaeological sites, including 11 low density scatters. SAS recommended three of the five Reynolds Plantation sites as eligible for listing in the National Register.

Since 1996, Georgia Power has annually monitored seven archaeological sites at the Wallace Dam Project. Current monitoring efforts for Wallace Dam include one site determined eligible for prehistoric artifact/shell scatter, and six recommended eligible sites consisting of prehistoric artifact/shell scatters, prehistoric Indian lithic scatters, and rock piles. Results from 2018 monitoring activities found no changes in status or indications of new disturbances for any of the Wallace Dam Project cultural resources.

Phase II testing was conducted by TRC Environmental Corporation (TRC) in 2016 at three sites (9GE751, 9GE952, and 9HK23) to assist in determining National Register eligibility, and to aid in evaluating the need for continued cultural resources monitoring. Sites 9GE751 and 9HK23 were previously recommended eligible for listing on the National Register, while the eligibility of 9GE952 was unknown. Based on the results of the Phase II testing, sites 9GE751 and 9HK23 were recommended as being not eligible for listing in the National Register (TRC, 2016a). Georgia Power believes that further monitoring of these two sites is not warranted under a new license. The investigation of site 9GE952 found that the site extends outside of the project boundary and may yet yield significant information. Georgia Power's archaeology firm, TRC, recommends that the National Register eligibility status of this site remain unassessed, monitoring continue, and stabilization measures be considered, because the greatest concentration of artifacts is close to the shoreline of the impoundment. In addition, based on the results of previous investigations, TRC recommended that site 9PM990 be added to the list of sites for monitoring under any new license.

Georgia Power proposes to monitor six archaeological sites, as part of an HPMP. Site 9GE169 is a Mississippian-Lamar Phase site containing intact cultural features. The

site was recommended eligible for the National Register. The site is currently outside the project APE, but is being monitored by Georgia Power as part of the land exchange with Reynolds Corporation, as discussed in section 3.3.5, *Recreation and Land Use*. Site 9GE952 is a Late-Mississippian Period site on an upland ridge and currently extends below the full pool level. It has been recommended as potentially eligible for the National Register. Sites 9GE1495 and 9GE1530 are Late-Mississippian Period sites containing Lamar phase occupations. Site 9PM402 is a lithic scatter of indeterminate prehistoric origin. The site is currently submerged beneath Lake Oconee. Site 9PM990 is a late-nineteenth century farmstead that is currently a component of an educational trail system. The Georgia SHPO concurs that Georgia Power should monitor these sites. The Georgia SHPO also finds that the HPMP filed by Georgia Power is a sufficient record of the historic properties at the Wallace Dam Project, and states that the HPMP would guide the preservation strategy for the Wallace Dam Project's cultural resources.¹⁵⁹

Georgia Power assessed the historic hydro-engineering resources of the Wallace Dam Project to document the existing conditions of the hydropower facility and its support buildings (TRC, 2016b). Although the project is not yet 50 years old, it will become so during the next license term in 2029. The assessment was performed to develop a historic context and engineering analysis for future eligibility determination of the Wallace Dam Project for listing in the National Register.

Wallace Dam is the newest and largest of the 18 hydroelectric plants in Georgia Power's generating system. The project was completed in three construction periods between 1970 and 1979 under the design and engineering authority of Georgia Power. Wallace Dam possesses several unique engineering features. It was Georgia Power's first pumped storage hydroelectric project. At the time of construction, the project's pump turbines were the largest ever manufactured by Allis-Chalmers Manufacturing Company (now Voith Hydro, Inc.). The turbines feature innovative individual servomotors for each wicket gate, which provide economy and simplicity in design. This project was reported to be the first to use this technology in the United States. The powerhouse control building and administration building express a standardized version of the Brutalist architectural style that was common among public utility facilities across the nation during the 1970s. Other support buildings include a sewage lift station and maintenance buildings. Wallace Dam has not undergone any major structural or mechanical alterations since it was constructed in 1979, and it retains excellent physical integrity.

The Georgia SHPO determined that the Wallace Dam Project is eligible for listing in the National Register under Criterion G, for its exceptional significance in engineering and industry as the first pumped storage hydroelectric facility in Georgia. The Wallace Dam Project includes four historically significant resources built between 1970 and 1979,

¹⁵⁹ See Georgia SHPO's Letter filed August 3, 2018.

including the dam, powerhouse, control building, administration building, and maintenance building 1.

3.3.6.2 Environmental Effects

Historic Properties

Project-related effects on cultural resources within the APE can result from modifications to project facilities or project operations; project-related ground-disturbing activities; construction, modification, or maintenance of project recreation facilities and use of such facilities by visitors; project-induced shoreline erosion;¹⁶⁰ and vandalism. Georgia Power does not propose to modify project operation. To avoid, minimize, or mitigate for adverse effects on historic properties that may be affected by relicensing the project, Georgia Power proposes to implement an HPMP which directs the management of historic properties within the project's APE. The HPMP was developed in consultation with the Commission, the Georgia SHPO, Forest Service, the United Keetowah Band of Cherokee Indians, the Eastern Band of Cherokee Indians, the Muscogee (Creek) Nation, and the Cherokee Nation.¹⁶¹ The HPMP was filed on March 14, 2018. The Georgia SHPO and the Cherokee Nation commented on the draft HPMP. On May 31, 2018, Georgia Power submitted a revised HPMP in Volume 1 of the license application.

The HPMP would address the following items: (1) potential effects on historic properties resulting from the continued operation and maintenance of the project; (2) management and treatment measures, including monitoring, for six archeological sites, as well as four historically significant buildings and structures (including the dam, powerhouse, control building, administration building, and maintenance building one); (3) procedures for the review of proposed future ground-disturbing activities or other activities within the project's APE which would have the potential to adversely affect historic properties; (4) protection of historic properties threatened by direct or indirect project-related activities, including routine project maintenance; (5) resolution of unavoidable adverse effects on historic properties; (6) treatment and disposition of any human remains that may be discovered within the project's APE; (7) provisions for unanticipated discoveries of previously unidentified cultural resources within the

¹⁶⁰ Project-induced shoreline erosion does not include shoreline erosion attributable to flood flows or phenomena, such as wind-driven wave action, erodible soils, and loss of vegetation due to natural causes.

¹⁶¹ A Restricted Service List was devised and noticed on June 11, 2015. Upon request, the Muscogee and the Muscogee (Creek) Nation were added as a consulting party. The HPMP was sent to the members of the Restricted Service List and the Muscogee (Creek) Nation.

project's APE; (8) a dispute resolution process; (9) a list of categorical exclusions from further review of effects; (10) project-specific measures and a schedule for implementing the HPMP; (11) roles and responsibilities for the licensee, the Georgia SHPO, THPOs, and other individuals and organizations in regards to implementation of the HPMP; and (12) coordination with the Georgia SHPO, Forest Service, the United Keetowah Band of Cherokee Indians, the Eastern Band of Cherokee Indians, the Cherokee Nation, the Muscogee (Creek) Nation, and other consulting parties during implementation of the HPMP.

Georgia Power does not propose any changes to Wallace Dam or to the operation of the project that would affect historic properties. With the treatment measures proposed in the HPMP, constructing the liquid oxygen facility and the new project recreation sites, and recreation measures should not have any effect on historic properties. Georgia Power's HPMP would ensure that appropriate consultation occurs prior to any activity that could affect the historic properties in the APE. The HPMP describes the protection of the historic properties that have been listed or determined to be eligible for listing in the National Register, and includes provisions to address any historic properties discovered during the license term.

Forest Service 4(e) Condition 23 outlines the Native American Graves Protection and Repatriation Act, and states that if the licensee inadvertently discovers human remains, funerary objects, sacred objects, or objects of cultural patrimony on federal or tribal lands, the holder shall immediately cease work in the area of the discovery and shall make a reasonable effort to protect and secure the items, immediately notify the forest archaeologist of the discovery and follow up with written confirmation of the discovery. Condition 23 also requires that activity that resulted in the inadvertent discovery not resume until 30 days after the Chattahoochee-Oconee National Forest-Forest Archaeologist certifies receipt of the written confirmation, unless a recovery plan, agreed to by the Forest Service and the affected Indian tribe, provides for earlier resumption of the activity.

Our Analysis

Relicensing the project, with the proposed HPMP, with measures for continued use and maintenance of historic properties and treatment of historic properties affected by project-related activities, developed in consultation with the Georgia SHPO, Forest Service, the United Keetowah Band of Cherokee Indians, the Eastern Band of Cherokee Indians, the Cherokee Nation, the Muscogee (Creek) Nation, Georgia Power would ensure that continued operation and maintenance of the project would either have no effect on known historic properties or that any unavoidable effects would be minimized and appropriately mitigated. The HPMP would also provide guidance specific to the maintenance and upkeep of the dam, powerhouse, and other significant buildings with respect to the project facilities' historic character. In addition, the consultation provisions

in the HPMP (with the Georgia SHPO), where it concerns unanticipated discovery of historic resources and otherwise effects to historic properties at the project would ensure that such properties are adequately protected at the project over the term of any license.

To meet the requirements of section 106 of the NHPA, the Commission intends to execute a PA with the Georgia SHPO, Forest Service, the United Keetowah Band of Cherokee Indians, the Eastern Band of Cherokee Indians, the Cherokee Nation, the Muscogee (Creek) Nation for the proposed project for the protection of historic properties that would be affected by the continued operation and maintenance of the project. The terms of the PA would require Georgia Power to implement a final HPMP, for the term of any license issued for the project.

In the event that any of the objects described in Condition 23 are discovered, the HPMP provides protection and treatment measures for any remains found within the APE, and the 4(e) condition ensures compliance with the Native American Graves Protection and Repatriation Act on federal lands.

3.4 NO-ACTION ALTERNATIVE

Under the no-action alternative, the Wallace Dam Project would continue to operate as it has in the past. None of Georgia Power's proposed measures or the resource agencies' recommendations and mandatory conditions would be required. Lake Oconee would continue to fluctuate up to 2 feet daily, and would continue to support extensive recreational usage and an important lake fishery. The DO in the project tailwaters would not be improved, and use of the Wallace Dam forebay and tailwater by striped bass would continue to be restricted during the low-flow/high temperature summers months. Control measures for exotic, invasive aquatic species and vegetation would not be implemented. No improvements to, or inclusion of, project recreation sites would occur, nor would measures to protect historic and cultural resources be implemented. Lake Oconee's shoreline would continue to be managed as it has been in past.

4.0 DEVELOPMENTAL ANALYSIS

In this section, we look at the project's use of the Oconee River for hydropower purposes to see what effects various environmental measures would have on the project's costs and power generation. Under the Commission's approach to evaluating the economics of a hydropower project, as articulated in *Mead Corp.*,¹⁶² the Commission compares the current project cost to an estimate of the cost of obtaining the same amount of energy and capacity using a likely alternative source of power for the region (cost of

¹⁶² See *Mead Corp. Publ'g Paper Div.*, 72 FERC ¶ 61,027 (1995). In most cases, electricity from hydropower would displace some form of fossil-fueled generation, in which fuel cost is the largest component of the cost of electricity production.

alternative power). In keeping with Commission policy, as described in *Mead Corp.*, our economic analysis is based on current electric power cost conditions, and does not consider future escalation of fuel prices in valuing the hydropower project’s power benefits.

For each of the licensing alternatives, our analysis includes an estimate of: (1) the cost of individual measures considered in the EA for the protection, mitigation, and enhancement of environmental resources affected by the project; (2) the cost of alternative power; (3) the total project cost (i.e., for operation, maintenance, and environmental measures); and (4) the difference between the cost of alternative power and the total project cost. If the difference between the cost of alternative power and total project costs is positive, the project produces power for less than the cost of alternative power. If the difference between the cost of alternative power and total project cost is negative, the project produces power for more than the cost of alternative power. This estimate helps to support an informed decision concerning what is in the public interest with respect to a proposed license.

4.1 POWER AND ECONOMIC BENEFITS OF THE PROJECT

Table 16 summarizes the assumptions and economic information we use in our analysis for the project. This information was provided by Georgia Power in its license application or estimated by staff. We find that the values provided by Georgia Power are reasonable for the purposes of our analysis. Cost items common to all alternatives include: taxes and insurance costs; net investment (the total investment in power plant facilities remaining to be depreciated); estimated future capital investment required to maintain and extend the life of plant equipment and facilities; relicensing costs; normal operation and maintenance cost; and Commission fees.

Table 16. Parameters for the economic analysis of the Wallace Dam Project.
(Source: Staff).

Assumption	Value	Source
Period of economic analysis (years)	30	Staff
Current net investment (2019 dollars) ^a	\$116,014,900	Georgia Power
Current annual costs including O&M, and FERC fees (2019 dollars) ^b	\$9,066,117	Georgia Power
Relicense application costs (2019 dollars) ^c	\$5,857,962	Georgia Power

Assumption	Value	Source
Term of financing (years)	20	Staff
Cost of capital (percent) ^d	7.63	Georgia Power
Discount rate (percent) ^e	7.63	Staff
Energy rate (\$/MWh) ^f	39.8	Georgia Power
Capacity rate(\$/kilowatt-year) ^g	158	Staff

^a The net investment value of the Project was provided by Georgia Power in Volume 8, Exhibit D, Appendix A of its application.

^b Annual costs were provided by Georgia Power in Volume 8, Exhibit D, Appendix A of its application. FERC fees were estimated by staff. The average FERC fee over the 7-year period between 2012 and 2018 was \$515,360 per year.

^c The cost to develop the license application was provided by Georgia Power in Volume 8, Exhibit D of its application.

^d The cost of capital was assumed by staff to be equal to the discount rate provided by Georgia Power (*see* footnote below).

^e The discount rate was estimated by staff.

^f The energy rate was provided by Georgia Power in Volume 8, Exhibit D, Appendix A of its application.

^g The capacity rate was estimated by staff.

4.2 COMPARISON OF ALTERNATIVES

Table 17 summarizes the installed capacity, annual generation, cost of alternative power, estimated total project cost, and the difference between the cost of alternative power and total project cost for each of the alternatives considered in this EA: no-action; Georgia Power's proposal; the staff alternative, and the staff-alternative with mandatory conditions.

Table 17. Summary of the annual cost of alternative power and annual project cost for the three alternatives for the Wallace Dam Project. (Source: Staff).

	No Action	Georgia Power's Proposal	Staff Alternative ^b	Staff Alternative with all Mandatory Conditions ¹⁶³
Installed capacity (kW)	321,300	321,300	321,300	321,300
Dependable capacity (kW)	328,100	328,100	328,100	328,100
Annual generation (MWh)	390,083	390,083	390,083	390,083
Annual cost of alternative power ^a (\$ and \$/MWh)	\$67,365,100 (172.69)	\$67,365,100 (172.69)	\$67,365,100 (172.69)	\$67,365,100 (172.69)
Annual project cost (\$ and \$/MWh)	\$27,848,230 (71.39)	\$30,924,556 (79.27)	\$30,929,596 (79.29)	\$30,968,815 (79.39)
Difference between cost of alternative power and project cost (\$ and \$/MWh)	\$39,516,870 (101.3)	\$36,440,544 (93.42)	\$36,435,504 (93.4)	\$36,396,285 (93.3)

^a The power value includes the energy rate of \$39.8/MWh and the dependable capacity rate of \$158/kilowatt-year.

^b The Staff Alternative includes operating the project under existing operations with environmental measures as proposed by Georgia Power and some Forest Service 4(e) conditions.

4.2.1 No Action Alternative

Under the no-action alternative, the project would continue to operate as it does now, with no new environmental PM&E measures. The project would have an installed capacity of 321.3 MW, and generate an average of 390,083 MWh of electricity annually. The average annual cost of alternative power would be \$67,365,100, or about \$172.69/MWh. The average annual project cost would be \$27,848,230, or about \$71.39/MWh. Overall, the project would produce power at a cost that is \$39,516,870, or about \$101.3/MWh, less than the cost of alternative power.

¹⁶³ See *supra*, note 1.

4.2.2 Georgia Power's Proposal

Under Georgia Power's proposal, as shown in table 18, the project would have the same installed capacity, generation, and average annual cost of alternative power as the No Action Alternative. The average annual project cost would be \$30,924,556, or about \$79.27/MWh. Overall, the project would produce power at a cost that is \$36,440,544, or about \$93.42/MWh, less than the cost of alternative power.

4.2.3 Staff Alternative

The staff alternative would have the same capacity and energy attributes as Georgia Power's proposal, but would include the staff environmental measures shown in table 18. This alternative would have the same installed capacity, generation, and average annual cost of alternative power as the No Action Alternative. The average annual project cost would be \$30,968,815, or about \$79.39/MWh. Overall, the project would produce power at a cost that is \$36,435,504, or about \$93.4/MWh, less than the cost of alternative power.

4.2.4 Staff Alternative with Mandatory Conditions

This alternative is similar to the staff alternative, with the exception of incorporating Forest Service 4(e) conditions for consultation, the formation of a consultation group, special status species management (i.e., Biological Evaluation and annual list review), and annual training Georgia Power employees. This alternative would have the same installed capacity, generation, and average annual cost of alternative power as the No Action Alternative. The average annual project cost would be \$13,924,730, or about \$35.49/MWh. Overall, the project would produce power at a cost that is \$36,396,285, or \$93.3/MWh, less than the cost of alternative power.

4.3 COST OF ENVIRONMENTAL MEASURES

Table 18 provides the cost for each of the environmental enhancement measures considered in our analysis. We convert all costs to equal annual (levelized) values over a 30-year period of analysis to give a uniform basis for comparing the benefits of a measure to its cost.

Table 18. Cost of environmental mitigation and enhancement measures considered in assessing the environmental effects of continuing to operate the Wallace Dam Project. (Source: Georgia Power, as modified by Staff).

Enhancement/Mitigation Measures	Entities	Capital Cost (2019)^a	Annual Cost (2019\$)^a	Levelized Annual Cost (2019\$)^b
General Measures				
1. Annually consult, prior to April 15, regarding project operation and maintenance activities at the project, as well as on the results of any environmental monitoring conducted the previous year. ^c	Forest Service ^d	\$0	\$2,000	\$2,000
2. Establish a Consultation Group to provide a forum for Georgia Power to consult, under item 1 above, on (a) the annual meeting, (b) plans that are prepared, and (c) proposed modifications to license conditions. ^c	Forest Service ^d	\$0	\$25,000	\$25,000
3. Annually train project operation and maintenance staff in recognizing special status species, invasive plants, and sensitive areas that are known to occur in the project boundary. ^c	Forest Service ^d	\$20,000	\$5,000	\$7,718
Erosion and Sediment Control Measures				
1. Shoreline Stabilization that involves installing riprap at Old Salem Park, Parks Ferry Park, Long Shoals Boat Ramp, and Armour Bridge.	Georgia Power, Staff	\$260,000	\$3,000	\$352,587
2. Repair the eroded shoreline at the pump site for the Pond 2 waterfowl management area, and inspect the water level control structure	Georgia Power, Staff	\$50,000	NA	\$6,796
3. Develop a plan to treat erosion and control sedimentation within the project boundary.	Forest Service, ^d Staff	\$5,000	\$0 ^g	\$680

Enhancement/Mitigation Measures	Entities	Capital Cost (2019)^a	Annual Cost (2019\$)^a	Levelized Annual Cost (2019\$)^b
Water Resource Measures				
1. Operate the Wallace Dam Project in a pumped-storage mode, and maintain Lake Oconee water surface elevations between 433.0 to 435.0 feet 100 percent of the time, with an average drawdown of 1.5 feet (433.5 to 435.0 feet), except for maintenance and system emergency drawdowns.	Georgia Power, Staff	\$0	\$0	\$0 ^e
2. Project Operation Compliance Monitoring	Georgia Power, Staff	\$0	\$0	\$0 ^f
3. Consult with Georgia DNR regarding the timing of any planned, non-emergency drawdown below 433.0 feet, and notify FWS and the Commission at least 10 days in advance of the drawdown.	Georgia Power, Georgia DNR, Staff	\$0	\$0	\$0 ^g
4. Continue to coordinate Wallace Dam Project's operation with Sinclair Project's operation; use Lake Oconee's storage to supplement flows during droughts to support Sinclair's minimum flow requirement of 250 cfs.	Georgia Power, Staff	\$0	\$0	\$0 ^g

Enhancement/Mitigation Measures	Entities	Capital Cost (2019)^a	Annual Cost (2019\$)^a	Levelized Annual Cost (2019\$)^b
5. Measures to Enhance Summer Dissolved Oxygen	Georgia Power,			
a. Install a forebay oxygen line diffuser system in Lake Oconee, and operate the system, as needed, from May 1 through October 31 each year.	Staff	\$4,699,000		\$638,689
b. Design of forebay oxygen system and field studies.		\$500,000		\$67,960
c. Annual cost of oxygen for system.			\$300,000	\$300,000
d. Start-up management to optimize system.		\$150,000		\$20,388
e. Annual cost for managing system.			\$20,000	\$20,000
6. Continuously monitor DO and water temperature in the Wallace Dam tailrace from May 1 through October 31 for 3 years following the installation of the forebay oxygen line diffuser system.	Georgia Power, Staff	\$90,000	\$30,000 per year for 3 years	\$30,000
7. Annually consult with Georgia DNR regarding the DNR's fisheries population monitoring data.	Georgia DNR, Georgia Power, Staff	\$0	\$0	\$0 ^g
8. Prepare a Hazardous Substances Plan, which stipulates that no hazardous substances may be stored on Forest Service land without prior Forest Service approval. Prior to a request, Georgia Power must prepare a spill prevention and clean-up plan.	Forest Service, ^d Staff	\$5,000	\$500	\$1,180

Enhancement/Mitigation Measures	Entities	Capital Cost (2019)^a	Annual Cost (2019\$)^a	Levelized Annual Cost (2019\$)^b
9. Aquatic Invasive Species Management and Monitoring Plan that includes: a. Public education program; b. BMPs for individual project operation and maintenance activities; c. a monitoring program; and d. a provision to review, update, and revise plan, as warranted.	Forest Service, ^d Staff	\$5,000	\$1,000	\$1,680
Terrestrial Resource Measures				
1. Vegetation and Invasive Weed Management Plan that addresses: a. special status species; b. terrestrial non-native plant species; c. revegetation within project boundary.	Forest Service, ^d Staff	\$5,000		\$680
2. Restrict pesticide use on Forest Service lands without prior Forest Service approval.	Forest Service, ^d Staff	\$0	\$500	\$500
3. Special Status Species a. prepare a Biological Evaluation prior to taking actions to construct new project features that may affect special status species or their critical habitat. b. annually review list of special status species and assess presence within the project boundary.	Forest Service, ^d	\$0	\$4,000	\$4000
		\$0	\$500	\$500

Enhancement/Mitigation Measures	Entities	Capital Cost (2019)^a	Annual Cost (2019\$)^a	Levelized Annual Cost (2019\$)^b
4. Prepare a Fire Management and Response Plan that sets forth, in detail, Georgia Power's responsibility for preventing, reporting, responding and investigating fires related to project operation.	Forest Service, ^d Staff	\$5,000	\$2,000	\$2,680
Recreation Resource Measures				
1. Implement a Recreation and Land Use Plan that includes:				
a. Constructing new facilities at Lawrence Shoals Park to replace existing facilities; upgrading the existing well system that supplies water to park; and annual clean-up, trash removal, and landscaping.	Georgia Power, Staff	\$1,500,000	\$97,000	\$300,880
b. Constructing new facilities at Old Salem Park to replace existing facilities; upgrading the existing well system that supplies water to the park; reconfiguring the park entrance; and annual clean-up, trash removal, and landscaping.	Georgia Power, Staff	\$1,000,000	\$124,000	\$259,920
c. Constructing new facilities at Parks Ferry Park to replace existing facilities; upgrading the existing well system that supplies water to the park; replacing the underground water and electric service; reconfiguring the park entrance; and annual clean-up, trash removal, and landscaping.	Georgia Power, Staff	\$1,440,000	\$100,000	\$295,725
d. Providing new bank fishing access amenities at the Area C-5 Tract and Jerry's Highway 44 Bridge; and annual clean-up, trash removal, and landscaping.	Georgia Power, Staff	\$207,500	\$80,000	\$108,203

Enhancement/Mitigation Measures	Entities	Capital Cost (2019)^a	Annual Cost (2019\$)^a	Levelized Annual Cost (2019\$)^b
e. Adding new fishing amenities and upgrading other amenities at the Sugar Creek Boat Ramp; and annual clean-up, trash removal, and landscaping.	Georgia Power, Staff	\$180,000	\$34,000	\$58,466
f. Upgrading existing amenities at Armour Bridge; and annual clean-up, trash removal, and landscaping.	Georgia Power, Staff	\$170,000	\$34,000	\$57,106
g. Upgrading existing amenities and providing additional bank fishing access at the Long Shoals Boats Ramp; and annual clean-up, trash removal, and landscaping.	Georgia Power, Staff	\$440,000	\$34,000	\$93,805
h. Providing new amenities at the Georgia Highway 16 Bridge Boat Ramp; and annual clean-up, trash removal, and landscaping.	Georgia Power, Staff	\$75,000	\$40,000	\$50,194
i. Install improved lighting at the nine recreation sites described in items a-h above	Georgia Power, Staff	\$25,000	\$0	\$3,398
2. Additional Boating Capacity:				
a. Include a provision in the proposed Recreation Enhancement Measures Plan [now the Recreation and Land Use Plan] to add additional boating capacity to support large tournament events.	Georgia DNR, Staff	\$0	\$0	\$0 ^g
b. Consult with Georgia DNR when ramp capacity regularly exceeds 85 percent	Staff	\$0	\$0	\$0 ^g
3. Include all proposed recreation enhancement measures in the Recreation and Land Use Plan.	Georgia DNR, Staff	\$0	\$0	\$0 ^g

Enhancement/Mitigation Measures	Entities	Capital Cost (2019)^a	Annual Cost (2019\$)^a	Levelized Annual Cost (2019\$)^b
4. Consult with Forest Service prior to erecting signs related to safety issues on National Forest lands covered by the license.	Forest Service, ^d Staff	N/A	\$0 ^g	\$0
5. Implement deferred maintenance measures at three Forest Service recreation sites that provide direct access to Lake Oconee:	Forest Service, ^d Staff			
a. Redlands Recreation Area		\$1,358,500 ^h		\$184,648
b. Swords Recreation Area		\$1,246,000 ^h		\$169,357
c. Dyar Pasture Recreation Area		\$367,000 ^h		\$49,883
Land Use Measures				
1. Implement the proposed SMP that consolidates Georgia Power’s existing shoreline management components to continue managing the Lake Oconee shoreline in accordance with the <i>Shoreline Management Guidelines for Georgia Power Lakes</i> , and promote the maintenance or vegetative buffers around the lake.	Georgia Power, Staff	\$15,000	\$150,000	\$2,039
2. Revise Georgia Power’s proposed SMP to include: (a) a provision to consult with the appropriate agencies; (b) the filing of a report with the Commission at each 10-year review period; and (c) copies of the <i>Shoreline Management Guidelines for Georgia Power Lakes</i> and the <i>1993 Dredge Permitting Procedures</i> .	Staff	\$0	\$0	\$0 ^g
3. As part of the SMP, modify the 100-foot buffer designation to revert to the 25 feet designation for shorelines bordering the A-1 tract set aside for future recreation development.	Georgia Power Staff	\$0	\$0	\$0 ^g

Enhancement/Mitigation Measures	Entities	Capital Cost (2019)^a	Annual Cost (2019\$)^a	Levelized Annual Cost (2019\$)^b
Cultural Resource Measures				
1. Implement the HPMP, in accordance with a PA.	Georgia Power, Staff, Georgia SHPO	\$20,000	\$1,000	\$3,718
2. Adhere to the Native American Graves Protection and Repatriation Act.	Forest Service, ^d Staff	\$0	\$0	\$0 ^g

^a Annual costs typically include operational and maintenance costs and any other costs which occur on a yearly basis.

^b All capital and annual costs are converted to equal annual costs over a 30-year period to give a uniform basis for comparing costs.

^c Forest Service 4(e) conditions not adopted by staff.

^d Forest Service 4(e) condition.

^e Georgia Power currently operates the project within these parameters; thus, there is no additional cost to implementing this measure.

^f Georgia Power currently monitors reservoir elevations; thus, there is no additional cost to implementing this measure.

^g Staff assigned \$0 cost for this measure, because either (a) insufficient detail was provided to estimate a cost, (b) it would involve an unknown number of future meetings and consultations among Georgia Power and other state and federal agencies, (c) the recommendation has been addressed in the licensee's proposed plan, or (d) the costs would be negligible.

^h Forest Service did not provide a cost for its 4(e) conditions 17 and 24; therefore, staff estimated these costs based on market costs and Georgia Power's estimates for recreation enhancements at its project recreation sites.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 COMPREHENSIVE DEVELOPMENT AND RECOMMENDED ALTERNATIVE

Sections 4(e) and 10(a)(1) of the FPA require the Commission to give equal consideration to the power development purposes and to the purposes of energy conservation; the protection of, mitigation of damage to, and enhancement of fish and wildlife; the protection of recreational opportunities; and the preservation of other aspects of environmental quality. Any license issued shall be such as in the Commission's judgment will be best adapted to a comprehensive plan for improving or developing a waterway or waterways for all beneficial public uses. This section contains the basis for, and a summary of, our recommendations for relicensing the Wallace Dam Project. We weigh the costs and benefits of our recommended alternative against other proposed measures.

Based on our independent review of agency and public comments filed on the project, and our review of the environmental and economic effects of the proposed project and its alternatives, we selected the Staff Alternative as the preferred alternative. We recommend this option because: (1) issuance of a new hydropower license by the Commission would allow Georgia Power to operate the project as an economically beneficial and dependable source of electrical energy for its customers; (2) the public benefits of this alternative would exceed those of the no-action alternative; and (3) the proposed and recommended measures would protect and enhance fish and wildlife resources, improve recreation opportunities at the project, and protect cultural resources.

In the following section, we make recommendations as to which environmental measures proposed by Georgia Power or recommended by agencies and other entities (including staff) should be included in any license issued for the project. Appendix A includes draft license articles that depict these measures. We also discuss which measures we do not recommend including in the license.

5.1.1 Measures Proposed by Georgia Power

Based on our environmental analysis of Georgia Power's proposal in section 3.0, *Environmental Analysis*, and the costs discussed in section 4.0, *Developmental Analysis*, we conclude that the following environmental measures proposed by Georgia Power would protect and enhance environmental resources in the project area, and would be worth the cost. Therefore, we recommend including these measures in any new license issued for the project.

- Monitor project operation in accordance with the proposed compliance monitoring measures.

- Consult with Georgia DNR regarding the timing of any planned, non-emergency drawdown that would reduce the elevation of Lake Oconee below 433.0 feet (lower limit of normal operation), and notify FWS and the Commission at least 10 days in advance of the drawdown.
- Continue to coordinate Wallace Dam’s operation with the operation of the downstream Sinclair Project by using Lake Oconee’s storage to supplement flows during drought(s) to support the minimum flow requirement of the downstream Sinclair Project.
- Implement a Shoreline Stabilization Plan, which includes installing riprap along the shoreline at Old Salem Park, Parks Ferry Park, Long Shoals Boat Ramp, and Armour Bridge to (a) improve soil retention, (b) reduce sedimentation and turbidity of adjacent waters, (c) enhance near-shore (or littoral-zone) aquatic habitat, and (d) maintain shoreline recreational uses.
- Repair eroded shoreline at the pump site for downstream Pond 2 waterfowl management area and inspect the water level control structure on the eastern shore of the Wallace Dam tailrace to (a) improve soil retention at the site, (b) protect water quality and aquatic habitat, and (c) enhance the ability to maintain waterfowl refuge habitat.
- Install a forebay oxygen line diffuser system in Lake Oconee to enhance summer dissolved oxygen (DO) concentrations in the project tailrace, and operate the system as needed from May 1 through October 31 each year.
- Continuously monitor tailrace DO concentrations and water temperature May 1 through October 31 for a period of 3 years following deployment of the forebay oxygen line diffuser system, and file requisite reports of the monitoring, to verify system operation and DO enhancement in the tailrace.
- Consult annually with Georgia DNR to review available Georgia DNR fisheries population monitoring data to identify any changes or trends in the health of the fishery relative to operation of the proposed oxygen diffuser system, and include the information in the annual water quality monitoring reports.¹⁶⁴
- Implement a Recreation and Land Use Plan that includes the following provisions.
 - (1) enhance recreation amenities at Lawrence Shoals Park by: (a) constructing new facilities to replace two campground restrooms, a beach house, a boat ramp restroom, a courtesy dock at the boat ramp, a pavilion and dedicated pavilion restroom, and a guest relations gate house; and (b) upgrading the existing well system that supplies water to park facilities and customers.

¹⁶⁴ See *supra*, note 32.

- (2) enhance recreation amenities at Old Salem Park by: (a) constructing new facilities to replace two group docks (and add a third group dock), a pavilion and dedicated pavilion restroom, a boat ramp restroom, a courtesy dock at the boat ramp, a beach house, and a guest relations gate house; (b) upgrading the existing well system that supplies water to park facilities and customers; and (c) reconfiguring the park entrance and gate house to reduce single-lane traffic congestion, and allow for year-round operation of the boat ramp.
 - (3) enhance recreation amenities at Parks Ferry Park by: (a) constructing new facilities to replace two campground restrooms, a beach house, a courtesy dock at the boat ramp, and a pavilion and dedicated pavilion restroom; (b) upgrading the existing well system that supplies water to park facilities and customers; (c) replacing the underground water and electrical service; and (d) reconfiguring the entrance gate and gate house to reduce single-lane traffic congestion and allow for year-round operation of the boat ramp.
 - (4) increase bank fishing access on Lake Oconee by providing new bank fishing access amenities at the Area C-5 tract and at Jerry's Highway 44 Bridge, including barrier-free piers and gravel parking.
 - (5) enhance recreation amenities and increase bank fishing access at Sugar Creek Boat Ramp by adding a new barrier-free fishing pier, upgrading the vault toilet with a flush toilet, and upgrading the courtesy dock.
 - (6) enhance recreation amenities at Armour Bridge by upgrading the courtesy dock and replacing the vault toilet with a flush toilet.
 - (7) enhance recreation amenities and improve bank fishing access at Long Shoals Boat Ramp by upgrading the courtesy dock and trimming vegetation to provide additional bank fishing access.
 - (8) enhance recreation amenities and improve tailrace bank fishing access at the Georgia Highway 16 Bridge Boat Ramp, downstream from the dam, by providing a new barrier-free tailrace fishing pier and vault toilet.
 - (9) enhance recreational access at Georgia Power boat launch facilities by installing improved lighting at the 9 sites mentioned in items 1-9 above.
- Consult with Georgia DNR to develop a plan to ensure year-round public boating access for fishing tournaments.¹⁶⁵
 - Implement the proposed SMP that consolidates Georgia Power's existing shoreline management components to: (a) continue managing the project's shorelines in accordance with the *Shoreline Management Guidelines for Georgia Power Lakes*; and (b) promote the maintenance of vegetative buffers around Lake

¹⁶⁵ See *supra*, notes 32 and 33.

Oconee to protect water quality, aquatic habitat, and aesthetic and cultural resources. The proposed plan also includes a provision to modify a 100-foot buffer on the shoreline bordering the reserved area A-1 future recreation lands, to a 25-foot buffer.

- Implement the HPMP, in accordance with a PA, to assure the preservation and long-term management of archaeological sites, as well as historic buildings and structures, within the project boundary.

5.1.2 Additional Measures Recommended by Staff

Staff Measures

In addition to Georgia Power's proposed measures listed above, we recommend including the following additional staff-recommended measures in any license issued for the Wallace Dam Project:

- Revise the proposed Recreation and Land Use Plan to include a provision for Georgia Power to develop options, in consultation with Georgia DNR, to ensure that appropriate public boating access for fishing tournaments remains available throughout each year, when the capacity at boat ramps begins to regularly exceed 85 percent on non-holiday weekends during the recreation season.
- Revise the proposed SMP to include (a) a provision for Georgia Power to consult with the appropriate agencies at each 10-year SMP review to ensure the adequacy of the SMP measures, and file a report that includes agency comments and any recommended measures, and (b) a copy of the *Georgia Power Shoreline Management Guidelines for Georgia Power Lakes* and the 1993 *Dredge Permitting Procedures* in the SMP to bring in all applicable shoreline management components.

We discuss, below, our rationale for our additional staff recommended measures.

Consultation for Proposed Boating Access

In Exhibit E of the license application, Georgia Power states that it will consult with Georgia DNR if demand for public boating access begins to regularly exceed the capacity of the existing facilities. Georgia Power states that it will also develop a plan with Georgia DNR to ensure that access for fishing tournaments remains available. Consulting at the recommended time and developing options for increased capacity, when capacity begins to regularly exceed 85 percent at the boat ramps, would ensure that sufficient time would be available to discuss options, including adding ramp lanes and

parking at other project recreation facilities. The cost of adding this consultation and options development threshold to the Recreation and Land Use Plan would be negligible, but would provide a mechanism for Georgia Power to ensure public access to project waters is maintained at the project. Therefore, we recommend Georgia Power revise the proposed plan to include the provision, and file it for Commission approval.

Shoreline Management Plan Consultation and Revisions

The proposed SMP includes a provision to review the plan at a frequency of 10 years. However, the plan does not state that agencies will be included in the review. Nor does the plan include a provision to develop a report of the findings and recommended measures and file it with the Commission. Finally, the proposed SMP generally describes the provisions of *Georgia Power's Shoreline Management Guidelines for Georgia Power Lakes* and the *1993 Dredge Permitting Procedures*. The proposed SMP does not include the actual documents. By including these measures, and appending the two documents, the proposed SMP would be a more comprehensive and complete SMP, adding to its overall effectiveness. The cost of adding these provisions to the proposed SMP would be negligible, but would ensure effective shoreline management at the project. Therefore, we recommend Georgia Power revise the proposed SMP to include the provisions, and file it for Commission approval.

Forest Service 4(e) Conditions

In addition to Georgia Power's proposed measures and staff additional measures, we recommend including, in any license issued for the Wallace Dam Project, all but the four Forest Service preliminary 4(e) conditions discussed below in section 5.1.3, *Measures Not Recommended*.¹⁶⁶

5.1.3 Measures not Recommended by Staff

Staff finds that some of the measures recommended by other interested parties would not contribute to the best comprehensive use of the Wallace Dam water resources, do not exhibit sufficient nexus to project environmental effects, or would not result in

¹⁶⁶ Although we do not recommend some of Forest Service's 4(e) conditions (i.e., Conditions 13, 14, 19, and 22), we recognize that the Commission is required to include all 4(e) conditions in any license issued for the project. Moreover, these four conditions seem largely administrative; but each have the potential to result in measures that could benefit environmental resources. Thus, this EA evaluated the potential environmental benefits of the measures. In this EA, the staff alternative with mandatory conditions is the action alternative for section 7 consultation under the Endangered Species Act

benefits to non-power resources that would be worth their cost. The following discusses the basis for staff's conclusion not to recommend such measures

Additional Consultation and Review

Forest Service 4(e) Condition 13 stipulates that Georgia Power annually consult with Forest Service and other stakeholders on project operation and license implementation. Forest Service 4(e) Condition 14 stipulates that Georgia Power establish a Consultation Group to provide a forum for consulting with resource agencies and other interested stakeholders. Forest Service 4(e) Condition 19 would require Georgia Power to complete an annual review of special status species. When a species is added to the special status list, Georgia Power would consult with the Forest Service to evaluate if the species or its suitable habitat is likely to occur on Forest Service land within the project boundary. If a species is determined likely to occur on project land, Forest Service recommends Georgia Power develop and implement a study plan to assess the effects of the project on the species. As part of the process, Georgia Power would prepare a Biological Evaluation. The Biological Evaluation would evaluate the potential effect of the action on the species and/or its habitat. Georgia Power is not opposed to these 4(e) Conditions (Georgia Power, 2019b).

Georgia Power's proposed plans and implementation strategy for other measures include agency review and consultation for reports, prior to Commission approval. Conducting an annual consultation meeting with resource agencies would be redundant because there is already a mechanism for agency comment. Although we have no objection to Georgia Power conducting this agency consultation, the standard license article would provide a similar level of protection to Forest Service's conditions 13, 14, and 19. Therefore, we do not recommend including these measures as part of any new license issued for the project.

Forest Service 4(e) Condition 19 specifies that Georgia Power prepare and submit a biological evaluation for Forest Service approval before taking actions to construct new project features on Forest Service land that may affect special status species or their critical habitat on Forest Service land. As we indicate in sections 3.3.2.2, *Water Resources-Environmental Effects*, and 3.3.3.2, *Terrestrial Resources-Environmental Effects*, consultation prior to new construction and non-routine maintenance would help protect federally listed species, special status species, as well as their critical habitats over the term of the license. However, if ESA issues arise during the term of the license, either based on new listings or availability of new information, post-licensing procedures developed by the Commission and resource agencies (FERC, 2000) provide a framework for identifying issues, information gaps, and the need for protection measures. In addition, the Commission includes in its licenses a standard fish and wildlife reopener article that could be used to reopen the license for consideration of additional fish and

wildlife protection measures. Therefore, we do not recommend the measure be included in any new license issued for the project.

Annual Training

Implementation of project O&M activities would require interactions between licensees' staff and sensitive resources. To minimize the potential for inadvertent effects of operation and maintenance on sensitive resources, Forest Service 4(e) Condition 22 stipulates that Georgia Power annually train its O&M staff to recognize special status species, invasive plants, and sensitive areas that are known to occur in the project boundary. While Georgia Power does not oppose this 4(e) condition (Georgia Power, 2019b), no components of this type of training have been identified in any resource management plans to date, nor is the extent of the full training curriculum clear. While such training could ultimately benefit environmental resources, licensees are expected to train their employees to the extent needed for the licensees to maintain compliance with a license. Therefore, we do not recommend a condition incorporating this measure in any license issued for the project.

5.2 UNAVOIDABLE ADVERSE EFFECTS

Construction of the proposed forebay oxygen line diffuser system would have some unavoidable adverse effects on water quality. Installing the system would cause disturbance of upland soils, and some minimal disturbance to Lake Oconee's bottom sediments. This could result in adverse effects on local water quality, with increased turbidity and oxygen demand from sediments and soils. All effects are likely to be short-term and minimal in magnitude.

Operation of the Wallace Dam Project would continue to entrain and impinge fish to some degree during both generation and pump-back operation. Most adult fish could avoid involuntary entrainment, but entrainment of some small fish or young-of-year fish could still occur. However, the fish involved would likely be composed of species that have the ability to compensate for losses, and any such loss is not expected to significantly affect fish populations and recreational fishing opportunities in Lake Oconee or the Oconee River.

Fluctuations in lake levels would continue at present levels, and associated effects would continue to occur. As a pumped storage project, water level fluctuations are unavoidable. Large fluctuations over short periods of time have the potential to limit the reproductive success of littoral spawning fish and increase mortality of fry in rearing areas. In addition, the fluctuations potentially could disrupt the natural behavior of the fish within Lake Oconee.

There would be temporary, unavoidable shoreline disturbance associated with the proposed shoreline stabilization activities. In addition, some minor, unavoidable effects associated with land disturbances in upland and riparian areas during construction of the proposed forebay oxygen line diffuser system and recreation enhancements. However, these disturbances and effects would be mostly temporary. Effects on aquatic and terrestrial resources would be minimized through the implementation of BMPs for minimizing soil disturbance, controlling erosion, restoring natural contours, and re-vegetating disturbed areas following construction.

5.3 FISH AND WILDLIFE AGENCY RECOMMENDATIONS AND SECTION 4(e) CONDITIONS

5.3.1 Fish and Wildlife Agency Recommendations

Under the provisions of section 10(j) of the FPA, each hydroelectric license issued by the Commission shall include conditions based on recommendations provided by federal and state fish and wildlife agencies for the protection, mitigation, or enhancement of fish and wildlife resources affected by the project. Section 10(j) of the FPA states that whenever the Commission finds that any fish and wildlife agency recommendation is inconsistent with the purposes and the requirements of the FPA or other applicable law, the Commission and the agency shall attempt to resolve any such inconsistency, giving due weight to the recommendations, expertise, and statutory responsibilities of such agency.

In response to our February 22, 2019 notice accepting the application to relicense the project and soliciting motions to intervene, protests, comments, recommendations, preliminary terms and conditions, and preliminary fishway prescriptions, Georgia DNR, by letter filed April 23, 2019, submitted three recommendations for the Wallace Dam Project. Table 19 lists the recommendations filed subject to section 10(j), and indicates whether the recommendations are included under the staff alternative. Environmental recommendations that we consider outside the scope of section 10(j) have been considered under section 10(a) of the FPA, and are addressed in the specific resource sections of this EA, and in section 5.1, *Comprehensive Development and Recommended Alternative*.

Table 19. Fish and wildlife agency recommendations for the Wallace Dam Project. (Source: staff).

Recommendation	Agency	Within the scope of section 10(j)	Annualized cost	Adopted?
1. Annually consult with Georgia DNR regarding its annual fisheries population monitoring data.	Georgia DNR	No ^a	\$500	Yes, as a provision of the 3-year water quality monitoring plan
2. Include all proposed recreation enhancements in the Recreation and Land Use Plan ^b	Georgia DNR	No ^a	\$0 ^c	Yes
3. Include a provision in the proposed Recreation Enhancement Measures Plan ^b to add additional boating capacity to support large events.	Georgia DNR	No ^a	\$0 ^c	Yes

^a Not a specific measure to protect, mitigate, or enhance fish and wildlife resources affected by the project.

^b In response to Commission staff’s November 21, 2018 request for additional information, Georgia Power combined the Recreation and Land Use Plan and Recreation Enhancement Measures Plan included in the license application into a single plan entitled “Recreation and Land Use Plan,” which effectively addressed this recommendation.

^c Cost is negligible, or measure has been addressed or is too vaguely defined to assign a cost.

5.3.2 Forest Service’s Section 4(e) Conditions

In section 2.2.4, *Modifications to Applicant’s Proposal – Mandatory Conditions*, we list the preliminary 4(e) conditions submitted by the Forest Service, and note that section 4(e) of the FPA provides that any license issued by the Commission “for a project within a federal reservation shall be subject to and contain such conditions as the Secretary of the responsible federal land management agency deems necessary for the adequate protection and use of the reservation.” Thus, any 4(e) condition that meets the requirements of the law must be included in any license issued by the Commission, regardless of whether we include the condition in our staff alternative.

Of the Forest Service’s 24 4(e) conditions, we consider 12 of the conditions (Conditions 1 through 10, 15, and 16) to be administrative or legal in nature and not specific environmental measures. We, therefore, do not analyze these conditions in this EA. Condition 19 is also administrative in that it only requires the drafting of a report and reviewing existing species lists. However, it also provides for potential future measures, should a new Forest-Service special status species be discovered on Forest Service land, which would require the filing of a future amendment to the project license. We consider Condition 19 in this EA. Table 20 summarizes our conclusions with respect to the 12 4(e) conditions that we consider to be environmental measures or otherwise include provisions that we consider in this EA. We include, in the staff alternative, eight conditions specified by the agency, and did not recommend four conditions. The measures not adopted are discussed in more detail in section 5.1, *Comprehensive Development and Recommended Alternative*. We recognize, however, that the Commission is required to include valid 4(e) conditions in any license issued for the project. As such, Forest Service conditions that we do not recommend would be included in a new license.

Table 20. Forest Service preliminary section 4(e) conditions for the Wallace Dam Project. (Source: staff).

Condition	Annualized Cost	Adopted?
Condition 11. Prepare a Hazardous Substances Plan	\$1,180	Yes
Condition 12. Comply with Pesticide-Use Restrictions	\$500	Yes
Condition 13. Consult with Forest Service and other stakeholders on project operation	\$2,000	No
Condition 14. Establish Consultation Group	\$25,000	No
Condition 17. Implement Public Safety Signage	\$0	Yes

Condition	Annualized Cost	Adopted?
Condition 18. Prepare a Aquatic Invasive Species Management and Monitoring Plan and Vegetation and Invasive Weed Management Plan	\$1,680	Yes
Condition 19. (a) prepare a Biological Evaluation on special status species prior to constructing new project features, and (b) annually review the list of special status species and assess presence within the project boundary	\$4,500	No
Condition 20. Prepare a Sediment and Erosion Control Plan	\$680	Yes
Condition 21. Prepare a Fire Management and Response Plan	\$2,680	Yes
Condition 22. Annual Employee Training	\$7,718	No
Condition 23. Reasonably protect and secure human remains, funerary objects, sacred objects, or objects of cultural patrimony that may be inadvertently discovered on federal or tribal lands.	\$0	Yes
Condition 24. Implement deferred maintenance measures at the Forest Service's Redlands, Swords, and Dyar Pasture Recreation Areas that provide direct access to Lake Oconee.	\$184,648 \$169,357 \$49,883	Yes

5.4 CONSISTENCY WITH COMPREHENSIVE PLANS

Section 10(a)(2)(A) of the FPA¹⁶⁷ requires the Commission to consider the extent to which a project is consistent with federal or state comprehensive plans for improving, developing, or conserving a waterway or waterways affected by the project. We reviewed the following 19 comprehensive plans that are applicable to the Wallace Dam Project. No inconsistencies were found.

Atlantic State Marine Fisheries Commission. 1998. Amendment 1 to the Interstate Fishery Management Plan for Atlantic sturgeon (*Acipenser oxyrinchus*). Report No. 31. July 1998.

Atlantic States Marine Fisheries Commission. 1998. Interstate fishery management plan for Atlantic striped bass. Report No. 34. January 1998.

Atlantic States Marine Fisheries Commission. 1999. Amendment 1 to the Interstate Fishery Management Plan for shad and river herring. Report No. 35. April 1999.

Atlantic States Marine Fisheries Commission. 2000. Interstate Fishery Management Plan for American eel (*Anguilla rostrata*). Report No. 36. April 2000.

Atlantic States Marine Fisheries Commission. 2000. Technical Addendum 1 to Amendment 1 of the Interstate Fishery Management Plan for shad and river herring. February 9, 2000.

Atlantic States Marine Fisheries Commission. 2008. Amendment 2 to the Interstate Fishery Management Plan for American eel. Arlington, Virginia. October 2008.

Atlantic States Marine Fisheries Commission. 2009. Amendment 2 to the Interstate Fishery Management Plan for shad and river herring. Arlington, Virginia. May 2009.

Atlantic States Marine Fisheries Commission. 2010. Amendment 3 to the Interstate Fishery Management Plan for shad and river herring. Arlington, Virginia. February 2010.

Atlantic States Marine Fisheries Commission. 2013. Amendment 3 to the Interstate Fishery Management Plan for American eel. Arlington, Virginia. August 2013.

Atlantic States Marine Fisheries Commission. 2014. Amendment 4 to the Interstate Fishery Management Plan for American eel. Arlington, Virginia. October 2014.

¹⁶⁷ 16 U.S.C. § 803(a)(2)(A).

- Georgia Department of Natural Resources. 1985. Water availability and use – Oconee River Basin. Atlanta, Georgia.
- Georgia Department of Natural Resources. 1986. Water availability and use report – Altamaha River Basin. Atlanta, Georgia. March 1986.
- Georgia Department of Natural Resources. 2008. Georgia Statewide Comprehensive Outdoor Recreation Plan (SCORP): 2008-2013.
- National Marine Fisheries Service. 1998. Final Recovery Plan for the shortnose sturgeon (*Acipenser brevirostrum*). Prepared by the Shortnose Sturgeon Recovery Team for the National Marine Fisheries Service, Silver Spring, Maryland. December 1998.
- National Park Service. The Nationwide Rivers Inventory. Department of the Interior, Washington, D.C. 1993.
- State of Georgia. Office of the Governor. 1987. Water resources management strategy-summary document. Atlanta, Georgia. January 12, 1987.
- U.S. Fish and Wildlife Service. n.d. Fisheries USA: the recreational fisheries policy of the U.S. Fish and Wildlife Service. Washington, D.C.
- U.S. Fish and Wildlife Service. Canadian Wildlife Service. North American waterfowl management plan. Department of the Interior. Environment Canada. May 1986.
- U.S. Fish and Wildlife Service. National Marine Fisheries Service. Georgia Department of Natural Resources. 2013. Priority restoration and management actions for the American shad in the Altamaha River Basin, Georgia. Athens, Georgia. 2013.

6.0 FINDING OF NO SIGNIFICANT IMPACT

If the Wallace Dam Project is issued a new license as proposed with the additional staff-recommended measures, the project would continue to operate while providing enhancements to water quality and aquatic resources, improvements to recreation facilities, and protection of cultural and historic resources in the project area.

Based on our independent analysis, we find that the issuance of a license for the Wallace Dam Project, with additional staff-recommended environmental measures, would not constitute a major federal action significantly affecting the quality of the human environment.

7.0 LITERATURE CITED

- Aquacoustics. 2018. Richard B. Russell hydroacoustic sampling 2017 annual report. Prepared for Savannah District of the U.S. Army Corps of Engineers. January 15, 2018.
- Audubon. 2019. Bachman's Sparrow *Peucaea aestivalis*. Available at <https://www.audubon.org/field-guide/bird/bachmans-sparrow>. Accessed August 8, 2019.
- Bachoon, D. S., Nichols, T. W., Manoylov, K. M. and Oetter, D. R. 2009. Assessment of faecal pollution and relative algal abundances in Lakes Oconee and Sinclair, Georgia, USA. *Lakes & Reservoirs: Research & Management*, 14:139–149. doi: 10.1111/j.1440- 1770.2009.00396.x.
- Biocyclopedia. 2019. Fern ally. Available at https://biocyclopedia.com/index/fern_ally.php. Accessed July 26, 2019.
- Burton, M. L., L. J. Samuelson, and S. Pan. 2005. Riparian woody plant diversity and forest structure along an urban-rural gradient.
- Carlson, R.E. 1977. A trophic state index for lakes. *Limnology and Oceanography*, Vol 22, No. 2. Pp. 361-369.
- Central Savannah River Area Regional Commission. 2018. CSRA Regional Plan 2040. Accessed March 7, 2019, at https://csrarc.ga.gov/sites/default/files/csrarc/11212018_csrarc_regional_plan_update_draft.pdf.
- _____. 2011. Regionally Important Resource Plan. Adopted January 14, 2011. Accessed March 7, 2019, at https://www.dca.ga.gov/sites/default/files/2011-10_csra_rir_plan_adopted.pdf.
- Clark, W.Z., and A.C. Zisa. 1976. Physiographic map of Georgia. Georgia Department of Natural Resources, Atlanta. <http://georgiainfo.galileo.usg.edu/topics/geography/articles/physiographic-districts>.
- Coutant, C. C. 1985. Striped Bass, temperature, and dissolved oxygen: a speculative hypothesis for environmental risk. *Transactions of the American Fisheries Society* 114: 31-61.

- Coutant, C. C. 2013. When is habitat limiting for Striped Bass? Three decades of testing the temperature-oxygen squeeze hypothesis. pp. 65-91 *in*: Bulak *et al.* (eds.). *Biology and management of inland Striped Bass and Hybrid Striped Bass*. American Fisheries Society Symposium 80.
- Coutant, C.C., K.L. Zachman, D.K. Cox, and D.L. Pearman. 1984. Temperature Selection by Juvenile Striped Bass in Laboratory and Field. *Transactions of the American Fisheries Society*, 113:666–671.
- Cowardin, L. M., V. Carter, F. C. Golet, E. T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. Jamestown, ND: Northern Prairie Wildlife Research Center Online. Available at: <http://www.npwrc.usgs.gov/resource/wetlands/classwet/index.htm> (Version 04DEC1998). Accessed August 26, 2019.
- Crance, J. H. 1984. Habitat suitability index models and instream flow suitability curves: inland stocks of Striped Bass. U.S. Fish and Wildlife Services FWS/OBS-82/10. 85.
- Degan, D., and A. M. Mueller. 2013. Chapter 1 of the Fish Community Assessment Study Report. *in*: Fish Community Assessment Study FERC Required Fish Entrainment Modification. Duke Energy Carolinas, LLC, Charlotte, North Carolina. July 26, 2013.
- Dinkins, G. R. 2016a. Survey for freshwater mussels in Lake Oconee. Dinkins Biological Consulting, LLC. Prepared for Georgia Power. DBC Project 1308. October 2016.
- Dinkins, G. R. 2016b. Survey for freshwater mussels in tailrace below Wallace Dam. Dinkins Biological Consulting, LLC. Prepared for Georgia Power. DBC Project 1296. October 2016.
- Duke Energy Carolinas, LLC (Duke Energy). 2014. License Application Keowee-Toxaway Project (FERC No. 2503), Exhibit E: Environmental Report. Filed with Federal Energy Regulatory Commission, August 27, 2014.
- Edwards, L., J. Ambrose, and L. K. Kirkman. 2013. The natural communities of Georgia. Photographs by Hugh and Carol Nourse. The University of Georgia Press, Athens, Georgia.
- Electric Power Research Institute (EPRI). 1992. Fish entrainment and turbine mortality review and guidelines. Prepared by Stone and Webster Environmental Services,

Boston, Massachusetts. EPRI Report No. TR-101231, Project 2694-01. September 1992.

_____. 1997. Turbine entrainment and survival database – field tests. Prepared by Alden Research Laboratory, Inc., Holden, Massachusetts. EPRI Report No. TR-108630. October 1997.

_____. 2003. Evaluating the effects of power plant operations on aquatic communities: Summary of impingement survival studies. Pala Alto, California. EPRI Report No. 1007821.

Federal Energy Regulatory Commission (FERC). 1995. Preliminary assessment of fish entrainment at hydropower projects, a report on studies and protective measures, volumes 1 and 2 (appendices). FERC Office of Hydropower Licensing, Washington, D.C. Paper No. DPR-10. June 1995 (volume 1) and December 1994 (volume 2).

_____. (FERC). 2000. FERC, U.S. Department of the Interior, U.S. Department of Commerce, U.S. Department of Agriculture, Environmental Protection Agency, and Advisory Council on Historic Preservation. 2000. Interagency task force report on improving coordination of ESA section 7 consultation with the FERC licensing process. December 8, 2000

_____. (FERC). 2015a. Scoping Document 1 for the Wallace Dam Pumped Storage Project (FERC No. 2413-117). Office of Energy Projects, Washington, D.C. April 17, 2015.

_____. 2015b. Study Plan Determination for the Wallace Dam Pumped Storage Project (FERC No. 2413-117). Office of Energy Projects. December 17, 2015.

_____. 2017. Determination on Requests for Study Modifications and New Studies – Wallace Dam Pumped Storage Project. Project No. 2413-117, Georgia Power Company. Office of Energy Projects. March 17, 2017.

Freeman, B., C. Straight, J. Evans, K. Owers, and Z. Abouhamdan. 2016a. Species profile and conservation status assessment map, Robust Redhorse (*Moxostoma robustum*). Original 1999 account and updates. Georgia Department of Natural Resources. Accessed June 24 2019, at https://georgiabiodiversity.org/natels/profile.html?es_id=15895&fus_tab_id=1_tH10K6Q6Z5H2-W_XvDoW-o3Mf6RQ-6zZsj72Q_N&group=fish and https://georgiabiodiversity.org/natels/range_maps2.html?es_id=15895.

- Freeman, B., K. Owers, B. Albanese, and Z. Abouhamdan. 2016b. Species profile and conservation status assessment map, Altamaha Shiner (*Cyprinella xaenura*). Original 1999 account and updates. Georgia Department of Natural Resources. Accessed June 24, 2019, at https://georgiabiodiversity.org/natels/profile.html?es_id=18248&fus_tab_id=1_tH10K6Q6Z5H2-W_XvDoW-o3Mf6RQ-6zZsj72Q_N&group=fish and https://georgiabiodiversity.org/natels/range_maps2.html?es_id=18248.
- Georgia Bass Chapter Federation. 1996-2014. Tournament creel reports (19) for the individual years 1996 through 2014. Compiled and analyzed by Dr. Carl Quertermus and others, Biology Department, University of West Georgia.
- Georgia Department of Natural Resources (Georgia DNR). 2006. Forestry for Wildlife Partnership Program: Meeting of Potential and Current Partners, May 6, 2009. Available at <https://georgiawildlife.com/sites/default/files/wrd/pdf/FWPmeeting2.pdf>.
- _____. 2014a. Lake Oconee fisheries sampling unpublished data, 2002-2013. Wildlife Resources Division. Provided through personal communication from Joey Slaughter, Georgia Power, April 30, 2014.
- _____. 2014b. American shad habitat plan. Submitted to the Atlantic States Marine Fisheries Commission as a requirement of Amendment 3 to the Interstate Management Plan for Shad and River Herring. Approved February 6, 2014.
- _____. 2014c. Occurrences by HUC 10 watershed of the American eel (*Anguilla rostrata*) and recent aquatic survey locations. Map created January 10, 2014. Wildlife Resources Division, Nongame Conservation Section. http://fishesofgeorgia.uga.edu/index.php?page=speciespages/species_page&key=angurost.
- _____. 2014d. Occurrences by HUC 10 watershed of the blueback herring (*Alosa aestivalis*) and recent aquatic survey locations. Map created January 10, 2014. Wildlife Resources Division, Nongame Conservation Section. http://fishesofgeorgia.uga.edu/index.php?page=speciespages/species_page&key=alosaest.
- _____. 2016. Georgia's plan for outdoor recreation: SCORP 2017-2021. State Parks & Historic Sites. <https://gastateparks.org/SCORP>. Accessed August 15, 2019.
- _____. 2017a. Georgia rare natural element data portal. Wildlife Resources Division, Nongame Conservation Section. <http://gakrakow.github.io/natels/home.html>. Accessed November 6, 2017.

- _____. 2017b. Reservoir prospects, Lake Oconee. Wildlife Resources Division.
<https://georgiawildlife.com/fishing-forecasts>.
- _____. 2019a. History of the Georgia state parks and historic sites division.
<https://gastateparks.org/sites/default/files/parks/pdf/HistoryOfGSPHSD.pdf>
- _____. 2019b. Quota Hunts. Available at: <https://georgiawildlife.com/hunting/quota>. Accessed August 26, 2019.”

Georgia Environmental Protection Division (Georgia EPD). 1998. Oconee River basin management plan, 1998. Georgia Department of Natural Resources, Atlanta, Georgia.
https://epd.georgia.gov/sites/epd.georgia.gov/files/related_files/site_page/Oconee%20River%20Basin%20Management%20Plan.pdf.

- _____. 2013. Georgia’s plan for the adoption of water quality standards for nutrients. Revision 2.0. Georgia Department of Natural Resources. Atlanta, Georgia.
- _____. 2015. Rules and regulations for water quality control, Chapter 391-3-6. Revised May 2015. Georgia Department of Natural Resources. Atlanta, Georgia.
- _____. 2016a. List of Wastewater Permits in Effect (Revised April 2016). Georgia Department of Natural Resources, Atlanta, Georgia.
<http://epd.georgia.gov/watershed-protection-branch-lists>.
- _____. 2016b. Draft Georgia 2016 305(b)/303(d) List Documents.
<https://epd.georgia.gov/georgia-305b303d-list-documents>. Georgia Department of Natural Resources. Atlanta, Georgia.
- _____. 2017. List of Georgia EPD Non-Farm Surface Water Withdrawal Permits.
<http://epd.georgia.gov/watershed-protection-branch-lists>. Georgia Department of Natural Resources. Atlanta, Georgia.
- _____. 2018a. Triennial Review for Water Quality Standards for 2016.
<https://epd.georgia.gov/triennial-review-water-quality-standards>.
- _____. 2018b. Lakes Oconee and Sinclair Proposed Criteria Technical Support Document (4/3/2018). Georgia Department of Natural Resources, Atlanta Georgia.

Georgia Exotic Pest Plant Council. 2018. List of non-native invasive plants in Georgia. Available at: <https://www.gaeppc.org/list/>. Accessed June 2019.

Georgia Forestry Commission (GFC). 2018. Georgia wood-using industries – 2018 (map).
<https://gfcgis.maps.arcgis.com/apps/MapSeries/index.html?appid=6aaa47a604624b3eba2a6e4e0c3d4739>. Accessed March 7, 2019.

Georgia Power Company (Georgia Power). 1971. Revised recreation plan, Exhibit R. Application to the Federal Power Commission for a license for Wallace Dam (Laurens Shoals Project). Project No. 2413.

_____. 2015a. Pre-application Document, Wallace Dam Hydroelectric Project, FERC Project Number 2413. Prepared by Southern Company Generation Hydro Services, Geosyntec Consultants, and CH2M HILL. February 2015.

_____. 2015b. Revised study plan, Wallace Dam Hydroelectric Project, FERC Project Number 2413. Prepared by Southern Company Generation Hydro Services and Geosyntec Consultants. November 2015.

_____. 2015c. Georgia Power Response to FERC Additional Information Request, dated June 18, 2015, for the Wallace Dam Hydroelectric Project, FERC Project Number 2413. Georgia Power Company, Atlanta, Georgia. Filed July 27, 2015.

_____. 2016a. Geology and Soils Study Report, Wallace Dam Hydroelectric Project, FERC Project Number 2413. Prepared by Geosyntec Consultants. November 2016.

_____. 2016b. Water Resources Study Report, Wallace Dam Hydroelectric Project, FERC Project Number 2413. Prepared by Southern Company Generation Hydro Services and Geosyntec Consultants. November 2016.

_____. 2016c. Fish and Aquatic Resources Study Report, Wallace Dam Hydroelectric Project, FERC Project Number 2413. Prepared by Geosyntec Consultants. November 2016.

_____. 2016d. Rare, Threatened, and Endangered Species Study Report, Wallace Dam Hydroelectric Project, FERC Project Number 2413. Prepared by Corblu Ecology Group. November 2016.

_____. 2016e. Terrestrial Resources Study Report, Wallace Dam Hydroelectric Project, FERC Project Number 2413. Prepared by Corblu Ecology Group. November 2016.

- _____. 2016f. Recreation and Land Use Study Report, Wallace Dam Hydroelectric Project, FERC Project Number 2413. Prepared by Geosyntec Consultants and CH2M HILL. November 2016.
- _____. 2017a. Aeration methods to enhance summer dissolved oxygen in the Wallace Dam tailrace area study report, Wallace Dam Hydroelectric Project, FERC Project Number 2413. October 2017.
- _____. 2017b. Updated Water Resources Study Report, Wallace Dam Hydroelectric Project, FERC Project Number 2413. Prepared by Southern Company Generation Hydro Services and Geosyntec Consultants. October 2017
- _____. 2017c. Shoreline management guidelines, Georgia Power lakes. Accessed October 30, 2017: General guidelines and guidelines specific to Lake Oconee. http://georgiapowerlakes.com/oconeesinclair/wp-content/uploads/2015/10/shoreline_oconee.pdf.
- _____. 2018. License Application for the Wallace Dam Hydroelectric Project, FERC Project Number 2413. Georgia Power Company, Atlanta, Georgia.
- _____. 2019a. Georgia Power Response to FERC Additional Information Request, dated November 21, 2018, for the Wallace Dam Hydroelectric Project, FERC Project Number 2413. Georgia Power Company, Atlanta, Georgia. Filed January 22, 2019.
- _____. 2019b. Georgia Power Response to Comments, Interventions, and Preliminary Terms and Conditions for the Wallace Dam Hydroelectric Project, FERC Project Number 2413. Georgia Power Company, Atlanta, Georgia. Filed June 7, 2019.
- Georgia State Parks. 2016. Georgia Plan for Outdoor Recreation, 2017-2021. Georgia's Statewide Comprehensive Outdoor Recreation Plan. Georgia Department of Natural Resources, Stockbridge, Georgia.
- Griffith, G.E., J.M. Omernik, J.A. Comstock, S. Lawrence, and T. Foster. 2001. Ecoregions of Alabama and Georgia (color poster with map, descriptive text, summary tables, and photographs). U.S. Geological Survey, Reston, Virginia.
- Harris, M.J., B. Winn, J.C. Ozier, and T.M Schneider. 2010. Wood stork, *Mycteria americana* Linnaeus. Georgia Department of Natural Resources, Wildlife Resources Division. http://gakrakow.github.io/profiles/mycteria_americana.pdf.
- Hodson, R.G. 1989. Hybrid Striped Bass Biology and Life History. Southern Regional Aquaculture Center, SRAC Publication No. 300.

- Homer, M.D., Jr., and C.A. Jennings. 2011. Historical catch, age structure, sizes, and relative growth for an introduced population of blue catfish in Lake Oconee, Georgia. American Fisheries Society Symposium 77. 12 pp.
- Isely, J.J., and J.R. Tomasso. 1989. Estimating fish abundance in a large reservoir by mark-recapture. North American Journal of Fisheries Management 18:269-273.
- Jacobs. 2017. Upper Oconee regional water plan, June 2017. Prepared for the Upper Oconee Regional Water Planning Council. Adopted by Georgia Environmental Protection Division, July 2017.
https://waterplanning.georgia.gov/sites/waterplanning.georgia.gov/files/related_files/document/Upper%20Oconee%20RWP%202017%20Final.pdf.
- Johnson, J.A., J.M. Wisniewski, A.K. Fritts, and R.B. Bringolf. 2012. Host identification and glochidia morphology of freshwater mussels from the Altamaha River basin. Southeastern Naturalist 11(4):733-746.
- Knapp, W.E., B. Kynard, and S.P. Gloss (eds.). 1982. Potential effects of Kaplan, Osseberger, and bulb turbines on anadromous fishes of the northeastern United States. FWS/OBS-82/62. U.S. Fish and Wildlife Service, Newton, Massachusetts. September 1982. 132 pp.
- Lee, D.S., C.R. Gilbert, C.H. Hocutt, R.E. Jenkins, D.E. McAllister, and J.R. Stauffer Jr., (eds.). 1980 *et seq.* Atlas of North American Freshwater Fishes. North Carolina State Museum of Natural History, Raleigh, North Carolina. X+854 pp.
- Loewenstein, N.J. and E.F. Loewenstein. 2005. Non-native plants in the understory of riparian forests across a land use gradient in the Southeast. Urban Ecosystems 8:79-91.
- Madsen, J.D. 2017. Invasive plant atlas of the Midsouth. Geosystems Research Institute, Mississippi State University.
http://www.gri.msstate.edu/research/ipams/spec_desc.php. Accessed November 7, 2017.
- Merriam, R.W. and E. Feil. 2002. The potential impact of an introduced shrub on native plant diversity and forest regeneration. Biological Invasions 4:369-373.
- Middle Georgia Regional Commission. 2010. Regionally Important Resources Plan: Middle Georgia. Adopted January 2011. http://www.middlegeorgiarc.org/wp-content/uploads/2015/08/012210_FINAL_MG_RIR_Plan.pdf.

- Murray, D.E. 1974. A review of literature dealing with the swimming speeds of fishes of the Lake Erie vicinity. The Ohio State University Center for Lake Erie Area Research, Columbus, Ohio. Clear Technical Report No. 157.
- NatureServe. 2017. NatureServe Explorer, an online encyclopedia of life. Version 7.1 (2 February 2009). Data last updated November 2016.
<http://explorer.natureserve.org/>.
- National Oceanic and Atmospheric Administration. 2017. Endangered and threatened species – designation of critical habitat for the endangered New York Bight, Chesapeake Bay, Carolina and South Atlantic distinct population segments of Atlantic Sturgeon and the threatened Gulf of Maine distinct population segment of Atlantic Sturgeon. National Marine Fisheries Service. Federal Register 82(158):39160-39274.
- Nestler, J.M., D. Dennerline, M. Weiland, G. Weeks, D. Degan, S. Howie, and J. Sykes. 1999. Richard B. Russell Phase III Completion Report: Impacts of Four-Unit Pumpback Operation. Technical Report EL-99-1, U.S. Army Corps of Engineers Waterways Experiment Station, Vicksburg, Mississippi. January 1999.
- Normandeau Associates, Inc. 2013. Desktop study of entrainment survival, Keowee-Toxaway Hydroelectric Project, FERC No. 2503. Fish Community Assessment Study, FERC Required Fish Entrainment Modification, Appendix A. October 2013.
- Northeast Georgia Regional Commission. 2011. Regionally important resources, 2011.
http://www.negrc.org/user_files/1327346324_RIR%20List%202011.pdf.
- _____. 2012. Northeast Georgia Plan 2035. Adopted by Resolution of the Council of the Northeast Georgia Regional Commission, April 19, 2012.
http://www.negrc.org/user_files/1347898032_RegAgendaFINAL.pdf.
- Ozier, J.C. and T.M. Schneider. 2010. Species profile for red-cockaded woodpecker, *Picoides borealis*. Georgia Department of Natural Resources. Accessed December 22, 2014. Available at
https://georgiawildlife.com/sites/default/files/wrd/pdf/fact-sheets/red-cockaded_woodpecker_2010.pdf.
- Patrick, T.S., J.R. Allison, and G.A. Krakow. 1995. Protected plants of Georgia. Georgia Department of Natural Resources, Wildlife Resources Division. 246 pp.

- Purcell, T.R., D.R. DeVries, and R.A. Wright. 2010. The relationship between shoreline development and resident fish communities in Lake Martin, Alabama. Submitted to Alabama Power Company, December 1, 2010.
- Rhode, F.C., R.G. Arndt, J.W. Foltz, and J.M. Quattro. 2009. Freshwater fishes of South Carolina. University of South Carolina Press, Columbia, South Carolina.
- Robust Redhorse Conservation Committee Oconee Technical Working Group. 2014 and 2015. Annual member reports including Georgia Power Company's Robust Redhorse surveys of the Wallace Dam tailrace.
- Ruane, R.J., M.H. Mobley, and P.J. Wolff. 2017. Aeration Assessment for Conceptual Alternatives to Enhance Dissolved Oxygen in the Wallace Dam Tailrace. Reservoir Environmental Management, Inc., Mobley Engineering, Inc., and WolffWare, Ltd.
- Schreiner, S. 1990. Comparisons of Richard B. Russell with other projects. In: Nestler and Ploskey, eds. Workshop proceedings: results of the Richard B. Russell fish entrainment study. pp. 147-160. U.S. Army Corps of Engineers, Waterways Experiment Station. Miscellaneous Paper EL-90-3. Final Report. January 1990.
- Southern Company. 2017. Wallace Dam Relicensing Response to Initial Study Results Meeting Summary Comments. Letter from C.R. O'Mara, Hydro Licensing and Compliance Supervisor (on behalf of Georgia Power Company) to K.D. Bose, Secretary, Federal Energy Regulatory Commission. February 20, 2017.
- SSI Earth Systems Division. 1979. Wallace Dam-Eatonton transmission line archaeological survey, Putnam County, Georgia. Project number ES-1212. Marietta, Georgia. February 7, 1979.
- Straight, C.A., B. Albanese, and B.J. Freeman. 2009. Fishes of Georgia Website, Georgia Museum of Natural History, updated March 25, 2009. Accessed December 14, 2014, at <http://fishesofgeorgia.uga.edu/>.
- TRC. 2016a. Study report: cultural resources assessment for the Wallace Dam Hydroelectric Project, Greene, Hancock, Putnam, and Morgan Counties, Georgia. Prepared by TRC for Georgia Power Company. November 2016.
- _____. 2016b. Study report: historic hydro-engineering resources assessment for the Wallace Dam Hydroelectric Project, Greene, Hancock, Putnam, and Morgan Counties, Georgia. Prepared by TRC for Georgia Power Company. September 2016.

- U.S. Census Bureau. 2017. Quickfacts, United States. Statistics for all states and counties, and for cities and towns with a population of 5,000 or more. <https://www.census.gov/quickfacts/fact/table/US/PST045216>. Accessed October 31, 2017.
- U.S. Department of Agriculture, Natural Resources Conservation Service. 2017. The PLANTS Database (<http://plants.usda.gov>, accessed 5 November 2017). National Plant Data Team, Greensboro, NC 27401-4901 USA.
- U.S. Environmental Protection Agency (EPA). 2002. Total maximum daily loads (TMDLs) for fecal coliform in Oconee River basin. U.S. Environmental Protection Agency, Region 4, Atlanta, Georgia.
- U.S. Fish and Wildlife Service (FWS). Recovery Plan for Three Granite Outcrop Plant Species. Southeast Region, Atlanta, Georgia.
- _____. 2003. Recovery plan for the red-cockaded woodpecker (*Picoides borealis*), second revision. Southeast Region, Atlanta, Georgia.
- _____. 2007a. National bald eagle management guidelines. May 2007.
- _____. 2007b. Wood stork (*Mycteria americana*), 5-year review: summary and evaluation. Southeast Region, Jacksonville Ecological Services Field Office, Jacksonville, Florida.
- _____. 2008. Three granite outcrop plants: black-spored quillwort (*Isoetes melanospora*), mat-forming quillwort (*Isoetes tegetiformans*), and little amphianthus (*Amphianthus pusillus*). Five-year review: summary and evaluation. Southeast Region, Georgia Ecological Services Field Office, Athens, Georgia.
- _____. 2011. Endangered and threatened wildlife and plants: partial 90-day finding on a petition to list 404 species in the southeastern United States as endangered or threatened with critical habitat. Federal Register 76(187):59836-59862. September 27, 2011.
- _____. 2014a. Endangered and threatened wildlife and plants; reclassification of the U.S. breeding population of the wood stork from endangered to threatened. Final Rule, Federal Register. 79(125): 37078-37103.
- _____. 2014b. Michaux's sumac (*Rhus michauxii*), 5-year-review: summary and evaluation. Southeast Region, Raleigh Ecological Services Field Office, Raleigh, North Carolina.

- _____. 2017a. Information for Planning and Conservation (IPaC) Official Species List for the Wallace Dam Project, FERC Project No. 2413. Filed January 19, 2017, in response to Commission staff's use of FWS's IPaC system. Available at: <https://ecos.fws.gov/ipac>. Accessed January 19, 2017.
- _____. 2017b. FWS's Comments on Georgia Power's Study Reports for the Wallace Dam Hydroelectric Project, FERC Project Number 2413. FWS, Athens, Georgia. Filed January 20, 2017.
- _____. 2018. IPaC Official Species List for the Wallace Dam Project, FERC Project No. 2413. Filed October 5, 2018, in response to Commission staff's use of FWS's IPaC system. Available at: <https://ecos.fws.gov/ipac>. Accessed October 4, 2018.
- _____. 2019a. IPaC Official Species List for the Wallace Dam Project, FERC Project No. 2413. Filed July 10, 2019, in response to Commission staff's use of FWS's IPaC system. Available at: <https://ecos.fws.gov/ipac>. Accessed July 9, 2019.
- _____. 2019b. Fish Passage Engineering Design Criteria. U.S. Fish and Wildlife Service, Northeast Region R5, Hadley, Massachusetts.
- _____. 2019c. Species profile for red cockaded woodpecker (*Picoides borealis*). Available at: <https://ecos.fws.gov/ecp0/profile/speciesProfile?sId=7614>. Accessed July 22, 2019.
- _____. 2019d. Species profile for wood stork (*Mycteria americana*). Available at: <https://ecos.fws.gov/ecp0/profile/speciesProfile?sId=8477>. Accessed July 22, 2019.
- _____. 2019e. Species profile for little amphianthus, or pool sprite (*Amphianthus pusillus*). Available at: <https://ecos.fws.gov/ecp0/profile/speciesProfile?sId=6445>. Accessed July 22, 2019.
- _____. 2019f. Species profile for black spored quillwort (*Isoetes melanospora*). Available at: <https://ecos.fws.gov/ecp0/profile/speciesProfile?sId=6315>. Accessed July 22, 2019.
- _____. 2019g. Species profile for mat-forming quillwort (*Isoetes tegetiformans*). Available at: <https://ecos.fws.gov/ecp0/profile/speciesProfile?sId=887>. Accessed July 22, 2019.

- _____. 2019h. Species profile for harperella (*Ptilimnium nodosum*). Available at: <https://ecos.fws.gov/ecp0/profile/speciesProfile?sId=3739>. Accessed July 22, 2019.
- _____. 2019i. Species profile for Michaux's sumac (*Rhus michauxii*). Available at: <https://ecos.fws.gov/ecp0/profile/speciesProfile?sId=5217>. Accessed July 22, 2019.
- U.S. Forest Service. 2004a. Land and resource management plan, Chattahoochee-Oconee National Forests. U.S. Department of Agriculture, Forest Service Southern Region, Atlanta, GA. Management Bulletin R8-MB 113A.
- _____. 2004b. Final environmental impact statement for the land and resource management plan, Chattahoochee-Oconee National Forests. U.S. Department of Agriculture, Forest Service Southern Region, Atlanta, GA. Management Bulletin R8-MB 113B.
- _____. 2011. Oconee Forest Health and Wildlife Habitat Improvement Project: Chattahoochee-Oconee National Forest, Oconee Ranger District, Eatonton, GA. Available at: https://www.fs.usda.gov/nfs/11558/www/nepa/63555_FSPLT2_052123.pdf. Accessed August 11, 2019.
- _____. 2019. Silviculture. Available at: <https://www.fs.usda.gov/ccrc/index.php?q=topics/silviculture>. Accessed August 5, 2019.
- U.S. Geological Survey (USGS). 2017. Water-year summary for Site USGS 02223000, Oconee River at Milledgeville, Georgia, water-year 2016. Available at https://waterdata.usgs.gov/ga/nwis/wys_rpt/?site_no=02223000&agency_cd=USGS.
- Van Den Avyle, M.J., and R.W. Petering. 1988. Inundated timber as nursery habitat for larval gizzard and threadfin shad in a new pumped storage reservoir. Transactions of the American Fisheries Society 117(1):84-89.
- Ward, R.W. 2002. Extent and dispersal rates of Chinese privet (*Ligustrum sinense*) invasion on the upper Oconee River floodplain, north Georgia. Southeastern Geographer 42(1):29-48.
- Winchell, F., S. Amaral, and D. Dixon. 2000. Hydroelectric turbine entrainment and survival database: an alternative to field studies. HydroVision Conference, August 8-11, 2000, Charlotte, North Carolina.

Wisniewski, J.M., G. Krakow, and B. Albanese. 2005. Current status of endemic mussels in the lower Ocmulgee and Altamaha Rivers. Proceedings of the 2005 Georgia Water Resources Conference, April 25-27, 2005, University of Georgia, Athens.

Zelko, J. 2012. Report of the Robust Redhorse Conservation Committee Annual Meeting. Morrow Mountain State Park, Albemarle, North Carolina, October 8-10, 2012.

Zelko, J. 2013. Report of the Robust Redhorse Conservation Committee Annual Meeting. Charlie Elliott Wildlife Center, Mansfield, Georgia, October 1-3, 2013.

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APPENDIX A – Draft License Conditions Recommended by Staff

1. Mandatory Conditions

On April 19, 2019, the U.S. Department of Agriculture, Forest Service (Forest Service) filed 24 preliminary 4(e) conditions (Appendix B). The conditions are described in section 2.2.4, *Modifications to Applicant's Proposal, Mandatory Conditions*, of this environmental assessment (EA). Of Forest Service's 24 4(e) conditions, we consider 12 of the conditions (conditions 1 through 10, 15, and 16) to be administrative or legal in nature and not specific environmental measures. We, therefore, do not analyze these conditions in this EA. Condition 19 is also administrative in that it only requires the drafting of a report and reviewing existing species lists. However, it also provides for potential future measures, should a new special status species be discovered on Forest Service land, which would require the filing of a future amendment to the project license. Therefore, we consider condition 19 in this EA. Of the 12 conditions we consider to be environmental measures, or that otherwise include provisions that we consider applicable to the Wallace Dam Project, we include in the staff alternative 8 as specific by the agency, and do not recommend four conditions. We recognize, however, that the Commission is required to include valid 4(e) conditions in any license issued for the project. As such, Forest Service conditions that we do not recommend would be included in a new license.

2. Additional License Articles Recommended by Commission Staff

We recommend including the following license articles in any license issued for the Wallace Dam Project, in addition to the mandatory conditions.

Draft Article 301. *Contract Plans and Specifications*. At least 60 days prior to the start of any construction, the licensee shall submit one copy of its plans and specifications and supporting design document to the Commission's Division of Dam Safety and Inspections (D2SI)-Atlanta Regional Engineer, and two copies to the Commission (one of these shall be a courtesy copy to the Director, D2SI). The submittal to the D2SI-Atlanta Regional Engineer must also include as part of preconstruction requirements: a Quality Control and Inspection Program, Temporary Construction Emergency Action Plan, and Soil Erosion and Sediment Control Plan. The licensee may not begin construction until the D2SI-Atlanta Regional Engineer has reviewed and commented on the plans and specifications, determined that all preconstruction requirements have been satisfied, and authorized start of construction.

Draft Article 302. *Cofferdam and Deep Excavation Construction Drawings*. Should construction require cofferdams or deep excavations, the licensee must: (1) have a Professional Engineer who is independent from the construction contractor, review and approve the design of contractor-designed cofferdams and deep excavations prior to the start of construction; and (2) ensure that construction of cofferdams and deep excavations is consistent with the approved design. At least 30 days before starting construction of

any cofferdams or deep excavations, the licensee must submit one copy to the Commission's Division of Dam Safety and Inspections (D2SI)-Atlanta Regional Engineer and two copies to the commission (one of these copies shall be a courtesy copy to the Commission's Director, D2SI), of the approved cofferdam and deep excavation construction drawings and specifications, and the letters of approval.

Draft Article 303. Project Modification Resulting from Environmental Requirements. If environmental requirements under this license require modification that may affect the project works or operations, the licensee must consult with the Commission's Division of Dam Safety and Inspections-Atlanta Regional Engineer. Consultation must allow sufficient review time for the Commission to ensure that the proposed work does not adversely affect the project works, dam safety, or project operation.

Draft Article 401. Commission Approval, Filing Reports, Notification, and Filing of Amendments.

(a) Requirement to File Plans for Commission Approval.

Forest Service section 4(e) conditions (Appendix B) require the licensee to prepare plans in consultation with other entities for approval by Forest Service, or for submittal to the Commission, and implement specific measures without prior Commission approval. The following plans must also be submitted to the Commission for approval by the deadlines specified below:

Forest Service 4(e) Condition No.	Plan Name	Commission Due Date
11	Hazard Substances and Spill Prevention and Cleanup Plan	Within 14 days of Forest Service approval of any request to store hazardous substances on Forest Service land
18	Aquatic Invasive Species Management and Monitoring Plan	Within 1 year from license issuance
18	Vegetation and Invasive Weed Management Plan	Within 1 year from license issuance
20	Erosion and Sediment Control Management Plan	Within 1 year from license issuance

Forest Service 4(e) Condition No.	Plan Name	Commission Due Date
21	Fire and Fuels Management Plan	Within 1 year from license issuance

With each plan filed with the Commission, the licensee must include documentation that it developed the plan in consultation with Forest Service and the other consulted agencies, as identified above, and provide copies of any comments received, as well as its response to each comment. The Commission reserves the right to make changes to any plan filed. Upon Commission approval, the plan becomes a requirement of the license, and the licensee must implement the plan, including any changes required by the Commission. Any changes in the above schedule or plans require approval by the Commission before implementing the proposed change.

(b) Requirement to File Reports.

Forest Service preliminary 4(e) condition 19 in Appendix B requires the licensee to file a special status species report(s), or biological evaluation(s), with the Forest Service. Because this report(s) relates to compliance with the requirements of this license, the report(s) must also be submitted to the Commission. The report(s) must include documentation of consultation with the Forest Service, as well as the U.S. Fish and Wildlife Service and the Georgia Department of Natural Resources, as appropriate, and provide copies of any comments received and the licensee’s response to each comment. The Commission reserves the right to require changes to project operation or facilities based on the information contained in the report(s) and any other available information.

(c) Requirement to Notify Commission of Fulfilling License Requirements.

Forest Service preliminary 4(e) conditions 17 and 20 in Appendix B require the licensee to: (1) consult with the Forest Service prior to erecting signs related to public safety issues on Forest Service land covered under the license (Condition 17); and (2) develop site-specific temporary erosion control measures for each project approved by Forest Service (Condition 20). The Commission must be notified at least 30 days prior to implementing such measures.

(d) Requirement to File Amendment Applications.

Certain Forest Service preliminary 4(e) conditions in Appendix B contemplate unspecified long-term changes to project operation or facilities for the purpose of addressing environmental effects (e.g., Condition 18-modifications to the Aquatic Invasive Species Management and Monitoring Plan and Vegetation and Invasive Weed

Management Plan; and Condition 19-future changes to address special status species on Forest Service land). These changes may not be implemented without prior Commission authorization granted after the filing of an application to amend the license. In any amendment request, the licensee must identify related project requirements and request corresponding amendments or extensions of time, as needed, to maintain consistency among requirements.

Draft Article 402. Shoreline Stabilization Plan. The Shoreline Stabilization Plan, filed May 31, 2018, as Appendix B of the License Application (pages B-1 and B-8), is approved, and must be implemented according to the schedule included in the plan. In addition, the improvements to the shoreline adjacent to Waterfowl Pond 2 and inspection of the Pond 2 water control structure must be completed by December 31, 2023. Within 180 days of completion of all the shoreline stabilization measures included in the plan, the licensee must file, for Commission approval, as-built drawings that show the location of all the shoreline stabilization measures put in place, in relation to the Wallace Dam Pumped Storage Project boundary.

Upon license issuance, the licensee must implement the plan. The approved *Shoreline Stabilization Plan* may not be amended without prior Commission approval. The Commission reserves the right to make changes to any proposed revisions filed for the *Shoreline Stabilization Plan*.

Draft Article 403. Project Operation and Lake Levels. Upon the effective date of the license, the licensee must operate the Wallace Dam Pumped Storage Project to maintain the reservoir elevation between 433.0 feet and 435.0 feet Plant Datum (PD)¹⁶⁸ 100 percent of the hours each calendar year, with an average daily fluctuation of 1.5 feet.

Prior to any non-emergency drawdown of the reservoir below elevation 433 feet PD, the licensee must consult with the Georgia Department of Natural Resources (Georgia DNR). In the event of a planned, non-emergency drawdown, the licensee must notify the U.S. Fish and Wildlife Service (FWS), the U.S. Forest Service, and the Commission (including the Commission's Atlanta Regional Office-Regional Engineer) at least 10 days in advance of the drawdown. In addition, the licensee must execute the following requirements with regard to planned and un-planned (emergency) changes in the water surface elevation requirements of this article.

¹⁶⁸ Plant Datum equals mean sea level (NAVD 88) minus 0.20 feet (+/-0.01 feet), or mean sea level (NGVD 29) minus 0.60 feet (+/-0.01 feet). Unless otherwise stated, all elevations referenced in this EA are in plant datum.

Planned Deviations:

Impoundment elevations may be temporarily modified if required by operating emergencies beyond the control of the licensee, or for short periods, up to 3 weeks, after mutual agreement among the licensee and the Georgia Department of Natural Resources (Georgia DNR) and the U.S. Forest Service (Forest Service). After concurrence from Georgia DNR and Forest Service, the licensee must file a report with the Secretary of the Commission and FWS as soon as possible, but no later than 14 calendar days after the onset of the planned deviation. Each report must include: (1) the reasons for the deviation and whether operations were modified; (2) the duration and magnitude of the deviation; (3) any environmental effects; and (4) documentation of consultation with Georgia DNR and Forest Service. For planned deviations exceeding 3 weeks, the licensee must file an application for a temporary amendment of lake levels, and receive Commission approval prior to implementation.

Unplanned Deviation, more than 3 hours or resulting in environmental effects:

If the licensee deviates from the impoundment elevation requirements, the licensee must report each incident to the Secretary of the Commission. For any deviation that lasts longer than 3 hours or results in environmental effects, the licensee must file a report as soon as possible, but no later than 14 calendar days after each such incident. The report must include: (1) the cause of the event; (2) the duration and magnitude of the deviation; (3) any pertinent operational and/or monitoring data; (4) a timeline of the incident and the license's response; (5) any comments or correspondence received from Georgia DNR, FWS, and Forest Service, or confirmation that no comments were received from the consulted agencies; (6) documentation of any observed environmental effects; and (7) a description of measures implemented to prevent similar deviations in the future.

Unplanned Deviations lasting 3 hours or less with no environmental effects:

For deviations lasting 3 hours or less that do not result in environment effects, the licensee must file an annual report, by (insert the date of license issuance: month and day only), describing each incident up to 1 month prior to the reporting date, including: (1) the cause of the event; (2) the duration and magnitude of the deviation; (3) any pertinent operational and/or monitoring data; (4) a timeline of the incident and the license's response; (5) any comments or correspondence received from Georgia DNR, FWS, and Forest Service, or confirmation that no comments were received from the listed agencies; and (6) a description of measures implemented to prevent similar deviations in the future.

Article 404. *Use of the Sinclair Project Reservoir (Lake Sinclair).* The licensee for the Wallace Dam Pumped Storage Project No. 2413 (Wallace Dam Project) is

authorized to utilize the Sinclair Hydroelectric Project No. 1951 (Sinclair Project) reservoir (Lake Sinclair) as a source of water for the Wallace Dam Project when operating under this license. In addition, operation of the Wallace Dam Project must be such as not to adversely affect the Sinclair Project licensee's ability to comply with its license, including the provisions relating to the protection of the United States under Standard Article 12 of Form L-5.

Article 405. Project Operation Compliance Monitoring. Upon the effective date of the license, the licensee must monitor project operation and reservoir elevations, as described in Georgia Power Company's: (1) July 27, 2015 filing (Appendix B, Additional Information Response #5, pages 4 and 5); and (2) Exhibit B (pages 3 and 7) and Exhibit F (page 1) of Georgia Power Company's license application filed on May 31, 2018, to ensure compliance with the operational requirements of Articles 402, 403, and 404 of the license. The operational monitoring measures are generally described as follows, and must include, at a minimum:

1. Remote monitoring of the U.S. Geological Survey gages # 02218300 (on the Oconee River) and # 02219000 (on the Apalachee River) to estimate daily flows available for generation at Wallace Dam.
2. Using estimates of inflow, as determined by item 1, and changes in storage in Lake Sinclair to calculate inflow and outflow for the Wallace Dam Project.
3. Monitoring the elevation of Lake Oconee by digitally and physically recording readings from a staff gage and water level transducer installed at Wallace Dam.
4. Electronically recording the elevation of Lake Oconee on at least an hourly time step; and physically recording Lake Oconee elevations every hour.
5. Making the operational data available to the Commission, state and federal agency staff, and other stakeholders at any time upon request.

No changes can be made to the operational monitoring provisions for the Wallace Dam Project without prior Commission approval.

Draft Article 406. Tailrace Water Quality Enhancement. Within 2 years of license issuance, the licensee must install and operate a forebay oxygen line diffuser system in Lake Oconee to enhance summer dissolved oxygen (DO) concentrations in the Wallace Dam tailrace. The system must be based on the conceptual design developed by Ruane *et al.*, 2017; as documented in Appendix A to Georgia Power Company's Updated Study Report filed October 11, 2017). The licensee must operate the forebay oxygen line diffuser system, as needed, during the period May 1 through October 31 each year to achieve a minimum DO concentration of 4.0 milligrams per liter (mg/L) and a daily

average of 5.0 mg/L. The DO enhancement system must be in place throughout the period May through October, unless the DO monitoring required by Article 407 shows that a longer time period is needed to enhance DO in the Wallace Dam tailrace.

The use of the forebay oxygen line diffuser system for summer DO enhancement may be temporarily modified if required by operating emergencies beyond the control of the licensee, or for short periods upon mutual agreement among the licensee and the Georgia Department of Natural Resources (Georgia DNR).

In the event of a planned modification, the licensee must notify the Commission and the U.S. Fish and Wildlife Service (FWS) at least 10 days in advance. In the event of an emergency modification to the forebay oxygen line diffuser system, the licensee must notify the Commission, Georgia DNR, and FWS as soon as possible, but no later than 10 days after each such incident. The licensee must include, as part of its emergency notification to the Commission, an incident report. The report must include: (1) the reason for the modification; and (2) comments or correspondence, if any, received from Georgia DNR and FWS regarding the incident, including any recommendations made by the agencies. Based on the report and the Commission's evaluation of the incident, the Commission reserves the right to require modifications to the project facilities and operations to ensure future compliance.

Draft Article 407. Tailrace Water Quality Monitoring. Upon the effective date of the license, the licensee must monitor dissolved oxygen (DO) and water temperature in the Wallace Dam tailrace. DO and water temperature must be monitored during the period May 1 through October 31 for 3 years following the installation of the forebay oxygen line diffuser system in Lake Oconee. Monitoring must be conducted using an automatic probe that records measurements at 30-minute intervals at Station OCTR, which is located in the Wallace Dam tailrace within the direct influence of generation and pump-back flows where the channel is relatively uniform and water well mixed, or other representative location.

The licensee must prepare an annual monitoring report for each of the first 3 years of monitoring that includes the water quality data collected each of the 3 years, with the monitoring report due by January 31 of the succeeding calendar year. The licensee must consult annually with the Georgia Department of Natural Resources (Georgia DNR) to review available Georgia DNR fisheries population monitoring data to identify any effects on the fishery related to operating the proposed oxygen diffuser system. The fishery information must be included in the annual monitoring reports. The report must be submitted to the Georgia DNR and the U.S. Fish and Wildlife Service (FWS).

Upon completion of the third sampling season, the licensee must prepare a final 3-year monitoring report and submit it to Georgia DNR and FWS by February 28 of the calendar year following the third sampling season, and file it with the Commission, for

review and approval, by April 30 of the calendar year following the third sampling seasons. The licensee must include in the 3-year monitoring report:

1. the DO and water temperature data collected during the 3-year monitoring effort;
2. a discussion of the effectiveness of the forebay oxygen line diffuser system in maintaining DO in the project tailrace at or above the daily minimum of no less than 4.0 milligram per liter (mg/L) and a daily average of 5.0 mg/L;
3. the fishery data included in the annual reports, along with a summary of that data, and a discussion of any effects on fish and aquatic resources in the Lake Oconee forebay and the Wallace Dam tailrace regarding the potential for increased entrainment at the project;
4. any recommendations for (a) modifying the forebay oxygen line diffuser system or monitoring effort, or (b) providing any other enhancement measures, if DO falls below the above stated levels;
5. documentation of consultation with Georgia DNR and FWS, copies of the agencies' comments and recommendations on the completed report, after it has been prepared and provided to the agencies for review, and specific descriptions of how the agencies' comments are addressed in the report. The licensee must allow a minimum of 30 days for the agencies to comment and to make recommendations before filing the report with the Commission. If the licensee does not adopt a recommendation, the filing must include the licensee's reasons, based on project-specific information.

The approved Tailrace Water Quality Monitoring Program must not be amended without prior Commission approval. The Commission reserves the right to require changes to the program, based on information provided in the 3-year monitoring report.

Draft Article 408. *Reservation of authority to Prescribe Fishways.* Authority is reserved to the Commission to require the licensee to construct, operate, and maintain, or to provide for the construction, operation, and maintenance of such fishways as may be prescribed by the Secretary of the Interior pursuant to section 18 of the Federal Power Act.

Draft Article 409. *Recreation and Land Use Plan.* Within 120 days of license issuance, the licensee must file with the Commission for approval, a revised Recreation and Land Use Plan for the Wallace Dam Project that incorporates the U.S. Forest Service's preliminary 4(e) Condition 24, filed on April 19, 2019. In addition, the licensee must include in the revised Recreation and Land Use Plan a provision to consult, and develop options for increasing boat access with the Georgia Department of Natural Resources (Georgia DNR) regarding public boating access for large events (e.g., fishing tournaments) when capacity regularly exceeds 85 percent on non-holiday weekends

during the recreation season, and the need to ensure that such access remains available, and throughout each year in the future.

The licensee must continue to operate and maintain, or provide for the operation and maintenance of, the following new and existing recreation facilities for the term of the license: Lawrence Shoals Park, Old Salem Park, Parks Ferry Park, Sugar Creek Boat Ramp, Armour Bridge, Long Shoals Boat Ramp, Area C-5 Bank Fishing Access, Jerry's Highway 44 Bank Fishing Access, and Georgia Highway 16 Bridge Boat Ramp.

Within 90 days of completing construction of the approved recreation sites, Georgia Power must file with the Commission documentation of the completed recreation sites approved in this order. The documentation may include photographs (aerial or traditional), as-built drawings, or other methods, provided that the documentation clearly demonstrates the recreation sites, to include approved recreation facilities, have been constructed in substantial conformity as approved. The documentation must also include confirmation that the approved recreation sites are located inside the project boundary. In the event that the approved recreation sites are not located inside the project boundary, Georgia Power must propose a schedule to file, for Commission approval, revised Exhibit G (project boundary) drawings that incorporate the approved recreation sites inside the project boundary.

The Commission reserves the right to require changes to the Revised Recreation Plan. Land-disturbing activities must not begin until the licensees are notified by the Commission that the plan is approved. Upon Commission approval, the licensees must implement the plan, including any changes required by the Commission.

Draft Article 410. Shoreline Management Plan. Within 60 days of license issuance, the licensee must file with the Commission for approval, a revised *Shoreline Management Plan for the Wallace Dam Project* that incorporates (a) the provisions of the draft *Shoreline Management Plan for the Wallace Dam*, filed on May 31, 2018, as Appendix D of Exhibit E of the license application, and (b) the additional provisions described below. The purpose the Shoreline Management Plan (SMP) is to protect the scenic quality of, and environmental resources at, the Wallace Dam Project.

The revised SMP must include, at a minimum, the following additional provisions:

1. Consulting with the Georgia Department of Natural Resources (Georgia DNR) as part of the SMP's 10-year review cycle (i.e., within 10 year of license issuance and every 10 years thereafter).
2. Filing a report with the Commission after each 10-year review period, that includes documentation of consultation with Georgia DNR and other entities, as well as specific descriptions of how Georgia DNR's comments are

accommodated. The licensee must allow a minimum of 30 days for Georgia DNR and other entities to comment and make recommendations prior to filing the report.

3. Appended copies of the *Shoreline Management Guidelines for Georgia Power Lakes* and the *1993 Dredge Permitting Procedures*.

The Commission reserves the right to require changes to the revised SMP. Upon Commission approval, the licensees must implement the plan, including any changes required by the Commission.

Draft Article 411. Programmatic Agreement and Historic Properties Management Plan. The licensee must implement the “Programmatic Agreement between the Federal Energy Regulatory Commission and the Georgia Department of Natural Resources - Historic Preservation Division for Managing Historic Properties that may be Affected by Issuing a License to Georgia Power Company for the Continued Operation of the Wallace Dam Project in Hancock, Putnam, Greene, and Morgan Counties, Georgia” executed on _____ by the Georgia State Historic Preservation Officer, and including, but not limited to, the *Historic Properties Management Plan* (HPMP), filed May 31, 2018, for the project. In the event that the Programmatic Agreement is terminated, the licensee must continue to implement the provisions of its approved HPMP. The Commission reserves the right to require changes to the HPMP.

Draft Article 412. Use and Occupancy. (a) In accordance with the provisions of this article, the licensee shall have the authority to grant permission for certain types of use and occupancy of project lands and waters and to convey certain interests in project lands and waters for certain types of use and occupancy, without prior Commission approval. The licensee may exercise the authority only if the proposed use and occupancy is consistent with the purposes of protecting and enhancing the scenic, recreational, and other environmental values of the project. For those purposes, the licensee shall also have continuing responsibility to supervise and control the use and occupancies for which it grants permission, and to monitor the use of, and ensure compliance with the covenants of the instrument of conveyance for, any interests that it has conveyed, under this article. If a permitted use and occupancy violates any condition of this article or any other condition imposed by the licensee for protection and enhancement of the project's scenic, recreational, or other environmental values, or if a covenant of a conveyance made under the authority of this article is violated, the licensee shall take any lawful action necessary to correct the violation. For a permitted use or occupancy, that action includes, if necessary, canceling the permission to use and occupy the project lands and waters and requiring the removal of any non-complying structures and facilities.

(b) The type of use and occupancy of project lands and waters for which the licensee may grant permission without prior Commission approval are: (1) landscape plantings; (2) non-commercial piers, landings, boat docks, or similar structures and facilities that can accommodate no more than 10 water craft at a time and where said facility is intended to serve single-family type dwellings; (3) embankments, bulkheads, retaining walls, or similar structures for erosion control to protect the existing shoreline; and (4) food plots and other wildlife enhancement. To the extent feasible and desirable to protect and enhance the project's scenic, recreational, and other environmental values, the licensee shall require multiple use and occupancy of facilities for access to project lands or waters. The licensee shall also ensure, to the satisfaction of the Commission's authorized representative, that the use and occupancies for which it grants permission are maintained in good repair and comply with applicable state and local health and safety requirements. Before granting permission for construction of bulkheads or retaining walls, the licensee shall: (1) inspect the site of the proposed construction, (2) consider whether the planting of vegetation or the use of riprap would be adequate to control erosion at the site, and (3) determine that the proposed construction is needed and would not change the basic contour of the impoundment shoreline. To implement this paragraph (b), the licensee may, among other things, establish a program for issuing permits for the specified types of use and occupancy of project lands and waters, which may be subject to the payment of a reasonable fee to cover the licensee's costs of administering the permit program. The Commission reserves the right to require the licensee to file a description of its standards, guidelines, and procedures for implementing this paragraph (b) and to require modification of those standards, guidelines, or procedures.

(c) The licensee may convey easements or rights-of-way across, or leases of project lands for: (1) replacement, expansion, realignment, or maintenance of bridges or roads where all necessary state and federal approvals have been obtained; (2) storm drains and water mains; (3) sewers that do not discharge into project waters; (4) minor access roads; (5) telephone, gas, and electric utility distribution lines; (6) non-project overhead electric transmission lines that do not require erection of support structures within the project boundary; (7) submarine, overhead, or underground major telephone distribution cables or major electric distribution lines (69-kV or less); and (8) water intake or pumping facilities that do not extract more than one million gallons per day from a project impoundment. No later than January 31 of each year, the licensee shall file three copies of a report briefly describing for each conveyance made under this paragraph (c) during the prior calendar year, the type of interest conveyed, the location of the lands subject to the conveyance, and the nature of the use for which the interest was conveyed.

(d) The licensee may convey fee title to, easements or rights-of-way across, or leases of project lands for: (1) construction of new bridges or roads for which all necessary state and federal approvals have been obtained; (2) sewer or effluent lines that

discharge into project waters, for which all necessary federal and state water quality certification or permits have been obtained; (3) other pipelines that cross project lands or waters but do not discharge into project waters; (4) non-project overhead electric transmission lines that require erection of support structures within the project boundary, for which all necessary federal and state approvals have been obtained; (5) private or public marinas that can accommodate no more than 10 water craft at a time and are located at least one-half mile (measured over project waters) from any other private or public marina; (6) recreational development consistent with an approved report on recreational resources of an Exhibit E; and (7) other uses, if: (i) the amount of land conveyed for a particular use is five acres or less; (ii) all of the land conveyed is located at least 75 feet, measured horizontally, from project waters at normal surface elevation; and (iii) no more than 50 total acres of project lands for each project development are conveyed under this clause (d)(7) in any calendar year. At least 60 days before conveying any interest in project lands under this paragraph (d), the licensee must file a letter with the Commission, stating its intent to convey the interest and briefly describing the type of interest and location of the lands to be conveyed (a marked Exhibit G map may be used), the nature of the proposed use, the identity of any federal or state agency official consulted, and any federal or state approvals required for the proposed use. Unless the Commission's authorized representative, within 45 days from the filing date, requires the licensee to file an application for prior approval, the licensee may convey the intended interest at the end of that period.

(e) The following additional conditions apply to any intended conveyance under paragraph (c) or (d) of this article:

(1) Before conveying the interest, the licensee shall consult with federal and state fish and wildlife or recreation agencies, as appropriate, and the State Historic Preservation Officer.

(2) Before conveying the interest, the licensee shall determine that the proposed use of the lands to be conveyed is not inconsistent with any approved report on recreational resources of an Exhibit E; or, if the project does not have an approved report on recreational resources, that the lands to be conveyed do not have recreational value.

(3) The instrument of conveyance must include the following covenants running with the land: (i) the use of the lands conveyed shall not endanger health, create a nuisance, or otherwise be incompatible with overall project recreational use; (ii) the grantee shall take all reasonable precautions to ensure that the construction, operation, and maintenance of structures or facilities on the conveyed lands will occur in a manner that will protect the scenic, recreational, and environmental values of the project; and (iii) the grantee shall not unduly restrict public access to project waters.

(4) The Commission reserves the right to require the licensee to take reasonable remedial action to correct any violation of the terms and conditions of this article, for the protection and enhancement of the project's scenic, recreational, and other environmental values.

(f) The conveyance of an interest in project lands under this article does not in itself change the project boundaries. The project boundaries may be changed to exclude land conveyed under this article only upon approval of revised Exhibit G drawings (project boundary maps) reflecting exclusion of that land. Lands conveyed under this article will be excluded from the project only upon a determination that the lands are not necessary for project purposes, such as operation and maintenance, flowage, recreation, public access, protection of environmental resources, and shoreline control, including shoreline aesthetic values. Absent extraordinary circumstances, proposals to exclude lands conveyed under this article from the project shall be consolidated for consideration when revised Exhibit G drawings would be filed for approval for other purposes.

(g) The authority granted to the licensee under this article shall not apply to any part of the public lands and reservations of the United States included within the project boundary.

APPENDIX B – U.S. Forest Service Section 4(e) Conditions

U.S. Forest Service Section 4(e) Conditions¹⁶⁹

filed on April 19, 2019

PART I: STANDARD ADMINISTRATIVE CONDITIONS

Condition No. 1 – Revision of Forest Service Conditions

FS reserves the right, after notice and opportunity for comment, to require changes in the Project and its operation through revision of the Section 4(e) conditions to accomplish protection and utilization of National Forest System lands and resources. FS also reserves the right to modify these conditions, if necessary, to respond to any significant changes that warrant a revision of these conditions, for example, a Final Biological Opinion issued for this Project by the National Marine Fisheries Service or United States Fish and Wildlife Service; or any Certification issued for this Project by the State Water Resources Control Board.

Condition No. 2 - Surrender of License or Transfer of Ownership

Prior to any surrender of this license, Licensee shall provide assurance acceptable to FS that Licensee shall restore any project area directly affecting National Forest System lands to a condition satisfactory to FS upon or after surrender of the license, as appropriate. To the extent restoration is required, Licensee shall prepare a restoration plan for FS approval, which shall identify the measures to be taken to restore such National Forest System lands and shall include adequate financial mechanisms to ensure performance of the restoration measures.

In the event of any transfer of the license or sale of the project, Licensee shall assure that, in a manner satisfactory to FS, Licensee or transferee will provide for the costs of surrender and restoration. If deemed necessary by FS to assist it in evaluating Licensee's proposal, Licensee shall conduct an analysis, using experts approved by FS, to estimate the potential costs associated with surrender and restoration of any project area directly affecting National Forest System lands to FS specifications. In addition, FS may require Licensee to pay for an independent audit of the transferee to assist FS in determining whether the transferee has the financial ability to fund the surrender and restoration work specified in the analysis.

¹⁶⁹ The entire filing of the U.S. Forest Service is not duplicated herein. This appendix includes only the exact text of the substantive parts of the 4(e) conditions filed by the U.S. Forest Service.

Condition No. 3 - Requirement to Obtain a Forest Service Special Use Authorization for Use of National Forest System Lands

The following is from FSM 2700, Chapter 2771 and provides further information on the following subpart of this Section 4(e) Conditions: The Federal Land Policy and Management Act (FLPMA) of October 21, 1976 (43 U.S.C. 1761-1771) authorizes the Forest Service to issue special use authorizations for hydropower projects located on National Forest System lands. However, the Energy Policy Act of October 24, 1992 (43 U.S.C. 1761(d)) amended FLPMA by providing that a special use authorization is not required for any existing project, whether licensed or exempted, that was not subject to an authorization under FLPMA prior to October 24, 1992. Many projects in existence on October 24, 1992, did not have FLPMA special use authorizations and, therefore, are exempt from a Forest Service special use authorization requirement in the future. A special use authorization is required for new hydropower projects proposed after October 24, 1992.]

Requirement to Obtain a Forest Service Special Use Authorization Based on the Energy Policy Act of 1992

Licensee shall obtain a special use authorization from FS for the occupancy and use of lands included in the licensed project boundary. Licensee shall obtain the executed authorization prior to beginning any ground disturbing activities on National Forest System lands to be covered by the special use authorization and shall file that special use authorization with the Commission. Licensee shall be responsible for the costs of collecting all information directly related to the evaluation of the effects of the proposed occupancy and use that FS needs in order to make a decision concerning issuance of the special use authorization.

Requirement to Obtain a Forest Service Special Use Authorization Based on Issuance of Previous Special Use Authorization(s)

Licensee shall obtain a special use authorization from FS for the occupancy and use of lands previously covered by a special use authorization in any previous license. Licensee shall obtain the executed authorization within 6 months of license issuance and prior to beginning any ground disturbing activities on National Forest System lands to be covered by the special use authorization and shall file that special use authorization with the Commission. Licensee shall be responsible for the costs of collecting all information directly related to the evaluation of the effects of the proposed occupancy and use that FS needs in order to make a decision concerning issuance of a special use authorization.

Requirement to Obtain a Forest Service Special Use Authorization for Projects That Involve the Use of Additional National Forest System Lands That do not have a Special Use Authorization

Licensee shall obtain a special use authorization from FS for the occupancy and use of National Forest System lands that are (1) not part of the existing license but are added to the FERC boundary by the Commission and (2) not previously covered by a special use authorization. Licensee shall obtain the executed authorization within 6 months of license issuance and prior to beginning any ground disturbing activities on National Forest System lands to be covered by the special use authorization and shall file that special use authorization with the Commission. Licensee shall be responsible for the costs of collecting all information directly related to the evaluation of the effects of the proposed occupancy and use that FS needs in order to make a decision concerning issuance of a special use authorization.

Condition No. 4 - Requirement to Obtain a Short-Term Forest Service Special Use Authorization

If, during the term of the License, Licensee proposes to perform any project construction work, the Licensee shall obtain a short-term special use authorization prior to beginning any ground disturbing activities on National Forest System land. Licensee shall be responsible for the costs of collecting and analyzing all information directly related to the evaluation of the effects using the National Environmental Policy Act (NEPA) of the proposed project that FS needs in order to make a decision concerning issuance of a short-term special use authorization. Licensee may commence ground disturbing activities authorized by the License and short-term special use authorization no sooner than 60 calendar days following the date Licensee files the FS short-term special use authorization with the Commission, unless the Commission prescribes a different commencement schedule. In the event there is a conflict between any provisions of the License and FS special use authorization, the special use authorization shall prevail to the extent that FS, in consultation with the Commission, deems the terms of the special use authorization necessary to protect and utilize National Forest System resources.

The short-term special use permit shall address but not be limited to:

- Safety.
- Use and storage of equipment.
- Properly licensed construction personnel.

- Inspections.

Before any construction occurs on National Forest System lands, Licensee shall obtain prior written approval of FS for all final design plans for Project components, which FS deems as affecting or potentially affecting National Forest System resources.

Condition No. 5 - Compliance with Regulations

Licensee shall comply with the regulations of the Department of Agriculture for activities on National Forest System lands, and all applicable Federal, State, county, and municipal laws, ordinances, or regulations in regards to the area or operations on or directly affecting National Forest System lands, to the extent those laws, ordinances or regulations are not preempted by federal law.

Condition No. 6 - Protection of United States Property

Licensee, including any agents or employees of Licensee acting with the scope of their employment, shall exercise diligence in protecting from damage the land, property, and interests of the United States from damage arising from Licensee's construction, maintenance, or operation of the project works or the works appurtenant or accessory thereto under the license. Licensee's liability for fire and other damages to National Forest System lands shall be determined in accordance with the Federal Power Act and standard Form L-1 Articles 22 and 24.

As part of the occupancy and use of the project area, Licensee has a continuing responsibility to reasonably identify and report all known or observed hazardous conditions on or directly affecting National Forest System lands that would affect the improvements, resources, or pose a risk of injury to individuals. Licensee will abate those conditions, except those caused by third parties or not related to the occupancy and use authorized by the License. Any non-emergency actions to abate such hazards on National Forest System lands shall be performed after consultation with FS. In emergency situations, Licensee shall notify FS of its actions as soon as possible, but not more than 48 hours, after such actions have been taken. Whether or not FS is notified or provides consultation, Licensee shall remain solely responsible for all abatement measures performed. Other hazards should be reported to the appropriate agency as soon as possible.

Licensee shall maintain all its improvements and premises on National Forest System lands to standards of repair, orderliness, neatness, sanitation, and safety acceptable to FS. Licensee shall comply with all applicable Federal, State, and

local laws and regulations, including but not limited to, the Federal Water Pollution Control Act, 33 U.S.C. 1251 et seq., the Resources Conservation and Recovery Act, 42 U.S.C. 6901 et seq., the Comprehensive Environmental Response, Control, and Liability Act, 42 U.S.C. 9601 *et seq.*, and other relevant environmental laws, as well as public health and safety laws and other laws relating to the siting, construction, operation, and maintenance of any facility, improvement, or equipment. Disposal of all materials will be at an approved existing location, except as otherwise agreed by FS.

Condition No. 7 - Existing Claims

License shall be subject to all valid claims and existing rights of third parties. The United States is not liable to Licensee for the exercise of any such right or claim.

Condition No. 8 – Indemnification

Licensee shall indemnify, defend, and hold the United States harmless for:

- any violations incurred under any laws and regulations applicable to, or
- judgments, claims, penalties, fees, or demands assessed against the United States caused by, or
- costs, damages, and expenses incurred by the United States caused by, or
- the releases or threatened release of any solid waste, hazardous substances, pollutant, contaminant, or oil in any form in the environment related to the construction, maintenance, or operation of the project works or of the works appurtenant or accessory thereto under the license.

Licensee's indemnification of the United States shall include any loss by personal injury, loss of life or damage to property caused by the construction, maintenance, or operation of the project works or of the works appurtenant or accessory thereto under the license. Indemnification shall include, but is not limited to, the value of resources damaged or destroyed; the costs of restoration, cleanup, or other mitigation; fire suppression or other types of abatement costs; third party claims and judgments; and all administrative, interest, and other legal costs. Upon surrender, transfer, or termination of the license, Licensee's obligation to indemnify and hold harmless the United States shall survive for all valid claims for actions that occurred prior to such surrender, transfer or termination.

Condition No. 9 – Access Within the License Area

The United States shall have unrestricted use of any part of the licensed area on National Forest System lands for any purpose, including permitting uses by third parties or members of the public, provided such use does not interfere with the rights and privileges authorized for the license.

Condition No. 10 – Use of National Forest System Roads

If the Project requires use of roads on National Forest System lands, Licensee shall obtain suitable authorization for all project access roads and National Forest System roads needed for Project access. The authorization shall require road maintenance and cost sharing in reconstruction commensurate with Licensee's use and project-related use. The authorization shall specify road maintenance and management standards that provide for traffic safety, minimize erosion, and minimize damage to natural resources and that are acceptable to FS, as appropriate.

Licensee shall pay FS for its share of maintenance cost or perform maintenance or other agreed to services, as determined by FS, for all use of roads related to project operations, project-related public recreation, or related activities. The maintenance obligation of Licensee shall be proportionate to total use and commensurate with its use. Any maintenance to be performed by Licensee shall be authorized by and shall be performed in accordance with an approved maintenance plan and applicable Best Management Practices (BMPs). In the event a road requires maintenance, restoration, or reconstruction work to accommodate Licensee's needs, Licensee shall perform such work at its own expense after securing FS authorization.

Licensee shall complete a condition survey and a proposed maintenance plan subject to FS review and approval as appropriate once each year. The plan may take the format of a road maintenance agreement provided all the above conditions are met as well as the conditions set forth in the proposed agreement.

In addition, all National Forest System roads used as Project Access roads (PAR) and Right-of-Way access roads (ROW) shall have:

- Current condition survey.
- Map(s) at a scale to allow identification of specific routes or segments.
- FS assigned road numbers are used for reference on the maps, tables, and in the field.

- GIS compatible files of GPS alignments of all roads used for Project access are provided to FS.
- Adequate signage is installed and maintained by Licensee at each road or route, identifying the road by FS road number.

Licensee shall confine all vehicles being used for project purposes, including but not limited to administrative and transportation vehicles and construction and inspection equipment, to roads or specifically designed access routes, as identified in the authorization described above. FS reserves the right to close any and all such routes where damage is occurring to the soil or vegetation or to require reconstruction/construction by Licensee to the extent needed to accommodate Licensee's use. FS agrees to provide notice to Licensee prior to road closures, except in an emergency, in which case notice will be provided as soon as practicable. Licensee shall maintain suitable crossings as required by FS for all roads and trails that intersect the right-of-way occupied by linear Project facilities (powerline, penstock, ditch, and pipeline).

Condition No. 11 - Hazardous Substances Plan

Hazardous substances may not be stored on National Forest System lands without prior approval of FS. Licensee shall submit a spill prevention and cleanup plan for approval by FS as part of any request to store hazardous substances. The plan shall show evidence of consultation with required Federal, State, and Local agencies with jurisdiction at the time of the issuance of a new license term. The plan shall be filed with the Commission.

The holder shall comply with all applicable Federal, State, and local laws, regulations, and standards, including but not limited to, the Federal Water Pollution Control Act, 33 U.S.C. 1251 *et seq.*, the Resource Conservation and Recovery Act, 42 U.S.C. 6901 *et seq.*, the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S. C. 9601 *et seq.*, and other relevant environmental laws, as well as public health and safety laws and other laws relating to the siting, construction, operation, and maintenance of any facility, improvement, or equipment on the property.

At a minimum, the plan must (1) outline the Licensee's procedures for reporting and responding to releases of hazardous substances, including names and phone numbers of all emergency response personnel and their assigned responsibilities; (2) maintain in the project area, a cache of spill cleanup equipment suitable to contain any spill from the project; (3) include a schedule to periodically inform FS of the location of the spill cleanup equipment on National Forest System lands and

of the location, type, and quantity of oil and hazardous substances stored in the project area; and (4) include a requirement to inform FS immediately of the magnitude, nature, time, date, location, and action taken for any spill. The plan shall include a monitoring plan that details corrective measures that will be taken if spills occur. The plan shall include a requirement for a weekly written report during construction documenting the results of the monitoring.

Condition No. 12 - Pesticide-Use Restrictions on National Forest System Lands

Pesticides may not be used on National Forest System lands or in areas affecting National Forest System lands to control undesirable woody and herbaceous vegetation, aquatic plants, insects, rodents, non-native fish, etc., without the prior written approval of FS. Any request by Licensee to use pesticides shall be accompanied by the following:

- A determination as to whether pesticide applications are essential for use on National Forest System lands;
- Specific locations of use;
- Specific herbicides proposed for use;
- Application rates;
- Dose and exposure rates; and
- Safety risk and timeframes for application.

Exceptions to this schedule may be allowed only when unexpected outbreaks of pests require control measures that were not anticipated at the time the report was submitted. In such an instance, an emergency request and approval may be made.

On National Forest System lands, Licensee shall only use those materials registered by the U.S. Environmental Protection Agency and consistent with those applied by FS and approved through FS review for the specific purpose planned. Licensee must strictly follow label instructions in the preparation and application of pesticides and disposal of excess materials and containers. Licensee may also submit Pesticide Use Proposal(s) with accompanying risk assessment and other FS required documents to use pesticides on a regular basis. Submission of this plan will not relieve Licensee of the responsibility of annual notification and review.

Condition No. 13 – Consultation

Licensee shall annually consult with FS. The date of the consultation meeting will be mutually agreed to by Licensee and FS but in general should be held by April 15. At least 30 calendar days in advance of the meeting, Licensee shall notify other

interested stakeholders, confirming the meeting location, time and agenda. At the same time, Licensee shall also provide notice to other Federal, State and local agencies, who may choose to participate in the meeting. Licensee shall attempt to coordinate the meeting so interested agencies and other stakeholders may attend.

Licensee shall make the following information available to FS and other meeting participants at least 30 calendar days prior to the meeting:

- An operations plan for the year in which the meeting occurs, including planned outages.
- A description of planned maintenance projects for the year in which the meeting occurs.
- Any records of non-compliance with the License.
- The hydrology record for the previous year, if available, including any variances.
- Results of any monitoring conducted the previous year.
- Safety reports, including geologic and seismic reports.
- A document that tracks the status of the Section 4(e) Conditions that require action in the year in which the meeting occurs.

Consultation shall include, but not be limited to:

- A status report regarding implementation of license conditions.
- Results of any monitoring studies performed over the previous year in formats agreed to by FS and Licensee during development of implementation plans.
- Review of any planned maintenance.
- Discussion of any foreseeable changes to Project facilities or features.
- Discussion of any necessary revisions or modifications to implementation plans approved as part of this license.
- Discussion of needed protection measures for species newly listed as threatened, endangered, or sensitive, or changes to existing management plans that may no longer be warranted due to delisting of species or, to incorporate new knowledge about a species requiring protection. Discussion of needed protection measures for newly discovered cultural resource sites.
- Discussion of elements of current year maintenance plans, e.g. road and trail maintenance.
- Discussion of any planned pesticide use.

A record of the meeting shall be kept by Licensee and shall include any recommendations made by FS for the protection of National Forest System lands and resources. Licensee shall file the meeting record, if requested, with the Commission no later than 60 calendar days following the meeting.

Condition No. 14 - Consultation Group

The Licensee shall, within 3 months of license issuance, establish a Consultation Group as follows.

Purpose

The primary purpose of Consultation Group is to provide a forum for the Licensee to consult with resource agencies and other interested parties on the following:

- The Annual Meeting as described in Condition No. 13, Consultation. To the extent topics covered in Condition No. 13 affect project-affected areas outside FS jurisdiction, consultation with appropriate resource agencies on those same topics will occur at the Annual Meeting, other Consultation Group meetings, or as otherwise agreed with the Licensee and appropriate resource agencies. Licensee shall provide copies of the meeting materials to those who request it.
- Plans that are developed as required by the new license and plans that require specific consultation processes during implementation.
- Proposed temporary or permanent modifications to license conditions.

Licensee shall also provide notification of license compliance deviations to the current members of the Consultation Group.

Decision Making

The Consultation Group will report its recommendations to the FS and other Federal, State and Local Agencies participating. The FS shall be responsible for final addressing matters covered by the Section 4(e) Conditions. Other agencies shall be responsible for final decisions within their jurisdictions. Licensee shall also ensure that consultation, permitting, and any necessary approvals within the jurisdiction of other agencies are completed. Licensee shall implement license conditions as approved and directed by the Commission.

Participation

In addition to the Licensee, FS, other Federal, State and Local Agencies, Consultation Group meetings shall be open to any organization or individual that notifies the Licensee in writing of interest in participating in the Annual Meeting or Consultation Group meetings. The Consultation Group should establish mutually agreeable process guidelines for conducting effective and efficient

meetings no later than 1 year after license issuance. Each organization or individual shall be responsible for providing notification information to the Licensee and shall be responsible for keeping current a single point of contact for purposes of notification related to the Consultation Group. If a participant is interested in a particular meeting or topic, the participant is responsible for ensuring they are represented.

Condition No. 15 - Approval of Changes

Notwithstanding any license authorization to make changes to the Project, when such changes directly affect National Forest System lands, Licensee shall obtain written approval from FS prior to making any changes in any constructed Project features or facilities, or in the uses of Project lands and waters or any departure from the requirements of any approved exhibits filed with the Commission. Following receipt of such approval from FS, and a minimum of 60 calendar days prior to initiating any such changes, Licensee shall file a report with the Commission describing the changes, the reasons for the changes, and showing the approval of FS for such changes. Licensee shall file an exact copy of this report with FS at the same time it is filed with the Commission. This condition does not relieve Licensee from the amendment or other requirements of Article 2 or Article 3 of this license.

Condition No. 16 - Surveys, Land Corners

Licensee shall avoid disturbance to all public land survey monuments, private property corners, and forest boundary markers. In the event that any such land markers or monuments on National Forest System lands are destroyed by an act or omission of Licensee, in connection with the use and/or occupancy authorized by this license, depending on the type of monument destroyed, Licensee shall reestablish or reference same in accordance with (1) the procedures outlined in the "Manual of Instructions for the Survey of the Public Land of the United States," (2) the specifications of the County Surveyor, or (3) the specifications of FS. Further, Licensee shall ensure that any such official survey records affected are amended as provided by law.

Condition No. 17 – Signs

Licensee shall consult with FS prior to erecting signs related to safety issues on National Forest System lands covered by the license. Prior to Licensee erecting any other signs or advertising devices on National Forest System lands covered by the license, Licensee must obtain the approval of FS as to location, design, size, color,

and message. Licensee shall be responsible for maintaining all Licensee-erected signs to neat and presentable standards.

PART II: STANDARD RESOURCE CONDITIONS

Condition No. 18 – Invasive Species Management

Aquatic Invasive Species Management and Monitoring Plan

Within one year of license issuance, Licensee shall develop an Aquatic Invasive Species (AIS) Plan that meets applicable State and Federal laws and regulations. The plan shall be approved by FS after consultation with other Federal, State and Local Agencies with jurisdiction. The applicable State and Federal resource agencies shall be responsible for making the determination as to whether the AIS Plan complies with the State and/or Federal regulations of their respective agencies.

Public Education Program

The AIS Plan shall include a public education program, including appropriate signage and information pamphlets at designated public boat access. The following shall be addressed:

- Draining water from boat, motor, bilge, live well and bait containers before leaving a water access site.
- Removing visible plants, animals and mud from boat before leaving waterbody.
- Cleaning and drying boats and fishing equipment using accepted protocols for the prevention of all AIS before entering any waterbody area.
- Disposing of unwanted bait in trash, including earthworms.
- Avoiding the release of plants and animals into a waterbody, unless they originally came from that waterbody.

AIS information shall be included on Project websites that provide public information on Project facilities. The public information website will also include information on the amphibian chytrid fungus.

Best Management Practices

The AIS Plan shall specify that Licensee is responsible for developing BMPs for individual Project O&M activities, performed by Licensee and/or its contractors, which activities have the potential to introduce AIS into a Project reservoir, to prevent the spread of AIS, and submitting them to FS and other Federal, State and

Local Agencies with jurisdiction for review at the Annual Consultation Meeting required in the FERC license.

Development of BMPs for Project activities shall include but not be limited to the following:

- List of AIS with potential to be introduced.
- Control or preventive measures for AIS.
- Identification of critical control points in the Project activity sequence at which to prevent the introduction of AIS.
- Any necessary implementation monitoring for potential AIS to ensure BMPs are followed.
- Actions that will be taken if an introduction of AIS is found.

If invasive aquatic species are detected within any reservoir, Licensee will consult with the appropriate agencies and institute an appropriate plan of action.

Monitoring and Reporting

The AIS Plan shall include a specific monitoring program that addresses all reservoirs that have a boat launch, or identified as having boating access, and that follows State and/or Federal laws, regulations, and policies. Mapping and monitoring results shall be provided to FS and other Federal, State and Local Agencies with jurisdiction.

Plan Revisions

Licensee, in consultation with FS and other Federal, State and Local Agencies with jurisdiction shall review, update, and/or revise the AIS Plan, as determined necessary by FS in consultation with other Federal, State and Local Agencies with jurisdiction, when substantial changes in the existing conditions occur. Additional monitoring may be part of any plan revisions. Changes or revisions to the Plan would be expected if AIS conditions change as a result of unforeseen effects, either from new or existing Project-related activities, the potential for new AIS to occur, or from natural events or if other regulatory or legal requirements are established. Licensee shall include all relevant documentation of coordination/consultation with the updated Plan filed with the Commission.

Vegetation and Invasive Weed Management Plan

Within 1 year of license issuance, Licensee shall complete, in consultation with FS and other Federal, State and Local Agencies with jurisdiction, and approved by FS, a

Vegetation and Non- Native Invasive Plant Management (NNIP) Management Plan (Plan) for all National Forest System lands potentially affected by the Project. Targeted NNIP will be those species defined by the other Federal, State and Local Agencies with jurisdiction, or as FS species of concern.

The Plan will address special status species, terrestrial NNIP species, and revegetation within the Project boundary and adjacent to Project features directly affecting National Forest System lands including Project and project related roads, facilities, and distribution and transmission lines.

Minimum components of the Plan shall include, but may not be limited to:

- Special status species management: protection, monitoring, frequency of surveys, internal education, reporting, and adaptive management.
- Sensitive area protection, including guidelines for conducting activities that reduce the effects to sensitive resources.
- Non-native invasive plant (NNIP) species management: frequency of surveys, guidelines for prevention, treatment, internal education, monitoring, reporting, guidelines for conducting weed risk assessment for new project feature development, including an adaptive management element to implement methods for prevention of aquatic invasive weeds, as necessary.
- Methods that ensure early detection and treatment of NNIP.
- Guidelines for treatment of NNIP populations on Federal lands within the FERC Project boundary. In areas where NNIP populations that are determined to be project-related extend outside the FERC Project boundary, treatments would extend up to ¼ mile beyond the FERC Project boundary. If noxious weed populations extend more than ¼ mile from the FERC Project Boundary, and are determined to be Project-related, Licensee will consult with FS or BLM to determine if the populations should be treated and, if so, the appropriate treatment methods. The same treatments are recommended on Licensee lands.
- Guidelines for conducting Licensee's inspections of equipment and vehicle for NNIPs.
- List of target NNIPs agreed to and approved by BLM and FS.
- Revegetation implementation and monitoring.
- Treatment protocols for vegetation management, hazardous fuels reduction, and hazard tree management for protection of Project facilities and Project-affected resources within the Project affected area.
- Pesticide/herbicide use approval and restrictions.
- Annual reporting guidelines for the Annual Meeting.

Licensee, in consultation with FS, will review, update, and/or revise the Plan if substantial changes in vegetation management occur. Changes may be implemented if monitoring feedback indicates that resource objectives are not being met.

Any updates to the Plan would be prepared in coordination and consultation with FS. A minimum of 60 days would be allowed for FS to comment and make recommendations before Licensee files the updated plan with the Commission. Any changes to the Plan shall be approved by FS. Licensee would include all relevant documentation of coordination/consultation with the updated Plan filed with the Commission.

Condition No. 19 - Special Status Species

Biological Evaluations

Before taking actions to construct new project features on National Forest System lands that may affect FS special status species or their critical habitat on National Forest System land, Licensee shall prepare and submit a biological evaluation (BE) for FS approval. The BE shall evaluate the potential impact of the action on the species or its habitat. FS may require mitigation measures for the protection of the affected species on National Forest System land.

The BE shall:

- Include procedures to minimize or avoid adverse effects to special status species.
- Ensure project-related activities shall meet restrictions included in site management plans for special status species.
- Develop implementation and effectiveness monitoring of measures taken or employed to reduce effects to special status species.

Annual Review of Special Status Species Lists and Assessment of New Species on Federal Land

Licensee shall, beginning the first full calendar year after license issuance, in consultation with FS, annually review the current lists of special status species (species that are Federally Endangered or Threatened, Proposed Threatened or Endangered, FS Sensitive, or Southern Region-Regional Forester Sensitive Species, National Forest Watch Lists, State Threatened or Endangered, State Species of Special Concern, and CDFW Fully Protected) that might occur on National Forest System lands, as appropriate, in the Project area that may be directly affected by

Project operations. When a species is added to one or more of the lists, FS, in consultation with Licensee shall determine if the species or un-surveyed suitable habitat for the species is likely to occur on such National Forest System lands, as appropriate. For such newly added species, if FS determines that the species is likely to occur on such National Forest System lands, Licensee shall develop and implement a study plan in consultation with FS to reasonably assess the effects of the project on the species. Licensee shall prepare a report on the study including objectives, methods, results, recommended resource measures where appropriate, and a schedule of implementation, and shall provide a draft of the final report to FS for review and approval. Licensee shall file the report, including evidence of consultation, with the Commission and shall implement those resource management measures required by the Commission.

If new occurrences of FS special status plant or wildlife species as defined above are detected prior to or during ongoing construction, operation, or maintenance of the Project or during Project operations, Licensee shall immediately notify FS. If FS determines that the Project-related activities are adversely affecting FS sensitive or watch list species, Licensee shall, in consultation with FS, develop and implement appropriate protection measures.

If new occurrences of state or federally listed or proposed threatened or endangered species are detected prior to or during ongoing construction, operation, or maintenance of the Project or during Project operations, Licensee shall immediately notify FS and the relevant Service Agency for consultation or conference in accordance with the Endangered Species Act. If state listed or fully protected species are affected, [ADD APPROPRIATE AGENCY] shall be notified.

Condition No. 20 – Erosion and Sediment Control and Management

Within 1 year of license issuance, Licensee shall file with the Commission an Erosion and Sediment Control Management Plan developed in consultation with FS and other interested parties, and approved by FS that will provide direction for treating erosion and controlling sedimentation within the Project and Project-affected National Forest System lands during the term of the new license. Upon Commission approval, Licensee shall implement the Plan.

The Plan shall include at a minimum the components included in the referenced by this condition, unless otherwise agreed to by FS during Plan finalization. Minimum components include, but may not be limited to:

Erosion Control Guidelines for Existing Project-Affected Areas

- Methods for initial and periodic inventory and monitoring of the entire Project area and Project-affected National Forest System lands to identify erosion sites and assess site condition for each. Periodic monitoring and inventory will include recording effectiveness of erosion treatment measures, and identification of new erosion sites for the term of the new license.
- Criteria for ranking and treating erosion sites including a risk rating and hazard assessment for scheduling erosion treatment measures and monitoring at each site.
- Erosion control measures that incorporate current standards, follow FS regulations and guidance (e.g., LRMP, RMOs, BMPs), are customized to site-specific conditions, and approved by FS.
- Develop and implement a schedule for treatment (e.g. repair, mitigate, monitor) of erosion sites, including a list of sites requiring immediate mitigation and schedule for their implementation.
- Effectiveness monitoring of completed erosion control treatment measures after treatment in order to determine if further erosion control measures are needed. If erosion control measures are not effective, Licensee will implement additional erosion control measures approved by FS and continue monitoring until the site has stabilized.
- Protocols for emergency erosion and sediment control.
- Process for documenting and reporting inventory and monitoring results including periodic plan review and revision. Documentation shall include a FS compatible GIS database for maps keyed to a narrative description of detailed, site-specific, erosion treatment measures and sediment monitoring results.

Erosion Control Guidelines for New Construction or Non-Routine Maintenance

Licensee shall develop site-specific temporary erosion control measures for each project to be approved by FS. These temporary measures will prevent erosion, stream sedimentation, dust, and soil mass movement during the period of ground disturbance until replaced by permanent measures.

Condition No. 21– Fire Management and Response Plan

Within 1 year of license issuance, Licensee shall complete, in consultation with FS and other Federal, State and Local Agencies with jurisdiction and approved by FS, a Fire and Fuels Management Plan (FFMP). The plan shall set forth in detail Licensee's responsibility for the prevention (including fuels treatment), reporting,

emergency response, and investigation of fires related to Project operations. Upon Commission approval, Licensee shall implement the Plan.

Minimum components include, but may not be limited to:

- Fuels Treatment/Vegetation Management: Identification of fire hazard reduction measures and reoccurring maintenance measures to prevent the escape of project-induced fires.
- Fire Prevention and Patrol: Address fire danger and public safety associated with project induced recreation, including fire danger associated with dispersed camping, existing and proposed developed recreation sites, trails, and vehicle access. Identify water drafting sites and other fire suppression resources.
- Emergency Response Preparedness: Analyze fire prevention needs including equipment and personnel availability.
- Reporting: Licensee shall report any project related fires immediately to FS.
- Fire Control/Extinguishing: Provide FS a list of the locations of available fire suppression equipment and the location and availability of fire suppression personnel.

Condition No. 22 – Annual Employee Training

Licensee shall, beginning in the first full calendar year after license issuance, annually perform employee awareness training and shall also perform such training when a staff member is first assigned to the Project. The goal of the training shall be to familiarize Licensee's operations and maintenance (O&M) staff with special status species, noxious weeds and sensitive areas (e.g., special status plant populations and noxious weed populations) that are known to occur within or adjacent to the Commission Project Boundary on National Forest System lands, and the procedures for reporting to each agency, as appropriate, to comply with the license requirements. It is not the intent of this measure that Licensee's O&M staff perform surveys or become specialists in the identification of special status species or noxious weeds. Licensee shall direct its O&M staff to avoid disturbance to sensitive areas, and to advise all Licensee contractors to avoid sensitive areas. If Licensee determines that disturbance of a sensitive area is unavoidable, Licensee shall consult with FS to minimize adverse effects to sensitive resources. This measure applies to employee training that is not otherwise covered by a specific plan.

Condition No. 23 – Native American Graves Protection and Repatriation

If the licensee inadvertently discovers human remains, funerary objects, sacred objects, or objects of cultural patrimony on federal or tribal lands, the holder shall immediately cease work in the area of the discovery and shall make a reasonable effort to protect and secure the items. The holder shall immediately notify the forest archaeologist by telephone of the discovery and shall follow up with written confirmation of the discovery. The activity that resulted in the inadvertent discovery may not resume until 30 days after the Chattahoochee-Oconee National Forest-Forest Archaeologist certifies receipt of the written confirmation, if resumption of the activity is otherwise lawful, except that a recovery plan adopted as a binding agreement between the Forest Service and the affected Indian tribes may provide for earlier resumption of the activity.

PART III: SPECIFIC RESOURCE REQUIREMENTS

Condition No. 24 - Deferred Maintenance-Lake Oconee: Redlands Recreation Area, Swords Recreation Area, and Dyars Pasture Recreation Area

In order to redeem licensee responsibility to provide recreation within the project area, the Redlands, Swords, and Dyars Pasture Recreation Areas have a direct nexus to the project and their needs are listed below. The list is subject to revision, but not without first consulting with Georgia Power on the need for change and concurrence with the proposed changes. The Chattahoochee-Oconee Land and Resource Management Plan (Forest Plan) require facilities located on Forest Service lands to meet this goal:

- Goal 31 Provide a spectrum of high quality, nature-based recreation settings and opportunities that reflect the unique or exceptional resources of the Forest and the interests of the recreating public on an environmentally sustainable, financially sound, and operationally effective basis. Adapt management of recreation facilities and opportunities as needed to shift limited resources to those opportunities (Chattahoochee- Oconee Land and Resource Management Plan, 2004).

Redlands Recreation Area:

Items to be Completed by May 31, 2021 (Year 1)

- Replace the existing, aged, wooden vault toilet with a new concrete pre-fabricated CXT styled restroom.

- Stabilize bank using rip rap, along the public access side of Lake Oconee.

Items to be Completed by May 31, 2022 (Year 2)

- Replace concrete picnic tables with accessible composite styled picnic tables.
- Replace boat ramp light fixture.
- Replace older damaged trash receptacles with new bear-proof trash receptacles.

Items to be Completed by May 31, 2025 (Year 5)

- Replace existing wooden boat dock with a metal floating styled dock.
- Increase bank fishing access at Redlands Recreation Area, by adding a new fishing pier.
- Replace portal signs at the entrance of Redlands Recreation Area.

Items to be Completed by May 31, 2026 (Year 6)

- Repave and restripe Redlands Recreation Area parking lot.

Items to be Completed by May 31, 2030 (Year 10)

- Replace trash receptacles.
- Stabilize bank using rip rap, along the public access side of Lake Oconee.

Items to be Completed by May 31, 2035 (Year 15)

- Replace Info boards, bulletin boards and interpretive signs.
- Replace picnic tables.

Items to be Completed by May 31, 2040 (Year 20)

- Replace boat ramp light fixtures.

Items to be Completed by May 31, 2045 (Year 25)

- Replace Fishing Pier.
- Replace CXT restroom facility (every 25 years, after initial replacement).

Items to be Completed by May 31, 2046 (Year 26)

- Repave and restripe Redlands Recreation Area parking lot (after initial repaving, repave every 20 years).

Items to be Completed by May 31, 2050 (Year 30)

- Replace stationary boat docks with floating docks (regarding fluctuating water level).

Swords Recreation Area:

Items to be Completed by May 31, 2021 (Year 1)

- Replace the existing, aged, wooden vault toilet with a new concrete pre-fabricated CXT styled restroom.
- Stabilize bank using rip rap, along the public access side of Lake Oconee.

Items to be Completed by May 31, 2022 (Year 2)

- Replace concrete picnic tables with accessible composite styled picnic tables.
- Replace boat ramp light fixture.
- Replace older damaged trash receptacles with new bear-proof trash receptacles.

Items to be Completed by May 31, 2025 (Year 5)

- Replace existing wooden boat dock with a metal floating styled dock.
- Increase bank fishing access at Swords Recreation Area, by adding a new fishing pier.
- Replace portal signs at the entrance of Swords Recreation Area.

Items to be Completed by May 31, 2026 (Year 6)

- Repave and restripe Swords Recreation Area parking lot.

Items to be Completed by May 31, 2030 (Year 10)

- Replace trash receptacles.
- Stabilize bank using rip rap, along the public access side of Lake Oconee.

Items to be Completed by May 31, 2035 (Year 15)

- Replace Info boards, bulletin boards and interpretive signs.
- Replace picnic tables.

Items to be Completed by May 31, 2040 (Year 20)

- Replace boat ramp light fixtures.

Items to be Completed by May 31, 2045 (Year 25)

- Replace CXT restroom facility (every 25 years, after initial replacement).
- Replace Fishing Pier.

Items to be Completed by May 31, 2046 (Year 26)

- Repave and restripe Swords Recreation Area parking lot (after initial repaving, repave every 20 years).

Items to be Completed by May 31, 2050 (Year 30)

- Replace stationary boat docks with floating docks (regarding fluctuating water level)

Dyar Pasture Recreation Area:

Items to be Completed by May 31, 2021 (Year 1)

- Replace the existing, aged, wooden vault toilet with a new concrete pre-fabricated CXT styled restroom.
- Replace damaged decking on wildlife viewing platform.
- Stabilize bank using rip rap, along the public access side of Lake Oconee.

Items to be Completed by May 31, 2022 (Year 2)

- Replace gravel in parking area.
- Replace wooden picnic tables with accessible composite styled picnic tables.
- Replace older damaged trash receptacles with new bear-proof trash receptacles.

Items to be Completed by May 31, 2025 (Year 5)

- Resurface walking trail to dike and wildlife viewing platform.
- Replace Info boards, bulletin boards and interpretive signs.
- Pave accessible parking areas.

Items to be Completed by May 31, 2026 (Year 6)

- Increase bank fishing access at Dyar Pasture Recreation Area, by adding a new fishing pier.

Items to be Completed by May 31, 2027 (Year 7)

- Replace gravel in parking area.

Items to be Completed by May 31, 2030 (Year 10)

- Stabilize bank using rip rap, along the public access side of Lake Oconee.
- Replace trash receptacles.

Items to be Completed by May 31, 2035 (Year 15)

- Resurface walking trail to dike and wildlife viewing platform.

Items to be Completed by May 31, 2037 (Year 17)

- Replace picnic tables.

Items to be Completed by May 31, 2040 (Year 20)

- Replace Info boards, bulletin boards and interpretive signs.
- Replace decking on wildlife viewing platform.

Items to be Completed by May 31, 2045 (Year 25)

- Pave/stripe accessible parking areas.
- Replace CXT style concrete restroom facility (every 25 years, after initial replacement).
- Replace boat dock.

Items to be Completed by May 31, 2046 (Year 26)

- Replace Fishing Pier.