Southern Company Generation.
241 Ralph McGill Boulevard, NE
BIN 10193
Atlanta, GA 30308-3374
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December 20, 2018

FERC Project No. 2336-094
Lloyd Shoals Project
Proposed Study Plan, Georgia Power Response to Stakeholder Scoping Comments and FERC Additional Information Request (AIR) dated November 05, 2018

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, D.C. 20426

Dear Ms. Bose:

On behalf of Georgia Power Company, Southern Company is filing this letter to provide the Proposed Study Plan for relicensing the Lloyd Shoals Project, to respond to stakeholder scoping comments, and to also respond to FERC's Additional Information Request (AIR), dated November 05, 2018.

There are two parts to this filing with five components total:

Part 1 of 2
1) Cover Letter
2) Appendix A – Lloyd Shoals Proposed Study Plan
3) Appendix B – Response to Scoping Comments

Part 2 of 2
4) Cover Letter
5) Appendix C - Response to AIR

If you require further information, please contact me at 404.506.7219.

Sincerely,

Courtenay R. O'Mara

Courtenay R. O'Mara, P.E.
Hydro Licensing and Compliance Supervisor

cc: FERC/OEP – Neetu Deo, Allan Creamer
Geosyntec – Cristin Krachon
Kleinschmidt – Steven Layman, Ph.D.
Troutman Sanders – Hallie Meushaw

APPENDIX A

Lloyd Shoals Project
Proposed Study Plan
P-2336-094

Proposed Study Plan

Lloyd Shoals Hydroelectric Project
FERC Project Number 2336

Prepared with:

Southern Company Generation Hydro Services

Geosyntec consultants

and

Kleinschmidt

December 2018

Geosyntec
consultants

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ACRONYMS AND ABBREVIATIONS

APE	Area of potential effect
CFR	Code of Federal Regulations
cfs	cubic feet per second
Commission	Federal Energy Regulatory Commission
CPUE	catch per unit effort
DO	dissolved oxygen
EPA	U.S. Environmental Protection Agency
EPRI	Electric Power Research Institute
FERC	Federal Energy Regulatory Commission
ft	feet
FWS	U.S. Fish and Wildlife Service
GDNR	Georgia Department of Natural Resource
GEPD	Georgia Environmental Protection Division
Georgia Power	Georgia Power Company
GPS	Global Positioning System
HPD	Historic Preservation Division
HPMP	Historic Properties Management Plan
HUC	Hydrologic Unit Code
Hwy	Highway
IFIM	Instream Flow Incremental Methodology
ILP	Integrated Licensing Process
mm	millimeters
National Register	National Register of Historic Places
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NWI	National Wetlands Inventory
PAD	Pre-Application Document
PD	plant datum
PLP	Preliminary Licensing Proposal
PSP	Proposed Study Plan
RTE	rare, threatened, and endangered
SCORP	State Comprehensive Outdoor Recreation Plan
SD1	Scoping Document 1
USACE	U.S. Army Corps of Engineers
USGS	United States Geological Survey
WRD	Wildlife Resources Division

1.0 INTRODUCTION

Georgia Power Company (Georgia Power) is filing with the Federal Energy Regulatory Commission (FERC or Commission) this Proposed Study Plan (PSP) in support of the relicensing of the Lloyd Shoals Hydroelectric Project (FERC No. 2336) (Lloyd Shoals Project, the Project). The 18-megawatt Lloyd Shoals Project consists of a dam, powerhouse, and 4,750-acre reservoir (Lake Jackson, or Jackson Lake) on the Ocmulgee River in Butts, Henry, Jasper, and Newton Counties, Georgia (Figures 1-1 and 1-2). Georgia Power is not proposing to make any major modifications to the Project under the new license. The Project does not occupy federal lands. The current license expires December 31, 2023.

Georgia Power filed a Pre-Application Document (PAD) with FERC on July 3, 2018 using FERC's Integrated Licensing Process (ILP) (18 Code of Federal Regulations [CFR] Part 5). The PAD describes the existing facilities and current project operation; characterizes the affected environment and potential resource impacts of continued operation; and establishes the schedule for all pre-application activities, including stakeholder participation.

FERC issued Scoping Document 1 (SD1) on August 20, 2018 and held National Environmental Policy Act (NEPA) scoping meetings and a site visit on October 9-10, 2018. Relicensing stakeholders filed comments on the PAD and SD1, and study requests, by November 5, 2018. On November 5, 2018, FERC issued a letter with staff comments on the PAD, including an additional information request.

Relicensing stakeholders have until March 20, 2019 to review this PSP and file comments. Georgia Power will conduct a Study Plan Meeting on January 16, 2019 (see below). After the comment period, Georgia Power will file a Revised Study Plan for FERC approval by April 19, 2019.

1.1 Content of Proposed Study Plan

Sections 2 through 10 present eight study plans by resource area. Each study plan describes the goals and objectives, study background, study area, methodology to be used, reporting, and study schedule, including a progress report and a study report. The study plans include:

- **Section 2** – Geology and Soils
- **Section 3** – Water Resources
- **Section 4** – Fish and Aquatic Resources
- **Section 5** – American Eel Abundance and Upstream Movements
- **Section 6** – Terrestrial, Wetland, and Riparian Resources

- **Section 7** – Rare, Threatened, and Endangered Species
- **Section 8** – Recreation and Land Use
- **Section 9** – Cultural Resources

1.2 Study Plan Meeting

Georgia Power will hold a Study Plan Meeting on January 16, 2019. The date of the meeting has been advanced from the date provided in the PAD (January 22) to avoid any need for any agency and other stakeholder travel on Martin Luther King, Jr. Day (January 21). The purposes of the Study Plan Meeting will be to discuss Georgia Power's PSP and stakeholders' comments and to work together to resolve any outstanding issues with respect to the PSP.

The time and location of the Study Plan Meeting are as follows:

- Date and Time: Wednesday, January 16, 2019, 10:00 am to 5:00 pm
- Location: Pepper Sprout Barn
  562 Old Bethel Road
  Jackson, Georgia 30233
  (678) 752-1550

1.3 Study Implementation Master Schedule

Table 1-1 provides the master schedule for all proposed studies, including deadlines for filing progress reports and study reports and dates of Study Results Meetings. This schedule is consistent with the Process Plan and Schedule in the PAD. The first season of studies will commence by May 2019, with a Study Progress Report to be filed by January 31, 2020. The Study Report for the first season of studies will be filed by May 19, 2020 and will be followed by a Study Results Meeting on June 3, 2020.

For any studies extending into a second season (May 2020-April 2021), a Study Progress Report will be filed by January 29, 2021, an Updated Study Report will be filed by May 19, 2021, and a Study Results Meeting will be held on June 3, 2021.

TABLE 1-1
Study Implementation Master Schedule for the Lloyd Shoals Project

Activity	Start Date	Completion Date or Deadline
Conduct Field Studies		
Geology and Soils	July 2019	September 2019
Water Resources	May 2019	April 2020
Fish and Aquatic Resources	May 2019	April 2020

TABLE 1-1
Study Implementation Master Schedule for the Lloyd Shoals Project

Activity	Start Date	Completion Date or Deadline
American Eel Abundance and Upstream Movements	May 2019	April 2020
Terrestrial, Wetland, and Riparian Resources	May 2019	April 2020
Rare, Threatened, and Endangered Species	May 2019	April 2020
Recreation and Land Use	May 2019	September 2019
Cultural Resources	May 2019	April 2020
Study Progress Report (First Season of Studies)	NA	January 31, 2020
Study Report (First Season of Studies)	NA	May 19, 2020
Study Results Meeting	NA	June 3, 2020
File Study Results Meeting Summary	NA	June 18, 2020
Stakeholders file any Study Results Meeting Summary Disagreements and/or Modified or New Study Requests	NA	July 20, 2020
File Response to Study Results Meeting Summary Disagreements and/or Modified or New Study Requests	NA	August 19, 2020
FERC Resolves Disagreements (and Modifies Study Plan if Necessary)	NA	September 18, 2020
Study Progress Report (Second Season of Studies) [a]	NA	January 29, 2021
Updated Study Report (Second Season of Studies) [a]	NA	May 19, 2021
Updated Study Results Meeting [a]	NA	June 3, 2021
File Updated Study Results Meeting Summary [a]	NA	June 18, 2021

NA = not applicable.

[a] If necessary.

1.4 Relationship of the Resource Studies to the License Application

Each resource study will culminate in the preparation of a Study Report (Table 1-1), which will develop information to be used in characterizing the existing environment and evaluating the potential impacts of continued project operations in Georgia Power's Preliminary Licensing Proposal (PLP) and subsequent license application. The PLP will be filed by July 1, 2021, and will be made available for public comment (18 CFR § 5.16). The PLP will provide a draft environmental analysis by resource area of the impacts of the proposed action and will propose measures for the purpose of protecting, mitigating impacts to, or enhancing resources affected by the Project.

Based on comments on the PLP filed by stakeholders, Georgia Power will revise and incorporate the PLP into the license application as Exhibit E (18 CFR § 5.18). The license application will be filed by December 31, 2021. Exhibit E will evaluate reasonable and feasible alternatives to the proposed action, address cumulative impacts, and propose measures for protecting, mitigating impacts to, or enhancing environmental resources affected by the project proposal.

Under the ILP, FERC's NEPA document, which is also issued for public comment, will include FERC's determination regarding reasonable and feasible alternatives and cumulative impacts as part of its NEPA analysis.

Lloyd Shoals Project

Lloyd Shoals Dam

Juliette Dam

Lake Jackson

Lake Juliette

Oxford
Covington
Porterdale
Rutledge
Mansfield
Newborn
Jenkinsburg
Jackson
Flovilla
Monticello
Forsyth

Rockdale Co.
Newton Co.
Henry Co.
Butts Co.
Jasper Co.
Lamar Co.
Monroe Co.
Jones Co.

Yellow River
South River
Alcovy River
Tussahaw Creek
Ocmulgee River
Towaliga River

Charlie Elliott Wildlife Center/ Clybel WMA
Oconee National Forest
Indian Springs State Park
High Falls State Park
Piedmont National Wildlife Refuge
Rum Creek Wildlife Management Area
Jarrell Plantation Historic Site

Vicinity Map
Project Location
Georgia

0 1 2 4 Miles

Interstate Highway
U.S. Highway
State Highway
County Road
Minor Road
Railroad
Dam
Project Boundary
River
Lake
Swamp/Marsh
Towns/Cities
State Managed Lands
National Parks or Forest

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Georgia Power
Geosyntec consultants

Figure 1-1
Project Vicinity

Lloyd Shoals Project
(FERC No. 2336)

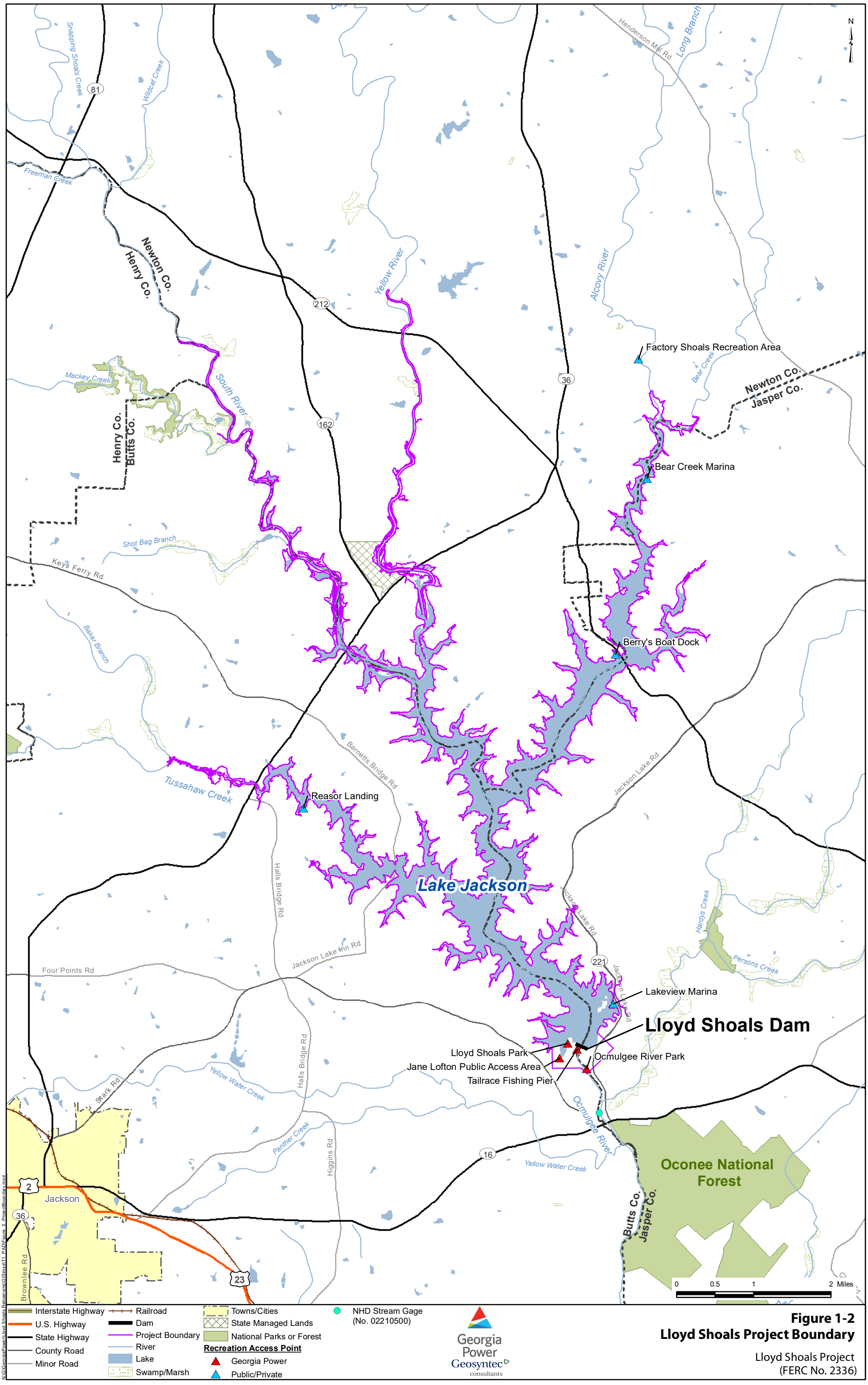

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Figure 1-2
Lloyd Shoals Project Boundary

Lloyd Shoals Project
(FERC No. 2336)

2.0 GEOLOGY AND SOILS

2.1 Introduction

Georgia Power proposes to conduct a study characterizing existing erosion and sedimentation conditions within the Lloyd Shoals project boundary and evaluating the potential impacts of continued project operation and project-related recreation on erosion and sedimentation in the project area. This will be accomplished through a combination of a shoreline survey within the project boundary and review of existing information and data to analyze erosion and sedimentation as well as the effects of shoreline structural stabilization practices on littoral-zone aquatic habitats.

2.2 Goals and Objectives

The goal of this study is to develop information for: (1) characterizing existing shoreline conditions with respect to erosion and sedimentation in Lake Jackson and the Lloyd Shoals tailrace and (2) evaluating the Geology and Soils resource issues identified during FERC's public scoping process pursuant to NEPA that have a nexus with project operations.

The specific objective of the study is to characterize the distribution and sources of erosion and sedimentation within the FERC project boundary based on a shoreline field reconnaissance survey and review and analysis of existing information.

2.3 Study Background

This study will develop information needed to evaluate potential impacts of continued project operation in the PLP and license application in consideration of: (1) the geology and soils resource issues identified during NEPA scoping; (2) any study modifications requested by resource agencies and other stakeholders; (3) the known resource management goals of the agencies with jurisdiction over resources related to geology and soils; (4) existing information available for the Ocmulgee River basin as summarized in the PAD; and (5) the requirement that there be a nexus between project operations and effects on the resources being evaluated.

2.3.1 Issues Identified

The Commission identified in SD1 the following resource issue pertaining to geology and soil resources:

- Effects of continued project operation and project-related recreation on reservoir and tailrace shoreline erosion and sedimentation.

2.3.2 Study Requests

Georgia Power proposed in the PAD (Section 5.2.1, Preliminary Studies List) to conduct a study to characterize the distribution and sources of erosion and sedimentation within the

project boundary based on a shoreline field reconnaissance survey and review and analysis of existing information and aerial photography. A shoreline survey would be conducted within the project boundary, including a shoreline aquatic habitat survey, and a literature review and analysis would be conducted on the effects of shoreline stabilization structures on littoral-zone aquatic habitat.

Georgia Power proposes to include the shoreline aquatic habitat survey as part of this Geology and Soils Study because the survey will be conducted concurrently with the reconnaissance survey for erosion and sedimentation (using the same field data form) and will be integral to the analysis of shoreline conditions and the effects of continued project operations and project-related recreation. The findings of the aquatic habitat survey portion of the field reconnaissance survey also will be summarized in the Fish and Aquatic Resources Study (Section 4.0).

No study requests pertaining to geology and soils were filed by stakeholders following the study criteria under 18 CFR § 5.9(b). In its PAD and SD1 comments letter dated November 5, 2018, the Georgia Department of Natural Resources' (GDNR's) Wildlife Resources Division (WRD) requested that additional objectives be incorporated into the shoreline aquatic habitat survey study element. These include mapping developed and undisturbed shoreline areas in the project reservoir; surveying and mapping submergent vegetation in the reservoir; incorporating literature review on how rates and magnitude of shoreline development affect sport fish species such as Largemouth Bass, Black Crappie, and sunfish; and incorporating drawdown schedules, including magnitude and duration, to assist planning of aquatic plantings and fish stocking.

Georgia Power proposes to survey shoreline aquatic habitat using a stratified random selection of sites to develop information on the proportions of natural versus modified shoreline with respect to vegetative buffer zone condition, bank stability and vegetative protection, proportions of shoreline with structural stabilization practices, potential causes of shoreline erosion/sedimentation and whether or not they are project-related, and sources of littoral-zone fish cover and habitat. If submergent/submersed vegetation is observed at shoreline sites, its extent of linear coverage of the shoreline site will be estimated. The distribution and abundance of submersed vegetation will be characterized in the Terrestrial, Wetland, and Riparian Resources Study (Section 6.0) based on a separate field reconnaissance survey for those resources. As requested by WRD, the shoreline analysis will review literature on the relationship between structural stabilization practices (i.e., developed shoreline) and littoral-zone fish habitat. Regarding reservoir drawdowns, Georgia Power schedules drawdowns for homeowner and shoreline maintenance every few years and notifies GDNR in advance.

In its PAD and preliminary study proposal comments of November 5, 2018, FERC staff requested a map delineating ownership of lands along the reservoir and tailrace shorelines indicating whether land is privately, or project owned and any available historical data, including bathymetry, topography, and/or aerial photography that shows how erosion and sedimentation within the project boundary has changed over time. In comments filed

September 25, 2018, stakeholder Ms. Julia Haar expressed concern about siltation and its consequences for the water quality of Lake Jackson. As part of the Recreation and Land Use Study, Georgia Power will provide a map of land ownership within the project boundary indicating whether land is privately owned or owned by Georgia Power. As part of the Geology and Soils Study, Georgia Power will also conduct a spatial and temporal analysis of shoreline change over time in representative shoreline areas and coves using available historical aerial photography.

FERC staff requested a summary of all dredging permits issued at the Project and available information pertaining to each dredging event. FERC staff also requested that when erosion areas are being characterized as part of the shoreline reconnaissance survey, that erosion be denoted as project related, non-project related, or a combination of both. These elements have also been incorporated into the Geology and Soils Study Plan.

2.3.3 Resource Management Goals

GDNR and the U.S. Fish and Wildlife Service (FWS) are the primary state and federal resource agencies having jurisdiction along the Ocmulgee River pertaining to the protection of land and water resources. Relevant resource management goals of these agencies generally include the maintenance and protection of native shoreline vegetation, water quality, and littoral-zone habitats for fish and aquatic species.

2.3.4 Existing Information

The Lloyd Shoals Project is 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. The Lake Jackson shoreline is characterized by gently sloping topography in most areas. Since the Project was constructed in 1911 and due to its proximity to Atlanta, much of the shoreline in the southern and central portions of the reservoir has been developed for residential and commercial use. Many developed portions of the shoreline have structural stabilization practices in place, including riprap, seawalls, or seawalls with riprap at the base. Conversely, substantial stretches of undeveloped, forested shoreline occur along the Tussahaw Creek arm of the reservoir, west of Georgia Highway (Hwy) 36, and along the South River and Yellow River arms north of Hwy 36. Natural vegetative shoreline cover is prevalent along many of these shorelines.

The shorelines around Lake Jackson and in the Lloyd Shoals tailrace area exhibit low potential for erosion or other forms of instability due to a high degree of vegetative cover and/or the use of shoreline structural stabilization practices. Sites with the greatest potential for shoreline erosion include public recreation access sites where shoreline activity may contribute to localized bank instability.

2.3.5 Nexus between Project Operations and Effects

Georgia Power operates the Lloyd Shoals Project as a modified run-of-river project. Lloyd Shoals generates during peak power demand hours to meet the electrical system demand with renewable, waste-free, low-emission power. Georgia Power operates the Lloyd Shoals Project to maintain reservoir elevations between 530 and 527 feet (ft) plant datum (PD)[1] year-round. Daily fluctuations of Lake Jackson are less than 1.5 ft about 98-percent of the time.

Lloyd Shoals discharges directly into the Ocmulgee River. When the Project is not operating to generate peaking energy, the Project releases a continuous minimum flow of 400 cubic feet per second (cfs), or inflow, whichever is less, for the protection and enhancement of fish and wildlife resources downstream of the Project.

2.4 Study Area

The proposed study area includes the FERC project boundary around Lake Jackson and the tailrace area downstream of Lloyd Shoals Dam. Literature review and analysis of existing information and data will extend to adjacent lands and watersheds upstream of the project boundary.

2.5 Methodology

Georgia Power's proposed approach for completing the Geology and Soils Study consists of the following study elements.

2.5.1 Shoreline Reconnaissance Survey

A single shoreline reconnaissance survey of Lake Jackson and the Lloyd Shoals tailrace area will be conducted in summer 2019 to inventory and characterize existing sources of erosion and sedimentation within the project boundary and to characterize physical aquatic habitat and available sources of littoral-zone cover for fish. Representative shoreline sites within the project boundary will be selected and visually evaluated in the field as described below.

Site Selection

A geographic information system shapefile will be prepared defining 500-ft shoreline segments for the entire project reservoir and tailrace area within the project boundary. The study area will be partitioned into five sections (Figure 2-1) for stratified random selection of 500-ft shoreline segments for the reconnaissance survey as follows:

[1] Plant datum = mean sea level elevation (NAVD88) + 0.45 feet.

- South River (SR) – the northwest portion of Lake Jackson that includes the South River embayment upstream of its confluence with the Alcovy River embayment and the junction of Butts, Newton, and Jasper Counties.

- Alcovy River (AR) – the northeast portion of Lake Jackson that includes the Alcovy River embayment upstream of its confluence with the South River embayment and the junction of Butts, Newton, and Jasper Counties.

- Tussahaw Creek (TC) – the Tussahaw Creek embayment of Lake Jackson on the western side of the reservoir.

- Main reservoir (MR) – the main-stem pool of the reservoir from the confluence of the South River and Alcovy River embayments downstream to Lloyd Shoals Dam.

- Tailrace Area (TR) – the Lloyd Shoals tailrace area extending downstream to and including Ocmulgee River Park.

A total of 106 shoreline segments, or sites, will be selected for the reconnaissance survey. Twenty-five sites will be selected in each of the four reservoir sections (SR, AR, TC, MR) for a total of 100 on Lake Jackson. Six sites will be selected in the tailrace area section (TR). The stratified random selection will occur as follows:

- One site will be selected at each of the four project recreation facilities (Figure 2-1). These facilities include two in reservoir section MR (Lloyd Shoals Park and Jane Lofton Public Access Area) and two in the tailrace section TR (Tailrace Fishing Pier and Ocmulgee River Park).

- The remaining survey sites will be randomly selected to total 25 sites in each reservoir section and 6 sites in the tailrace area (TR), three on each side of the river.

The geographic coordinates of the midpoint of each selected shoreline site will be determined and tabulated and mapped in the study report.

Field Survey

The shoreline survey will consist of visual observation and assessment of each shoreline segment in summer 2019 during dry weather and normal project operating conditions. The assessment sites will be surveyed from a boat to the extent practical.

Survey teams of three investigators each will complete the visual shoreline assessment using the field data form provided in Figure 2-2. At each site, the survey team will inventory and rate the following shoreline attributes:

- Vegetative buffer zone condition;

- Adjacent land uses;
- Bank stability and vegetative protection;
- Shoreline structural stabilization practices (e.g., seawalls, riprap);
- Potential causes of erosion (project related, and/or non-project related); and
- Sources of littoral-zone fish cover.

These shoreline attributes will be jointly rated by the survey team. The inventory of shoreline structural stabilization structures in place will include visual estimates of the proportional length of seawalls, riprap, a combination of seawalls with riprap at the base, and any other forms of non-vegetated armoring. Proportional length of the various sources of fish cover/habitat available will also be visually estimated for each site. Documentation will include digital photographs of representative shorelines, including any active erosion problem areas as well as least-disturbed shoreline conditions.

The visual assessment protocol (Figure 2-2) has been customized for use on this project. Similar visual habitat and waterbody assessment protocols are widely used by water resource agencies, including the U.S. Environmental Protection Agency (EPA) (Barbour et al., 1999; EPA, 2002), GDNR (2007), and Natural Resources Conservation Service (1998), to evaluate the condition of freshwater ecosystems. Thus, the proposed survey methodology is generally consistent with accepted practice in the scientific community.

2.5.2 Shoreline Temporal Change Analysis

Reasonably available aerial photography of the study area will be inspected to qualitatively characterize spatial and temporal changes in shoreline conditions occurring since 1993, when the current license was issued. The aerial photography will be examined to identify any trends in erosion and sedimentation patterns potentially related various shoreline uses or sediment loading from upstream watersheds. Imagery sets will be obtained, as available, from sources such as the U.S. Department of Agriculture National Aerial Photography Program and the University of Georgia Map and Government Information Library. Up to six representative areas of the project shoreline will be selected for aerial photography comparisons to represent developed and undeveloped shorelines, major tributary embayment shorelines, and the main body of the reservoir.

2.5.3 Analysis of Existing Information and Data

The effects of continued project operation on shoreline erosion and sedimentation within the project boundary will be evaluated using: (1) findings of the shoreline reconnaissance survey; (2) aerial photography review of spatial and temporal change in erosion and sedimentation occurring in representative shoreline areas and coves; and (3) operational data characterizing

Lloyd Shoals daily maximum and minimum reservoir fluctuations during normal, dry, and wet inflow periods.

The results of the shoreline survey will be presented in tables and graphs and will include photographs of representative survey sites. The shoreline survey will document current active erosion problem areas and their potential causes. Aerial photography review may reveal trends in erosion and sedimentation patterns related to various shoreline uses or upstream loading sources and help to determine whether the condition is project related, non-project related, or a combination of both. Project related erosion is defined as erosion caused primarily by daily reservoir fluctuations or downstream flow fluctuations from project operation, or by shoreline activities at project recreation sites. Non-project related sources of erosion may include flood flows, wind-driven wave action, stormwater run-off from steep terrain, loss of vegetation due to natural causes, and other factors not attributable to project operation. The survey results will also be used to characterize current shoreline and littoral-zone habitat conditions for fish and other aquatic organisms.

In addition, a literature review will be conducted on shoreline structural modifications associated with shoreline development, including seawalls/bulkheads, rock riprap, and combinations of seawalls with riprap at the base, and their effects on littoral-zone aquatic habitats as reflected in fish species composition, diversity, and abundance. The literature review will include studies conducted at southeastern hydropower reservoirs in North and South Carolina (Barwick, 2004) and Alabama (Purcell et al., 2013), and other relevant scientific literature dealing with shoreline structural stabilization practices.

A map will be prepared of the project boundary delineating ownership of lands along the shorelines as to whether land is privately or project-owned. In addition, a summary will be provided of all dredging permits issued at the Project and available information pertaining to each dredging event, including: the purpose, volume of material removed, and equipment used; the dates and duration of each event; the location and site characteristics of each event and location and characteristics of disposal sites, including a map as appropriate; and methods used to contain turbidity and prevent the transport of disturbed material downstream.

2.6 Reporting

A Study Progress Report will be prepared and provided to participants prior to the completion of the study. The progress report will describe overall progress in completing the proposed shoreline reconnaissance survey, summarize preliminary findings as available, and explain any variance from the study plan and schedule.

A Geology and Soils Study Report will be prepared and provided to participants for review and comment at the conclusion of the study. The study report will compile the data gathered from the shoreline survey and present the analyses developed through the use of existing information and data.

2.7 Schedule

In accordance with the Lloyd Shoals Process Plan and Schedule and the master schedule provided in Section 1.3, the Geology and Soils Study will be completed according to the milestones listed in Table 2-1 below.

TABLE 2-1
Schedule for Conducting the Geology and Soils Study

Activity	Deadline
Begin Field Studies and Literature-Based Review	May 21, 2019
File Progress Report	January 31, 2020
Complete Field Studies and Literature-Based Review	February 28, 2020
File Final Study Report	May 19, 2020

2.8 References

Barbour, M. T., J. Gerritsen, B. D. Snyder, and J. B. Stribling. 1999. Rapid bioassessment protocols for use in streams and wadeable rivers: periphyton, benthic macroinvertebrates and fish, second edition. EPA 841-B-99-002. U.S. Environmental Protection Agency, Office of Water, Washington, D.C.

Barwick, D. H. 2004. Species richness and centrarchid abundance in littoral habitats of three southern U.S. reservoirs. North American Journal of Fisheries Management 24:76-81.

Georgia Department of Natural Resources. 2007. Standard operating procedures, macroinvertebrate biological assessment of wadeable streams in Georgia. Environmental Protection Division, Watershed Protection Branch. Version 1.0.

Natural Resources Conservation Service. 1998. Stream visual assessment protocol. U.S. Department of Agriculture. National Water and Climate Center Technical Note 99-1. December 1998.

Purcell, T.R., D.R. DeVries, and R.A. Wright. 2013. The relationship between shoreline development and resident fish communities in a southeastern US reservoir. Lake and Reservoir Management 29:4, 270-278.

U.S. Environmental Protection Agency. 2002. Environmental monitoring and assessment program (EMAP) research strategy. EPA 620/R-02/002. Office of Research and Development, National Health and Environmental Effects Research Laboratory, Research Triangle Park, North Carolina.

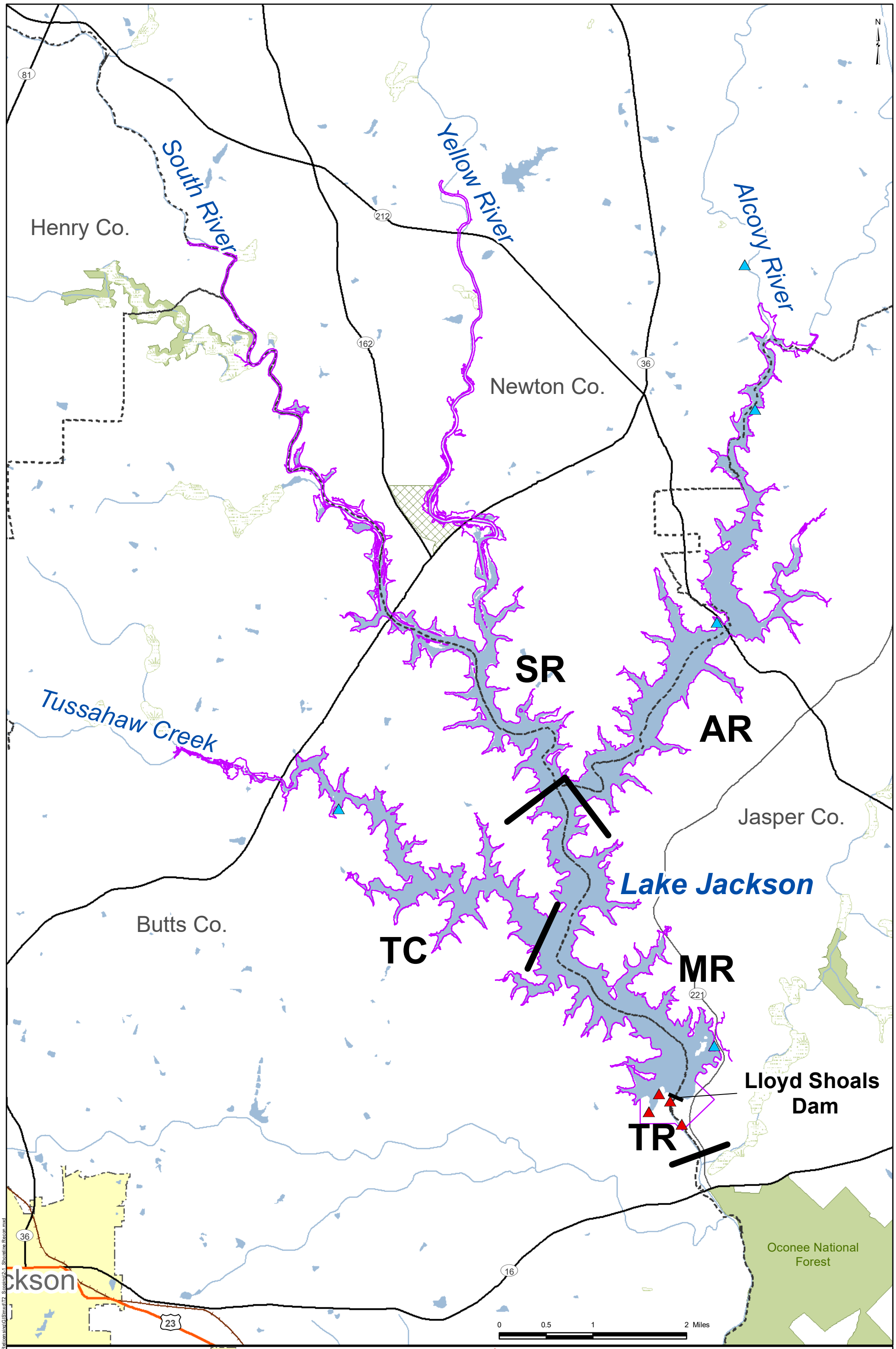


Figure 2-1
Shoreline Reconnaissance Survey Areas

Lloyd Shoals Project
(FERC No. 2336)

Figure 2-2. Shoreline Reconnaissance Survey Form – Lloyd Shoals Project (FERC No. 2336)
Georgia Power Company

Site ID No.:	**Date:**	**Time:**
Waterbody: ____Lake Jackson ____Tailrace	**County:** ____Butts ____Henry ____Jasper ____Newton	
Site Description:		**GPS?:** ___Yes ___No
Adjacent Land Ownership: ____GPC ____Residential ____Commercial ____Other		
Weather:	**Reservoir Pool Level:** ___Full ___Medium ___Low	
Investigators:		**Photos Taken?:** ___Yes ___No

Length of Assessment Site: ____500 feet ____Other:____feet	**Active Erosion Problem Present?**: ____Yes ____No

Shoreline Vegetative Buffer Zone Condition:	____Natural: heavily vegetated, less than 20 percent of natural vegetation removed
	____Landscaped-Natural: disturbed and cleared up to 50 percent; some trees & understory remaining
	____Landscaped: cleared of more than 50 percent natural vegetation or underbrush completely removed

Land Uses Adjacent to Shoreline (check all that apply):

____Residential	____Forested	____Golf Course	____Open	____Transportation
____Recreation/access	____Agricultural	____Commercial	____Logging	____Other: _____

Bank Stability:	____Stable; minimal erosion; <5% affected by erosion; low potential for future problems
	____Moderately stable; 5-30% affected by erosion or slumping; slight erosion potential during floods
	____Moderately unstable; 30-70% affected by erosion or slumping; high erosion potential during floods
	____Unstable; >70% affected by erosion or slumping; mass erosion and bank failure evident
Bank Vegetative Protection:	____>90% of bank surfaces covered by healthy, living vegetation
	____70-90% of bank covered by variety of vegetation; some open areas with disruption evident
	____50-70% of bank covered by vegetation; scattered shrubs, grasses, and forbs; bare spots visible
	____<50% of bank with vegetative cover; any shrubs or trees are widely scattered; many bare spots

Shoreline Structural Stabilization Practices Present? ____Yes ____No (**check all that apply):**

____Seawall/bulkhead only (_____% of site)	____Seawall/bulkhead and riprap combined (_____% of site)
____Riprap or other large stone only (_____% of site)	____Other armoring: _____ (_____% of site)

Potential Sources of Active Shoreline Erosion (check all that apply):

____Land-disturbing activity	____Residential landscape	____Reservoir fluctuations	____Wave action from watercraft/wind
____Impervious surfaces	____Roads and bridges	____Lack of buffer vegetation	____Tributary inflow
____Stormwater runoff	____Recreation/access	____Livestock activity	____Other: _____

Sources of Shoreline Fish Cover/Habitat to 50 feet from Shoreline (check all that apply):

____Docks/piers/boatslips (_____% of shoreline length)	____Overhanging vegetation (_____% of shoreline length)
____Riprap (_____% of shoreline length)	____Large woody debris (_____% of shoreline length)
____Bedrock and boulders (_____% of shoreline length)	____Standing timber (_____% of shoreline length)
____Emergent vegetation (_____% of shoreline length)	____Other:_____ (_____% of shoreline length)
____Submersed vegetation (_____% of shoreline length)	____Other:_____ (_____% of shoreline length)

Other Observations and Aquatic Habitat Notes:

3.0 WATER RESOURCES

3.1 Introduction

Georgia Power proposes to conduct a study characterizing existing water resources in Lake Jackson and the Ocmulgee River below the Lloyd Shoals Project, including water use, availability, and water quality, and evaluating potential impacts to water resources associated with continued project operation. A principal element of the study will be an evaluation of the effects of continued project operation on water quality, particularly dissolved oxygen (DO) levels and water temperature in the Ocmulgee River in the tailrace area downstream of the dam. This study will be accomplished through a combination of new water quality monitoring in the project tailrace and compilation and analysis of existing water resources information and data.

3.2 Goals and Objectives

The goal of this study is to develop information for characterizing existing water resources in the project area and evaluating the water resource issues identified during FERC's public scoping process pursuant to NEPA that have a nexus with project operations.

The specific objectives of the study are to:

- Characterize water use, availability, and water quality in the Lloyd Shoals Project study area.

- Characterize the effects of continued project operation on water quality in Lake Jackson and the tailrace area within the project boundary.

- Review the substantial amount of water resources information and data available for the Ocmulgee River, along with the findings of Georgia Power's water quality monitoring in project waters, to evaluate the effects of continued project operation on water quality, including water temperature and DO concentrations, in Lake Jackson and the tailrace area.

3.3 Study Background

This study will develop information needed to evaluate potential impacts of continued project operation on aquatic resources in the PLP and license application in consideration of: (1) the water resource issues identified during NEPA scoping; (2) any studies and modifications to studies requested by resource agencies and stakeholders; (3) the known resource management goals of the agencies with jurisdiction over the water resources; (4) the substantial amount of existing information available for the Ocmulgee River and Lake Jackson as summarized in the PAD; and (5) the requirement that there be a nexus between project operations and effects on the resources being evaluated.

3.3.1 Issues Identified

The Commission identified in SD1 the following resource issue pertaining to water resources:

- Effects of continued project operation on water quality, including dissolved oxygen concentrations and water temperature in Lake Jackson and the Ocmulgee River downstream from the project.

3.3.2 Study Requests

Georgia Power proposed in the PAD (Section 5.2.1, Preliminary Studies List) to conduct a study to characterize water use, availability, and water quality in the project area; characterize the effects of project operations on water quality in the project reservoir and in the Ocmulgee River tailrace area immediately downstream of the dam; characterize the effects of project operations during drought on water uses downstream in the Ocmulgee River. Seasonal water quality monitoring data collected through 2017 would be analyzed. DO and water temperature would be continuously monitored in the project tailrace in summer 2019, and a literature-based analysis would be conducted for water quantity and quality.

Although no study requests pertaining to water resources were filed by stakeholders following the study criteria under 18 CFR § 5.9(b), resource agencies have made the following comments and recommendations for modifying Georgia Power's proposed study.

Water Quality Monitoring

In its scoping comments filed November 2, 2018, EPA recommended Georgia Power coordinate with resource agencies to define a downstream boundary for the proposed water quality studies. EPA also recommended year-round monitoring to demonstrate water-quality standards compliance. Further, EPA recommended acquiring downstream data to understand changes (if any) in riverine characteristics. EPA suggests downstream data may be available from readily available sources including state and federal agencies. EPA believes the acquisition of downstream data would facilitate an analysis and comparison of upstream and downstream water quality.

In its study request letter dated November 2, 2018, the Georgia Environmental Protection Division (GEPD) requested that the tailrace monitoring period be expanded to a full-year from the summer period described in the PAD. GEPD also requested that continuous monitoring, to include DO and water temperature, be performed on at least an hourly frequency. Further, GEPD requested that monthly grab samples be taken from the tailrace and analyzed for the following water quality parameters: 5-day biological oxygen demand, ammonia, nitrate-nitrite, organic phosphorous, total phosphorous, ortho-phosphate, and organic phosphorous. GEPD indicates that these efforts would support the GEPD hydrodynamic and water quality model for the Ocmulgee River. In 2014, GEPD conducted a water quality model calibration field study of the Ocmulgee River downstream of the dam; however, the data were not collected in

the project tailrace but over 1 mile downstream and were limited in duration and parameters modeled. GEPD believes that data collected within the tailrace and over an entire year would better characterize the upstream boundary of the model and would increase the predictive capability and defensibility of the model to improve GEPD's ability to make water quality decisions for the Ocmulgee River downstream of the Project.

Georgia Power has collected a substantial amount of vertical profile and water chemistry data for Lake Jackson representing the full length of the main-stem reservoir and major tributary coves, as summarized in the PAD (Section 4.3.1). Table 3-1 indicates the months in which vertical profile and water chemistry data have been collected since 1995. Older data for Lake Jackson exists in Georgia Power records, but only data since 1995 are included in Table 3-1. Georgia Power has obtained additional water quality data for Lake Jackson, as collected by volunteers in the Adopt-a-Lake program. This dataset includes 11 sample locations with data from 2014 through 2017. Georgia Power will also work with other entities (e.g., GEPD, Butts County, et al. Water and Sewer Authority) to collect any additional and relevant water quality data. Georgia Power proposes herein to analyze the substantial amount of existing vertical profile and water quality data collected by Georgia Power and others to evaluate the effects of continued project operation on water quality, including temperature and DO, in Lake Jackson and the tailrace area. Georgia Power has not proposed water quality monitoring in Lake Jackson in 2019 because Georgia Power believes that an analysis of the existing data will represent water quality changes occurring over the course of the summer, including normal, dry, and wet years.

TABLE 3-1

Lake Jackson Water Quality Sampling Dates, 1995-2017

	Winter			Spring			Summer			Fall		
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1995			○		○	♦	♦	○	♦	♦	○	
1996		○			○	♦	♦	○	♦	♦	○	
1997						○	♦	○			○	
1998						○	♦	○			○	
1999					○						♦	
2000						○	♦	○			♦	
2001						●		♦			●	
2002						●		●			●	
2003						●		●			●	
2004						●		●			●	
2005						●		●	♦	●		
2006						●		●			♦	
2007				♦		●		♦		●		
2008						●		●		●		

TABLE 3-1

Lake Jackson Water Quality Sampling Dates, 1995-2017

Year	Winter			Spring			Summer			Fall		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2009						●		●		♦		
2010							●	●		●		
2011				●				●			●	
2012				♦				●			●	
2013				●				●	●			
2014		♦		●				●		●		
2015	♦			♦				♦			○	
2016		♦		♦				●		●		
2017	●		○				●					

● = profile and chemistry data for 6 stations

○ = profile only data for 6 stations

♦ = profile and chemistry data for fewer than 6 stations

To address EPA and GEPD interests regarding tailrace monitoring, Georgia Power proposes to conduct continuous tailrace water quality monitoring of temperature and DO for a year-long period in order to represent annual tailrace water quality conditions and their relationship to project operations. Monthly grab samples will be collected from the tailrace and analyzed for the following water quality parameters: 5-day biological oxygen demand, ammonia, nitrate-nitrite, organic phosphorous, total phosphorous, ortho-phosphate, and organic phosphorous.

The existing and newly collected water quality data will be used to analyze the effects of project operations on water quality in Lake Jackson and the Lloyd Shoals tailrace area.

Algal Blooms

To address stakeholder interests regarding blue-green algal (cyanobacteria) blooms that have occurred in Lake Jackson in recent years, Georgia Power proposes to include in the Water Resources Study, a literature review and analysis of the occurrences of harmful algal blooms in Lake Jackson, the factors that could lead to harmful algal blooms, and their relationship, if any, to project operations.

3.3.3 Resource Management Goals

GDNR is the primary resource agency having jurisdiction over water resources in the project area. GEPD (2015) classifies the water use of the main pool of Lake Jackson as Recreation. This area extends from South River at Hwy 36, Yellow River at Hwy 36, and Alcovy River at Newton Factory Road Bridge downstream to Lloyd Shoals Dam. The South and Yellow River arms of the reservoir upstream of Hwy 36 are designated for Fishing use. The Ocmulgee River

from Lloyd Shoals Dam downstream to Wise Creek, a distance of about 6.2 river miles, is classified for Drinking Water.

3.3.4 Existing Information

As described in the PAD, a substantial amount of existing information and data are available for characterizing water use and water quality in the vicinity of the Lloyd Shoals Project. Georgia Power will review and apply this and other available information as appropriate to evaluating the potential effects of continued project operation on water resources in the Ocmulgee River. Key sources of this information include but are not limited to:

- Georgia Power seasonal water quality data collected in Lake Jackson at multiple reservoir locations, typically in spring, summer and fall, from 2000 to 2017. These data include vertical profile measurements and water chemistry analyses of grab samples from 6 stations distributed longitudinally in the main-stem reservoir and in the major tributary coves.

- Water quality data collected in Lake Jackson by Adopt-a-Lake member Jackson Lake Association.

- Scientific literature and technical papers assessing nutrient loading sources and land use practices upstream of Lake Jackson and their potential influences on nutrient concentrations, algal abundance, and eutrophication in the reservoir.

- Middle Ocmulgee Regional Water Plan (GEPD, 2017) developed under the Georgia State-wide Water Management Plan.

- Water resource management plan of the Metropolitan North Georgia Water Planning District (CH2M and Black & Veatch, 2017) located upstream of the Project in the Ocmulgee River basin.

- Georgia 305(b)/303(d) list documents (GEPD, 2016), which assess whether surface water bodies in the project area and upstream are supporting their designated uses.

3.3.5 Nexus between Project Operations and Effects

Georgia Power operates the Lloyd Shoals Project as a modified run-of-river project. Lloyd Shoals generates during peak power demand hours to meet the electrical system demand with renewable, waste-free, low-emission power. Water for generation at Lloyd Shoals Dam comes from precipitation in the Ocmulgee River basin upstream of the Project. Inflows are stored for short period of time, generally no longer than 24 hours, and then released through generating turbines during peak power demand periods. Georgia Power operates the Lloyd Shoals Project to maintain reservoir elevations between 530 and 527 PD year-round. Lloyd Shoals discharges directly into the Ocmulgee River. When the Project is not operating to generate peaking

energy, the Project releases a continuous minimum flow of 400 cfs, or inflow, whichever is less, for the protection and enhancement of fish and wildlife resources downstream of the Project.

3.4 Study Area

For the purposes of water resources, the proposed study area includes Lake Jackson and the Lloyd Shoals tailrace area within the project boundary, tributary watersheds to Lake Jackson, and the Ocmulgee River downstream to the Lloyd Shoals project boundary at Ocmulgee River Park. New water quality monitoring field studies are proposed in the project tailrace area within the project boundary.

Regarding water quality and site-specific effects downstream of the Lloyd Shoals project boundary, Georgia Power believes that existing data characterizing water quality in the Ocmulgee River are sufficient for evaluating downstream water quality effects. Georgia Power will use existing information in analyzing site-specific and cumulative water quality effects downstream of the Project in the PLP and license application for Lloyd Shoals.

3.5 Methodology

Georgia Power's proposed approach for completing the Water Resources Study consists of the following study elements.

3.5.1 Water Quality Monitoring in the Tailrace

Continuous Monitoring of DO and Water Temperature

Georgia Power proposes to conduct continuous DO and water temperature monitoring in the Lloyd Shoals tailrace beginning in May 2019. A water quality monitoring station (i.e., LSTR) will be established in the tailrace area within the direct influence of generation flows where the channel cross section is relatively uniform in depth and the water is well mixed. Figure 3-1 shows the proposed area in which the station will be located. The exact location will be determined at the time of placement. Georgia Power proposes to collect data at the tailrace location for one year to represent annual variation in water quality conditions.

An electronic multi-parameter water quality measurement sonde and data recorder will be deployed to continuously record DO concentration, pH, specific conductance, water temperature, and turbidity in the Lloyd Shoals tailrace area. Water quality data will be recorded every hour. The sonde will be installed on a buoy-mounted system at a depth of 1 meter, consistent with the application of state DO criteria as set forth in GEPD's Rules and Regulations for Water Quality Control (Chapter 391-3-6). Routine maintenance and necessary equipment calibration will be performed monthly throughout the monitoring period. During monthly calibration, grab samples will be collected at 1-m depth near the buoy location and

analyzed for 5-day biological oxygen demand, ammonia, nitrate-nitrite, organic phosphorous, total phosphorous, ortho-phosphate, and organic phosphorous.

Georgia Power will compile continuous DO and water temperature data collected from the tailrace monitoring location and align these data with real-time project operational data for the same periods.

3.5.2 Analysis of Information and Data

Seasonal water quality data, including vertical profile measurements of temperature, DO, pH, specific conductance, and turbidity and water chemistry data including nutrients and metals will be analyzed to evaluate water quality within Lake Jackson. Monthly vertical profiles of temperature and DO in Lake Jackson will be plotted to depict vertical stratification patterns and describe the relationship between the project intake's invert elevation and typical depth at which summer thermal and DO stratification occurs in Lake Jackson. Other data sources, such as Adopt-a-Lake volunteer data will be used to augment the existing data record. Continuous temperature and DO data collected in the tailrace in 2019-2020 will be summarized in tables and graphs and combined with plots of corresponding turbine operations. Data will be plotted to demonstrate the effects of generation during summer critical conditions.

Monitoring trends and data, and abundant existing information and literature on water use, quantity, quality, and cyanobacteria occurrence and blooms in Lake Jackson and the Ocmulgee River will be used to evaluate the water resource issues identified during scoping. The review of cyanobacteria blooms in Lake Jackson will include factors that could lead to harmful algal blooms, and their relationship, if any, to project operations. Literature review of cyanobacteria occurrence will include but not necessarily be limited to the following sources:

- GEPD information and data.
- Georgia Power algal reports and sampling information.
- Research program of phycologist Dr. Kalina Manoylov of Georgia College and State University pertaining to Georgia reservoirs.
- Research of community ecologist Dr. Alan Wilson of Auburn University pertaining to algal blooms, sedimentation, and nutrients in reservoirs.
- The University of Georgia's CyanoTracker Project – blooms reported by public as trigger for remote sensing estimation of cyanobacteria concentration.
- Scientific literature.

3.6 Reporting

A Study Progress Report will be prepared and provided to participants prior to the completion of the study. The progress report will describe overall progress in completing the proposed monitoring and analysis, summarize preliminary findings as available, and explain any variance from the study plan and schedule.

A Water Resources Study Report will be prepared and provided to participants for review and comment at the conclusion of the 1-year study.

3.7 Schedule

In accordance with the Lloyd Shoals Process Plan and Schedule and the master schedule provided in Section 1.4, the Water Resources Study will be completed according to the milestones listed in Table 3-2 below.

TABLE 3-2
Schedule for Conducting the Water Resources Study

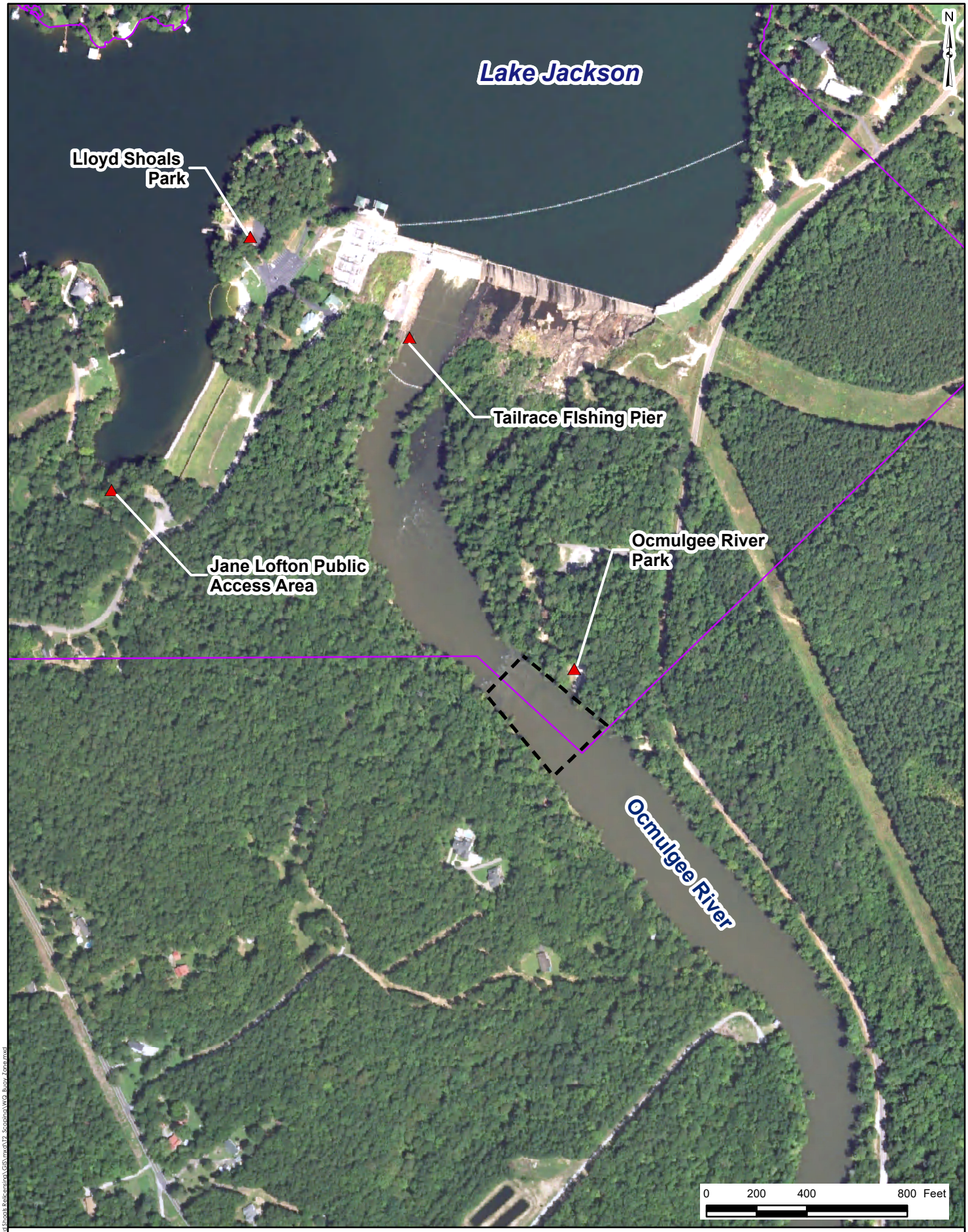
Activity	Deadline
Begin Field Studies and Literature-Based Review	May 2019
File Progress Report	January 31, 2020
Complete Field Studies and Literature-Based Review	April 2020
File Initial Study Report	May 19, 2020

3.8 References

Georgia Environmental Protection Division (GEPD). 2015. Rules and regulations for water quality control, Chapter 391-3-6. Revised May 2015. Georgia Department of Natural Resources, Atlanta, Georgia.

Georgia Environmental Protection Division (GEPD). 2016. Water quality in Georgia; Georgia's 2014 305(b)/303(d) list, approved May 13, 2016. Georgia Department of Natural Resources, Atlanta, Georgia. https://epd.georgia.gov/georgia-305b303d-listdocuments.

Georgia Environmental Protection Division (GEPD). 2017. Middle Ocmulgee Regional Water Plan. Georgia Department of Natural Resources, Atlanta, Georgia. https://epd.georgia.gov/middle-ocmulgee-rwp-updates.



Legend

Project Boundary

Water Quality Monitoring Location (Proposed)

Recreation Access Point

Georgia Power

Georgia Power
Geosyntec consultants

Figure 3-1
Proposed Water Quality Monitoring Location
Lloyd Shoals Project
(FERC No. 2336)

N:\GA\GeorgiaPower\Lloyd Shoals Relicensing\GIS\mxd\T2_Scoping\WQ Buoy Zone.mxd

4.0 FISH AND AQUATIC RESOURCES

4.1 Introduction

Georgia Power proposes to conduct a study characterizing the existing fish and aquatic resources in the Lloyd Shoals Project waters and developing aquatic resource information for evaluating the potential impacts of continued project operation on the fish and aquatic resources of the Ocmulgee River. This will be accomplished through a combination of: analyzing existing fisheries survey data; a shoreline aquatic habitat survey conducted as part of the shoreline reconnaissance survey for the Geology and Soils Study; a freshwater mussel survey; and review of existing fisheries and water quality information and data.

Section 5.0 provides a separate study plan for American Eel Abundance and Upstream Movements, as requested by FWS and the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS).

4.2 Goals and Objectives

The goal of this study is to develop information for characterizing the existing aquatic environment and evaluating the fisheries-related aquatic resource issues identified during FERC's public scoping process pursuant to NEPA that have a nexus with project operations.

The specific objectives of the study are to:

- Characterize representative shoreline and littoral-zone aquatic habitats occurring in the project reservoir (Lake Jackson).

- Conduct a freshwater mollusk survey within the project boundary to characterize the occurrence and distribution of native mussels and aquatic snails.

- Evaluate the effects of continued project operations on habitat for primary sport fish species in Lake Jackson, including Largemouth Bass and stocked Striped Bass.

- Evaluate the effects of continued project operations on riverine aquatic habitat downstream of the Project using the previously conducted Instream Flow Incremental Methodology (IFIM) study, ongoing conservation efforts for the state endangered Robust Redhorse (*Moxostoma robustum*), and other relevant existing information and data.

- Evaluate the potential for fish entrainment and turbine-induced mortality by applying trends and data from entrainment studies completed at other hydroelectric projects to the physical, operational, and fisheries characteristics of the Lloyd Shoals Project.

4.3 Study Background

This study will develop information needed to evaluate potential impacts of continued project operation on fish and aquatic resources in the Ocmulgee River in the PLP and license application in consideration of: (1) the fish and aquatic resources issues identified during NEPA scoping; (2) any study requests and modifications to studies requested by resource agencies and stakeholders; (3) the known resource management goals of the agencies with jurisdiction over fish and aquatic resources; (4) existing information available for the Ocmulgee River and Lake Jackson as summarized in the PAD; and (5) the requirement that there be a nexus between project operations and effects on the resources being evaluated.

4.3.1 Issues Identified

FERC staff identified in SD1 the following aquatic resource issues pertaining to fisheries:

- Effects of continued project operation and shoreline permitting (e.g., docks, seawalls, etc.) on fish habitat and aquatic resources in Lake Jackson.
- Effects of continued project operation on habitat for primary sport fish species in Lake Jackson, including Largemouth Bass and stocked Striped Bass.
- Effects of continued project operation on riverine fish and mussel habitat downstream in the Ocmulgee River.
- Effects of continued project operation on fish movement in the Ocmulgee River.
- Effects of continued project operation on fish entrainment and turbine-induced mortality at the Project.
- Aquatic non-native invasive species and their effects on native flora and fauna within the project boundary, and the effects of continued project operation and maintenance activities and project-related recreation on non-native invasive aquatic species.
- Effects of continued project operation on state species of concern in the vicinity of the project.

4.3.2 Study Requests

Georgia Power proposed in the PAD (Section 5.2.1, Preliminary Studies List) to conduct a study characterizing existing fish and aquatic resources in the project area and evaluating the effects of continued project operations on fish and aquatic resources inhabiting Lake Jackson and the Ocmulgee River downstream. The study would include: (1) a shoreline aquatic habitat survey conducted as part of the shoreline reconnaissance survey for shoreline erosion and sedimentation in the Geology and Soils Study; (2) analysis of native mollusk occurrence and habitat use within the project boundary based on existing data and a mussel survey; (3) analysis

of GDNR standardized fisheries survey data for the project reservoir for primary sport fishes of interest; (4) analysis of existing IFIM study results for riverine species, existing information on Robust Redhorse habitat use and recruitment downstream of Lloyd Shoals Dam, and the results of ongoing monitoring efforts implemented as part of the Ocmulgee Candidate Conservation Agreement with Assurances (CCAA) for Robust Redhorse; and desktop analysis of the potential for fish entrainment and turbine-induced mortality.

FWS and NMFS each filed study requests for developing baseline data on the life stage, size range, abundance, and timing of upstream movements of American Eel below Lloyd Shoals Dam. Georgia Power's preliminary studies list did not include an American Eel study. Section 5.0 provides a separate study plan adopting with proposed modifications the agencies' study request.

In its PAD and SD1 comments letter dated November 5, 2018, GDNR's WRD did not propose any additional studies but requested that additional objectives be incorporated into the shoreline aquatic habitat survey study element. These include mapping developed and undisturbed shoreline areas in the project reservoir; surveying and mapping submergent vegetation in the reservoir; incorporating literature review on how rates and magnitude of shoreline development affect sport fish species such as Largemouth Bass, Black Crappie, and sunfish; and incorporating drawdown schedules, including magnitude and duration, to assist planning of aquatic plantings and fish stocking.

Georgia Power proposes to survey shoreline aquatic habitat using a stratified random selection of sites to develop information on the proportion of natural versus modified shoreline with respect to vegetative buffer zone condition, bank stability, vegetative protection, shoreline structural stabilization practices, potential causes of shoreline erosion/sedimentation and whether or not they are project-related, and sources of littoral-zone fish cover and habitat. If submersed vegetation is observed at shoreline sites, its extent of linear coverage of the shoreline site will be estimated (see Figure 2-2) but mapping of submersed vegetation in the reservoir is not a purpose of the survey. The distribution and abundance of submersed vegetation will be characterized in the Terrestrial, Wetland, and Riparian Resources Study (Section 6.0) based on a field reconnaissance survey. As requested by WRD, the shoreline analysis will review literature on the relationship between structural stabilization practices (i.e., developed shoreline) and littoral-zone fish habitat. Regarding reservoir drawdowns, Georgia Power schedules drawdowns for homeowner and shoreline maintenance every few years and notifies GDNR in advance.

In its comments on the PAD and preliminary study proposals dated November 5, 2018, FERC staff requested that the proposed desktop analysis of fish entrainment and mortality develop an estimate of the total number of fish entrained annually by species, size class, and season. Georgia Power has incorporated estimating the magnitude, species composition and relative abundance, size distribution, and seasonal distribution of annual entrainment into this Fish and Aquatic Resources Study Plan. WRD also requested estimates of monetary loss of fish due to

entrainment and impingement. Georgia Power is not proposing to estimate the monetary loss of fish because the potential effects of entrainment on fishery resources have yet to be assessed and there is no basis at this time for finding that mitigation would be justified or that compensation for lost fish would result in appropriate resource-based enhancement.

4.3.3 Resource Management Goals

WRD and FWS are the primary resource agencies having jurisdiction over fish and aquatic resources in Lake Jackson and the Ocmulgee River. In addition, NMFS has jurisdiction over diadromous fishery resources in the Altamaha River basin.

WRD manages the project waters to provide a quality outdoor recreational experience. From a fisheries standpoint, important components of this effort include public access to the natural resource and implementing statewide fish harvest regulations to help manage and conserve sport fish populations.

FWS' overall management goal for the Altamaha River basin and its sub-basins is to protect, enhance, and restore a diverse, healthy, and native aquatic community, the aquatic habitats on which this community depends, and especially imperiled species. This goal includes an objective to provide safe, timely, and effective upstream and downstream passage for native Altamaha River basin fishes, particularly diadromous species.

A goal of NMFS is to restore American Eel to historical habitats and ensure safe migratory pathways to build abundance and resilience in the population (see Section 5.0).

4.3.4 Existing Information

A substantial amount of existing information and data are available for characterizing the fish and aquatic resources in the vicinity of the Lloyd Shoals Project and evaluating the potential resource impacts of continued project operation. Key sources of this information include but are not limited to:

- WRD, which has conducted over 30 years of annual standardized fishery surveys of Lake Jackson. WRD uses these data to understand population characteristics and associated fishing trends, make fisheries management decisions, and characterize angler prospects.

- The previous relicensing studies for the Project in the late 1980's, which included fisheries investigations of Lake Jackson and the Ocmulgee River downstream, and an instream flow study in the Ocmulgee River (EA Engineering, Science, and Technology, Inc. [EA], 1990a, 1990b, 1990c).

- The Fishes of Georgia Website (Straight et al., 2009), cooperatively funded by the FWS, GDNR Wildlife Conservation Section, and the Georgia Museum of Natural

History (GMNH). This source provides an online distributional atlas of freshwater fishes in Georgia based on historical and recent collection data.

- Online species accounts and occurrence maps by Hydrologic Unit Code (HUC) 10 watershed for fish species of conservation concern, prepared by GDNR's Wildlife Conservation Section.

- The Georgia Bass Chapter Federation (GBCF, 1996-2015), which has compiled angler catch data annually for Lake Jackson and numerous other Georgia reservoirs from bass tournaments for the past 20 years.

- Fish species distribution, habitat use, and conservation information available in the scientific literature and through NatureServe Explorer (NatureServe, 2017), an online database providing in-depth coverage for rare and endangered species.

- Scientific literature on the distribution of fishes in the Ocmulgee River, including nongame species (Bart et al., 1994; Nuckols and Roghair, 2004); habitat use and movements of Robust Redhorse (Jennings and Shepard, 2003; Grabowski and Jennings, 2009; Pruitt, 2013); and spawning migrations and habitat use of Atlantic Sturgeon in the Altamaha River basin (Ingram and Peterson, 2016).

- GDNR Wildlife Conservation Section records of mollusks in the upper Ocmulgee River basin, 2008-2014; and scientific literature on the distribution of and suitable host fishes for freshwater mussels from the Altamaha River basin (Wisniewski et al., 2005; Johnson et al., 2012).

4.3.5 Nexus between Project Operations and Effects

Georgia Power operates the Lloyd Shoals Project in a modified run-of-river mode for generation during peak power demand hours to meet electrical system demand. Inflows are stored for only short periods of time, generally no longer than 24 hours, and then released through the generating turbines during peak power demand periods. Daily fluctuations of Lake Jackson are less than 1.5 ft about 98-percent of the time.

Lloyd Shoals Dam discharges directly into the Ocmulgee River. When the plant is not operating to generate peak energy, the Project releases a continuous minimum flow of 400 cfs, or inflow, whichever is less, for the protection of fish and wildlife resources in the Ocmulgee River downstream.

Lloyd Shoals Dam is one of two major dams on the mainstem Ocmulgee River, the other being Juliette Dam located about 19 miles downstream. Downstream of Lloyd Shoals Dam, the Ocmulgee River flows south and then east-southeast for 250 miles south to its confluence with the Oconee River to form the Altamaha River. The Altamaha River flows 137 miles southeast to the Atlantic Ocean.

4.4 Study Area

The proposed study area includes the FERC project boundary around Lake Jackson and the Lloyd Shoals tailrace area, and the Ocmulgee River downstream to Juliette Dam.

4.5 Methodology

Georgia Power's proposed approach for completing the Fish and Aquatic Resources Study consists of the following study elements.

4.5.1 Shoreline Habitat Survey

Georgia Power proposes to conduct a shoreline habitat survey that will characterize representative shoreline and littoral-zone aquatic habitats occurring throughout the project reservoir. Section 2.0 (Geology and Soils) describes the methodology for the shoreline habitat survey to be conducted concurrently with the shoreline reconnaissance survey for erosion and sedimentation.

4.5.2 Freshwater Mollusk Survey

A survey will be conducted within the Lloyd Shoals project boundary and at certain locations near the project boundary within the period May 2019-April 2020 to characterize the occurrence, distribution, relative abundance, and species richness of the native freshwater mussel community. Additionally, a survey will be conducted upstream but near the project boundary in the Alcovy River for the rare gastropod mollusk Reverse Pebblesnail (*Somatogyrus alcoviensis*). The surveys will focus on habitats having the greatest potential to support rare, threatened, and endangered (RTE) species of mollusks.

The mollusk survey of the Lloyd Shoals project area will also be part of field studies associated with the Altamaha Mollusk Candidate Conservation Agreement (CCA). The CCA is a collaborative and cooperative 30-year agreement between Georgia Power, WRD, and FWS to implement conservation measures for certain mollusk species of the Altamaha River basin. Species targeted for conservation in the CCA include Delicate Spike (*Elliptio arctata*), Altamaha Arcmussel (*Alasmidonta arcula*), Inflated Floater (*Pyganodon gibbosa*), Savannah Lilliput (*Toxolasma pullus*), and Reverse Pebblesnail. The first annual survey for the CCA will specifically focus on the Lloyd Shoals Project area.

The survey will be led by WRD. WRD's subject matter expertise includes knowledge of the mollusk fauna of the Altamaha River basin and the Lloyd Shoals project area, and is covered by a Federal Endangered Species Permit. Georgia Power will assist logistics and field work components of the mollusk surveys.

Lake Jackson Mussel Survey

A mussel survey of Lake Jackson will be conducted in representative habitats as determined by pre-survey reconnaissance. The reservoir will be searched for native mussels using an occupancy-based sampling design developed by WRD. Up to 12 survey sites will be distributed within coves, tributary embayments, and along the margins of the historic river channel, where habitat is potentially most suitable. The survey will be conducted in daylight hours in summer or fall 2019.

The surveys will be conducted by a team of biologists experienced in mussel collection. At least one person-hour will be spent searching for native mussels at each site. The survey methods will be tailored to site-specific conditions of depth, accessibility, water clarity, and safety. Survey methods may include visual observations while wading, hand grubbing while on hands and knees, snorkeling, self-contained underwater breathing apparatus (SCUBA), and surface-supplied air in deeper water. Divers will follow all applicable safety regulations.

The mussel survey in Lake Jackson will target areas containing potentially suitable habitat and habitats previously documented to harbor native species. The survey team will identify and enumerate all live mussels and shells of dead mussels found. All mussel specimens will be measured (length in millimeters [mm]), unless a large number of live specimens is encountered, in which case representative subsamples of shells will be measured. The location of all survey areas will be documented in the field using a hand-held Global Positioning System (GPS) unit. Representative live specimens of each species will be digitally photographed. Unless a voucher specimen is required for positive identification, all live mussels will be returned to source habitats. Field notes will be recorded to include date and time of the survey and general habitat information about the survey area.

Reverse Pebblesnail Survey

A survey will be conducted for Reverse Pebblesnail upstream of the project boundary in the Alcovy River. The species is very small, often with a shell length of less than 3 mm. The species is known to inhabit rapidly flowing water on surfaces of gravel, cobble, boulder, and bedrock, and Hornleaf Riverweed (*Podostemum ceratophyllum*), but is absent from silty substrates.

The survey will be conducted during summer or fall 2019. Search effort will be conducted in representative habitats for this species. Search effort and results will be managed using WRD's occupancy-based model. The number of survey sites within the shoals will be determined on site by the team leader at the time of the survey, which will be conducted in daylight.

The survey will be conducted by a team of biologists experienced in collection of mussels and gastropods (snails). At least one person-hour will be spent searching for native mussels at each site. The survey methods will be tailored to site-specific conditions of depth, accessibility,

water clarity, and safety. Survey methods may include visual observations while snorkeling, SCUBA, and surface-supplied air. Divers will follow all applicable safety regulations.

The survey team will identify and enumerate all live snails and shells of dead snails. Specimens large enough to measure in the field will be measured (length in mm). If a large number of live specimens is encountered, a subsample of specimens will be measured. The location of all survey areas will be documented in the field using a hand-held GPS unit. If large enough for reasonable viewing, representative live specimens will be digitally photographed. Due to the very small size of Reverse Pebblesnail, voucher specimens may be required for later positive identification and measurement in a laboratory. Otherwise, all live snails will be returned to source habitats. Field notes will be recorded to include date and time of the survey and general habitat information about the survey area.

Lloyd Shoals Tailrace Area Mussel Survey

A mussel survey of the Lloyd Shoals tailrace area will be conducted in representative habitats concurrent with the reservoir mussel survey. The search reach will extend from Lloyd Shoals Dam downstream a distance of up to 1.8 river miles to encompass habitats within the project boundary (to 0.5 mile downstream) and the islands and shoals immediately downstream of the Georgia Hwy 16 bridge (Figure 1-2).

The survey will begin with a reconnaissance of benthic substrates in the tailrace reach. Up to 12 areas in the river channel will be searched for the presence of native mussels. The survey will use the occupancy-based sampling design recommended by WRD. At least one person-hour will be spent searching for native mussels at each location. The survey methods will be tailored to site-specific conditions of depth, accessibility, water clarity, and safety. Survey methods may include visual observations while wading, hand grubbing, snorkeling, SCUBA, and surface-supplied air in deeper water. Divers will follow all applicable safety regulations.

The survey team will identify and enumerate all live mussels and shells of dead mussels found. All mussel specimens will be measured (length in mm), unless a large number of live specimens is encountered, in which case representative subsamples of shells will be measured. The location of all survey areas will be documented in the field using a hand-held GPS unit. Representative live specimens of each species will be digitally photographed. With exception of necessary voucher specimens, all live mussels will be returned to source habitats. Field notes will be recorded to include date and time of the survey and general habitat information about the survey area.

Georgia Power will obtain WRD's summarized survey information and incorporate it into the Fish and Aquatic Resources Study Report.

4.5.3 Habitat for Primary Sport Fish Species

The availability of suitable summer water quality for sport fish species in Lake Jackson, including Largemouth Bass and Striped Bass, will be assessed using reservoir water quality data collected annually by Georgia Power, standardized fisheries survey data for primary sport fishes collected annually by GDNR, and Largemouth Bass and Striped Bass temperature and DO preference criteria reported in the scientific literature. Georgia Power collected seasonal water quality data at up to six sampling stations throughout Lake Jackson on an annual basis from 2000 to 2017, including vertical profile measurements of water temperature and DO at multiple locations. These existing data will provide the basis for characterizing summer reservoir water quality and habitat for Largemouth Bass and Striped Bass as two popular sport fisheries in the project reservoir.

Vertical profile data for the warmest months, including April through September, will be depicted in graphs of depth versus water temperature and depth versus DO concentration to characterize the spatial and temporal extent of summer vertical stratification that occurs in Lake Jackson. In addition, data will be graphed as monthly isopleths showing the variation in water temperature and DO over the entire length of the reservoir. This analysis will be used to delineate those areas of the reservoir which vertically stratify during the summer and those areas which may tend to mix.

Existing fisheries survey data for Lake Jackson will be analyzed for the abundance and growth characteristics of Largemouth Bass, Striped Bass, and other primary sport fish species. Data available from the standardized fisheries survey database include sampling procedures and effort information, species abundance, length, weight, and other sampling or reservoir specific details. Georgia Power will coordinate with WRD at the outset of the study to obtain the most updated version of the database and associated metadata defining station locations, parameters, units, species-specific weight-length relationships used as the basis for relative condition factors, and other relevant data fields.

The fisheries data will be analyzed to characterize the abundance and well-being and condition of Largemouth Bass and Striped Bass relative to other Georgia reservoirs. Population attributes to be compared may include length-frequency distribution, relative condition factors, species numerical abundance, catch per unit effort, and other descriptive statistics.

Habitat suitability for Largemouth Bass and Striped Bass between different areas of the reservoir will be evaluated on the basis of temperature, DO concentration, and time of year with consideration for ranges defined by scientific literature sources as appropriate for each species. For Largemouth Bass, which is a habitat-generalist species, areas will be compared as to the ranges and stability of summer water quality conditions. Documented temperature and DO habitat suitability criteria for adult Striped Bass will be compared to the summer vertical profiles to identify and approximate the areas of the reservoir providing suitable habitat under representative summer conditions. Rather than measuring precise volumes or areas, this

approach will characterize variation in habitat suitability for Striped Bass occurring around each water quality station in the reservoir.

In addition, existing information and WRD reports on fish kill events occurring in the project waters during the current license term will be described and summarized in the study report.

4.5.4 Downstream Riverine Habitat

The suitability of summer water temperatures and DO concentrations for fish and other aquatic organisms in the Lloyd Shoals tailrace area will be evaluated using a combination of newly collected water quality monitoring data and literature review. Continuous water temperature and DO monitoring data collected for the Water Resources Study (Section 3.0) will be plotted against contemporaneous generation flows and compared to known water quality tolerance and habitat suitability criteria for representative species as determined from literature sources.

The effects of continued project operations on riverine aquatic habitat downstream of the Project will be evaluated by reviewing the habitat-discharge relationships developed in the previously conducted IFIM study for 12 species and life stages in a 17-mile reach of the Ocmulgee River downstream of Lloyd Shoals Dam. The study will be summarized and the results presented in tables and graphs to allow comparison of the physical habitat available, expressed as weighted usable area, across discharge ranging from 50 to 3,500 cfs.

In addition, existing literature and available study information will be reviewed for Robust Redhorse, other riverine fish and invertebrate species, and diadromous fishes to further characterize the current condition of potential for impacts to the riverine aquatic community downstream of the Project.

4.5.5 Fish Entrainment Evaluation

The potential for fish entrainment and turbine-induced mortality at the Lloyd Shoals Project will be evaluated using a literature-based approach that draws upon entrainment field studies completed at numerous other hydroelectric projects east of the Mississippi River, including several in the southeastern U.S. Common trends and data from these other studies will be applied with consideration of the site-specific physical, operational, and fisheries characteristics of the Lloyd Shoals Project.

The primary source of turbine entrainment field study information will be the database prepared by the Electric Power Research Institute (EPRI, 1997). The EPRI database includes test data from 43 hydroelectric sites and provides detailed information on the species and size classes of fish collected in monthly entrainment samples. All of these sites are located east of the Mississippi River, and seven are located in the southeastern U.S. (South Carolina, Georgia, and Virginia).

Other sources of turbine entrainment information and data will include comprehensive reviews prepared by EPRI (1992) and FERC (1995a). The FERC (1995a) review provides information for two additional sites in South Carolina and Georgia. Entrainment sampling data for the Stevens Creek Project (Dames and Moore, 1993; FERC, 1995b) and the Richard B. Russell Pumped Storage Project (U.S. Army Corps of Engineers [USACE], 1999) on the Savannah River also will be examined for species composition, relative abundance, and size distribution trends.

The primary source of turbine mortality field study information will be the turbine passage survival database prepared by EPRI (1997). The database includes test data from studies conducted at 51 difference turbines (41 hydroelectric sites), including Francis turbines.

Common trends and data from field studies completed at other hydroelectric sites will be applied to the Lloyd Shoals Project to:

- Characterize potential turbine entrainment that could be occurring at the Project, including the magnitude of total annual entrainment, fish size distribution, species composition and relative abundance, and seasonal variation in entrainment rates.

- Evaluate potential mortality rates of fish passing through the turbines based on turbine survival tests conducted at other projects with head and turbine design characteristics similar to those at Lloyd Shoals.

The potential impacts and implications of losses of fish due to entrainment mortality will be assessed based upon fishery survey data for the project reservoir, intake location and related factors in the reservoir forebay, natural mortality rates of young fish, and other relevant factors. In addition, the potential implications of entrainment will be assessed with respect to WRD's Striped Bass and White Bass-Striped Bass hybrid (hybrid bass) management in Lake Jackson and experimental stocking of American shad in the reservoir.

4.6 Reporting

A Study Progress Report will be prepared and provided to participants prior to the completion of the study. The progress report will describe overall progress in completing the proposed mollusk survey and fisheries analyses, summarize preliminary findings as available, and explain any variance from the study plan and schedule.

A Fish and Aquatic Resources Study Report will be prepared and provided to participants for review and comment at the conclusion of the 1-year study. The study report will compile the data gathered from the mussel survey and present the analyses developed through the use of existing information and data.

4.7 Schedule

In accordance with the Lloyd Shoals Process Plan and Schedule and the master schedule provided in Section 1.3, the Fish and Aquatic Resources Study will be completed according to the milestones listed in Table 4-1 below.

TABLE 4-1
Schedule for Conducting the Fish and Aquatic Resources Study

Activity	Deadline
Begin Field Studies and Literature-Based Review	May 2019
File Progress Report	January 31, 2020
Complete Field Studies and Literature-Based Review	April 2020
File Final Study Report	May 19, 2020

4.8 References

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5.0 AMERICAN EEL ABUNDANCE AND UPSTREAM MOVEMENTS

5.1 Introduction

Georgia Power proposes a study evaluating the abundance and upstream movements of American Eel (*Anguilla rostrata*) in the Ocmulgee River downstream of Lloyd Shoals Dam. This study plan adopts the study requests of FWS and NMFS, with proposed modifications to the methodology to reflect existing information on American Eel in the Ocmulgee River and Altamaha River basin and recent published studies on the seasonality and environmental correlates of the species' upstream migrations.

5.2 Goals and Objectives

The goal of this study is to develop current baseline information on the abundance, life stages, size range, and timing of upstream movements of American Eel that approach Lloyd Shoals Dam within the project boundary. This information will enable FWS and NMFS to evaluate whether passage may be needed for American Eel at Lloyd Shoals Dam.

The objectives of this study are to:

- Identify the life stage and size range of American Eel migrating to Lloyd Shoals Dam.
- Identify the timing of upstream movements of American Eel migrating to Lloyd Shoals Dam in terms of seasonality and correlation to environmental variables, including discharge, water temperature, and the percent of moon illumination.
- Calculate indices of abundance of American Eel migrating to Lloyd Shoals Dam.

5.3 Study Background

This study will develop information on the life stage and abundance of American Eel needed to evaluate potential impacts of continued project operation on the movement of this catadromous[2] species in the Ocmulgee River in the PLP and license application.

5.3.1 Issues Identified

FERC staff identified as an issue in SD1 the effects of continued project operation on fish movement in the Ocmulgee River. This issue is to be analyzed for both cumulative and site-specific effects.

5.3.2 Study Requests

The preliminary studies list in the PAD did not identify any potential field studies pertaining to American Eel.

[2] Catadromous species spend most of their lives in fresh or brackish water, then migrate to marine environments to spawn.

In its PAD and study request comments letter dated November 5, 2018, FWS requested a study on the Life Stage, Size Range, Timing, and Abundance of American Eel below Lloyd Shoals Dam. The study would take place in the mainstem Ocmulgee River below Lloyd Shoals Dam in the 1.2-mile reach extending downstream to the Georgia Hwy 16 bridge. FWS proposes that multiple gear types (boat electrofishing, eel traps) be used to sample American Eel within the study area monthly for a minimum of two years. Information would be obtained on discharge, water temperature, and percent of moon surface illuminated on the last day of each sample for correlation with American Eel abundance. In addition, monthly catch-per-unit-effort (CPUE) would be produced and illustrated by gear types separately and combined and a mark-recapture procedure would be used to derive population estimates (plus 95-percent confidence intervals) of the eel population for each year of sampling.

In its SD1 comments letter dated November 15, 2018, NMFS also requested a study to provide baseline data necessary to evaluate the need for American Eel passage at the Lloyd Shoals Project. The study request shares the same goals, objectives, and proposed methodology as the FWS study request.

5.3.3 Resource Management Goals

American Eel is an interjurisdictional diadromous[3] fish species and federal trust resource. The Atlantic States Marine Fisheries Commission (ASMFC) coordinates interstate management for American Eel along the Atlantic Coast via an Interstate Fishery Management Plan (ASMFC 2000) and subsequent addenda. Applicable objectives of the fishery management plan include:

- Protect and enhance American Eel abundance in all watersheds where eel now occur.
- Where practical, restore American Eel to those waters where they had historical abundance but now may be absent by providing access to inland waters for glass eel, elvers, and yellow eel, and adequate escapement to the ocean for pre-spawning adult (silver) eel.

FWS' overall management goal for the Altamaha River basin and its sub-basins is to protect, enhance, and restore a diverse, healthy, and native aquatic community and the aquatic habitats on which this community depends. This goal includes an objective to provide safe, timely, and effective upstream and downstream passage for native Altamaha River basin fishes, particularly diadromous species. For diadromous species, FWS' primary goals are to:

- Protect, enhance, and restore passage for existing fish populations, reunify fragmented fish populations, and introduce or re-establish fish migratory pathways.
- Protect, enhance, and restore the habitats on which those populations will depend.

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

A goal of NMFS is to restore American Eel to historical habitats and ensure safe migratory pathways to build abundance and resilience in the population.

5.3.4 Existing Information

The following life history overview is based primarily on the species accounts of ASMFC (2000) and Shepard (2015) and included references.

American Eel is a catadromous species that ranges in North America along the Atlantic and Gulf coasts in marine and continental waters, penetrating tributary streams far inland. Mature adults spawn in the Sargasso Sea, an area within the western Atlantic Ocean, in winter and early spring. Their progeny disperse in major ocean currents to continental waters. After hatching, the transparent, ribbonlike leptocephalus larvae passively drift westward and northward for about one year before metamorphosing to the glass eel stage. Glass eels are transparent and resemble a miniature free-swimming eel. Glass eels actively migrate toward land and fresh water, ascending estuaries and river systems during the winter and spring, where they darken into elvers. Elvers migrate upstream primarily at night and are able to surmount vertical obstacles, such as low-head dams with wetted surfaces, that can pose barriers to the upstream movement of other aquatic species.

The yellow eel stage begins with development of full pigmentation at about 100-mm total length. Yellow eel resemble the adult form and range in length up to 280 mm for males and 460 mm for females. They are able to exploit a wide range of habitats, including bays, estuaries, rivers, streams, lakes, and ponds, where they feed opportunistically on invertebrates and smaller fish. Some yellow eel (mostly males) stay behind in brackish areas while others (mostly females) migrate upstream into fresh water and may eventually reach extreme upper portions of the river basin. Helfman et al. (1984) found in the Altamaha River that 94 percent of the eels in fresh water were females. The timing and duration of yellow eel upstream movements is watershed specific and can occur from March through October. Yellow eel may continue moving upstream over many years until they reach sexual maturity. In the Altamaha River, maturation occurs by 3 to 6 years old (Helfman et al. 1984). American Eel in the Altamaha River tend to be smaller, younger, and may mature more rapidly than eels at more northern latitudes.

Hammond and Welsh (2009) studied the movements of radio-tagged yellow eel near Millville Dam on the Shenandoah River, West Virginia, and found the onset of upstream migration in the spring to be associated with an increase in river discharge when water temperature exceeded 15°C. Welsh and Liller (2013) investigated the association between daily counts of upstream migrant yellow eel at the Mill Dam eel fishway and the environmental variables lunar illumination, river discharge, and water temperature. They found elevated river discharge to be associated with almost all peaks of daily eel counts when water temperature ranged from 19 to 28°C. Elevated river discharge and low lunar illumination were also associated with higher counts of upstream migrants. Little yellow eel movement was indicated during low discharge periods, and mass upstream migration was observed during an extreme discharge event.

Yellow eel undergo several physiological changes in maturing into the adult silver eel phase. The silver eel life stage is better suited for ocean migration. Silver eel may begin their seaward spawning migration by the fall. Silver eel in the Altamaha River basin migrate downstream from October to March (Shepard, 2015).

American Eel Abundance in the Ocmulgee River

Available sampling data for the Ocmulgee River from 1987 and 1988 indicate the presence of a relatively abundant population of American Eel in a 28-mile reach downstream of the Lloyd Shoals Project. These American Eel sampling data from two years of fisheries investigations on the Ocmulgee River, although 30 years old, partly address objectives 1 and 3 of the agencies' study request. They identify the size range and life stage of eels migrating into the area below Lloyd Shoals Dam (objective 1) and they provide indices of abundance, including CPUE by number and biomass (objective 3).

As summarized in the PAD, fisheries investigations for the previous Lloyd Shoals relicensing included one year of quarterly sampling of the Ocmulgee River at four stations in 1988 (EA Engineering, Science, and Technology, Inc. [EA] 1990a). The sampling stations each consisted of river segments 0.5- to 1.0-mile in length beginning at distances of 0.6 4.2, 14.0, and 27.6 river miles downstream of Lloyd Shoals Dam. Three stations were between Lloyd Shoals Dam and Juliette Dam, and one was downstream of Juliette Dam. Boat and backpack electrofishing were used exclusively. American Eel was among the top ten numerically abundant species overall, comprising 2.74 percent of the total catch. Table 5-1 presents the American Eel catch statistics for 1988. Station 1 is within 1.1 miles of the dam (the study area requested by FWS and NMFS). Forty-seven eels were collected at Station 1 and a total of 204 eels were collected from all four stations. The electrofishing catch of eels was highest in April and June and lowest in December at all but Station 3, where only boat electrofishing could be used. CPUE at Station 1 was highest in June at 19.3 fish per half-hour. Most eels in the study were collected by backpack electrofishing. The eels covered a wide range in length of yellow eel, average length was 343 mm, and the maximum length indicated the likely presence of silver eel in the catch.

As summarized in the PAD, electrofishing sampling at two sites downstream of Lloyd Shoals Dam in September 1987, as part of the instream flow study (EA 1990b), yielded fish species composition and abundance similar to the quarterly sampling in 1988. American Eel was among the top ten numerically abundant species overall, comprising 5.6 percent of the total catch. Fifty-one eels ranged in total length from 190 to 610 mm and averaged 295.2 mm.

TABLE 5-1
American Eel Quarterly Electrofishing Catch Statistics for the Ocmulgee River below Lloyd Shoals Dam in 1988

	Station 1	Station 2	Station 3	Station 4
Station Location and Habitat				
Miles below Lloyd Shoals Dam	0.6-1.1	4.2-4.8	14.0-15.0	27.6-28.2
Presence by habitat type	Pool, shoal	Pool, shoal	Pool/run	Pool, shoal
Quarterly catch (no. of fish)				

TABLE 5-1
American Eel Quarterly Electrofishing Catch Statistics for the Ocmulgee River below Lloyd Shoals Dam in 1988

	Station 1	Station 2	Station 3	Station 4
April	11	26	1	10
June	30	29	23	15
September	4	19	5	10
December	2	11	6	2
Total	**47**	**85**	**35**	**37**
Quarterly CPUE (fish/0.5 hr)				
April	7.3	14.3	0.2	6.0
June	19.3	17.0	3.8	7.6
September	2.7	11.3	0.8	6.3
December	1.0	6.7	1.0	1.3
Quarterly biomass (g)				
April	441	1,786	104	876
June	1,924	2,108	2,840	1,841
September	663	2,135	1,013	1,162
December	1,215	1,385	1,198	88
Total	**4,243**	**7,414**	**5,155**	**3,967**
Quarterly biomass CPUE (g/0.5 hr)				
April	294	981	17	413
June	1,212	1,139	473	824
September	442	1,265	169	645
December	414	819	200	59
Lengths (mm) and Life Stages Present	**All Stations**			
Minimum	168			
Maximum	825			
Mean	343			
Standard Deviation	95			
Life Stages	Juveniles, adults			

Source: EA (1990a)

5.3.5 Nexus between Project Operations and Effects

The Lloyd Shoals Project is on the Ocmulgee River at river mile 250.2 in the upper Ocmulgee River basin of the greater Altamaha River basin. The Ocmulgee River joins the Oconee River to form the Altamaha River, which flows 137 miles to the Atlantic Ocean. The Project is located 387 river miles upstream of the Atlantic Ocean above the Fall Line in the Piedmont physiographic province.

Juliette Dam, located about 19 river miles downstream of Lloyd Shoals Dam, is the first dam encountered by upstream migrant American Eel in the Ocmulgee River basin. The fisheries

studies summarized above, and occurrence records compiled by the GDNR Wildlife Conservation Section have established that American Eel are able to ascend Juliette Dam and inhabit the reach of river up to Lloyd Shoals Dam. Occurrence records within the past 25 years include two streams upstream of Lake Jackson.

5.4 Study Area

The proposed study area includes the mainstem Ocmulgee River from Lloyd Shoals Dam downstream about 1.2 river miles to the Georgia Hwy 16 bridge.

5.5 Methodology

Sampling for American Eel within the study area will be conducted using multiple gear types (electrofishing and eel traps) during six months of a one-year period. Sampling will be conducted in March, April, May, and June to encompass the onset and probable peak period of spring upstream eel migration, after water temperature rises consistently above 15°C and river discharge is high on average. Sampling will also be conducted in September and October to represent fall upstream migration. Figure 5-1 shows 2017 and 2018 daily water temperature for the nearest U.S. Geological Survey (USGS) gage downstream on the Ocmulgee River that records temperature (USGS No. 02215000, Ocmulgee River at U.S. 341 at Hawkinsville, Georgia). Water temperature rises above 15°C by late February and ranges up to 25°C into early June. For the months in which water temperature consistently exceeds 15°C (March-October), mean flow by month at Lloyd Shoals Dam is highest in March, April, and May (see Table 5 in the PAD). A combination of water temperature above 15°C and elevated river discharge has been correlated with peaks of upstream eel migration (Hammond and Welsh 2009; Welsh and Liller 2013). The previous fisheries investigations on the Ocmulgee River (EA 1990a) documented the highest CPUE of American Eel in June and April (Station 1; Table 5-1). Sampling also will be conducted in September and October to characterize seasonal variation in abundance and upstream migration before water temperature falls below 15°C.

Sampling is not proposed for July-August because water temperature is consistently higher than 25°C (Figure 5-1) and mean river discharge is low. Sampling also is not proposed for November-February because water temperature is consistently below 15°C and studies indicate that eel migration is minimal during winter months (Shepard 2015).

Georgia Power proposes sampling over a one-year period, as numerical CPUE of American Eel from the previous fisheries investigations (EA 1990a) suggests that six months of sampling will yield sufficient numbers of eel to achieve the study objectives.

5.5.1 Electrofishing

Electrofishing sampling, including boat and backpack electrofishing as appropriate to depth and habitat conditions, will be conducted once per month in March-May and September-October. This active method of sampling will be effective for characterizing the current size range and life stage of American Eel inhabiting the study area. In the previous fisheries

investigations, which used daylight boat and backpack electrofishing, numerical CPUE of American Eel in the study area was dominated by the backpack electrofishing catch from wadeable shoal habitats (EA 1990a). All electrofishing will be conducted under daylight conditions during off-peak flow releases from Lloyd Shoals Dam.

Electrofishing methods will be standardized to include timed runs or transects to represent habitats available along the entire length of the study area and both sides of the river. Up to four 30-minute boat electrofishing runs (totaling 2 hours of effort) will be made during each sampling event to represent the range of boat-able habitats available in the study area. During each run, the boat will be maneuvered slowly upstream along the shoreline while stunned eel are netted. All fish collected will be held in a live well for processing.

Backpack electrofishing will be conducted in shoal habitats within the study area using a standard backpack electrofisher. Sampling effort will consist of up to four 15-minute runs (totaling 1 hour of effort) to represent the range of wadeable habitats available in the study area. All fish collected will be held in water-filled buckets or coolers with aeration for processing.

5.5.2 Eel Trapping

Sampling will also include one multi-day sampling event per month in March-May and September-October, during which eel traps will be deployed overnight for at least two consecutive nights. This passive sampling method will be used to characterize upstream migrant American Eel approaching the base of Lloyd Shoals Dam. Eel traps will be deployed in up to five locations near the base of Lloyd Shoals Dam, including shorelines within or approaching the tailrace channel and shallow pools near the base of the spillway.

Eel trap design will be based on the physical habitat conditions and accessibility at the specific locations selected for sampling. Standard eel traps/pots will be constructed from 0.5- by 0.5-inch minimum mesh size wire with 2-inch diameter circular entry rings. Baited traps will be set at sunset and pulled after sunrise the following morning. At readily accessible locations along the dam for tending traps from a staging area, trapping methods may also include the use of a metal ramp lined with landscape fabric climbing substrate (Enkamat or Akwadrain), an attraction flow, and a covered collection bucket with aeration or flow-through water supply. Ramp attraction flow will be provided by either gravity-fed or pumped water supply. Ramp traps will be set at sunset and checked and emptied after sunrise the following morning. Trapped eels will be held in water-filled buckets or coolers with aeration for processing.

5.5.3 Data Analysis

All captured eels will be anesthetized with an approved anesthetic such as MS 222, measured to the nearest mm total length, weighed in grams, caudal fin-clipped, tagged with a Biomark Passive Integrated Transponder (PIT) tag, and released to the study area. Length-frequency distributions will be produced by month of sampling, gear type, and combined gear types for the entire sampling period. Minimum, maximum, and mean total lengths will be reported.

Data for the environmental variables river discharge, water temperature, and percent of moon illumination will be collected for the sampling periods for correlation to eel catch. Discharge data will be obtained from the USGS gage located about 1 mile downstream (USGS No. 02210500, Ocmulgee River near Jackson, Georgia). Water temperature data is available from the USGS gage on the Ocmulgee River at Hawkinsville (USGS No. 02215000) but water temperature data will be continuously recorded in the study area as part of the tailrace water quality monitoring proposed by Georgia Power in the Water Resources Study (Section 3.0); these data will be used when they coincide with eel sampling periods. Readily available percent of moon surface illumination data will be obtained online from the U.S. Naval Observatory for the last day of each sampling event.

The number of eels captured by date will be graphed separately by gear type and combined for the entire sampling period. Any resulting trends will be interpreted. The eel catch by date will also be evaluated for correlation to river discharge, water temperature, and percent moon surface illumination. These data will be presented in graphs and any resulting trends will be interpreted.

Monthly CPUE by separate and combined gear types will be presented. A mark-recapture procedure will also be used to generate a population estimate (plus 95-percent confidence interval) of the American Eel population in the study area.

5.6 Reporting

A Study Progress Report will be prepared and provided to participants prior to the completion of the study. The progress report will describe overall progress in completing the proposed sampling and data analysis, summarize preliminary findings as available, and explain any variance from the study plan and schedule.

An American Eel Abundance and Upstream Movements Study Report will be prepared and provided to participants for review and comment at the end of the 1-year study. The study report will compile the data gathered, present the findings in tables and graphs, and interpret any resulting trends.

5.7 Schedule

In accordance with the Lloyd Shoals Process Plan and Schedule and the master schedule provided in Section 1.3, the American Eel Abundance and Upstream Movements Study will be completed according to the milestones in Table 5-2.

TABLE 5-2
Schedule for Conducting the American Eel Abundance and Upstream Movements Study

Activity	Deadline
Begin Field Studies and Literature-Based Review	May 2019
File Progress Report	January 31, 2020
Complete Field Studies and Literature-Based Review	April 2020
File Final Study Report	May 19, 2020

5.8 References

Atlantic States Marine Fisheries Commission (ASMFC). 2000. Interstate fishery management plan for American Eel. Fishery Management Report No. 36. April 2000.

EA Engineering, Science, and Technology, Inc. (EA). 1990a. Fisheries investigations of the Ocmulgee River downstream of the Lloyd Shoals hydroelectric facility. Prepared for Georgia Power Company. EA Report No. 10277.08. June 1990.

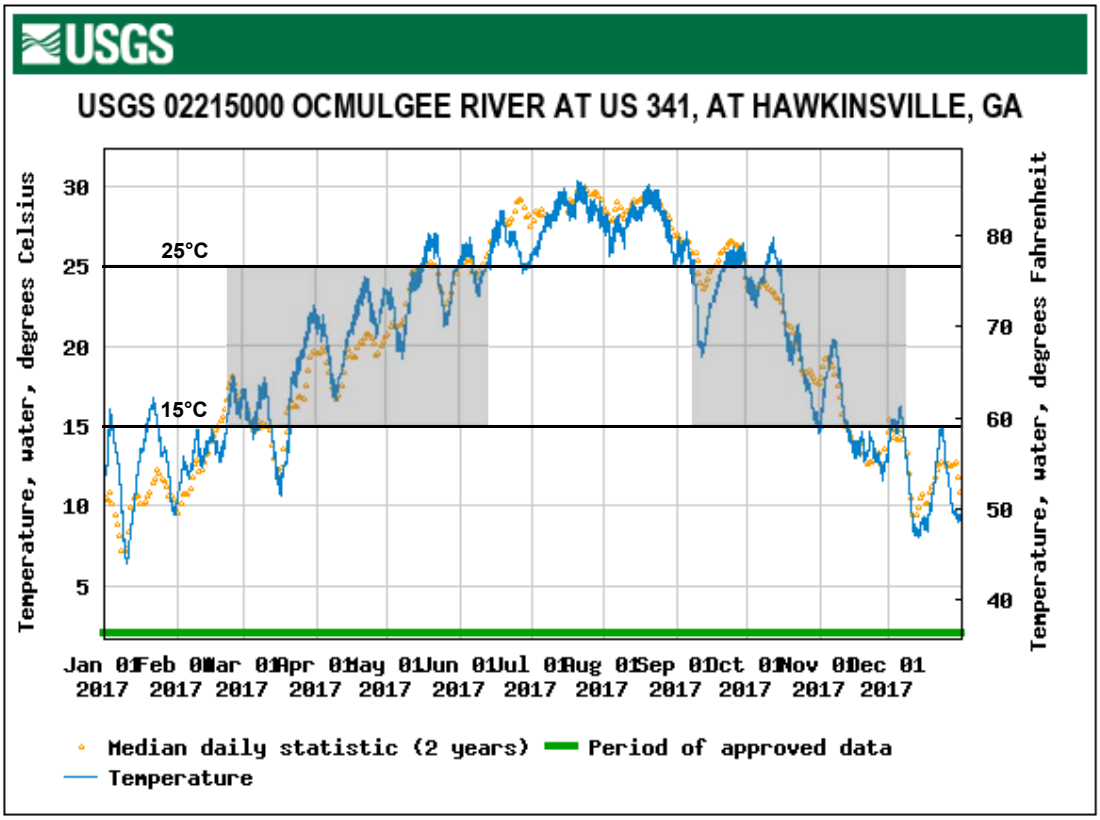
EA Engineering, Science, and Technology, Inc. (EA). 1990b. Instream flow studies for the North Georgia (FERC Project No. 2354) and Lloyd Shoals (FERC Project No. 2336) hydroelectric facilities. Prepared for Georgia Power Company. EA Report No. 10276.08. February 1990.

Hammond, S. D., and S. A. Welsh. 2009. Seasonal movements of large yellow American eels downstream of a hydroelectric dam, Shenandoah River, West Virginia. American Fisheries Society Symposium 58:309-323.

Helfman, G. S., E. L. Bozeman, and E. B. Brothers. 1984. Size, age, and sex of American eels in a Georgia River. Transactions of the American Fisheries Society 113:132-141.

Shepard, S. L. 2015. American eel biological species report. Supplement to: Endangered and Threatened Wildlife and Plants; 12-Month Petition for the American Eel (*Anguilla rostrata*), Docket Number FWS-HQ-ES-2015-0143. U.S. Fish and Wildlife Service, Region 5. June 2015.

Walsh, S. A., and H. L. Liller. 2013. Environmental correlates of upstream migration of yellow-phase American eels in the Potomac River drainage. Transactions of the American Fisheries Society 142(2):483-491.



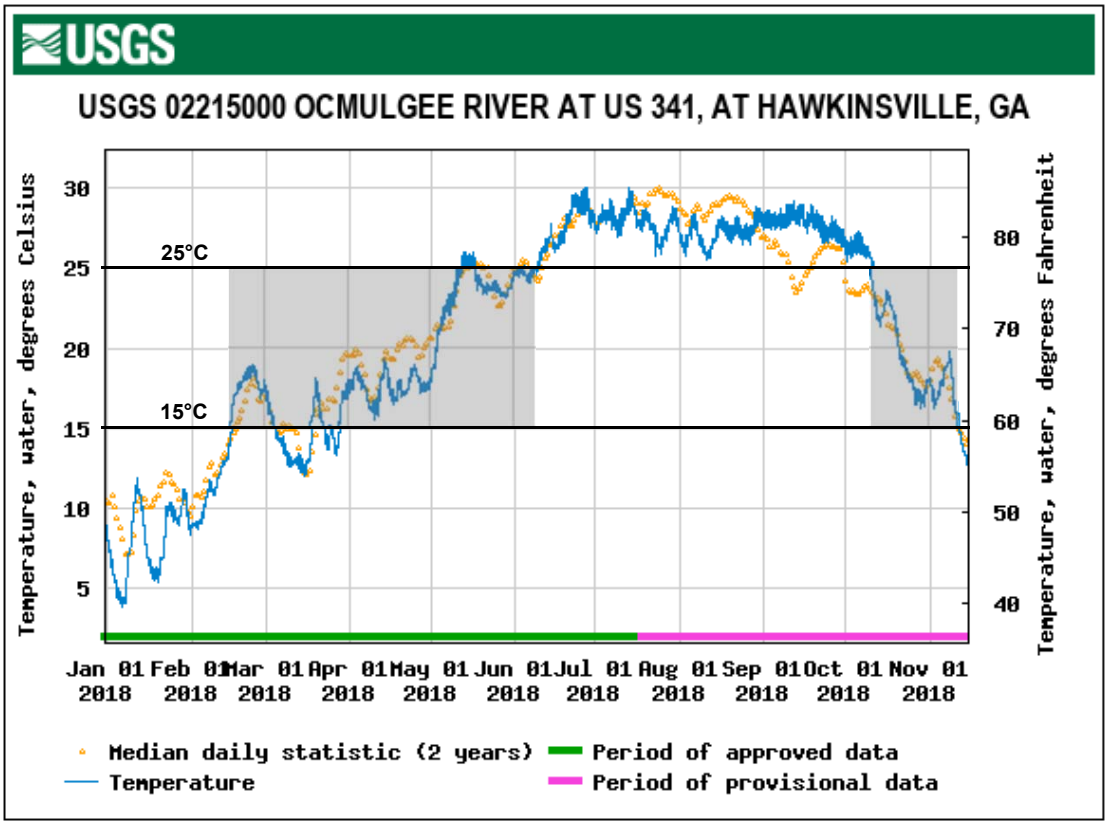


Figure 5-1
Ocmulgee River Water Temperature in 2017 and 2018 with Suitable Temperature Range for Upstream Movement of American Eel Indicated by Shading
Lloyd Shoals Project (FERC No. 2336)

6.0 TERRESTRIAL, WETLAND, AND RIPARIAN RESOURCES

6.1 Introduction

Georgia Power proposes to characterize existing terrestrial, wetland, and riparian resources at the Lloyd Shoals Project through a field reconnaissance survey and the use of existing information and data. This study plan combines wildlife and botanical resources as described in Section 4.5 of the PAD with wetlands, riparian, and littoral habitat as described in Section 4.6 of the PAD into a single consolidated study effort.

6.2 Goals and Objectives

The goal of the study is to characterize existing terrestrial, wetland, and riparian resources for evaluating the associated resource issues identified during FERC's public scoping process pursuant to NEPA that have a nexus to project operations.

The specific study objectives are to:

- Describe terrestrial wildlife and botanical resources occurring in the Lloyd Shoals Project area, including providing lists of representative plant and animal species that use representative upland habitats, and to identify invasive species in these habitats.

- Describe the floodplain, wetlands, and riparian habitats occurring in the project area, including lists of representative plant and animal species that use representative habitats, to identify invasive species, and to prepare a map delineating wetland, riparian, and littoral habitat.

6.3 Study Background

This study will develop information needed to evaluate potential impacts of continued project operation in consideration of the terrestrial resource issues identified during scoping, known resource management goals of the agencies with jurisdiction over terrestrial resources, the availability of existing relevant information as to plant and animal species using upland and wetland, riparian, and littoral habitats in the project area, and the requirement that there be a nexus between project operations and effects on terrestrial resources.

6.3.1 Issues Identified

FERC staff identified in SD1 the following list of terrestrial resource issues, which include those also pertaining to wetlands, riparian, and littoral habitat:

- Effects of continued project operation and maintenance, project-related recreation, and shoreline development on upland habitat, reservoir wetland, and littoral habitats, and associated wildlife.

- Effects of continued project operation and maintenance, as well as project-related recreation, on state species of concern in the vicinity of the project.

- Effects of continued project operation and maintenance activities, including shoreline management, and project-related recreation on non-native invasive botanical and wildlife species.

6.3.2 Study Requests

Georgia Power's preliminary studies list (PAD Section 5.2.1) identified separate studies for wildlife and botanical resources, and for wetlands, riparian, and littoral habitat. These studies would describe terrestrial wildlife and botanical resources, as well as floodplain, wetlands, riparian, and littoral habitats occurring the study area based on a field reconnaissance survey and through review of existing information and data. Because these resource areas tend to overlap spatially, and the field reconnaissance survey would be performed concurrently for both sets of objectives, Georgia Power has consolidated these proposed efforts under a single Terrestrial, Wetland, and Riparian Resources Study.

No study requests pertaining to wildlife and botanical resources or wetlands, riparian, and littoral habitats were filed by stakeholders following the study criteria under 18 CFR § 5.9(b).

In its comments on preliminary study proposals pertaining to wildlife, botanical resources, and threatened and endangered species (letter dated November 5, 2018), FERC staff highlighted the need for sufficient project-specific information for analysis of potential project-related effects on these resources, including information regarding non-native invasive species, RTE species, and their habitats. FERC requests that the study plans include methodologies for collecting sufficient detail allowing its staff to accurately describe the existing natural resources in the project area and assess potential project-related effects on those resources within the project boundary, including at existing formal and informal project facilities (e.g., recreation access sites), and at any other areas under consideration for potential development as part of the licensing proposal. FERC further requests that the timing of field surveys for the botanical RTE species coincides with each species' flowering or fruiting period, as appropriate, for accurate identification. Georgia Power has incorporated these elements into this Terrestrial, Wetland, and Riparian Resources Study Plan.

In its PAD and SD1 comments, WRD requested that Georgia Power survey and map submergent aquatic vegetation in Lake Jackson to assist aquatic habitat planning and addressing future issues, should they occur. WRD also requested that Georgia Power develop an aquatic vegetation plan for the reservoir, which should outline all principles and practices as they relate to aquatic vegetation in the project reservoir and include notifying WRD of aquatic nuisance vegetation treatment in the project area.

Georgia Power proposes to describe the distribution and abundance of submergent/submersed vegetation in Lake Jackson based on familiarity with the reservoir gained from ongoing

shoreline and resource management activities and through the proposed field reconnaissance survey. In addition, there has been no evidence to date of the occurrence of Hydrilla (*Hydrilla verticillata*), a highly invasive exotic aquatic plant species, in the reservoir. Regarding aquatic invasive species management, the information developed in this study through the field reconnaissance survey and review of past treatment of aquatic nuisance vegetation in the reservoir will allow Georgia Power to develop proposals for aquatic vegetation management, as appropriate, in the PLP.

6.3.3 Resource Management Goals

GDNR and FWS are the primary state and federal resource agencies having jurisdiction along the Ocmulgee River pertaining to the protection of terrestrial and wetland resources.

6.3.4 Existing Information

The Lloyd Shoals Project is located in the Southern Outer Piedmont ecoregion. Major forest types include loblolly-shortleaf pine, oak-hickory, and oak-pine forests. The PAD describes dominant native vegetation and other natural community types in the region and lists the Georgia invasive plant species posing the most serious problems or potential to become serious problems in the four counties occupied by the Project.

The wildlife community in the project area includes many terrestrial mammal species, a wide variety of birds using diverse, wetland, upland, and open-water habitats in the project vicinity, as well as diverse reptile and amphibian communities. The Bald Eagle, a Georgia threatened species, occurs year-round within the project area and nests along the shoreline of Lake Jackson on Georgia Power land. The PAD describes and lists the wildlife species occurring in the project area based on an extensive amount of existing information and data.

The wetlands surrounding the Lloyd Shoals Project are primarily palustrine forested, scrub-shrub, and emergent wetlands associated with Lake Jackson. Overall, there are approximately 400 acres of wetlands within the project boundary, and forested/shrub wetlands are the dominant type. The wetlands and riparian areas provide habitat for wildlife, including birds, reptiles, amphibians, and small mammals.

Georgia Power proactively monitors the occurrence of and periodically treats invasive terrestrial and aquatic plants within the project boundary. Georgia Power has occasionally treated the emergence of aquatic weeds in Lake Jackson. Identified taxa include the cyanobacteria *Microsystis* spp., *Lyngbya* spp., and *Cylindrospermopsis raciborskii*; and the vascular aquatic plant Alligatorweed (*Alternanthera philoxeroides*).

Forested stands found on floodplains of Lake Jackson include Green Ash, Red Maple, and Sweet Gum in the canopy, Box Elder and Red Maple within the understory, and River Birch and Water Willow along the water's edge. Natural shoreline vegetation and riparian habitat

within the floodplains of Lake Jackson have been reduced by development, primarily for residential land use and some businesses.

6.3.5 Nexus between Project Operations and Effects

Georgia Power operates the Lloyd Shoals Project in a modified run-of-river mode for generation during peak power demand hours to meet electrical system demand. Inflows are stored for only short periods of time, generally no longer than 24 hours, and then released through the generating turbines during peak power demand periods. Georgia Power normally operates the Lloyd Shoals Project to maintain reservoir elevations between approximately 530 and 527 ft PD year-round, excluding planned drawdowns and drought. Daily fluctuations of Lake Jackson are less than 1.5 ft about 98-percent of the time.

The FERC project boundary generally follows the full-pool elevation contour of 530 ft PD, except in some areas where it follows metes-and-bounds property lines, including areas for public recreation and around the powerhouse (Figure 1-2). Georgia Power maintains four project recreation access areas within the project boundary. The project boundary extends downstream of Lloyd Shoals Dam approximately 0.5 mile to encompass Ocmulgee River Park.

6.4 Study Area

The proposed study area includes the project boundary around Lake Jackson and project lands adjacent to Lloyd Shoals Dam and the tailrace area, including the project recreation facilities.

For the purposes of mapping vegetative cover types and wetlands, the study area will also include a zone extending to 2,000 ft beyond the project boundary around Lake Jackson to encompass a conservatively large area for characterizing the existing environment.

6.5 Methodology

Georgia Power's approach for completing the Terrestrial, Wetland, and Riparian Resources Study consists of the following elements.

6.5.1 Review of Existing Information

Descriptions of existing terrestrial, wetland, and riparian resources in the project study area (i.e., wildlife and botanical resources, and wetlands, riparian, and littoral habitat) will be based on review of existing information summarized in the PAD and other sources, inspection of existing aerial photography and National Wetlands Inventory (NWI) maps, and a field reconnaissance survey for observing habitat and specific plant and wildlife species occurrences and verifying approximate wetland boundaries and locations of significant beds of submergent/submersed aquatic vegetation (see below).

Terrestrial habitats will be quantitatively described and mapped in areas where project-related disturbances would occur. A map of vegetative cover types, including approximate wetland

boundaries, will be prepared for the project boundary around Lake Jackson. Available habitat types will be compared against habitat requirements of wildlife known from the region to refine the list of species most likely to occur within the project area. Wildlife and plant species lists will be compiled for the common species found in the project area.

Wetlands, Bald Eagle nests, and any wading bird nesting areas identified within the project boundary will be approximately delineated and quantitatively described. The extent to which these habitats may extend beyond the project boundary will also be described. Wildlife and plant species lists will be compiled for the common species found in the project area, and the extent of any known occurrences of terrestrial and aquatic non-native invasive plant species within the project boundary will be quantitatively described. Potentially sensitive information pertaining to Bald Eagle nesting and other RTE species locations will be separated out and marked as "privileged" information upon filing the study results. The reservoir elevation-area relationship for Lake Jackson will be evaluated to estimate the area of wetland and littoral zone habitats potentially affected by typical daily reservoir fluctuations.

In addition, Georgia Power will describe its invasive vegetation monitoring and management practices for Lake Jackson and project lands, including the species of invasive plants previously reported from within the project boundary around Lake Jackson, species and acreage treated, management techniques and frequency of maintenance applications, and guidance and best management practices used by Georgia Power in invasive vegetation management.

6.5.2 Field Reconnaissance Survey

A field reconnaissance survey of the study area, concentrating mainly on lands and waters within the project boundary around Lake Jackson, will be conducted in appropriate seasons from May 2019 to April 2020 to observe representative terrestrial communities and associated wildlife habitat and to characterize wetland, riparian, and littoral habitats.

- Field biologists will inspect existing, recent aerial photography prior to and during the survey to identify signatures of representative upland, wetland, and riparian vegetation community types for reconnaissance.

- Teams of biologists will visually assess upland, wetland, and riparian communities around and above the Lake Jackson and Lloyd Shoals tailrace shoreline from a boat and/or walking on Georgia Power and public lands. Areas inaccessible by boat or public lands will be evaluated by inspecting available recent aerial photography.

- Field notes will be recorded, and aerial photographs annotated as to dominant vegetative cover classes including wetlands, unique or unusual habitat types, observations of bird, reptile, amphibian, and mammal species, evidence of wildlife (nests, burrows, etc.), and locations of invasive pest plant species.

- A community evaluation form will be completed for each vegetative community observed (Figure 6-1). The form will be standardized for the survey to include a general habitat description, including moisture regime, and will document common species, invasive pest plant species, and any animal observations.

- Wetland areas, including submergent aquatic beds, will be documented on the community evaluation form (Figure 6-1), including common species, invasive pest plant species, and any animal observations. Wetlands will be characterized according to the FWS classification system (Cowardin et al., 1979).

- Where non-native invasive pest plant species are observed, biologists will estimate the size of the infestation and note whether the species appears to be actively spreading.

- Aerial photography and NWI maps will be used to help locate and verify approximate wetland boundaries for mapping purposes. Mapping will include ground-truthing of NWI wetland boundaries and annotating aerial photographs to update approximate wetland boundaries. Soils, hydrology, and plant composition will be evaluated consistent with the USACE (1987) three-parameter approach, but wetland boundaries will not be formally delineated.

The field reconnaissance survey will be completed within approximately 5 to 7 field days by teams of two biologists. The field reconnaissance will not include a delineation of boundaries of wetlands suitable for a USACE jurisdictional determination but will verify approximate boundaries of existing wetlands for mapping purposes.

Mapping of vegetative cover types, including wetlands, will be developed in a GIS database. Tables will be generated showing acreages of each vegetative and wetland community type within the project boundary and within a zone extending 2,000 ft beyond the project boundary around Lake Jackson.

6.6 Reporting

A Study Progress Report will be prepared and provided to participants prior to the completion of the study. The progress report will describe overall progress in completing the field survey, summarize preliminary findings as available, and explain any variance from the study plan and schedule.

A Terrestrial, Wetland, and Riparian Resources Study Report will be prepared and provided to participants for review and comment at the conclusion of the study. The study report will compile the information gathered from the field survey and the review of existing information and data.

6.7 Schedule

In accordance with the Lloyd Shoals Process Plan and Schedule and the master schedule provided in Section 1.3, the Terrestrial, Wetland, and Riparian Resources Study will be completed according to the milestones listed in Table 6-1 below.

TABLE 6-1
Schedule for Conducting the Terrestrial, Wetland, and Riparian Resources Study

Activity	Deadline
Begin Field Studies and Literature-Based Review	May 2019
File Progress Report	January 31, 2020
Complete Field Studies and Literature-Based Review	April 2020
File Final Study Report	May 19, 2020

6.8 References

Cowardin, L. M., V. Carter, F. C. Golet, and 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. 131 pp.

Georgia Department of Natural Resources (GDNR). 2015. State Wildlife Action Plan. Social Circle, Georgia. September 2015.

U.S. Army Corps of Engineers (USACE). 1987. 1987 Wetland Delineation Manual. Wetlands Research Program Technical Report Y-87-1. U.S. Army Corps of Engineers Waterways Experiment Station Environmental Laboratory.

Figure 6-1
Community Evaluation Form – Lloyd Shoals Project (FERC No. 2336)
Georgia Power Company

Community ID#:_____ **Date:**_____

General Community Description

Common Species	Canopy	Subcanopy	Ground Cover

IPP Species Observations Species	Canopy	Subcanopy	Ground Cover

Wildlife Observations

7.0 RARE, THREATENED, AND ENDANGERED SPECIES

7.1 Introduction

Georgia Power proposes to conduct a study to characterize existing federal and state RTE species of plants and wildlife that may be present in the Lloyd Shoals Project area through review of existing information and field surveys. For the purposes of this study, RTE species includes species listed as federal and state protected species, species under review for federal listing, and other rare species being tracked by GDNR as species of concern.

7.2 Goals and Objectives

The goal of the study is to characterize existing RTE species, including candidate and special concern species, that may be present in the project area for evaluating significant issues identified during FERC's public scoping process conducted pursuant to NEPA that have a nexus to project operations. The specific study objectives are to:

- List federal and state RTE plant and animal species, and species currently under federal status review, with known records of occurrence near the Project.
- Identify habitat requirements of species included in the list described above.
- Describe distributions and habitat use of RTE species presently occurring near the project.
- Assess the potential effects of project operation on these species and their habitats.

Information compiled in the PAD will be analyzed and updated for this study based on the findings of field surveys and other new information.

7.3 Study Background

This study will develop information needed to evaluate the potential impacts of continued project operation in consideration of the RTE species issues identified during scoping, the resource management goals of the agencies having jurisdiction over RTE species, the availability of current relevant information, and any nexus between project operations and effects on RTE species.

7.3.1 Issues Identified

FERC staff identified in SD1 the following resource issue pertaining to RTE species:

- Effects of continued project operation and maintenance, and project-related recreation, on federally listed endangered, threatened, and candidate species, and their habitat, in the vicinity of the project, including the endangered Gulf Moccasinshell, Oval Pigtoe,

Shinyrayed Pocketbook, Black-spored Quillwort, Michaux's Sumac, Relict Trillium, and Red-cockaded Woodpecker; the threatened Purple Bankclimber, and Little Amphianthus (also known as Pool Sprite); and the candidate Robust Redhorse, Altamaha Arcmussel, Inflated Floater, and Reverse Pebblesnail.

7.3.2 Study Requests

In the PAD (Section 5.2.1), Georgia Power proposed to conduct a study evaluating federal and state RTE plant and animal species, and species currently under federal status review, with known occurrence records near the Project. The study would identify their habitat requirements and describe distributions and habitat use of RTE species presently occurring near the Project. Information compiled in the PAD would be reconsidered and updated based on the findings of field surveys, consultation with the resource agencies, and other new information.

No study requests pertaining to RTE species were filed by stakeholders following the study criteria under 18 CFR § 5.9(b). In its PAD and Study Request comments letter dated November 5, 2018, FWS identified that it has been petitioned to list the Robust Redhorse under the Endangered Species Act. FWS subsequently issued a partial 90-day finding that listing may be warranted. Because this species inhabits the Ocmulgee River downstream of the Lloyd Shoals Project, FWS supports the proposed DO monitoring and analyses that will be conducted in the Lloyd Shoals tailrace as part of the Water Resources Study (Section 3.0).

In its comments on preliminary study proposals pertaining to RTE species (letter dated November 5, 2018), FERC staff requests that the RTE Species Study include an assessment of the potential effects of project operation on these species and their habitats and that the timing of field surveys for the botanical RTE species coincides with each species' flowering or fruiting period, as appropriate, for accurate identification. This RTE Species Study Plan incorporates these elements. FERC also requests that documentation of occurrences of federally-listed species, or their habitats, be filed as "Not for Public Disclosure, Privileged."

7.3.3 Resource Management Goals

FWS and GDNR are the resource agencies having jurisdiction over federal and state RTE species, respectively. In addition, NMFS has jurisdiction over federally listed diadromous fishery resources in the Altamaha River basin.

7.3.4 Existing Information

Information on RTE species potentially occurring in the Ocmulgee River basin of Butts, Henry, Jasper, and Newton Counties, Georgia was obtained for the PAD from rare species databases maintained by the GDNR Wildlife Conservation Section, FWS (Environmental Conservation Online System) and NatureServe (2017). Literature review also included manuals on Georgia's rare plants (Patrick et al., 1995; Chafin, 2007) and recovery plans and recent species evaluations completed by FWS for federally listed species.

Based on known element of occurrence records (historic or present) and species range and habitat data, 21 state and/ or federally protected species of plants and wildlife potentially occur in the vicinity of the Lloyd Shoals Project. Table 7-1 briefly describes known habitat for each of the 21 species as well as 28 other species of concern being tracked by GDNR.

Federally Protected Species

Nine threated and endangered species potentially occur within the 4-county project vicinity (Table 7-1). These include four plant species, one bird species, and four mussel species:

- Little Amphianthus (*Amphianthus pusillus*) – threatened;
- Black-spored Quillwort (*Isoetes melanospora*) – endangered;
- Michaux's Sumac (*Rhus michauxii*) – endangered;
- Relict Trillium (*Trillium reliquum*) – endangered;
- Red-cockaded Woodpecker (*Picoides borealis*) – endangered;
- Gulf Moccasinshell (*Medionidus penicillatus*) – endangered;
- Oval Pigtoe (*Pleurobema pyriforme*) – endangered;
- Purple Bankclimber (*Elliptoideus sloatianus*) – threatened; and
- Shinyrayed Pocketbook (*Hamiota subangulata*) – endangered.

Brief accounts of the four federally protected plant species and one federally protected bird species are provided in the PAD. Critical habitat has not been designated for any of these plant and bird species.

As described in the PAD, the four freshwater mussel species, although reported for Henry County (and listed above by FERC [Section 7.3.1]), do not occur in the Ocmulgee River or the Altamaha River basin. They inhabit the adjacent Flint River basin to the west, where they are endemic to the Apalachicola-Chattahoochee-Flint River (ACF) basin of Georgia, Alabama, and Florida (FWS, 2007). Hence, these four mussel species will not be evaluated any further in the RTE Species Study.

There are no known occurrences of federally threatened or endangered species within the Lloyd Shoals project boundary.

State Protected Plant Species

Five other Georgia listed plants potentially occur in the project vicinity, including one listed as endangered, two as threatened, and two as rare (Table 7-1). Two of the state-protected plant species, Dwarf Hatpins (endangered) and Granite Stonecrop (threatened), inhabit granite outcrops and do not presently occur within the Lloyd Shoals project boundary. Based on available information, Oglethorpe Oak (threatened), Mountain Catchfly (rare), and Silky Camellia (rare) are not presently known to occur within the Lloyd Shoals project boundary.

State Protected Wildlife Species

Seven other Georgia listed wildlife species potentially occur in the project vicinity, including one mussel, three fish, one crayfish, one reptile, and one bird species (Table 7-1). The freshwater mussel species Altamaha Arcmussel is currently present in the Ocmulgee River downstream of Lloyd Shoals Dam and was also recently discovered in Lake Jackson (Georgia Power, 2017b).

Of the three fish species, Altamaha Shiner and Robust Redhorse presently occur in the project vicinity. The Altamaha Shiner, a Georgia threatened species, occurs in tributary streams upstream of Lake Jackson and in the Ocmulgee River downstream of Lloyd Shoals Dam. The species is currently undergoing a status review by FWS to determine whether listing as a threatened or endangered species is warranted (FWS, 2011). The Goldstripe Darter occupies spring-fed headwaters and creeks in the Coastal Plain and is unlikely to occur near the Project.

One established nesting pair of Bald Eagles occurs along the shoreline of Lake Jackson on Georgia Power land. The species is protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act.

The Southern Hognose Snake is primarily found in the Coastal Plain of Georgia. A single specimen from near Lake Jackson represents the only Piedmont record of the species in Georgia, but this occurrence is historical, and the species may be extirpated from the area. The Southern Hognose Snake is unlikely to occur within the Lloyd Shoals project boundary.

Species of Concern

An additional 28 species tracked by GDNR as species of special concern potentially occur in the project vicinity (Table 7-1). These include 17 plants, one mussel, two freshwater snails, four fishes, one amphibian, one reptile, one bird, and one bat. The mussel species (Inflated Floater) has been found in the Ocmulgee River including Lake Jackson (Georgia Power, 2017). The Reverse Pebblesnail inhabits shoals with rapidly flowing water and is known from two locations in Newton County; both are upstream of the project boundary (Georgia Power, 2017). The species is currently undergoing a status review by FWS to determine whether listing as a threatened or endangered species is warranted. The fish species Brassy Jumprock inhabits the

Ocmulgee River and has been reported from tributaries to Lake Jackson including the South River and Yellow River systems.

7.3.5 Nexus between Project Operations and Effects

Georgia Power normally operates the Lloyd Shoals Project to maintain reservoir elevations between approximately 530 and 527 ft PD year-round, excluding planned drawdowns and drought. Daily fluctuations of Lake Jackson are less than 1.5 ft about 98-percent of the time.

Lloyd Shoals Dam discharges directly into the Ocmulgee River. When the plant is not operating to generate peak energy, the Project releases a continuous minimum flow of 400 cfs, or inflow, whichever is less, for the protection of fish and wildlife resources in the Ocmulgee River downstream.

The FERC project boundary generally follows the full-pool elevation contour of 530 ft PD, except in some areas where it follows metes-and-bounds property lines, including areas for public recreation and around the powerhouse (Figure 1-2). Georgia Power maintains four project recreation access areas within the project boundary. The project boundary extends downstream of Lloyd Shoals Dam approximately 0.5 mile to encompass Ocmulgee River Park.

TABLE 7-1

Rare, Threatened, and Endangered Species with Known Records of Occurrence in the Lloyd Shoals Project Vicinity[a]

Scientific Name	Common Name	Federal Status[b]	Georgia Status[c]	Global Rank[d]	Habitat	County
PLANTS:						
Amphianthus pusillus	Little Amphianthus	LT	T	G2	Shallow, flat-bottomed depressions (solution pits, vernal pools) on granite outcrops, with thin gravelly soils and winter-spring inundation.	Butts, Henry, Newton
Anemone caroliniana	Carolina Windflower			G5	Openings in seepage swamps over Iredell soils; wet meadows.	Jasper
Carex seorsa	Weak Stellata Sedge			G5	Moist depressions in forests and deciduous swamps.	Newton
Cyperus lupulinus ssp. macilentus	Meagre Hop Flatsedge			G5T5	Open sandy or coarse soil habitats along roadsides, sandy shores of lakes or rivers, rock outcrops in forests, and disturbed soils.	Jasper
Cypripedium acaule	Pink Ladyslipper			G5	Upland pine and mixed pine-hardwood forests with acidic soils; in the mountains, near edges of rhododendron thickets and mountain bogs.	Henry, Jasper
Dryopteris celsa	Log Fern			G4	Wet slopes, hammocks and swamps with calcareous soils.	Jasper
Eriocaulon koernickianum	Dwarf Hatpins		E	G2	Seepage areas and wet depressions on granite outcrops, often with horned bladderwort.	Newton
Eurybia avita	Alexander Rock Aster			G3	Granite outcrops; rooted in shallow soils of moist depressions in light shade.	Newton
Eurybia jonesiae	Piedmont Bigleaf Aster			G3?	Rich deciduous forests bordering rivers and streams; moist ravines	Butts
Glyceria septentrionalis	Floating Manna-grass			G5	Swamps and marshes, either in shallow water or very wet soil; alluvial forests, borders of streams, and shores of ponds or lakes.	Newton

TABLE 7-1

Rare, Threatened, and Endangered Species with Known Records of Occurrence in the Lloyd Shoals Project Vicinity[a]

Scientific Name	Common Name	Federal Status[b]	Georgia Status[c]	Global Rank[d]	Habitat	County
Gratiola graniticola	Granite Hedge-hyssop			G3	Restricted to ephemeral vernal pools on granite outcrops.	Butts, Newton
Isoetes melanospora	Black-spored Quillwort	LE	E	G1	Shallow, temporarily flooded, flat-bottomed pools formed by natural erosion on granite outcrops.	Butts, Newton
Listera australis	Southern Twayblade			G4	Low, moist woods with rich humus and a shady understory.	Jasper
Panax quinquefolius	American Ginseng			G3G4	Rich, cool, moist but not extremely wet woods under a closed canopy.	Jasper
Pilularia americana	American Pillwort			G5	Granite outcrops, seasonally exposed muddy shores.	Butts
Portulaca umbraticola ssp. coronata	Wingpod Purslane			G5T2	Sandy soils of granite and sandstone outcrops	Newton
Quercus oglethorpensis	Oglethorpe Oak		T	G3	Wet clay soils of seepage swamps, stream terraces, and moist hardwood forests.	Jasper
Quercus prinoides	Dwarf Chinquapin Oak			G5	Roadsides, hillside pastures, and barren slopes with dry rocky or sandy soils.	Newton
Quercus similis	Swamp Post Oak			G4	Rich, moist bottom lands; pine woods, gulf prairies, and marshes.	Jasper
Rhus michauxii	Michaux's Sumac	LE	E	G2G3	Sandy or rocky open woods in areas where disturbance has provided open areas.	Newton
Sedum pusillum	Granite Stonecrop		T	G3	Granite outcrops, usually in mats of moss beneath cedar trees	Henry, Newton
Silene ovata	Mountain Catchfly		R	G3	Rich, deciduous forests over limestone or amphibolite in the Coastal Plain and in Fall Line Ravines.	Jasper
Solidago porteri	Porter's Goldenrod			G1Q	Dry woods and barrens; mix of native grasslands and oak savannah).	Jasper

TABLE 7-1

Rare, Threatened, and Endangered Species with Known Records of Occurrence in the Lloyd Shoals Project Vicinity[a]

Scientific Name	Common Name	Federal Status[b]	Georgia Status[c]	Global Rank[d]	Habitat	County
Stewartia malacodendron	Silky Camellia		R	G4	Rich ravine and slope forests; lower slopes of sandhills above bogs and creek swamps.	Butts
Trillium reliquum	Relict Trillium	LE	E	G3	Mature hardwood forests in rich ravines and on stream terraces on amphibolite or limestone.	Jasper
Zanthoxylum americanum	Northern Prickly-ash			G5	Along riverbanks and in moist ravines, thickets, and woods; upland rocky hillsides, bluffs, and open woods.	Newton
MUSSELS:						
Alasmidonta arcula	Altamaha Arcmussel		T	G2	Sloughs, oxbows, or depression areas in large creeks to large rivers with silt, mud, and/or sand substrates.	Jasper, Newton
Elliptoideus sloatianus	Purple Bankclimber	LT			Small to large rivers with sandy to silty substrates and moderate current.	Henry
Hamiota subangulata	Shinyrayed Pocketbook	LE			Medium streams to large rivers with slight to moderate current and sandy to muddy substrates.	Henry
Medionidus penicillatus	Gulf Moccasinshell	LE			Small streams to large rivers moderate flow and sandy substrates.	Henry
Pleurobema pyriforme	Oval Pigtoe	LE			Small streams to large rivers with moderate flow and sand or gravel substrates.	Henry
Pyganodon gibbosa	Inflated Floater			G3Q	Rivers with soft substrates of mud, silts, or fine sands; pool and slack-water habitats of rivers.	Jasper, Newton
CRAYFISH:						
Cambarus howardi	Chattahoochee Crayfish		T	G3Q	Clear, free-flowing waters in riffle habitat in small tributaries to large rivers.	Newton
FRESHWATER SNAILS:						

TABLE 7-1

Rare, Threatened, and Endangered Species with Known Records of Occurrence in the Lloyd Shoals Project Vicinity[a]

Scientific Name	Common Name	Federal Status[b]	Georgia Status[c]	Global Rank[d]	Habitat	County
Elimia mutabilis	Oak Elimia			G2Q	Large rivers on granite shoals in clear silt-free areas; downstream sides of granite boulders and outcrops in moderate to swift current.	Henry, Newton
Somatogyrus alcoviensis	Reverse Pebblesnail	UR		G1Q	Shoals with rapidly flowing water, on surfaces of gravel, cobble, boulder, and bedrock, as well as vegetation.	Newton
FISH:						
Cyprinella xaenura	Altamaha Shiner		T	G2G3	Small tributaries and rivers; often found in small pools with rocky to sandy substrates.	Butts, Henry, Jasper, Newton
Etheostoma parvipinne	Goldstripe Darter		R	G4G5	Small streams, spring seeps, and runs with aquatic vegetation; occurs below the Fall Line.	Butts, Jasper
Micropterus cataractae	Shoal Bass			G3	Rocky riffles and pools of creaks and small to medium rivers; shoal areas of rivers of and creeks.	Butts, Henry, Jasper
Micropterus sp.	Altamaha Bass				Rocky riffles and pools of creaks and small to medium rivers; shoal areas of rivers of and creeks.	Butts
Moxostoma robustum	Robust Redhorse	UR	E	G1	Medium to large rivers, shallow riffles to deep flowing water; moderately swift current.	Butts, Jasper
Notropis chalybaeus	Ironcolor Shiner			G4	Low gradient creeks and small rivers with sandy substrate; pools and slow runs; clear well-vegetated water.	Jasper
Moxostoma sp. 4	Brassy Jumprock			G4	Silty to rocky pools and slow runs of large creeks; small to medium rivers; impoundments.	Butts, Newton
AMPHIBIANS:						

TABLE 7-1

Rare, Threatened, and Endangered Species with Known Records of Occurrence in the Lloyd Shoals Project Vicinity[a]

Scientific Name	Common Name	Federal Status[b]	Georgia Status[c]	Global Rank[d]	Habitat	County
Hemidactylium scutatum	Four-toed Salamander			G5	Under objects or among mosses in swamps, boggy streams, and wet areas near quite pools.	Butts, Jasper, Newton
REPTILE:						
Heterdon simus	Southern Hognose Snake		T	G2	Long leaf pine and/or scrub oak areas with well drained, xeric, sandy soils; wiregrass understory.	Butts
Lampropeltis calligaster rhombomaculata	Mole Kingsnake			G5T5	Areas of soft soil, including abandoned or cultivated fields; adept burrowers and rarely encountered aboveground.	Henry, Jasper
BIRDS:						
Haliaeetus leucocephalus	Bald Eagle		T	G5	Almost always nest near open waters (rivers, lakes, coastal waters, wetlands). Usually found in large, open-topped pines near open water.	Butts, Henry, Jasper, Newton
Picoides borealis	Red-cockaded Woodpecker	LE	E	G3	Large expanses of mature, open pine forest, particularly longleaf, slash, or loblolly pine. Nests in old living pines.	Jasper
Tyto alba	Barn Owl			G5	Nests in large hollow trees or old barns in areas with pasture, grassland, or open marsh.	Henry, Newton
MAMMAL:						
Perimyotis subflavus	Tri-colored Bat			G2G3	Forested landscapes and along waterways; foraging occurs in riparian areas and roosting occurs near openings.	Jasper

Sources: GDNR (2018); FWS (2018).

[a] This list is for rare species with known element of occurrence records in Butts, Henry, Newton and Jasper Counties, Georgia.

[b] Federal status: **LE** = listed endangered; **LT** = listed threatened; **UR** = under review to determine if listing may be warranted.

[c] Georgia state status: **E** = Georgia endangered; **T** = Georgia threatened; **R** = Georgia Rare.

TABLE 7-1

Rare, Threatened, and Endangered Species with Known Records of Occurrence in the Lloyd Shoals Project Vicinity[a]

Scientific Name	Common Name	Federal Status[b]	Georgia Status[c]	Global Rank[d]	Habitat	County

[d] Global ranks: G1 = critically imperiled, at very high risk of extinction due to extreme rarity; G2 = imperiled, at high risk of extinction due to very restricted range; G3 = vulnerable, at moderate risk of extinction due to restricted range; G4 = apparently secure, uncommon but not rare; G5 = secure – common, widespread, abundant; ? = denotes inexact numeric rank.

7.4 Study Area

The proposed study area includes the project boundary around Lake Jackson and project lands adjacent to Lloyd Shoals Dam and the tailrace area, including the project recreation facilities.

7.5 Methodology

Georgia Power's approach for completing the RTE Species Study consists of the following elements.

7.5.1 Review of Existing Information

The review will result in a tabular listing of RTE species with known records of occurrence in and near the Lloyd Shoals Project, their federal or state status (or that they have been petitioned for federal listing), their global and state ranks, their habitat requirements, and county of known occurrence. The listing will be prepared based on review of existing information sources listed above including the FWS and GDNR Wildlife Conservation Section.

This activity will update and refine the listing of RTE species in Table 7-1 (reproduced from the PAD). RTE species with known records of occurrence in the project vicinity will be identified with respect to their historic and present distributions, their habitat use, and the potential availability of such habitats in the study area. Species potentially occurring in the project area will be characterized further as to their documented occurrences within the study area). Any present occurrences of RTE species within the project boundary will be identified. Information on species being tracked by GDNR as species of concern and species petitioned for federal listing (e.g., Robust Redhorse) will also be summarized.

The following sources of existing information will be reviewed for the RTE Species Study:

- The GDNR Wildlife Conservation Section's on-line Georgia Rare Natural Element Data Portal providing inventory data by county, quarter quad sheet, and watershed (HUC 10) for protected species and species of concern in Georgia.

- The FWS Environmental Conservation Online System and associated listing information, critical habitat designations, recovery plans, and status reviews; and the FWS Georgia Ecological Services Field Offices website, which provides links to endangered species information and facilitates requests for county listings of species.

- The Fishes of Georgia website (Straight et al. 2009), which provides an online distributional atlas of freshwater fishes based on historical and recent collection data from a variety of sources including the Georgia Museum of Natural History, and maps developed by the GDNR Wildlife Conservation Section.

- The freshwater mussel and snail surveys planned as part of Fish and Aquatic Resources Study described in Section 4.5.2.

- Distribution information for RTE species compiled and maintained by NatureServe (2018).

- Research publications, manuals, regional texts, and other technical reports on Georgia's protected plants and wildlife.

7.5.2 Field Surveys

A field survey for freshwater mollusk species, including freshwater mussels and Reverse Pebblesnail, is proposed under the Fish and Aquatic Resources Study Plan in Section 4.5.2.

Georgia Power proposes to conduct a field reconnaissance survey that will identify potentially suitable habitats for RTE species of plants and wildlife within the study area around Lake Jackson. This survey will be conducted concurrently with the survey of wildlife, botanical, wetlands, riparian, and littoral habitats proposed in the Terrestrial, Wetland, and Riparian Resources Study Plan (Section 6.5). As described in Section 5.5.2, the field work would likely be completed in about 5 to 7 field days by teams of two biologists.

Field surveys will be conducted according to the following methods:

- Existing topographic maps, NWI maps, and recent aerial photography will be inspected prior to the survey to identify areas of potentially suitable habitat for protected species of interest.

- Surveys will be conducted by biologists visually assessing habitats along and above the shoreline from a boat and/or walking on public lands during spring or early summer to coincide with flowering times of RTE plants having the greatest potential to occur in the study area.

- Observations of federally protected or state-protected species will be recorded on the appropriate GDNR Wildlife Conservation Section reporting forms available for special concern plants and animals (Figures 7-1 and 7-2).

- Areas inaccessible by boat or public lands relevant to the project area will be evaluated by inspecting existing aerial photography.

- Particular attention will be given to any areas containing potentially suitable habitat for RTE terrestrial species, such as granite outcrops, mature coniferous forests relative to the Red-cockaded Woodpecker, or other areas of unique or sensitive habitat, as determined by field observation.

- Occurrences of RTE plants will be recorded as either an area polygon containing many plants, or a point for a single plant or a few plants, using a GPS unit. Habitat and demographic information will be recorded for the occurrence.

Should potentially suitable habitat be found within the project boundary for federally listed plants, additional surveys could be required to determine whether these species occur. Any additional surveys will be timed to occur during the species' flowering or fruiting period or other optimum time, as appropriate, for accurate identification.

7.5.3 Analysis of Information and Data

Existing, relevant, and reasonably available information and data gathered during the RTE surveys in the form of log books, notes, and field data sheet entries will be compiled into electronic tabular and narrative form to describe existing and likely occurrences of RTE species in and near the Project. The results of the freshwater mollusk survey conducted separately will be incorporated into this analysis. Potentially sensitive information pertaining to RTE species locations will be separated out and marked as "Not for Public Disclosure, Privileged" upon filing the study results. This body of information will ultimately be used to evaluate the effects of continued project operations on RTE species in the project area.

7.6 Reporting

A Study Progress Report will be prepared and provided to participants prior to the completion of the study. The progress report will describe overall progress in completing the field survey, summarize preliminary findings as available, and explain any variance from the Study Plan and schedule.

An RTE Species Study Report will be prepared and provided to participants for review and comment at the conclusion of the study year. The study report will summarize current presence or absence of RTE species within the project area and, if RTE species are present, discuss any potential effects associated with continued project operations.

7.7 Schedule

In accordance with the Lloyd Shoals Process Plan and Schedule and the master schedule provided in Section 1.3, the RTE Species Study will be completed according to the milestones listed in Table 7-2 below.

TABLE 7-2
Schedule for Conducting the RTE Species Study

Activity	Deadline
Begin Field Studies and Literature-Based Review	May 2019
File Progress Report	January 31, 2020
Complete Field Studies and Literature-Based Review	April 2020
File Final Study Report	May 19, 2020

7.8 References

Chafin, L.G. 2007. Field guide to the rare plants of Georgia. The State Botanical Garden of Georgia. Athens, Georgia.

Georgia Department of Natural Resources (GDNR). 2018. Georgia rare element data portal. http://georgiabiodiversity.org/. Accessed January 2018.

Georgia Power Company (Georgia Power). 2017. Candidate conservation agreement (CCA) for mollusks of the Altamaha River Basin, Georgia. Prepared in cooperation with the U.S. Fish and Wildlife Service and the Georgia Wildlife Resources Division, April 2017.

NatureServe. 2017. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://explorer.natureserve.org.

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.

U.S. Fish and Wildlife Service (FWS). 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.

U.S. Fish and Wildlife Service (FWS). 2018. ECOS environmental conservation online system. https://ecos.fws.gov/ecp/. Accessed January 2018.

Figure 7-1
Georgia Special Concern Animal Data Sheet

Nongame Conservation Section
2065 US Hwy 278 SE
Social Circle, GA 30025
Phone: (770) 918-6411

SPECIAL CONCERN ANIMAL OBSERVATION AND COLLECTION DATA SHEET

Species Scientific Name: _____

Date Observed / Collected: _____ County: _____

Method of Observation/Capture: _____

_____

Observer / Collector: _____

Affiliation / Address: _____

Field Collection Number: _____

Museum & Accession Number: _____

Site Name: _____Topographic Quad: _____

Directions To Site From Known Landmark: _____

_____

_____

General Description of Habitat: _____

_____

_____

Specimen Data: _____

_____

_____

Weight: _____ Sex: _____

Additional Notes (e.g. behavior, condition): _____

_____

_____

_____

*****Attach a photocopy from a 7.5-minute U.S.G.S. topographic map showing the location of the observation or collection site. Please mark the precise location of the site.*****

Send to: Katrina Morris, Wildlife Biologist
Georgia Department of Natural Resources
Wildlife Resources Division
Nongame Conservation Section
2065 U.S. Hwy. 278, SE
Social Circle, Georgia 30025

Figure 7-2
Georgia Special Concern Plant Data Sheet

Nongame Conservation Section
2065 US Hwy 278 SE
Social Circle, GA 30025
Phone: (770) 918-6411

SPECIAL CONCERN PLANT DATA SHEET

Species Scientific Name: _____

Date Observed / Collected: _____ County: _____

Observer / Collector: _____

Affiliation / Address: _____

Was a Voucher Specimen Collected? Yes _____ No _____

Where Will specimen Be Deposited? _____

Was a Photo Taken? Yes _____ No _____

Where Will Photo Be Located?

Was live material collected? Yes _____ No _____

Where will specimen be grown? _____

Site Name: _____ Topographic Quad: _____

Directions To Site From Known Landmark: _____

_____

_____

General Description of Habitat: _____

_____

_____

Landowner information: _____

Additional Notes (size of population, vigor, flowering, fruiting, etc.): _____

_____

_____

_____

_____

*****Attach a photocopy from a 7.5-minute U.S.G.S. topographic map showing the location of the observation/collection site. Please mark the precise location of the site.*****

Send to: Greg Krakow, Data Manager
Georgia Department of Natural Resources
Wildlife Resources Division
Nongame Conservation Section
2065 U.S. Hwy. 278, SE
Social Circle, Georgia 30025

8.0 RECREATION AND LAND USE

8.1 Introduction

Georgia Power proposes to conduct a study characterizing existing recreational use and land use at the Lloyd Shoals Project and to evaluate the potential impacts of continued project operation on these resource areas. This study will be accomplished through the compilation and analysis of abundant existing recreational use information and new field surveys conducted at project recreation facilities to determine recreation usage trends and demand.

8.2 Goals and Objectives

The goal of this study is to develop information for characterizing existing recreation and land use at the Project and evaluate recreation and land use issues identified during FERC's public scoping process pursuant to NEPA that have a nexus with project operations.

The specific objectives of this study are to:

- Review existing information to describe existing recreation and land use in the Lloyd Shoals project area.
- Characterize the effects of continued project operation on recreational opportunities at the Project.
- Characterize existing recreational capacity and usage on Lake Jackson and in the Lloyd Shoals tailrace area.
- Evaluate the adequacy of existing recreational facilities to meet current and future recreational demand.
- Evaluate the adequacy of the existing Shoreline Management Program to address land use practices, including erosion, and protect environmental resources within the project boundary.

8.3 Study Background

This study will develop information needed to evaluate potential impacts of continued project operation in the PLP and license application in consideration of: (1) the recreation and land use issues identified during NEPA scoping; (2) any studies and modifications to studies requested by resource agencies; (3) the known resource management goals of the agencies with jurisdiction over recreation and land use; (4) existing information and data concerning recreation and land use in the project area; and (5) the requirement for there being a nexus between project operations and effects on the resources being evaluated.

The PAD described the existing recreation facilities providing access to Lake Jackson and the Lloyd Shoals tailrace area in detail (Figures 1-2 and 3-1). Table 7-1 summarizes the operational responsibility, type of use, and amenities for each Georgia Power project recreation facility. Numerous other privately-owned facilities provide direct access to Lake Jackson, as described in the PAD.

8.3.1 Issues Identified

FERC staff identified in SD1 the following resource issues pertaining to recreation and land use:

- Effects of the up to 3 ft of water level changes in Lake Jackson on recreational opportunities at the Project.

- Effects of continued project operation on downstream recreational use in the Ocmulgee River.

- Adequacy of existing public access and recreational facilities in the project boundary to meet current and future recreation demand, including special events (e.g., fishing tournaments) at the project.

- Adequacy of the existing Shoreline Management Program to address land use practices, including erosion, and protect environmental resources within the project boundary.

Regarding water level changes in Lake Jackson, as described in the PAD (on page 9 and in Appendix D), Georgia Power maintains reservoir elevations within a 3-foot range (530 and 527 ft PD) year-round. For the years 1997 through 2016, daily reservoir fluctuations were less than 1.5 ft 98-percent of the time and less than 1.0 ft 95-percent of the time. Moreover, since the installation of the Obermeyer gate system in 2012, reservoir fluctuations have been reduced.

8.3.2 Study Requests

Georgia Power proposed in the PAD (Section 5.2.1, Preliminary Studies List) to conduct a study to review existing information to describe recreation, land use, and visual aesthetic qualities in the Lloyd Shoals project area; characterize current types and levels of recreational use on Lake Jackson and in the tailrace area; and evaluate the need for additional recreational access or facilities at Lake Jackson. The study effort would include: (1) review and analysis of the Licensed Hydropower Development Recreation Report (Form 80) recreational use information gathered at the project recreation facilities in 2014 based on car counters, cameras, and visual observations; (2) review and analysis of available fishing tournament information; and (3) assessing the adequacy of existing facilities, determining individual access site pressure and user conflicts, and estimate the number of recreation user days per year.

No study requests pertaining to recreation and land use were filed by stakeholders following the study criteria at 18 CFR § 5.9(b). In its PAD and SD1 comments, WRD commented on the difficulty of assessing the recreational use and capacity data as reported in the Form 80 from 2015. Georgia Power proposes to review and analyze the data in detail, including the dates of field collection and the camera counts, traffic counts, attendance records, staff observation and estimation, and methods for extrapolating recreation days for a full calendar year. WRD also requested a map of Georgia Power land holdings distinguishing between leased and non-leased lands. A map of land ownership within the project boundary indicating whether land is privately owned or owned by Georgia Power will be included as part of this Recreation and Land Use Study. The map will also distinguish whether Georgia Power lands are fee-simple or leased lands.

In its comments on the PAD and preliminary study proposals, FERC staff requested that the non-project recreation facilities listed in the PAD be shown on a map with respect to the project boundary and that the condition of the project recreation facilities, including any erosion due to project-related recreational use be addressed in the study. These elements have been incorporated into the study plan.

TABLE 8-1
Recreation Facilities Providing Access to the Lloyd Shoals Project

Park/Facility	County	Acreage	Address	Amenities
Georgia Power Owned and Operated Facilities (located within Project Boundary):				
Lloyd Shoals Park	Butts		155 Dam Rd, Jackson, GA 30233	50 parking spaces (with trailer slots), picnic/day use area; swimming beach; large "pirate ship" playground; barrier-free fishing pier; restrooms; 2-lane barrier-free boat ramp, extensive shoreline fishing.
Lloyd Shoals Tailrace Fishing Pier	Butts		155A Dam Rd, Jackson, GA 30233	10 parking spaces, trash can, barrier-free boardwalk path to fishing pier with seats for fishing as well as a secluded seated area for viewing.
Ocmulgee River Park Public Access	Jasper		8484 Jackson Lake Rd, Monticello, GA 31064	15 parking spaces, 1-lane boat ramp; picnic/day use area; bank fishing, trail to eastern tailrace
Jane Lofton Public Access Area	Butts		Just off Hendricks Road @ Dam Road / Power Plant Road	Bank fishing, gravel parking, and a trash can.

8.3.3 Resource Management Goals

WRD is the primary resource agencies having jurisdiction over recreation resources on Lake Jackson and the Ocmulgee River.

WRD has the goal of managing the project waters to provide a quality outdoor recreational experience, including components related to quality public access to the natural resource as well as implementing statewide fish harvest regulations to help manage and conserve sport fish populations.

8.3.4 Existing Information

The following sources of existing information, described further in the PAD, will be evaluated in completing the Recreation and Land Use Study:

- Form 80 Licensed Hydropower Development Recreation Report from 2015 and supporting data collection in 2014;
- Article 405 Recreation Report completed in 2015;
- Available Georgia Bass Chapter Federation and other fishing tournament information;
- The Statewide Comprehensive Outdoor Recreation Plan (SCORP) for Georgia (Georgia State Parks, 2016);
- Regional Recreation Plans (Three Rivers RC, Northeast Georgia RC Resource Management Plan, Atlanta Regional Commission Resource Plan);
- Georgia Power Shoreline Management Guidelines; and
- Population and employment projections developed by the University of Georgia for the Georgia state-wide water planning process.

8.3.5 Nexus between Project Operations and Effects

Georgia Power normally operates the Lloyd Shoals Project to maintain reservoir elevations between approximately 530 and 527 ft PD year-round, excluding planned drawdowns and drought. Daily fluctuations of Lake Jackson are less than 1.5 ft about 98-percent of the time and less than 1.0 ft about 95-percent of the time.

The FERC project boundary generally follows the full-pool elevation contour of 530 ft PD, except in some areas where it follows metes-and-bounds property lines, including areas for public recreation and around the powerhouse (Figure 1-2). Georgia Power maintains four project recreation access areas within the project boundary. The project boundary extends downstream of Lloyd Shoals Dam approximately 0.5 mile to encompass Ocmulgee River Park.

8.4 Study Area

For the purposes of recreation and land use resources, the proposed study area includes: the project boundary extending around Lake Jackson and the Lloyd Shoals tailrace area, including the four project recreation facilities; and the four counties directly adjacent to the Project (Butts, Henry, Jasper, and Newton Counties) for future recreational demands analysis based on forecasted population growth.

The land use assessment will also include a zone extending to 2,000 ft beyond the project boundary to encompass a conservatively large area for characterizing existing land use around the Project, including the preparation of a land use map.

8.5 Methodology

Georgia Power's study approach for completing the Recreation and Land Use Study will analyze existing information and data to identify recreational usage trends and recreation demand. Existing recreation and land use in the project study area will be described based on: review of existing information sources listed in Section 8.3.4; analysis of the most recent recreational use information gathered by Georgia Power in 2014 for the 2015 Form 80; and review of available fishing tournament information.

The four project recreation facilities will be delineated as to their associated acreage within the project boundary, and inventoried and described in terms of numbers of boat ramps, picnic tables, grills, picnic shelters, benches, restrooms, fishing docks, playgrounds, hiking/nature trails, and car and boat trailer parking areas; detailed maps and/or drawings will be provided. The barrier-free characteristics of these facilities will be noted as well as their ability to provide access to persons with physical disabilities. The current condition of the project recreation facilities will be assessed, including any erosion due to project-related recreational use. Georgia Power will evaluate the need for updating and replacing comfort stations during the recreation surveys.

Georgia Power will review current and future recreation needs identified in the SCORP, applicable plans, comprehensive plans, and resource management plans, as identified in the PAD (Sections 4.8, 5.3, and 5.4).

8.5.2 Recreation Assessment

2015 Form 80 Data Analysis

Annual recreation use of the project reservoir will be estimated by analyzing data collected in 2014 for the development of the 2015 Form 80. In completing Form 80, Georgia Power utilized a variety of recreational use sampling methods including trail cameras, traffic counters, attendance records, staff observations, visitor counts/surveys, and estimation. Sampling was conducted according to a planned schedule to target both winter and summer seasons, as well

as to capture all the summer "peak" weekends (Memorial Day, Independence Day, and Labor Day).

The methods used in developing Form 80 values will be fully described. Trail cameras were installed in high-use areas to allow for observations of boat ramps and parking lots. Photographs were reviewed to count the number of axles and vehicles. Axle count was used to determine the number of vehicles and trailers recorded on traffic counters. The raw data for Form 80 will be analyzed in detail for the Lloyd Shoals Dam recreation assessment.

Recreation Field Surveys

To supplement the 2015 Form 80, recreation surveys will be conducted at four Georgia Power recreation facilities on five days in 2019: Lloyd Shoals Park, Jane Lofton Public Access Area, Tailrace Fishing Pier, and Ocmulgee River Park. The purpose of these on-site surveys will be to assess recreational user satisfaction and to further characterize user trends, carrying capacity, competing uses, and the adequacy of existing recreation facilities. Two survey instruments, a Recreational Survey Form (Figure 8-1) and a Recreation User Count Form (Figure 8-2), will be used to collect project-related information.

The facility surveys will be administered on two weekdays, two weekend days, and a holiday weekend day during the spring and summer seasons. All survey events will be targeted toward fair-weather conditions to maximize the return of user surveys for the effort spent. Each survey event will last approximately 8 to 10 hours. Surveyors will interview users with a prepared questionnaire. The questionnaire will solicit information on group size, county of residence, age groups of visitors, frequency and duration of visits, reasons for visit, species fished for (if fishing), and qualitative ratings of existing facilities, including parking, boat ramps, docks, bank fishing access, restrooms, and facility cleanliness. Open-ended questions will solicit feedback on specific improvements needed and other comments and suggestions. The interviews will also include general creel-related questions to provide information on fishing.

A team of surveyors will administer the surveys at all four access points. The surveyors also will periodically count parked vehicles, trailers, boats, bank anglers, and other users, and record notes about recreation activities. Any congestion at the access points will be noted as well. Roving recreation surveys also will be administered to interview bank anglers at informal recreation access points located elsewhere within the project boundary.

User response trends and other findings of the access point surveys will be summarized in tabular format. The information obtained during the access point surveys will be used to supplement the recreational use information collected in 2014 for the 2015 Form 80 and to refine annual use estimates.

The Recreation and Land Use Study Report will provide maps showing the project recreation sites, and privately-operated recreation access facilities and tables of their associated acreage in relation to the project boundary.

The proposed recreation assessment approach will develop the information required for the FERC license application as set forth at 18 CFR § 5.18(b) and will be consistent with guidance provided by FERC (1996) on recreation development at hydropower projects. The recreation survey methodology and level of effort proposed are consistent with generally accepted practice at FERC-licensed projects, employing field reconnaissance, traffic/trail cameras, vehicle counts, discussions with user groups, and the use of existing data.

Future Recreation Demands

Future annual visitation to the Lloyd Shoals Project will be estimated based on review of existing population forecasts. This information will be evaluated, along with information from the SCORP and other relevant sources, to estimate future demand for recreation facilities in the project study area. Future demand will be compared to the estimated carrying capacity of existing facilities on Lake Jackson to characterize future facility needs.

Land Use Assessment

Land use information collected for the PAD will be augmented by reasonably available land use and zoning information from adjacent local governments, literature review, as well as observations from the shoreline reconnaissance survey described in the Geology and Soils Study Plan (Section 2.0). This information will be used to characterize and evaluate the existing shoreline management and shoreline and buffer zone within the Project. A land use map will also be prepared. The mapping will be developed in a GIS database. Tables will be generated showing acreages of each land use classification within the project boundary and a zone extending 2,000 ft beyond the project boundary around Lake Jackson. The land use map will delineate developed and undeveloped lands within the project boundary, as well as any Georgia Power-owned lands (leased and non-leased) adjacent to, and within 2,000 ft of, the project boundary. The study will also evaluate the consistency of the Project with federal, state, regional, and local ordinances and resource management plans.

8.6 Reporting

In accordance with 18 CFR § 5.15(b), a Recreation and Land Use Study Progress Report will be prepared and provided to participants prior to the completion of the study. The progress report will describe overall progress in summarizing preliminary findings as available and explain any variance from the study plan and schedule.

In accordance with 18 CFR § 5.15(c)(1), a Recreation and Land Use Study Report will be prepared and provided to participants for review and comment at the conclusion of the study.

The study report will characterize existing recreation and land use and evaluate the need for additional recreational access or facilities.

8.7 Schedule

In accordance with the Lloyd Shoals Dam Process Plan and Schedule and the master schedule provided in Section 1.4, the Recreation and Land Use Study will be completed according to the milestones listed in Table 7-2 below.

TABLE 8-2
Schedule for Conducting the Recreation and Land Use Study

Activity	Deadline
Begin Literature-Based Review and Field Survey Work	May 2019
Complete Literature-Based Review and Field Surveys	October 2019
File Progress Report	January 31, 2020
File Final Study Report	May 19, 2020

8.8 References

Atlanta Regional Commission (ARC). 2015. Regional resource plan, revised 10.6.2015. https://www.dca.ga.gov/development/PlanningQualityGrowth/Regional%20Plans/Adopted%20Regional%20Plans/Atlanta%20Regional%20Commission/Regional_Resource_Plan-2016.pdf.

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.

Northeast Georgia Regional Commission. 2011. Resource management plan for regionally important resources. April 2011.

Three Rivers Regional Commission (TRRC). 2012. Regionally Important Resources Plan. Griffin, Georgia. February 2012.

Figure 8-1
Recreational Survey Form

Georgia Power Company **Lloyd Shoals Project** **Recreation Use Survey**	Georgia Power Company is conducting this survey to learn about recreational use at Lake Jackson, user satisfaction with existing recreation facilities, and whether facility improvements may be needed. Please take a few minutes to answer some questions about your visit today. Thank you for your participation.

Location:				**Date:**	**Time:**
Weather:	____Clear	____Partly Cloudy	____Cloudy	____Rainy	**Temperature:**
Investigator:					

1. What is your county and state of residence?	County:	State:
2. How many people (including you) are in your group today? _____people		

3. What is your age? (check one)	____18-24	____25-34	____35-44	____45-54	____55+

4. If you came with others, what are their age groups? (check all that apply)			
____Children (infants-12)	____Youth (13-17)	____Adults (18-55)	____Senior Adults (over 55)

5. How many hours will you have spent here today? _____hours
6. How many times (including today) have you visited Lake Jackson or its parks in the last 30 days? _____times
7. How many times do you visit Lake Jackson annually? _____times

8. Do you use the reservoir at night?	____Yes	____No	**If "yes", how many times per year?** _____times

9. Are the parks at this reservoir your primary destination for outdoor recreation activities?	____Yes	____No

10. What other parks and lakes in the area do you frequent for recreation? (list below)

11. What is the primary reason for your visit today? (check all that apply)			
____Boat fishing	____Pontoon boating	____Canoeing/kayaking	____Hiking/walking
____Bank fishing	____Sail boating	____Sailboarding	____Shoreline relaxation
____Tournament fishing	____Water skiing	____Picnicking/playing	____Other (list below):
____Pleasure boating	____Jet skiing	____Swimming/wading	

12. If you came to fish today, what were you fishing for? (check all that apply)			
____Largemouth bass	____Striped bass	____Channel catfish	____ Other (list below):
____Crappie	____Hybrid bass	____Blue catfish	
____Sunfish/bream	____White bass	____Flathead catfish	

13. Please rate the quality of the existing facilities at this access area. (choose one description for each)							
Parking:	____Good	____Fair	____Poor	**Restrooms:**	____Good	____Fair	____Poor
Boat ramp:	____Good	____Fair	____Poor	**Cleanliness:**	____Good	____Fair	____Poor
Dock:	____Good	____Fair	____Poor	**Bank fishing access:**	____Good	____Fair	____Poor

14. List any specific improvements you would like to see at this access area, and any other comments or suggestions.

Figure 8-2
Recreation User Count Form

Georgia Power Company Lloyd Shoals Project User Count Form	Location:_____ Investigator:_____						
Date:							
Time:							
Weather:							
# of Vehicles with Trailers							
# of Vehicles without Trailers							
# of Boats Visible on Reservoir:							
Fishing Boats							
Canoes/Kayaks							
Pontoon Boats							
Power Boats							
Sail Boats							
Rowing Boats/Sculls							
# of Bank Fishers in Observed							
Fill in Location:							
Rec. Area Name, Tailrace, road name							
# of Parties using other facilities and list (e.g., beaches)							
# of Parties Using or Waiting to Use Picnic Tables							
# of Parties Using or Waiting to Use Boat Lanes							
Other Activities Observed – (list recreation activity and number of persons participating):							
# of Vehicles with County Tag from:							
Butts Co., GA							
Henry Co., GA							
Jasper Co., GA							
Newton Co., GA							
Co., GA							
Co., _____							
Co., _____							
Co., _____							

Comments (in particular, note any congestion observed):

9.0 CULTURAL RESOURCES

9.1 Introduction

Georgia Power proposes to conduct a cultural resources study of the Lloyd Shoals Project to identify and evaluate archaeological and historical resources within the area of potential effect (APE). The study will consist primarily of review of available information on known archaeological and historical sites in the project area, including cultural resources assessments as summarized in the PAD. In addition, limited new field testing will be conducted of previously recorded archaeological sites within the project boundary recommended as eligible for the National Register of Historic Places (National Register). The results of this work will be provided in a report describing the archaeological and historical resources at the Lloyd Shoals Project.

9.2 Goals and Objectives

The goal of this study is to identify, and document historic properties located within the project boundary and immediately adjacent areas that could be affected by the continued operation and maintenance of the Project. This information will be used to develop a Historic Properties Management Plan (HPMP) based upon the guidelines established by the Advisory Council on Historic Preservation and FERC.

Specific objectives of this study are to:

- Identify and delineate the APE.
- Identify known historic resources through literature and site file review.
- Determine if any historic properties are eligible for listing on the National Register.
- Evaluate the potential for effects upon historic resources by the operation and maintenance of the Project or by activities conducted along the shoreline of the project reservoir.

9.3 Study Background

9.3.1 Issues Identified

The Commission identified in SD1 the following resource issues pertaining to cultural resources:

- Effects of continued project operation and maintenance on properties that are included in or eligible for inclusion in the National Register.

- Effects of continued project operation and maintenance on archaeological and historic resources at the Project.

9.3.2 Study Requests

Georgia Power proposed in the PAD (Section 5.2.1, Preliminary Studies List) to conduct a cultural resources study. The study would identify known historic resources through literature site file review, determine if any historic properties are eligible for listing on the National Register, and evaluate the potential for effects upon historic properties by the continued operation of the Project or by activities conducted along the project reservoir. The study effort would entail further assessments of sites being monitored by Georgia Power to assess effectiveness of the current management plan and provide photographic documentation of the project dam, powerhouse, and associated equipment. FERC listed Georgia Power's proposed study in SD1 as Study No. 12, Cultural Resources.

In its comments on preliminary study proposals pertaining to cultural resources (letter dated November 5, 2018), FERC staff requested that the study include map(s) that clearly identify the APE in relation to the project boundary and provide documentation of concurrence on the proposed APE from the Georgia Historic Preservation Division (HPD) and potentially-affected tribes. These elements have been incorporated in the study plan. No other requests for study modifications have been received.

9.3.3 Resource Management Goals

The GDNR HPD is Georgia's State Historic Preservation Office. *Georgia's State Historic Preservation Plan 2012-2016: Partnering for Preservation* is the guiding document for the state historic preservation program administered by HPD. Resource management goals consistent with this plan and applicable to the relicensing of the Lloyd Shoals Project include preventing the unintentional disturbance of historic properties by planning for the use of protective measures in activities that may cause a disturbance of the site and preserving the integrity of any historical structures of the Project's dam and powerhouse and the historical information regarding the development of the Project.

9.3.4 Existing Information

The Lloyd Shoals project area was used for thousands of years before European settlers arrived at the Ocmulgee River. Cultural resources studies have been conducted on lands in and adjacent to the Project which have helped to develop an overall cultural context for the project area. Individual sites identified include the Lloyd Shoals Construction and Operator's Village, Dempsey Ferry, Hendrick's Mill, and the hydropower plant/dam itself. These sites are eligible for the National Register (Table 25 of the PAD) and are monitored and reported to FERC annually (Georgia Power, 2017).

9.3.5 Nexus between Project Operations and Effects

Georgia Power normally operates the Lloyd Shoals Project to maintain reservoir elevations between approximately 530 and 527 ft MSL year-round, excluding planned drawdowns and drought. Lloyd Shoals Dam discharges directly into the Ocmulgee River. When the plant is not operating to generate peaking energy, the Project releases a continuous minimum flow of 400 cfs, or inflow, whichever is less, through the turbines into the Ocmulgee River downstream for the protection and enhancement of fish and wildlife resources. Project operations and shoreline activities within the FERC project boundary could affect exposure of sub-surface archeological resources.

9.4 Study Area

The study area for cultural resources will include the area between the low daily Lake Jackson pool elevation of 530 ft PD and the project boundary. Other areas immediately adjacent to the project boundary may be added to the area evaluated, provided adjoining ownership is willing for cultural resource specialists to be present on adjoining property. Georgia Power proposes that this study area be considered the APE for archaeological resources. The study area for hydro-engineering resources evaluation will include the area immediately around the dam, powerhouse, and operations areas (i.e., the project works) within the project boundary. Georgia Power proposes that this study area be considered the APE for documentation of hydro-engineering resources.

9.5 Methodology

Georgia Power will prepare map(s) clearly showing the APE in relation to the project boundary and will document concurrence of the proposed APE from Georgia HPD and potentially-affected Indian tribes.

Georgia Power will contract the services of a professional cultural resources consultant who will use currently accepted practices as defined under Section 106 of the Historic Preservation Act of 1966 (as amended) and implementing regulations (36 CFR 800) for the identification and evaluation of historic properties. Specific field methods will conform to applicable state guidelines such as HPD's *Archaeological Assessment Reports Components and Guidelines* (2004).

Historic properties at Lloyd Shoals were investigated during a previous relicensing. For the current study, the six sites recommended eligible for the National Register, will be have further evaluation testing and will provide the basis for a definitive determination as to their eligibility and whether or not they warrant continued monitoring. The evaluation testing will be conducted in consultation with HPD and in accordance with the *Georgia Standards and Guidelines for Archaeological Surveys* (Georgia Council of Archaeologists, 2014).

For any human remains accidentally or inadvertently exposed or discovered as part of the cultural resources field evaluation, Georgia Power personnel will:

- Stop all activity leading to the discovery or exposure of the human remains; secure the area from public access, protect and treat the remains respectfully, and notify the Georgia Power project manager.

- Notify the local law enforcement agency and other agencies (HPD, FERC) as appropriate of the discovery or exposure, and schedule a site visit to occur within 24 hours.

The study will culminate in updating the HPMP for the Lloyd Shoals Project.

9.6 Reporting

In accordance with 18 CFR § 5.15(b), a Cultural Resources Study Progress Report will be prepared and provided to participants prior to the completion of the study. The progress report will describe overall progress in completing data collection and explain any variance from the study plan and schedule.

In accordance with 18 CFR § 5.15(c)(1), a Cultural Resources Study Report will be prepared and provided to participants for review and comment at the conclusion of the studies.

9.7 Schedule

In accordance with the Lloyd Shoals Dam Process Plan and Schedule and the master schedule provided in Section 1.4, the Cultural Resources Study will be completed according to the milestones listed in Table 8-1.

TABLE 9-1
Schedule for Conducting the Cultural Resources Study

Activity	Deadline
Begin Field Studies and Literature-Based Review	May 2019
File Progress Report	January 31, 2020
Complete Field Studies and Literature-Based Review	March 2020
File Final Study Report	May 19, 2020

9.8 References

Georgia Power Company (Georgia Power). 2017. Annual cultural resources monitoring at FERC Project Nos. 485, 2336, 1218, 2413, 2354, 2341, 2177, and 2350. Letter report to the Federal Energy Regulatory Commission, dated December 19, 2017.

APPENDIX B

Lloyd Shoals Project
Response to Stakeholder Scoping Comments
Includes Response to Schedule B of FERC AIR November 5, 2018
P-2336-094

GEORGIA
DEPARTMENT OF NATURAL RESOURCES
WILDLIFE RESOURCES DIVISION

MARK WILLIAMS
COMMISSIONER

RUSTY GARRISON
DIRECTOR

November 5, 2018

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, DC 20426

RE: Comments on Pre-Application Document and Scoping Document 1
Lloyd Shoals Hydroelectric Project (P-2336-094)

Dear Secretary Bose:

We appreciate the opportunity to review the Pre-Application Document (PAD) and Scoping Document 1 (SD1) for the Lloyd Shoals Hydroelectric Project (P-2336-094). We recognize that this project has impacts to the water quality, aquatic habitat, fisheries resources, and recreational opportunities within, upstream and downstream of the project area. At this time, we are not proposing additional studies and have attached our comments identifying opportunities to collaborate and enhance angling, fish habitat and recreational boating at Lake Jackson.

Sincerely,

Matt Thomas.

Matt Thomas
Chief of Fisheries

FISHERIES MANAGEMENT SECTION
2065 U.S. HIGHWAY 278 S.E. | SOCIAL CIRCLE, GEORGIA 30025-4711
770.918.6406 | FAX 706.557.3030 | WWW.GEORGIAWILDLIFE.COM

Georgia Wildlife Resources Division
Comments on PAD and SD1 – Lloyd Shoals Hydroelectric Project (P-2336-094)

Pre-Application Document (PAD) and Scoping Document 1 (SD1) Comments and Proposed Study Modifications

Project Location (PAD 3.2, SD1 3.1.1)

A map of the land adjacent to the project showing Georgia Power Company's (GPC) land holdings with distinct representation for leased and non-leased lands would be helpful in managing fisheries resources at Lake Jackson. 1

Fish and Aquatic Resources (PAD 4.4, SD1 4.2.3)

Annual Fish Stockings – In addition to the stockings noted in the PAD, the Wildlife Resources Division, Fisheries Management Section (WRD-FM) will continue its efforts of supplemental largemouth bass stocking to enhance existing populations at Lake Jackson. WRD-FM encourages GPC to continue to provide WRD-FM information regarding drawdown timing, duration and magnitude, so we may plan fish stocking and other fisheries management activities.

Fish entrainment and turbine-induced mortality – WRD-FM concurs that the effects of continued project operation on potential fish entrainment and turbine-induced mortality be evaluated. Study result mortality numbers should be categorized by species/size and identify periods (i.e., months) when fish are most vulnerable to entrainment. Estimated monetary loss of fish due to entrainment and impingement also should be included. Results will help determine if project operations can be feasibly modified to lessen the impact of fish entrainment and mortality.

Migratory fish – WRD-FM concurs that language regarding fish passage be drafted for the upcoming relicensing period of this project and requests that WRD be consulted during language development. The project and its operation have direct effects on American shad recovery efforts inside the project boundary; and other migratory fish species (e.g. Robust redhorse), should fish passage be achieved at the low-head dam in Juliette during the upcoming license term.

Aquatic non-native invasive species – WRD-FM concurs that language regarding the impacts of invasive species be drafted for the relicensing period of this project and requests that WRD be consulted during language development. Impacts of invasive species (both plant and animal) have direct effects on native flora and fauna within the project boundaries and downstream of the boundaries. WRD-FM recommends that GPC evaluate the installation of waterless cleaning systems (Figure 1) to curtail the spread of aquatic invasive species in Georgia.

Shoreline permitting on fish habitat and aquatic resources – As a result of increased shoreline development and processes of sedimentation in an aging reservoir, habitat improvements are

2

needed to help maintain, improve and concentrate sport fish populations. Several opportunities for continued partnership in conserving and enhancing fish habitat are listed below:

- WRD-FM has been planting native vegetation annually in select waterbodies, such as Lake Sinclair and Lake Oconee, and is looking for opportunities to expand production capacity and plantings of native aquatic vegetation to improve and increase fish habitat across Lake Jackson and other Georgia Power reservoirs. Increasing native aquatic vegetation in the project area through plantings of aquatic, semi-aquatic and terrestrial vegetation will provide habitat for adult fish, nursery habitat for juvenile fish, assist in erosion control and protect natural shoreline areas.
- Continue collaboration with WRD Fisheries Section to construct, install and map fish attractors at Lake Jackson.
- WRD-FM recommends that GPC promote the importance of native aquatic vegetation and fish habitat in its publications (e.g. website and email notifications) and develop opportunities for landowner involvement.

...2

Requested Objectives to Proposed Study (Fish and Aquatic Resources # 3):

The objective of the Fish and Aquatic Resources proposed study # 3 in SD1 is to characterize representative shoreline and littoral-zone aquatic habitats occurring throughout the reservoir. A shoreline habitat survey would be conducted to characterize physical aquatic habitat and available sources of littoral-zone cover for fish.

WRD requests the following objectives be incorporated into the Fish and Aquatic Resources # 3 proposed study:

- The shoreline habitat survey should result in maps representing developed (i.e., seawalls, docks and residences) and undisturbed (i.e., natural and aquatic vegetation) project shoreline areas. WRD-FM also requests GPC survey and map submergent vegetation in Lake Jackson. This information will assist WRD-FM and GPC in aquatic habitat planning and addressing future issues, should they occur. GPC should update this information at an interval commensurate with the selected relicensing term.
- The proposed shoreline habitat survey also should include a complete literature review to inform how rates and magnitude of shoreline development effect sport fish species such as largemouth bass, black crappie and sunfish.
- The proposed shoreline habitat survey also should incorporate schedules for drawdowns. Drawdown schedules should include magnitude and duration. This information will be helpful for planning aquatic plantings and fish stockings inside the project boundaries.

3

Proposed Study (Fish and Aquatic Resources # 6):

WRD-FM supports the objectives of the Fish and Aquatic Resources proposed study # 6 in SD1 to evaluate Lloyd Shoals operation and impacts on downstream habitat (e.g. Robust redhorse spawning habitat) as the project and its operation influence instream flow beyond the Juliette

4

low-head dam, despite inputs from other tributaries (e.g. Towaliga River). WRD-FM also concurs with the continued implementation of the Robust redhorse candidate conservation agreement (CCA) in consultation with the WRD Wildlife Conservation Section. ...4

Wetlands, Riparian and Littoral Habitat (PAD 4.6, SD1 4.2.2)

Wetland and aquatic vegetation – WRD-FM agrees that GPC should develop an aquatic vegetation plan for the project reservoir. Aquatic vegetation plan should outline all principles and practices (i.e., identification of vegetation, plantings of vegetation, treatment and/or permitting treatment of vegetation) by GPC as it relates to aquatic vegetation in the project reservoir. Furthermore, GPC should notify WRD-FM of aquatic nuisance vegetation treatment in the project area. 5

Recreation and Land Use (PAD 4.8, SD1 4.2.6)

Recreational use – The PAD includes estimates of recreational use from the FERC Licensed Hydropower Development Recreation Report (Form 80) from 2015. These statistics are presented as daytime recreation days and nighttime recreation nights, and a peak weekend average, for the project during a summer recreation season. In referring to the FERC document it is unclear how and when these statistics were calculated. For example, the peak weekend average estimate does not indicate the sampling data that was averaged, or which weekends were included and reported statistics are not delineated by facility and statistics do not contain extrapolated results for a full calendar year. It is difficult to assess the recreational use and capacity data based on the current reported information. WRD-FM has identified several enhancements to evaluate.

Public boating access – WRD-FM requests that existing GPC boating access sites be evaluated to ensure they adequately support user needs. Non-boating (i.e. tubing) use has increased significantly in tailrace below Lloyd Shoals Dam. WRD-FM encourages GPC to evaluate the tailrace boat ramp facility and identify new angling/boating opportunities in the project boundary. 6

Tournament angling – Fishing tournaments are very popular and held regularly on the project reservoir. Between 1997 and 2016, the Georgia BASS Federation alone averaged 33 tournaments a year on the project reservoir (Carl Quertermus, University of West Georgia). Many other sanctioned and unsanctioned fishing tournaments are also held. Most tournaments require multiple lane boat ramps, substantial parking areas, public restrooms, sufficient boat dock space, weigh-in areas and fish returns. Opportunities to better serve tournament anglers at these types of facilities should be evaluated and considered.

Public bank angling access – Additional bank fishing opportunities (i.e., additional access areas and fishing piers) to accommodate all anglers (i.e., physically disabled) also should be evaluated at Lloyd Shoals Park. Fishing piers are popular amenities and would provide much needed bank access opportunities within the project boundaries. GPC is encouraged to consult with WRD-FM to identify suitable locations.

Figure 1

CD³ Waterless Cleaning Systems

Clean-Drain-Dry-Dispose: CD³ Systems empower boaters to prevent spread of invasive species with user-operated, waterless cleaning equipment. Four models available:

1. CD³ Station

Grid-connected, for unlimited use. Tools include wet/dry vacuum, air blower, tethered hand tools & LED lights. Unit has concrete base with 220 volt, 30 amp service required.

2. CD³ Wayside

Solar powered or 120v for sites with ~100 boats/day. Fast-install option available with precast base.

3. CD³ Trailer

Mobile unit with ratchet down base, removable wheels & storage deck. Solar powered or recharge option with 120v smart charger.

My CD³ Software + Invasive WiFi

All systems are internet connected to provide use data and save on O&M. Invasive WiFi option provides boaters local lake information via a digital kiosk.

4. CD³ Outpost

Tethered hand tools & solar powered lights. Best suited for smaller or overflow launch areas. A precast base is an option for quick, easy install.

SALE or LEASE CONTACT
stopAIS@cd3station.com
612-467-9441
www.cd3station.com

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RESPONSE TO GEORGIA DEPARTMENT OF NATURAL RESOURCES WILDLIFE RESOURCES DIVISION COMMENT LETTER DATED NOVEMBER 5, 2018

Response 1

Regarding a map delineating leased and non-leased lands along the Lake Jackson shoreline, Georgia Power proposes as part of the Recreation and Land Use Study to provide a map of land ownership within the project boundary indicating whether land is privately owned or owned by Georgia Power. The map will also distinguish whether Georgia Power lands are fee-simple or leased lands.

Response 2

Georgia Power appreciates Wildlife Resource Division's (WRD's) input and suggestions on opportunities to conserve and enhance fish and aquatic resources at the Lloyd Shoals Project. This phase of the Integrated Licensing Process is focused on developing a Study Plan that will address information needs for describing the existing environment and evaluating the potential impacts of continued project operation. The study findings will be incorporated into Georgia Power's Preliminary Licensing Proposal (PLP). The PLP will provide a draft environmental analysis of the impacts of continued project operation and propose measures for protecting, mitigating impacts to, or enhancing resources affected by the Project. Upon conclusion of the resource studies, we will consult further with WRD on appropriate measures to include in our relicensing proposal.

Regarding annual fish stockings and reservoir drawdowns, Georgia Power schedules drawdowns for homeowner and shoreline maintenance every few years and notifies the Georgia Department of Natural Resources (GDNR) in advance. Georgia Power will continue to communicate with GDNR in advance of planned drawdowns on their timing, duration, and magnitude.

Regarding fish entrainment and turbine-induced mortality, Georgia Power proposes in the Fish and Aquatic Resources Study Plan to estimate the magnitude, species composition and relative abundance, and seasonal distribution of entrainment. We are not proposing to estimate the monetary loss of fish due to entrainment because the potential effects on fishery resources have yet to be assessed and there is no basis at this time for finding that mitigation would be justified or that compensation for lost fish would result in appropriate resource-based enhancement.

Response 3

Georgia Power proposes to survey shoreline aquatic habitat using a stratified random selection of sites to develop information on the proportion of natural versus modified shoreline. Shoreline conditions at each site will be visually rated and inventoried with respect to vegetative buffer zone condition, bank stability, vegetative protection, shoreline structural stabilization practices, potential causes of shoreline erosion/sedimentation and whether or not they are project-related, and sources of littoral-zone fish cover and habitat. If submergent/submersed vegetation is observed at shoreline sites, its extent of linear coverage of the shoreline site will be estimated. The

distribution and abundance of submersed vegetation in the reservoir will be characterized in the Terrestrial, Wetland, and Riparian Resource Study based on a separate field reconnaissance survey effort for that study.

As requested by WRD, the shoreline analysis will review literature on the relationship between structural stabilization practices (i.e., developed shoreline) and littoral-zone fish habitat.

Regarding reservoir drawdowns, Georgia Power will continue to notify GDNR in advance of scheduled drawdowns for homeowner and shoreline maintenance (see also Response 2).

Response 4

Regarding the Ocmulgee Candidate Conservation Agreement with Assurances (CCAA) for Robust Redhorse, Georgia Power has formally indicated to current Ocmulgee CCAA signatory representatives its intention to renew or extend the agreement. Georgia Power met with the U.S. Fish and Wildlife Service Region 4 At-Risk Species Program on September 19, 2018, and with WRD's Wildlife Conservation Section on December 6, 2018.

Response 5

As part of the Terrestrial, Wetland, and Riparian Resources Study, Georgia Power proposes to review and provide information on its existing invasive species and vegetation management practices, including the methods used to treat non-native invasive aquatic plants, areas that have been treated, and frequency of treatments. The information developed by this study through the field reconnaissance survey and review of past aquatic vegetation treatment practices will allow Georgia Power to evaluate its current management approach and propose measures as may be appropriate in the PLP.

Response 6

Regarding recreational use estimates from the 2015 Form 80, as part of the proposed Recreation and Land Use Study Georgia Power will review and analyze in detail the recreational use information gathered at the Project in 2014. These data include the use of trail cameras, traffic counters, attendance records, and staff observation and estimation. The dates of field data collection and the methods for extrapolating visitor days to a full calendar year will be described and the results evaluated.

Regarding public boating and bank angling access, Georgia Power also proposes in the Recreation and Land Use Study Plan to conduct recreation surveys at the project recreation sites on five days in 2019 (two holiday weekends, one weekend, and two weekdays) to assess recreational user satisfaction and to further characterize user trends, carrying capacity, competing uses, and the adequacy of existing recreation facilities.

Study Request
Georgia Power Company
Lloyd Shoals Hydroelectric Project (P-2336-094)
FERC Project Number 2336

Georgia Power Company's Pre-Application Document (PAD) for the Lloyd Shoals hydroelectric Federal Energy Regulatory Commission (FERC) relicensing project describes in section 5.0, Preliminary Issues and Studies List the potential resource issues associated with the continued operation of the Lloyd Shoals hydroelectric facility. In section 5.2, Potential Studies or Information Gathering identifies existing and new studies to provide relevant information and data to evaluate the resource impacts of continued project operation. Water resources are identified as a resource area where project operations affect water quality in Lake Jackson and the Ocmulgee River downstream. The PAD includes a study element to monitor the Lloyd Shoals Project tailrace water quality during the summer of 2019 to characterize water quality immediately downstream from the dam.

The Georgia Environmental Protection Division (GAEPD) requests that the proposed Lloyd Shoals Project tailrace monitoring be expanded to include a year-long monitoring period and additional water quality parameters. The request is designed to support GAEPD's hydrodynamic and water quality model for the Ocmulgee River downstream from Lloyd Shoals Dam.

First, GAEPD requests that the monitoring period be extended to a full year from the summer period described in the PAD. Secondly, GAEPD requests that continuous monitoring be performed on at least an hourly frequency to include the water quality parameters of water temperature and dissolved oxygen concentration. Finally, GAEPD requests that monthly grab samples be taken from the tailrace and analyzed for the water quality parameters listed below:

- 5-day biochemical oxygen demand
- Ammonia
- Nitrate-nitrite
- Organic nitrogen
- Total phosphorus
- Ortho-phosphate
- Organic phosphorus

The data would be used to support GAEPD's hydrodynamic and water quality model for the Ocmulgee River. The Ocmulgee River Model (Model) begins at Lloyd Shoals Dam and continues downstream to its confluence with the Oconee River. It is also part of a larger model for the Altamaha River Basin that includes the Ocmulgee, Oconee, and Altamaha Rivers. The Lloyd Shoals Project flow releases represent the upstream boundary for the Model and are fundamental to the model's ability to predict downstream flows and water quality. The goal of the Lloyd Shoals tailrace monitoring study would be to collect representative water quality data

for a period of one year that can be used to characterize the upstream boundary of the Model. These data would improve the defensibility of the Model and would improve GAEPD's ability to make water quality decisions for the Ocmulgee River downstream from Lloyd Shoals Dam.

Georgia Power monitored dissolved oxygen concentrations in the Lloyd Shoals tailrace during the summer months in 2006 and 2007 in order to assess the performance of the draft tube aeration system. The data collected was limited to dissolved oxygen concentration and was gathered over a very limited period. The requested tailrace monitoring study would be performed over a one year period and includes more water quality parameters.

GAEPD conducted a water quality model calibration field study of the Ocmulgee River downstream from Lloyd Shoals Dam in 2014. The data collected for the upstream model boundary was gathered at State Road 16 approximately 1.2 miles downstream from Lloyd Shoals dam. The data collected were not collected in the Lloyd Shoals Dam tailrace and are limited in their duration, and parameters monitored. The proposed monitoring study would be at a more appropriate location, include the model parameters of interest, and performed for an entire year including all seasons.

The requested tailrace water quality monitoring study would provide data for the upstream boundary of the Ocmulgee River hydrodynamic and water quality model. These data would improve the predictive ability and defensibility of the Model, as well as the water quality management decisions based on Model results.

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RESPONSE TO GEORGIA DEPARTMENT OF NATURAL RESOURCES ENVIRONMENTAL PROTECTION DIVISION STUDY REQUEST DATED NOVEMBER 2, 2018

At the Georgia Environmental Protection Division's request, the Water Resources Study has been revised to include monthly grab samples collected in the tailrace and analyzed for the following water quality parameters: 5-day biological oxygen demand, ammonia, nitrate-nitrite, organic phosphorous, total phosphorous, ortho-phosphate, and organic phosphorous. Additionally, the continuous monitoring of dissolved oxygen and water temperature will be conducted for a one-year period with measurements collected each hour.

United States Department of the Interior

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Coastal Sub Office
4980 Wildlife Drive
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November 5, 2018

Ms. Kimberly D. Bose
Federal Energy Regulatory Commission
888 First Street, NE
Washington, DC 20426

Subject: Comments on Pre-Application Document and Study Request for the Lloyd Shoals Hydroelectric Project, FERC Project Number P-2336-094

Dear Ms. Bose:

The U.S. Fish and Wildlife Service (Service) has reviewed the Pre-Application Document (PAD) and Scoping Document 1 (SD) for the relicensing of the Lloyd Shoals Hydroelectric Project (LSHP). This facility, operated by the Georgia Power Company (GPC), is located on the Ocmulgee River in east-central Georgia, within Butts, Henry, Jasper, and Newton Counties. We submit the following comments and recommendations under the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. § 1531, *et seq*.), the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. § 661 *et seq*.), and the Federal Power Act (FPA) (16 U.S.C. § 791a, *et seq*.).

Comments on the PAD

Diadromous Fishes: Dams in the Altamaha River Basin have affected diadromous species including the federally-endangered Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*), American Shad (*Alosa sapidissima*), Striped Bass (*Morone saxatilis*) and American Eel (*Anguilla rostrata*). These dams have eliminated riverine habitat and created barriers to migration, which has reduced or eliminated access to habitats used for spawning, rearing, and/or resident stages of growth. We provide what is known of current and historical distributions of these and closely related species from nearby drainages. Currently, these species are excluded from the LSHP by the downstream Juliette Dam, except for American Eel and Striped Bass (Appendix A).

GPC refers to American Eel occurrence records above Lloyd Shoals Dam as “historic” on page 34 of the PAD. It should be clarified that several of these records are within the past 16-25 years, so although these records are dated, they are not correlated to pre-dam conditions. They are records that occurred long after the dam began operation in 1911 (Appendix B).

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Robust Redhorse: The Service has been petitioned to list the Robust Redhorse (*Moxostoma robustum*) under the ESA and subsequently issued a partial 90-day finding that listing may be warranted (FR 76 59836). Because this species inhabits the Ocmulgee River below the LSHP, operations of LSHP facilities in relation to this species are of importance. As such, the Service is supportive of the proposed dissolved oxygen studies and analyses that will be conducted in the LSHP tailrace as part of the relicensing process. We provide two additional enhancement measures that will be of importance to the Service for the conservation of the Robust Redhorse. We realize these are being provided early in the relicensing process, but would like to be as beneficial and informative during this collaborative process as possible:

1. *Tailrace Habitat Plan*: Preservation of the currently forested riparian buffer areas surrounding the Ocmulgee River within the LSHP project boundary downstream of Lloyd Shoals Dam should be included as an enhancement measure during the upcoming license term. Preservation of GPC's undeveloped habitats for sensitive species has been similarly included in the current FERC licenses for GPC's Bartletts Ferry Hydropower Project (BFHP) and the Middle Chattahoochee Hydropower Project (MCHP). We include the riparian habitat plan for the BFHP for quick reference, as this was similarly developed for the conservation of riverine aquatic species and serves as an example for the LSHP (Appendix C).

2. *Robust Redhorse Flow Advisory Team*: An adaptive management-type approach to flow releases downstream of Lloyd Shoals Dam for Robust Redhorse should be included as an enhancement measure during the upcoming license term, which would include an interagency, collaborative periodic evaluation of releases at the LSHP. As an example, the Robust Redhorse Flow Advisory Team for the Oconee River is a working subgroup of the Robust Redhorse Conservation Committee that includes GPC, formed to address the specific flow and habitat needs for the species in the Oconee River. The following enhancement measure was included in the current FERC license for the Sinclair Dam Hydropower Project (SDHP) as License Article 404, which serves as an example for the LSHP:

   "Upon the effective date of this license, the licensee shall coordinate the efforts of the Flow Advisory Team, and this responsibility shall continue for the term of the license, or until such time that the Flow Advisory Team determines it is no longer needed. This may occur if the Robust Redhorse is declared an extinct species, or is declared recovered and no longer in need of special protection by the appropriate federal agency. At that time, the licensee may petition the Commission for a discontinuation of this requirement.

   In addition, the licensee should provide every two years, a progress report to the Commission, developed in coordination with the Flow Advisory Team, which summarizes the status of the Robust Redhorse and makes a determination on the adequacy of flow releases in meeting the needs of this species. The first report shall be filed with the Commission two years from the effective date of this license.

   In the event that in the future, the licensed flows are shown to be inadequate to meet management objectives for the Oconee River, the Flow Advisory Team may petition the

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Commission for a change in any flow requirement in the license. If the Flow Advisory Team members cannot agree, individual groups may still act independently to petition the Commission for any change in flows they believe is necessary."

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Study Request

Based on a lack of current information, we request the following study to assist in project review during the relicensing process:

Life Stage, Size Range, Timing, and Abundance of American Eel (*Anguilla rostrata*) below Lloyd Shoals Dam:

Describe the goals and objectives of each study proposal and the information to be obtained:

The overall goal of the study is to provide baseline data necessary to evaluate the potential need for American Eel passage at the LSHP and as needed, enable the provision of appropriate technical recommendations. The objectives of the study are as follows:

Objective 1: Identify the life stage and size range of American Eel migrating to the LSHP.

Objective 2: Identify the timing of upstream movements of American Eel that are migrating to LSHP in terms of seasonality and correlation to environmental variables including discharge, water temperature, and the percent of moon illumination.

Objective 3: Calculate indices of abundance of American Eel migrating to the LSHP.

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Resulting data will provide insight into the abundance of American Eels actually present below Lloyd Shoals Dam. This information, along with life stage, size range, and timing of those individuals, are critical elements necessary to evaluate the potential need for American Eel passage and to provide the associated relevant parameters at the LSHP.

If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied:

The American Eel ranges from Greenland to Brazil where it inhabits fresh, brackish, and coastal waters. The species is catadromous, spending the majority of its life in freshwater but migrating to the ocean to reproduce. They spawn in the Sargasso Sea, where the eggs hatch and then subsequently larvae (leptocephali) are transported via currents to the various coasts of North and South America within their range. Leptocephali transform into glass eel and enter nearshore waters, beginning upriver migrations. Glass eel develop into sexually immature yellow eel before entering the sexually mature silver eel phase at the end of their

lifespan. Silver eel subsequently migrate downstream and out to the Sargasso Sea where they spawn and die.

Juvenile and silver eel make extensive use of freshwater systems. During the resident yellow eel stage, American Eel occupy a diversity of habitats including headwater streams (Helfman et al. 1984). In an unimpounded scenario, this yellow eel phase of this species can reach the extreme upper portions of the rivers it inhabits (ASMFC 2000). During their time in accessible freshwater habitats, they are known to serve as hosts to several freshwater mussel species. Multiple factors influence the American Eel across its range, including barriers to upstream and downstream migration and loss of upstream riverine habitat (ASMFC 2008). Concerns regarding recruitment of American Eels have prompted efforts to restore this species to historic habitats by providing passage for both upstream migrant juveniles and downstream migrant adults at riverine barriers (ASMFC 2013b). Importantly, the gender of American Eels appears to be related to habitat characteristics including type of habitat, latitude, salinity, and productivity, as well as demographic attributes such as eel density, growth rate, age at maturity, and length and weight. Eels that occupy productive habitats (particularly estuaries with high eel densities) mature mostly as males versus those that are able to access headwaters and likewise inhabit northern latitudes that grow slower and mature mostly as large fecund females (Service 2015).

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The American Eel is an interjurisdictional, diadromous species of fish that is a Federal trust resource. The Service's overall management goal for the Altamaha River Basin and its sub-basins is to protect, enhance, and restore a diverse, healthy, and native aquatic community and the aquatic habitats on which this community depends. This goal includes an objective to provide safe, timely, and effective upstream and downstream passage for native Altamaha River Basin fishes, particularly diadromous species. For diadromous species, our primary goals are to:

a) protect, enhance, and restore passage for existing fish populations, reunify fragmented fish populations, and introduce or re-establish fish migratory pathways, and
b) protect, enhance, and restore the habitats on which those populations will depend.

The Atlantic States Marine Fisheries Commission (ASMFC) has coordinated interstate management for the American Eel along the Atlantic Coast since 2000 via an Interstate Fishery Management Plan (FMP) and subsequent Addenda to the FMP. Per the FMP (ASMFC 2000), two of the five objectives of the document are specifically applicable to this document and include:

- Protect and enhance American Eel abundance in all watersheds where eel now occur.
- Where practical, restore American Eel to those waters where they had historical abundance but now may be absent by providing access to inland waters for glass eel,

elvers, and yellow eel and adequate escapement to the ocean for pre-spawning adult eel.

The primary objective of Addendum II of the FMP is to recommend stronger regulatory language to improve upstream and downstream passage of American Eel to State and Federal regulatory agencies. Addendum II states that if removal is not feasible for non-federally licensed dams, then upstream and downstream passage should be improved to provide access to inland waters for glass eel, elvers, and yellow eel and adequate escapement to the ocean for pre-spawning adult eel consistent with the goal of the FMP (ASMFC 2008). The 2012 ASMFC American Eel Benchmark Stock Assessment found the coastwide stock had declined in recent decades and the stock was declared depleted (ASMFC 2013a). Habitat recommendations in Addendum III to the FMP include engaging the relevant regulatory agencies to increase or improve upstream/downstream eel passage (ASMFC 2013a). Research needs for upstream passage (ASMFC 2013b) include:

- Evaluate effects of temperature on attraction upstream.
- Identify eel searching behaviors at barriers and evaluate effect on upstream migration.
- Determine the effect of year class variability and environmental influences on passage numbers and evaluations of passageway efficiencies.

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If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study:

The requester is a resource agency.

Describe existing information concerning the subject of the study proposal, and the need for additional information:

These data are needed to evaluate the effect of LSHP project operations on the American Eel. While occurrences have been documented in the Ocmulgee River below the LSHP, the actual abundance of individuals in the study area is unknown. Additionally, this study would provide data regarding life stage, size range, and timing of their migration and correlation of migration to environmental variables. These are currently unknown and are valuable components for evaluating potential American Eel fish passage at the LSHP.

Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements:

Dams in the Altamaha River Basin have cumulatively curtailed American Eels from accessing their historic habitat. As included in the PAD, American Eels in the Ocmulgee

River are able to navigate above the dam located downstream of the LSHP, Juliette Dam, at some level and have been documented in the Ocmulgee River below the LSHP. Several post-dam records of American Eel are known above LSHP (GDNR 2014), so it appears at least some individuals have been able to navigate upstream of Lloyd Shoals Dam. Study results would inform the development of license requirements by providing current information on American Eel present in the Ocmulgee River below Lloyd Shoals Dam. These data would provide information for evaluating potential American Eel passage at the LSHP.

Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate filed season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge:

Study Area: The proposed project would take place in the mainstem Ocmulgee River, at the LSHP and immediately downstream. The study area would extend from LSHP downstream to Georgia Highway 16 for a distance of 1.2 river miles (2 kilometers).

Objective 1 Methodology: Multiple gear types (boat electrofishing, eel traps) would be used year-round to sample American Eel within the study area for a two-year minimum period. A minimum sampling period of two years was selected to capture a range of environmental variation and potential American Eel behavioral responses. Sampling would consist of at least one multi-day sampling event per month, during which eel traps should be deployed overnight for two consecutive nights. In addition, on a monthly basis boat electrofishing would be used to conduct timed, standardized transects along both shorelines, encompassing the entire length of the study area on both sides of the Ocmulgee River. All eels captured would be anaesthetized with an approved anesthetic (e.g., MS 222), measured to the nearest total length in millimeters, weighed, caudal fin-clipped, tagged with a Biomark Passive Integrated Transponder (PIT) tag, and released. Length frequency distributions would be produced by month, gear type, and combined gear types for the entire sampling period. Smallest, largest, and mean total lengths would be reported.

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Objective 2 Methodology: American Eels would be captured via methodologies outlined above in Objective 1. Discharge data used in analyses can originate from online United States Geological Survey (USGS) gage data for the survey period that is readily available to the public. If USGS water temperature is not available below LSHP, water temperature should be recorded with on-site temperature recording devices set to record at least every 15 minutes. Percent of moon surface illuminated on the last day of each sample has been used as an index of lunar influence on upstream movements; it is regarded as a more quantitative measure of the moon's appearance than lunar phase (Dominion 2009).

Percent illumination data can be obtained online from the United States Naval Observatory (http://aa.usno.navy.mil/data/docs/RS_OneDay.html). The number of eels captured by date would be graphed separately by gear type and also combined for the entire sampling period; any resulting trends would be interpreted. The number of eels captured by date would also be correlated to discharge, water temperature, and percent moon surface illumination data; these would be graphically depicted and any resulting trends would be interpreted.

Objective 3 Methodology: American Eels would be captured via methodologies outlined above in Objective 1. Monthly catch-per-unit-effort (CPUE)'s would be produced and illustrated per gear type as well as a monthly CPUE combining gear type data. A mark-recapture procedure would be used to produce population estimates (plus 95% confidence intervals) of the eel population for each year.

The Service is available to work with GPC to tailor specific details of the American Eel study to the LSHP; GPC should also coordinate with the National Marine Fisheries Service when developing detailed methodology. The capture methodologies and analyses listed above are standard practices that are widely utilized in the scientific community for fisheries research. Whereas our study request focuses on gathering data regarding *upstream* migrants due to the likelihood of currently capturing more individuals downstream of the LSHP, it should be noted that similar data for *downstream* migrants would be necessary in the future if American Eel passage at the LSHP is subsequent recommended. Therefore, as it seems at least some individuals have navigated upstream of the LSHP, it would be beneficial to gather similar baseline data immediately upstream of Lloyd Shoals Dam at this time, if possible. ...3

Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs:

No proposed alternative American Eel studies were included in the PAD or SD; therefore, this study is the only one that will answer our information needs.

It is unclear as to if GPC would hire a consultant or scientist with students and research technicians for a portion or all of this American Eel study at the LSHP, or conversely if this study would be organized and led by GPC. GPC biologists would be capable of either leading or assisting in the survey effort. Because of this uncertainty of the personnel that would conduct this study, we cannot estimate costs for salaries and potential overhead for outside entities. Not including salaries, trucks, and boats (of which GPC already has in their possession), operating expenses (if necessary, hotel and per diem for project reconnaissance and sampling, truck and boat fuel, miscellaneous supplies) are estimated at $50,000 and equipment/supplies (PIT tags, PIT tag scanner, and eel traps) are estimated at $6,500.

We appreciate the opportunity to comment during the planning stages of your project. If you have any questions, please contact staff biologist Alice Lawrence at (706) 208-7507.

Sincerely,

Donald Imm
Field Supervisor

cc: T. Litts, GDNR, Social Circle, GA
K. Weaver, GDNR, Social Circle, GA
B. Albanese, GDNR, Social Circle, GA
P. Marcinek, GDNR, Social Circle, GA
F. Rhode, NMFS, Beaufort, NC
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Appendix A
Diadromous Fishes Historical Information

Atlantic Sturgeon

Acipenser oxyrinchus is composed of two subspecies, the federally-threatened Gulf Sturgeon (*Acipenser oxyrinchus desotoi*) and the federally-endangered Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*), the latter of which coexists in Atlantic slope drainages with the federally-endangered Shortnose Sturgeon (*Acipenser brevirostrum*). Sturgeon have been documented as far upstream as at or above the Fall Line in Georgia's three large Atlantic slope drainages that extend above the Fall Line: the Ocmulgee, Oconee, and Savannah Rivers. A historical record of Atlantic Sturgeon exists above the Fall Line in the Ocmulgee River, Georgia (Frazier 2001), photo documentation of Atlantic Sturgeon at the Fall Line in the adjacent Oconee River from around 1900 has been preserved (Freeman et al. 2003), and sturgeon remains were excavated from just below, and possibly above, the Fall Line in the Savannah River (Reitz et al. 1987). Historical records of Atlantic and Shortnose Sturgeons exist above the Fall Line into the Piedmont in the Saluda, Broad, Enoree, and Catawba Rivers, South Carolina [USFWS, National Marine Fisheries Service (NMFS), and South Carolina Department of Natural Resources (SCDNR) 2001].

Remains of the closely related Gulf Sturgeon were located during an excavation conducted just below the Fall Line near the city of Columbus, Georgia on the Chattahoochee River (Rock 1980) and historical accounts of a Gulf Sturgeon Native American fishery from the Fall Line in Columbus have been documented (Lupold and Schnell 1991, Willoughby 1999). Similarly, the fish's historic range in the Apalachicola-Chattahoochee-Flint River basin was calculated to be both the Chattahoochee and Flint Rivers at least up to the Fall Line in the Gulf Sturgeon Recovery Plan [USFWS and Gulf States Marine Fisheries Commission (GSMFC) 1995]. In Alabama, Gulf Sturgeon have been documented at the Fall Line in the Cahaba, Coosa, and Tallapoosa Rivers (Boshung 1992, Mettee et al. 1996, Boschung and Mayden 2004, Freeman et al. 2005).

Following the construction of mainstem dams in the Altamaha River Basin, observations and anecdotal reports of Atlantic Sturgeon in the Oconee River are occasionally recorded as far upstream as the Milledgeville area below Sinclair Dam. Shortnose Sturgeon are currently known to be farther downstream in the Oconee River, within approximately 10 kilometers of the confluence with the Ocmulgee River (Jimmy Evans, GDNR, 2012, pers. comm.; Doug Petersen, UGA, 2012, pers. comm.; Rogers 1993). In the adjacent Ocmulgee River, recent observations and reports of Atlantic Sturgeon have been recorded as far upstream as Macon, Georgia. Shortnose Sturgeon are currently known to be farther downstream in the Ocmulgee River, within approximately 10 kilometers of the confluence with the Oconee River (Jimmy Evans, GDNR, 2012, pers. comm.; Doug Petersen, UGA, 2012, pers. comm.; Rogers 1993).

American Shad

American Shad (*Alosa sapidissima*) have been documented above the Fall Line in Georgia's Ocmulgee, Oconee, and Savannah Rivers. In the Ocmulgee River, Georgia, there are records of a shad fishery at Snapping Shoals on the South River in the early 1800's, as well as a historic Indian fishery near the confluence of the South and Yellow Rivers. Within the Ocmulgee River Basin there were shad runs up the South River at least to Snapping Shoals, the Yellow River at least to Cedar Shoals (Porterdale, Georgia), and the Alcovy River at least to the "high shoals" (Bryson 1826, Baird 1884, Frazier 2001). In the Oconee River, the shad migration extended above the WHP to near the town of Athens, Georgia (Baird 1884). American Shad remains in the Oconee River drainage were located above WHP during an excavation in Morgan County, Georgia (E. Reitz, UGA, 2007, pers. comm.). In the Savannah River, Georgia, American Shad were known to migrate to the headwaters of the Savannah, the Tugaloo and Tallulah Rivers (USFWS, NMFS, & SCDNR 2001).

Records exist for Alabama Shad (*Alosa alabamae*), a closely related species, above the Fall Line into the Piedmont in both the Flint and Chattahoochee Rivers, Georgia (Couch et al. 1996), as well as in the Coosa and Cahaba Rivers, Alabama (Boschung 1992, Mettee et al. 1996, Freeman et al. 2005). In the Mississippi River system, Alabama Shad migrated as far inland as the upper Ohio and Missouri River drainages (Lee et al. 1980; Mettee and O'Neil 2003). There are additional historic records of a shad fishery above the Fall Line in the Flint River (B. Frazier, historian, 2002, pers. comm.). Alabama Shad potentially might have once migrated into the Upper Coosa system of northwest Georgia, based on the observation that the closely-related American Shad migrated as far inland in Atlantic slope drainages as the Blue Ridge physiographic province (Freeman et al. 2005).

Following the construction of mainstem dams in the Altamaha River Basin, spawning migrations of American Shad are known to extend as far upstream as the tailrace of Juliette Dam on the Ocmulgee River and the tailrace of Sinclair Dam on the Oconee River (C. Nelson, GDNR, 2014, pers. comm.; EA 1994; GDNR 1994).

Striped Bass

Striped Bass distributional data presented by published literature has an artificial bias due to widespread stocking of this species. Therefore, the Service bases its justification on historical narratives of the fishery, and what is known regarding the historical spawning migration of Striped Bass in other drainages. Historic migration records occur above the Fall Line into the Piedmont for the Striped Bass in the Catawba, Saluda, Broad, Pacolet, Tyger, and Enoree Rivers, South Carolina (USFWS, NMFS, & SCDNR 2001). The historical range of Gulf Striped Bass is delineated at least to the Fall Line in the regional management plan for the species (GSMFC 2006). Although historical run information is unknown for the Flint River, publications describe Striped Bass, or "rock", from the Chattahoochee River at Columbus. This area is the termination of the Fall Line, and is described as, "...but no where so steep but that fish may not ascend..." (Lupold and Schnell 1991, Willougby 1999). Historically, Gulf Striped Bass migrated upstream to at least the Fall Line in the nearby Coosa and Tallapoosa drainages in Alabama (Boschung

1992, Boschung and Mayden 2004, Freeman et al. 2005). As stated by GPC in the PAD, current records of Striped Bass below Lloyd Shoals Dam are a result of stocking activities.

American Eel

In an unimpounded scenario, during the resident (yellow eel) stage, American Eel occupy a diversity of habitats, including headwater streams (Helfman et al. 1984). The yellow eel phase is able to reach the extreme upper portions of rivers it inhabits (ASMFC 2000). Mature adults, called silver eel, migrate back downstream to return to the Sargasso Sea, where they reproduce in winter and early spring, and then die (ASMFC 2000).

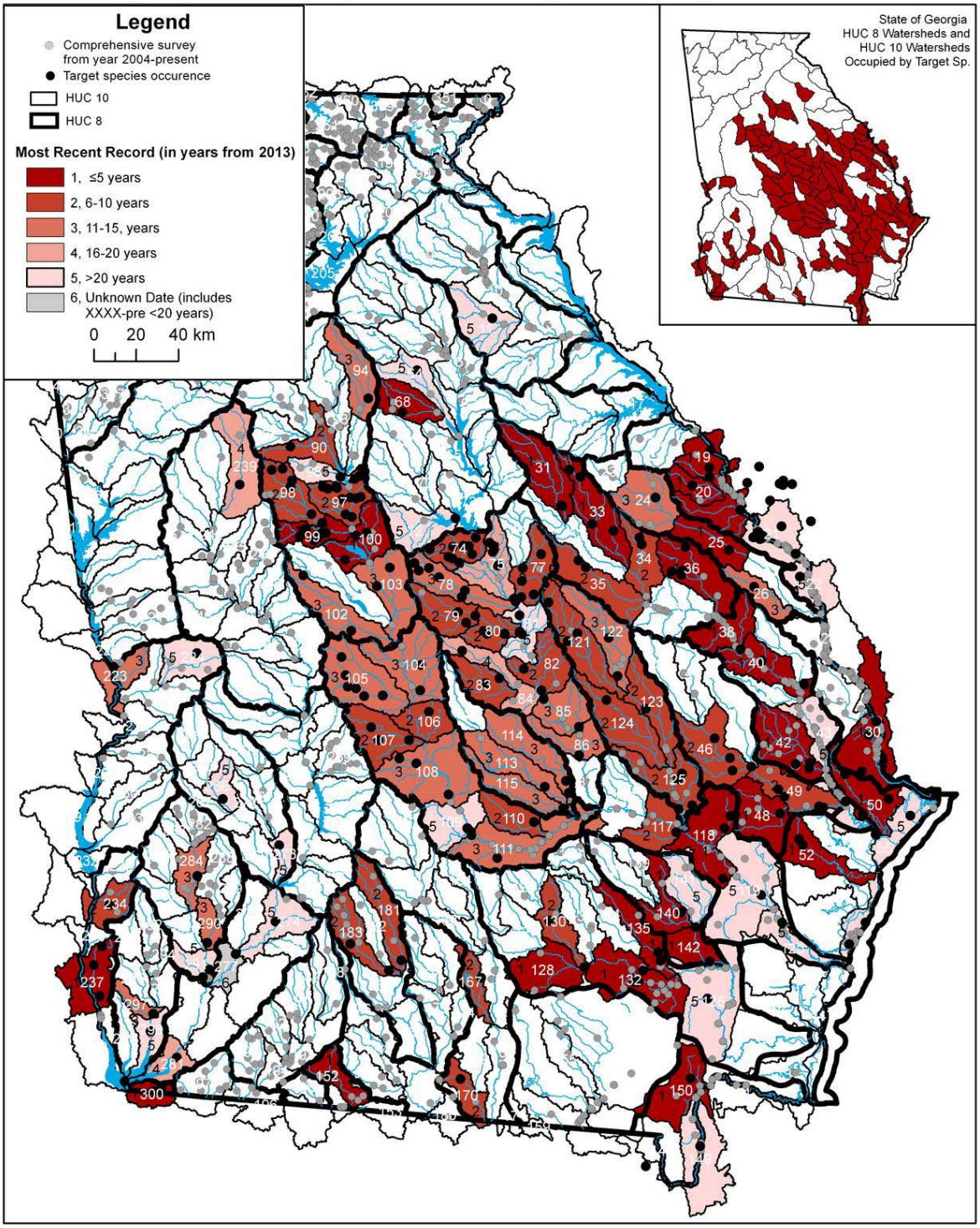
American Eel have been located above the Fall Line into the Piedmont in Georgia's Chattahoochee, Flint, Ocmulgee, Oconee, Ogeechee, and Savannah River Basins (GDNR 2014). In South Carolina, their historical range extends above the Fall Line into the Piedmont in the Saluda, Broad, Enoree, Tyger, Pacolet, and Catawba Rivers (USFWS, NMFS, & SCDNR 2001).

In nearby Gulf Slope drainages, American Eel are currently most commonly encountered below Walter F. George Lock and Dam in the Chattahoochee River, but individuals have been located as far upstream as the Middle Chattahoochee Hydroelectric Project, which is in the vicinity of the Fall Line (Georgia Power Company 2002). It is known that American Eel were taken commercially in rock fish trap dams above the Fall Line in the Flint River, Meriwether County as late as 1934, and brought 10 cents a pound (B. Frazier, historian, 2006, pers. comm.). Historical accounts of the eel fishery in the Flint River indicate that there were a large number of eel taken on their spawning run downstream each year, both for personal consumption and for commercial purposes (B. Frazier, historian, 2002, pers. comm.). In the Alabama River system, American Eel ranged above the Fall Line in Alabama's Cahaba, Tallapoosa and Coosa Rivers, as far upstream as the Etowah and Oostanaula Rivers in north Georgia (Moorehead 1978; Boschung 1992; Mettee et al. 1996; Freeman et al. 2005; J. Powell, USFWS, 2006, pers. comm.).

As of 2014, except for the one recent record from Hard Labor Creek, all American Eel collections following the construction of Sinclair Dam on the Oconee River have been restricted to below Sinclair Dam in the Oconee River and/or tributaries (Patti Lanford, GDNR, 2014, pers. comm.; Wayne Clark, Aquatic Escapes, 2014, pers. comm.; EA 1994; GDNR 1994). In the Ocmulgee River, as stated by GPC in the PAD, current records of American Eel exist below the LSHP. Additionally, there are several dated records from Ocmulgee River tributaries above the LSHP (GDNR 2014).

Appendix B
2014 Georgia Department of Natural Resources American Eel Occurrence Records

Occurrences by HUC 10 Watershed of the American Eel *(Anguilla rostrata)* and Recent Aquatic Survey Locations



Map created by: Catherine Reuter, 2014-01-10
Data sources: Georgia DNR Fisheries Management Section, Georgia DNR Nongame Conservation Section, and Georgia Museum of Natural History, 2014-01-10

Georgia Department of Natural Resources
Wildlife Resources Division
Nongame Conservation Section

Appendix C
Bartletts Ferry Hydropower Project Headwaters and Tailrace Habitat Plan

Environmental Affairs
Bin 10221
241 Ralph McGill Boulevard NE
Atlanta, Georgia 30308-3374

GEORGIA POWER
A SOUTHERN COMPANY

July 15, 2014
Electronic Filing (FERC efiling)

Ms. Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 First Street, NE
Room 1-A – Dockets Room
Washington, DC 20427

BARTLETTS FERRY PROJECT, FERC PROJECT NUMBER P-485-063
Headwaters and Tailrace Habitat Plan

Dear Ms. Bose:

In the United States Department of the Interior, Fish and Wildlife Service's (FWS) May 21, 2014 comments and recommendations letter, FWS responded to the Federal Energy Regulatory Commission's (FERC's) April 22, 2014 letter to FWS asking if there were any other measures that would accomplish the objectives of FWS' original recommendations.

Through evaluation of FWS' response, including FWS' recommendation options, Georgia Power developed a draft Headwaters and Tailrace Habitat Plan to establish a vegetative buffer of up to 100 feet on undeveloped Georgia Power-owned land in certain areas of the Bartletts Ferry headwaters and tailrace within the project boundary. The purpose of expanding the buffer in these two areas is to provide additional protection to riparian zone terrestrial habitat, aquatic habitat for riparian species and water quality.

On July 2, 2014 Georgia Power met with FWS to discuss the plan. FWS recommended revisions that Georgia Power made to the plan resulting in the finalized plan attached Attachment I. Documentation of consultation on the plan between FWS and Georgia Power is provided under Attachment II.

We appreciate the opportunity to work directly with FWS on the Headwaters and Tailrace Habitat Plan and request that FERC include the plan as appropriate in the forthcoming Bartletts Ferry license order. If you have questions or comments regarding this filing, please contact me directly at (404) 506-1357 or gamartin@southernco.com or Courtenay O'Mara at (404) 506-7219 or cromara@southernco.com.

Sincerely,

George A. Martin
Environmental Specialist,
Hydro Relicensing Project Manager

Attachment I

Headwaters and Tailrace Habitat Plan

Headwaters and Tailrace Habitat Plan
Bartletts Ferry Project (FERC No. 485)

Introduction

Georgia Power Company (Georgia Power) proposes to establish a vegetative buffer of up to 100 feet on undeveloped Georgia Power-owned land in certain areas of the Bartletts Ferry headwaters and tailrace within the project boundary. The purpose of expanding the buffer in these two areas is to provide additional protection to riparian zone terrestrial habitat, aquatic habitat for riverine species, and water quality. Georgia Power consulted with the U.S. Fish and Wildlife Service (FWS) in developing this plan, which includes a schedule for periodic inspection of the headwaters and tailrace buffer areas during the term of the new license for the Bartletts Ferry Project.

Specific Measures

Georgia Power will maintain up to a 100-foot buffer on undeveloped Georgia Power-owned lands within the project boundary (525-foot contour). These areas consist of a portion of the Bartletts Ferry Reservoir in the Riverview Shoals area in the headwaters of the project (the "Headwaters Habitat Buffer Areas"), and a portion of the Bartletts Ferry tailrace (the "Tailrace Habitat Buffer Areas"). The Headwaters Habitat Buffer Areas and the Tailrace Habitat Buffer Areas are shown in Attachments A and B, respectively, and are further described below.

The Headwaters Habitat Buffer Areas and Tailrace Habitat Buffer Areas will be maintained with any potential land disturbance activities limited during the license term to:

- For the Headwaters Habitat Buffer Areas, (a) bank fishing and other types of public recreation and (b) activities necessary to implement project safety and operational measures.
- For the Tailrace Habitat Buffer Areas, (a) bank fishing and other types of public recreation, (b) activities necessary to implement project safety and operational measures, (c) activities necessary for public water supply purposes and (d) activities necessary to manage exotic invasive terrestrial vegetation.

The Headwaters Habitat Buffer Areas and Tailrace Habitat Buffer Areas will be inspected annually. Annual inspection reports will be made available for review upon request.

Schedule

The Headwaters and Tailrace Habitat Plan will be implemented according to the following schedule:

Activity	Completion Date or Deadline
Inspect the Headwaters Habitat Buffer Areas and Tailrace Habitat Buffer Areas	Annually

Description of Headwaters Habitat Buffer Areas
(Shown on drawing entitled "Headwaters Habitat Buffer Areas" included in Attachment A)

Headwaters Buffer Area #1: A buffer encompassing all currently owned Georgia Power lands within the project boundary, beginning at a point on the eastern shoreline of the Chattahoochee River located at 32°47'47.895"N, 85°8'31.63"W and running southeasterly along the shoreline of the Chattahoochee River to a point located at 32°47'39.232"N, 85°8'22.195"W, together with a 100-foot buffer, more or less, beginning at such point located at 32°47'39.232"N, 85°8'22.195"W and running easterly along the shoreline of the Chattahoochee River to a point located on the shoreline of the Chattahoochee River and Flat Shoal Creek located at 32°47'39.173"N, 85°8'14.869"W, then running northwesterly along the western shoreline of Flat Shoal Creek to a point located at 32°47'53.229"N, 85°8'18.24"W.

Headwaters Buffer Area #2: A buffer encompassing all currently owned Georgia Power lands up to 100 feet in width within the project boundary beginning at a point of the eastern shoreline of Flat Shoal Creek located at 32°47'46.078"N, 85°8'16.233"W and running southeasterly along the eastern shoreline of Flat Shoal Creek and the Chattahoochee River to a point located at 32°47'19.329"N, 85°7'59.472"W.

Headwaters Buffer Area #3: A 100-foot buffer, more or less, encompassing the Chattahoochee River shoreline of the unnamed island directly north of the island known as Johnson Island, beginning at a point on the Chattahoochee River shoreline located at 32°47'36.048"N, 85°8'22.31"W, running easterly along such shoreline to a point located at 32°47'36.603"N, 85°8'13.658"W, then running south along such shoreline to a point located at 32°47'31.133"N, 85°8'11.747"W, then running southwesterly along such shoreline to a point located at 32°47'22.4", 85°8'16.56"W, then running northwesterly along such shoreline to the initial point located at 32°47'36.048"N, 85°8'22.31"W.

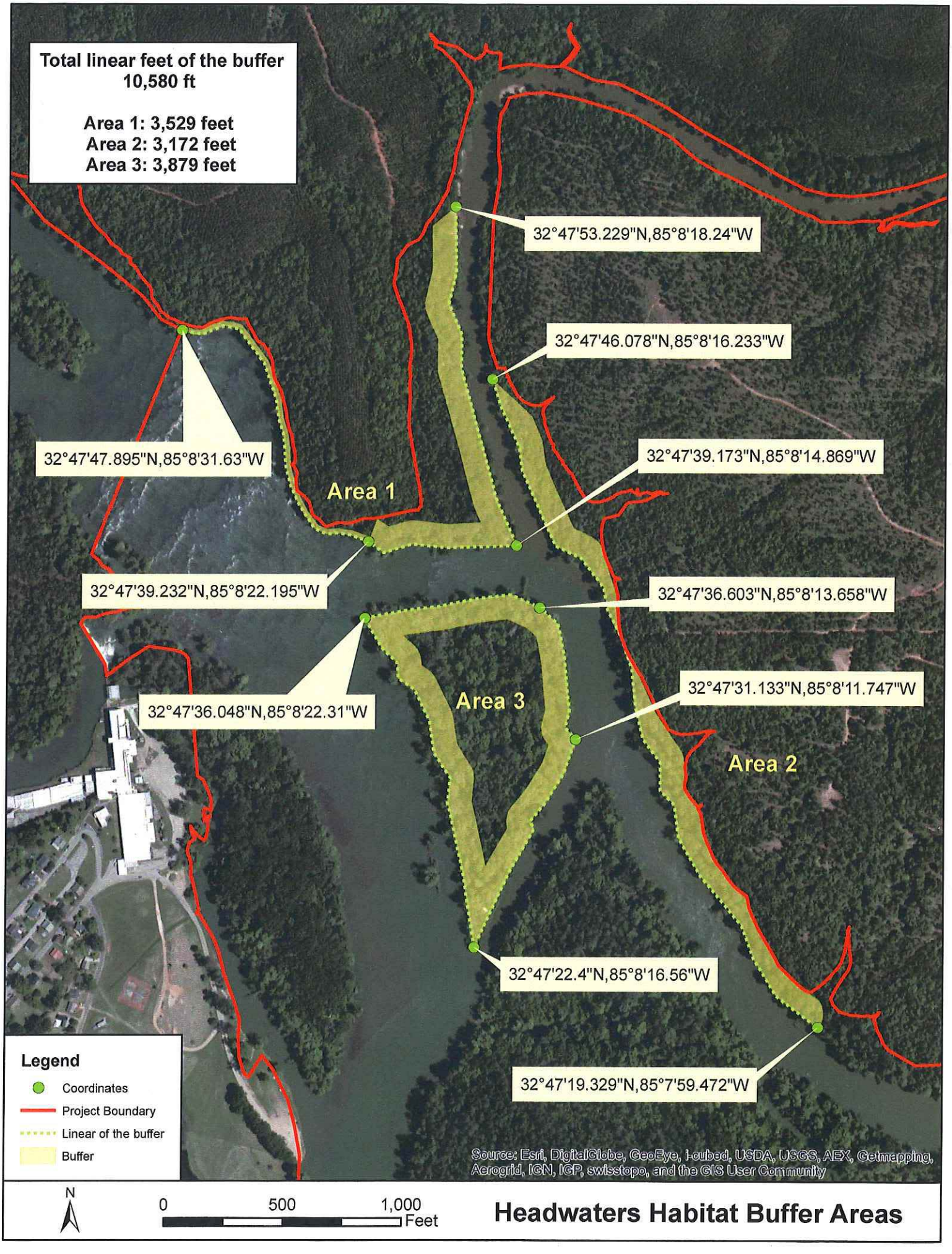
Description of Tailrace Habitat Buffer Areas
(Shown on drawing entitled "Tailrace Habitat Buffer Areas" included in Attachment B)

Tailrace Buffer Area #1: A 100-foot buffer, more or less, beginning at a point on the western shoreline of the Chattahoochee River located at 32°39'34.879"N, 85°5'25.701"W and running southeasterly along the western shoreline of Chattahoochee River to a point on the project boundary located at 32°39'27.989"N, 85°5'19.598"W.

Tailrace Buffer Area #2: A 100-foot buffer, more or less, beginning at a point on the eastern shoreline of the Barletts Ferry Dam tailrace (a portion of the Chattahoochee River) located at 32°39'38.368"N, 85°5"9.284"W and running southwesterly along such tailrace to a point on the project boundary located at 32°39'31.976"N, 85°5"10.696"W.

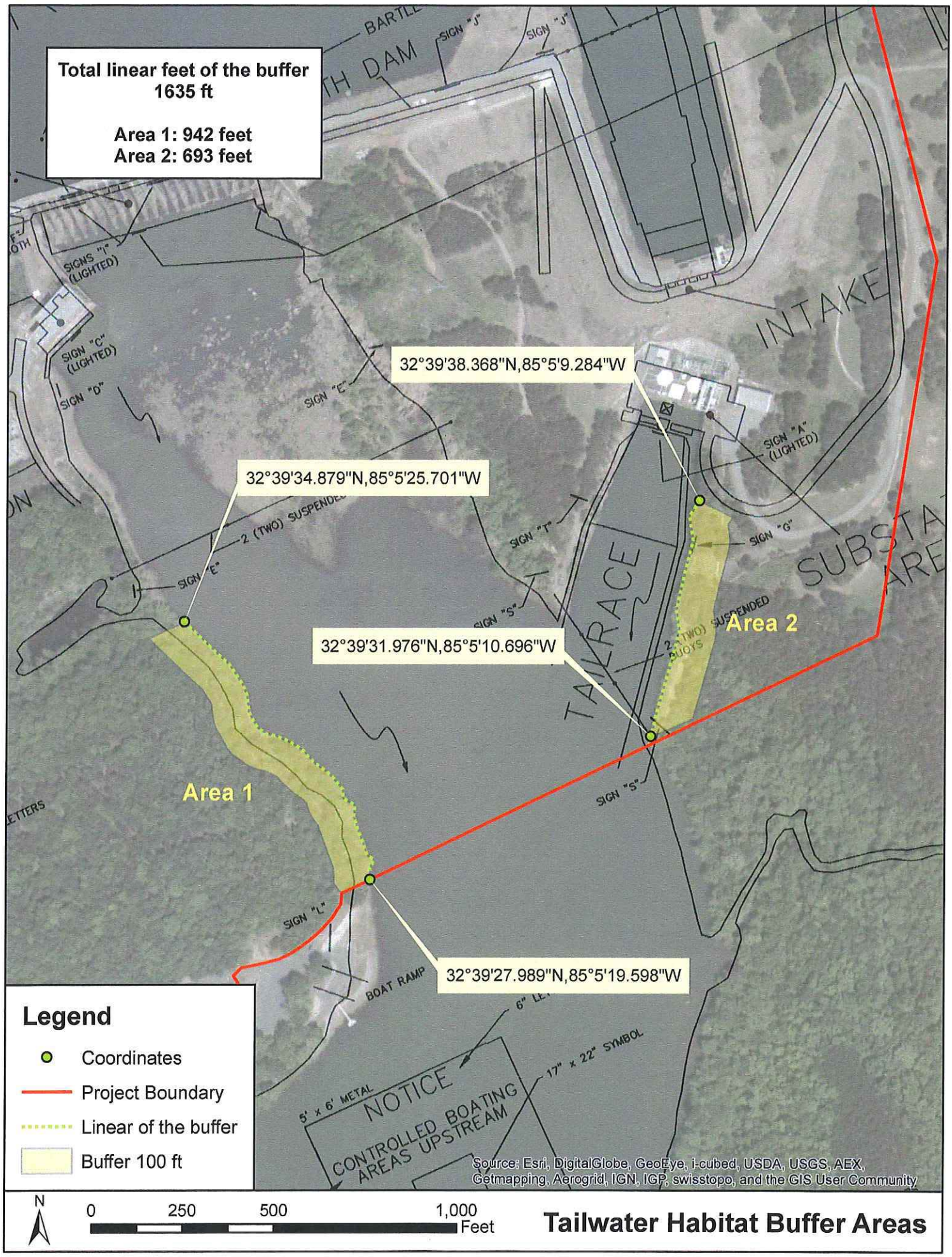
Attachment A

Headwaters Habitat Buffer Areas


Total linear feet of the buffer
10,580 ft
Area 1: 3,529 feet
Area 2: 3,172 feet
Area 3: 3,879 feet
32°47'53.229"N,85°8'18.24"W
32°47'46.078"N,85°8'16.233"W
32°47'47.895"N,85°8'31.63"W
32°47'39.173"N,85°8'14.869"W
Area 1
32°47'39.232"N,85°8'22.195"W
32°47'36.603"N,85°8'13.658"W
32°47'36.048"N,85°8'22.31"W
Area 3
32°47'31.133"N,85°8'11.747"W
Area 2
32°47'22.4"N,85°8'16.56"W
32°47'19.329"N,85°7'59.472"W
Legend
Coordinates
Project Boundary
Linear of the buffer
Buffer
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community
N
0
500
1,000
Feet
Headwaters Habitat Buffer Areas

Attachment B

Tailrace Habitat Buffer Areas


Total linear feet of the buffer
1635 ft
Area 1: 942 feet
Area 2: 693 feet
32°39'38.368"N,85°5'9.284"W
32°39'34.879"N,85°5'25.701"W
32°39'31.976"N,85°5'10.696"W
32°39'27.989"N,85°5'19.598"W
Area 1
Area 2
INTAKE
TAILRACE
SIGN "A" (LIGHTED)
SIGN "C" (LIGHTED)
SIGNS "I" (LIGHTED)
SIGN "D"
SIGN "E"
SIGN "F"
SIGN "G"
SIGN "J"
SIGN "L"
SIGN "S"
SIGN "T"
2 (TWO) SUSPENDED BUOYS
BOAT RAMP
5' x 6' METAL
NOTICE
CONTROLLED BOATING AREAS UPSTREAM
17" x 22" SYMBOL
Legend
Coordinates
Project Boundary
Linear of the buffer
Buffer 100 ft
Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community
N
0
250
500
1,000
Feet
Tailwater Habitat Buffer Areas

***Draft* Article 409**
Headwaters and Tailrace Habitat Plan

The Headwaters and Tailrace Habitat Plan, filed July 15, 2014, is approved and shall be implemented according to the schedule included in the Plan.

The approved Headwaters and Tailrace Habitat Plan shall not be amended without prior Commission approval. The Commission reserves the right to make changes to any proposed revisions filed for the Headwaters and Tailrace Habitat Plan.

Attachment II

Documentation of Consultation Between FWS and Georgia Power

Martin, George A.

From: Lawrence, Alice <alice_lawrence@fws.gov>
Sent: Tuesday, July 15, 2014 2:56 PM
To: Martin, George A.
Cc: Tamara Johnson; Slaughter, Joe Ernest
Subject: Re: Draft Headwaters and Tailrace Habitat Plan

This final draft version works for us- thanks! Alice

Alice P. Lawrence
Fish and Wildlife Biologist
105 Westpark Drive, Suite D
Athens, Georgia 30606
706.613.9493 X 222

On Tue, Jul 15, 2014 at 1:57 PM, Martin, George A. <GAMARTIN@southernco.com> wrote:

Alice,

In response to your comments below, 1) the linear feet in the draft plan were incorrect as a result of initially considering buffer areas in square feet versus linear feet. There was some confusion in discussion with our GIS folks that we had to clear up. The final plan linear footage are calculated directly from one green latitude/longitude point to the next along the shoreline, see the smaller dotted green line between points on the drawings. The latitude/longitude points will be the references for our annual inspections of the buffer areas. As for 2) we made your recommended narrative changes regarding the Headwaters Areas 1 & 2 with reference to the project boundary (see attached revised plan). If that takes care of it, please provide your concurrence with the Plan via reply email.

Thanks for working with us on this,

George

From: Martin, George A.
Sent: Tuesday, July 15, 2014 10:25 AM
To: 'Lawrence, Alice'
Cc: Tamara Johnson; Slaughter, Joe Ernest
Subject: RE: Draft Headwaters and Tailrace Habitat Plan

Thanks Alice I'm working on your comments and will get back to you soon.

George

From: Lawrence, Alice [mailto:alice_lawrence@fws.gov]
Sent: Tuesday, July 15, 2014 9:53 AM
To: Martin, George A.
Cc: Tamara Johnson; Slaughter, Joe Ernest
Subject: Re: Draft Headwaters and Tailrace Habitat Plan

Hi George- thanks for sending this along. Several comments:

1) There is a large discrepancy between the linear footage between the draft plan you sent and this version; however, the mapped areas look to be the same for both the headwaters and tailrace areas. Why is there such a large difference in linear feet? Just wanted to make sure that the totals are correct in the most updated version of the plan.

2) I have some suggested changes to wording for the description of the Headwaters Habitat Buffer Areas #1 and #2:

Area 1: Instead of saying, "A 10-foot buffer, more or less...", I would instead insert, "A buffer encompassing all Georgia Power currently-owned lands..." The layers don't exactly match up in Attachment A, so looking at the map it seems that Georgia Power has not expanded the buffer width to all currently-owned lands in this portion of Area 1.

Area 2: Instead of saying, "A buffer area of varying width..." I would instead insert, " A buffer area encompassing all Georgia Power currently-owned lands up to 100 feet in width..."

Other than these items, this version is suitable for the Service. Thanks- Alice

Alice P. Lawrence

Fish and Wildlife Biologist

105 Westpark Drive, Suite D

Athens, Georgia 30606

706.613.9493 X 222

On Tue, Jul 15, 2014 at 8:31 AM, Martin, George A. <GAMARTIN@southernco.com> wrote:

Alice,

Thanks for meeting with us on July 2, 2014. As you requested at our meeting we have revised the Headwaters and Tailrace Habitat Plan and Drawings and provide here a draft Article 409 for the Plan. Please provide your concurrence with the Plan via reply email. If you need anything else just let me know.

Regards,

George

From: Lawrence, Alice [mailto:alice_lawrence@fws.gov]
Sent: Wednesday, July 02, 2014 9:56 AM
To: Martin, George A.; Greene, Wanda M.; Slaughter, Joe Ernest
Cc: Tamara Johnson
Subject: Draft Headwaters and Tailrace Habitat Plan

George, Wanda, and Joey:

Per our meeting yesterday, I reviewed the drafted concept and maps for a Headwaters and Tailrace Habitat Plan this morning. As I indicated during our meeting and in our May 21, 2014, filing to FERC, conserving the full extent of lands described in our prior filings in perpetuity would be the most beneficial for the natural resources at the Bartletts Ferry Hydropower Project (BFHP). However, in our May 21, 2014, filing, we gave several other options that would be less protective, and hence less desirable, but that we could consider. Those options included protecting lands through the license term instead of in perpetuity, and also concentrating the conserved lands in a smaller portion of the project area where imperiled species are known to occur.

The Draft Headwaters and Tailrace Habitat Plan focuses on riparian conservation in two areas of the BFHP- the Riverview Shoals/Flat Shoals Creek area and the BFHP tailrace area. These areas, along with Halawakee Creek, are the areas known to harbor imperiled aquatic species in the project area. Per our conversations yesterday, the project boundary

is narrow around Halawakee Creek and Georgia Power's 3,200 acres of non-project lands managed as forests in this vicinity are not located near Halawakee Creek. Therefore, we can agree that land conservation in the Riverview Shoals/Flat Shoals Creek and the BFHP tailrace areas are the most important locations for land conservation to occur. The draft concept discussed yesterday would provide for up to a 100-foot buffer, as dictated by Georgia Power land ownership, in portions of these two areas. These extended buffers would be conserved through the upcoming FERC license term.

This draft concept is consistent with similar land conservation measures contained in Article 409 of the Middle Chattahoochee Hydropower Project FERC license. The Service can agree with this concept, if we can review the more detailed information and suggested draft article language that would be developed before it is sent to FERC for consideration. Thanks- please let me know if you have further questions. Alice

Alice P. Lawrence

Fish and Wildlife Biologist

105 Westpark Drive, Suite D

Athens, Georgia 30606

706.613.9493 X 222

SERVICE LIST

O. Ben Harris
GPC VP Land Department
241 Ralph McGill Blvd., NE
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George A. Martin
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SCG Hydro Services
241 Ralph McGill Blvd., NE
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Atlanta, GA 30308

cc:

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RESPONSE TO U.S. DEPARTMENT OF THE INTERIOR FISH AND WILDLIFE SERVICE COMMENT LETTER DATED NOVEMBER 5, 2018

Response 1

Georgia Power appreciates U.S. Fish and Wildlife Service's (FWS') input regarding the current and historical distributions of diadromous fish species in the Ocmulgee River. Regarding American Eel occurrence records upstream of Lloyd Shoals Dam within the past 16-25 years, it seems unlikely these eels ascended the face of the dam, which is 100 feet tall. More plausible explanations may include bait bucket introductions by anglers or movement of eels across low divides between headwater tributaries during rainy/flood conditions. According to the Atlantic States Marine Fisheries Commission (2017), eels are often purchased by recreational fishermen for use as bait for larger sport fish such as striped bass, and some fishermen catch their own eels to use as bait. As part of its Proposed Study Plan, Georgia Power proposes to conduct a study on American Eel abundance and upstream movements in the Ocmulgee River downstream of Lloyd Shoals Dam.

Response 2

Georgia Power appreciates FWS' suggestions regarding potential enhancement opportunities for protecting forested riparian buffer areas and conserving habitat of the Robust Redhorse. This phase of the Integrated Licensing Process is focused on developing a Study Plan that will address information needs for describing the existing environment and evaluating the potential impacts of continued project operation. The study findings will be incorporated into Georgia Power's Preliminary Licensing Proposal (PLP). The PLP will provide a draft environmental analysis of the impacts of continued project operation and propose measures for protecting, mitigating impacts to, or enhancing resources affected by the Project. Upon conclusion of the resource studies, we will consult further with FWS on appropriate measures to include in our relicensing proposal.

Regarding Robust Redhorse, Georgia Power will pursue renewing or extending the existing Ocmulgee Candidate Conservation Agreement with Assurances (CCAA), which expires at the end of 2023. Georgia Power met with the FWS Region 4 At-Risk Species Program on September 19, 2018, and with the Georgia Department of Natural Resources, Wildlife Resources Division, Wildlife Conservation Section on December 6, 2018.

Response 3

Georgia Power's is proposing an American Eel Abundance and Upstream Movements Study to address the study request of FWS.

Reference

Atlantic States Marine Fisheries Commission. 2017. 2017 American Eel Stock Assessment Update. October 2017. https://www.asmfc.org/uploads/file//59fb5847AmericanEelStockAssessmentUpdate_Oct2017.pdf.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701-5505
http://sero.nmfs.noaa.gov

November 15, 2018 F/SER47:TC/pw

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, DC 20426

Re: Comments on Scoping Document 1 for the Lloyd Shoals Hydroelectric Project, FERC Project Number 2336

Dear Secretary Bose:

NOAA's National Marine Fisheries Service (NMFS) reviewed Scoping Document 1 issued on August 20, 2018, by the Federal Energy Regulatory Commission (FERC) for the relicensing of the Lloyd Shoals Hydroelectric Project (LSHP). This facility, operated by Georgia Power Company (GPC), is located on the Ocmulgee River in Butts, Henry, Jasper, and Newton Counties, Georgia, at river mile 250.2, just south of the confluence of the Alcovy, Yellow, and South Rivers and 19 river miles upstream of East Juliette Dam. Geographically, it is the second functioning dam in the upstream direction from the Atlantic Ocean, located on the main stem of the Ocmulgee River in the Altamaha River basin. GPC is seeking a new license through the Integrated Licensing Process; the existing license expires on December 31, 2023.

As the nation's federal trustee for the conservation and management of marine, estuarine, and anadromous fishery resources, the NMFS provides the following comments and study request pursuant to authorities of the Fish and Wildlife Coordination Act, Federal Power Act, Magnuson-Stevens Fishery Conservation and Management Act, and the Atlantic Coastal Fisheries Cooperative Management Act.

The Altamaha River, formed by the confluence of the Oconee and Ocmulgee Rivers, drains approximately one fourth of the State of Georgia. Dams located on both the Oconee and Ocmulgee branches affect diadromous species, including Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*), American shad (*Alosa sapidissima*), and American eel (*Anguilla rostrata*). Of these species, American eel presently range upstream in the Ocmulgee River basin as far as Lloyd Shoals Dam[1]. Presently, East Juliette Dam blocks the passage of both Atlantic sturgeon and American shad, but both the NMFS and the U.S. Fish and Wildlife Service (USFWS) have prescribed passage for American shad and American eel at this dam.

American eel can navigate low-head obstacles, such as the East Juliette Dam. During fisheries investigations for the previous licensing of the LSHP, American eels were collected at all four stations downstream of Lloyd Shoals Dam (EA Engineering, Science and Technology, Inc., 1990).

Study Request
Based on information provided in the Pre-Application Document (PAD) and historical records of American eel, the NMFS requests the following study to assist in project review during the relicensing process:

[1] Fishes of Georgia. http://fishesofgeorgia.uga.edu

American Eel Study

Goals and Objectives

The goal of this study is to provide baseline data necessary to evaluate the need for American eel passage at the LSHP.

The objectives of this study are as follows:

- Identify the life stage and size range of American eel migrating to the LSHP.
- Identify the timing of upstream movements of American eel migrating to LSHP in terms of seasonality and correlation to environmental variables, including discharge, water temperature, and the percent of moon illumination.
- Calculate indices of abundance of American eel migrating to the LSHP.

Resulting data will provide insight into the abundance of American eel present below Lloyd Shoals Dam. This information, along with life stage, size range, and timing of those individuals, are necessary to evaluate the potential need for American eel upstream passage and to provide the associated relevant parameters at the LSHP.

Research Management Goals

The Atlantic States Marine Fisheries Commission has developed five documents related to the management of American eel, including:

- Interstate Fishery Management Plan for American Eel (*Anguilla rostrata*). April 2000. Atlantic States Marine Fisheries Commission. Fisheries Management Report # 36.
- Addendum II to the Fishery Management Plan for American Eel. Atlantic States Marine Fisheries Commission. Approved October 23, 2008.

Objectives of the fishery management plan include:

(1) Protect and enhance American eel abundance in all watersheds where eel now occur; and

(2) Where practical, restore American eel to those waters where they had historical abundance, but may now be absent, by providing access to inland waters for glass eel, elvers, and yellow eel, and adequate escapement to the ocean for pre-spawning adult (silver) eel.

Addendum II contains specific recommendations for improving upstream and downstream passage of American eel, including requests that member states and jurisdictions seek special consideration for American eel during the relicensing of hydropower facilities by FERC.

American eel stocks have declined coastwide in recent decades as updated in the 2017 benchmark stock assessment for American eel performed by the Atlantic States Marine Fisheries Commission. A goal of the NMFS is to restore American eel to historical habitats and ensure safe migratory pathways to build abundance and resilience in the population.

Public Interest

The requester, NMFS, is a federal resource agency.

Existing Information and Need for Additional Information

Existing information on American eel populations in the Ocmulgee River are very limited. Eels were caught at four monitoring stations downstream of LSHP indicating their ability to reach the project site. Data are needed to evaluate the effect of LSHP project operations on the existing populations along with the actual abundance of individuals in the study area. Additionally, this study would provide data regarding life stage, size range, and timing of their migration and correlation of migration to environmental variables. These are currently unknown and are valuable components for evaluating potential passage of American eel at the LSHP.

Project Nexus

Dams in the Altamaha River basin have cumulatively curtailed American eels from accessing their historical habitat. As noted in the PAD, American eels in the Ocmulgee River are able to navigate to some degree above East Juliette Dam downstream of the LSHP, and eels have been documented in the Ocmulgee River below the LSHP. Maps and records provided by the Georgia Museum of Natural History indicate American eel occurrence north (above) of LSHP in Lake Jackson, South Alcovy River, and Walnut Creek (Figure 1). While this study request focuses on upstream migrants, similar data would be necessary for downstream migrants if passage at LSHP was recommended. Study results would inform the development of license requirements by providing current information on American eel present in the Ocmulgee River below Lloyd Shoals Dam and preliminary data on occurrences in Lake Jackson above the dam. These data would provide information for evaluating potential American eel passage at the LSHP.

Proposed Methodology

The proposed study would take place in the main stem Ocmulgee River, immediately downstream of the LSHP and in Lake Jackson immediately upstream of the dam. The study area would extend downstream from LSHP to Georgia Highway 16 for a distance of 1.2 river miles (2 kilometers).

Multiple gear types (boat electrofishing, eel traps) would be used year-round to sample for American eel within the study area for a two-year minimum period. A minimum sampling period of two years was selected to capture a range of environmental variation and potential American eel behavioral responses. Sampling would consist of at least one multi-day sampling event per month, during which eel traps should be deployed overnight for two consecutive nights. In addition, on a monthly basis boat electrofishing would be used to conduct timed, standardized transects along both shorelines, encompassing the entire length of the study area on both sides of the Ocmulgee River. All eels captured would be anaesthetized with an approved anesthetic (e.g., MS 222), measured to the nearest total length in millimeters, weighed, caudal fin-clipped, tagged with a Biomark Passive Integrated Transponder (PIT) tag, and released. Length-frequency distributions would be produced by month, gear type, and combined gear types for the entire sampling period. Smallest, largest, and mean total lengths would be reported.

Discharge data used in analyses can originate from online United States Geological Survey (USGS) gage data for the survey period that is readily available to the public. If USGS water temperature is not available below LSHP, water temperature should be recorded with on-site temperature recording devices set to record at least every 15 minutes. Percent of moon surface illuminated on the last day of each sample has been used as an index of lunar influence on upstream movements; it is regarded as a more quantitative measure of the moon's appearance than lunar phase. Percent illumination data can be obtained online from the United States Naval Observatory[2]. The number of eels captured by date would be graphed separately by gear type and also combined for the entire sampling period; any resulting trends

[2] http://aa.usno.navy.mil/data/docs/RS_OneDay.html

would be interpreted. The number of eels captured by date would also be correlated to discharge, water temperature, and percent moon surface illumination data; these would be graphically depicted and any resulting trends would be interpreted.

Monthly catch-per-unit-effort (CPUE) would be produced and illustrated per gear type as well as a monthly CPUE combining gear type data. A mark-recapture procedure would be used to produce population estimates (plus 95% confidence intervals) of the eel population for each year.

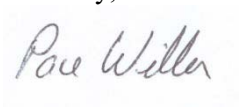
The NMFS is available to work with GPC to tailor specific details of the American eel study to the LSHP; GPC should also coordinate with the USFWS when developing detailed methodology. The capture methodologies and analyses listed above are standard practices that are widely utilized in the scientific community for fisheries research.

Level of Effort and Cost

It is unclear whether GPC would hire a consultant or scientist with students and research technicians for a portion or all of this American eel study at the LSHP, or conversely if this study would be organized and led by GPC. Because of this uncertainty, the NMFS cannot estimate costs for salaries and potential overhead for outside entities. Not including salaries, trucks, and boats (of which GPC already has in their possession), operating expenses (if necessary, hotel and per diem for project reconnaissance and sampling, truck and boat fuel, miscellaneous supplies) are estimated at $50,000 and equipment/supplies (PIT tags, PIT tag scanner, and eel traps) are estimated at $6,500. GPC did not propose an alternative American eel study in either the PAD or Scoping Document.

Thank you for the opportunity to comment during the earli licensing stages of this hydroelectric project. Please direct related questions or comments to the attention of Ms. Twyla Cheatwood at our Beaufort Field Office, 101 Pivers Island Road, Beaufort, North Carolina 28516-9722, or at (252) 728-8758.

Sincerely,



/ for

Virginia M. Fay
Assistant Regional Administrator
Habitat Conservation Division

cc: GDNR, Thom.Litts@dnr.state.ga.us
GDNR, Keith.Weaver@dnr.state.ga.us
GDNR, Paula.Marcinek@dnr.state.ga.us
USFWS, Alice_Lawrence@usfws.gov
USFWS, Donald_Imm@usfws.gov
F/SER47, Fritz.Rohde@noaa.gov

References

EA Engineering, Science, and Technology, Inc. 1990. Fisheries investigations of the Ocmulgee River downstream of the Lloyd Shoals hydroelectric facility. Prepared for Georgia Power Company. EA Report No. 10277.08. June 1990.

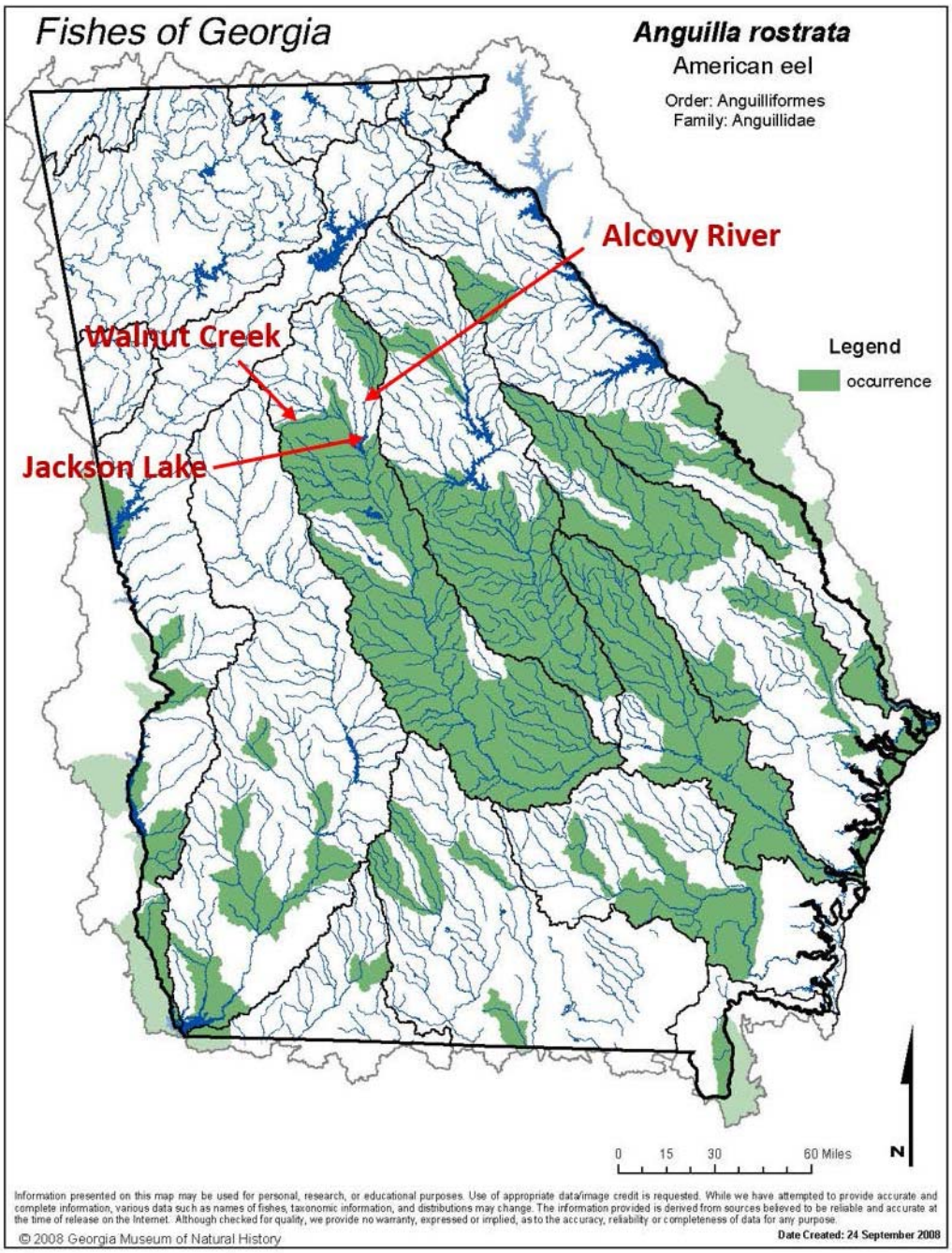


Figure 1: American Eel distribution in Georgia. (http://fishesofgeorgia.uga.edu)

RESPONSE TO NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION NATIONAL MARINE FISHERIES SERVICE COMMENT LETTER DATED NOVEMBER 15, 2018

Georgia Power appreciates the input of the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS) in requesting an American Eel study for the Lloyd Shoals Project. We have proposed an American Eel Abundance and Upstream Movements Study to address the NMFS study request.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

November 2, 2018

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E., Room 1A
Washington, D.C. 20426

Re: Lloyd Shoals Hydroelectric Project (P-2336-094); EPA Scoping Comments.

Dear Secretary Bose:

The U.S. Environmental Protection Agency has reviewed the referenced Scoping Document 1 (SD1), Pre-Application Document (PAD), and Notice of Intent (NOI) consistent with our responsibilities under Section 102(2)(C) of the National Environmental Policy Act (NEPA). The Federal Energy Regulatory Commission (FERC) proposes to issue a new license for the Lloyd Shoals Hydroelectric Project (P-2336-094). The proposed project is located on the Ocmulgee River just south of the confluence of the Alcovy, Yellow and South rivers in Butts, Henry, Jasper, and Newton Counties, Georgia. Summertime capacity of the project is 22.5 megawatts (MW) and its reservoir storage capacity is about 107,000 acre-feet. The operator, Georgia Power, proposes to continue operations as presently operated. No new additions or structures to the dam are planned.

The Lloyd Shoals Hydroelectric Project started generating power in 1911 and was managed by the Central Georgia Power Company. In 1928, the Georgia Power Company acquired the project. Lloyd Shoals received its first federal license in 1968 and second license in 1993 which expires on December 31, 2023. The Lloyd Shoals operates as a modified run-of-river mode which it means that "*the reservoir is drawn down when generating, and then refilled when not generating*"[1]. The closest dam to Lloyd Shoals is the Juliette Dam located 19 river miles downstream. The Lake Jackson is the surface reservoir of the project and occupies roughly 4,750 acres. The lake has 135 miles of shoreline. Four recreation areas are maintained by Georgia Power. Additional 1,138 acres of land and 106 miles of shoreline are also managed to follow compliance with FERC license and other laws and regulations.

The EPA has been part of the environmental review process and participated in various conference calls, scoping meeting and a site visit. By having this early involvement with the applicant, we can offer a better set of comments that could effectively assist the FERC's process. Further, the EPA would like to commend the applicant's willingness to provide information rapidly and candidness towards our questions and input.

The following comments are a summary of EPA's communications with the applicant and are intended to inform FERC about important issues to consider during the scoping process.

[1] PAD, Appendix D, p.3

Technical Issues and Recommendations:

Data:

The EPA understands that the project showed remarkable water quality improvements when the applicant replaced the oxygenating weir for tube aeration systems in 2006 (see PAD, Figure 10), and as a result of the new system in place, very limited data was collected since then. Some of the new license elements would require the applicant to demonstrate that compliance with water quality still exist. Ideally, water quality compliance should prevail year-round whether the project is generating or not. Additionally, we noticed that previous monitoring has been done only upstream and near the dam. No data was provided from downstream (over half a mile) of the dam. The project's boundary did not cover downstream from the dam, and the boundary of the project was not clearly delineated nor explained why the described/mapped extent was so limited.

Recommendation:

1. The EPA strongly encourages the applicant in collaboration with state and federal agencies to agree to a functional downstream virtual boundary to use for the proposed studies as a critical action to be considered.

2. Year-round water monitoring should be considered to obtain an accurate up-to-date data set that can demonstrate water quality standards compliance at all times.

3. Downstream data is needed to understand changes (if any) in riverine physical characteristics. This type of project often has a significant impact on downstream aquatic resources including degradation of biological integrity of the system.

4. For a starting point, some acquisition of baseline data from downstream of the project might be readily available from other state and federal agencies and reliable local organizations. Additionally, the applicant might obtain collaboration from governmental agencies regarding this activity.

5. New downstream monitoring data might include the same water quality profiles already measured by the (upstream) six monitoring stations and dam. Including a consistent set of data would facilitate a later analysis of upstream vs. downstream parameters that could be worked into a matrix analysis.

6. Additionally, the EPA proposed the possibilities of using low-tech practices to mitigate environmental impacts to water quality if the results from proposed studies should identify concerns with certain parameters.

1

Additional recommendations to include in the proposed studies:

- *Wetlands, Riparian and Littoral Habitats Proposed Study* - would be useful to analyze wetlands increase/decrease patterns through the years by mapping them and over imposing data layers over the years. These patterns might in part be helpful to show why some fish species have difficulty finding spawning areas and/or decide not to spawn. 2

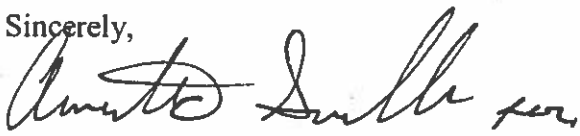
- *Geology and Soils* - erosion investigations are being proposed but should also cover downstream areas. The erosion data might be done in conjunction when delineating wetlands and the shoreline aquatic resources as suggested in the PAD. 3

- *Recreation and Land Use* - the study (or future plans) might be considering updating recreational facilities around the lake. The EPA recommends looking into the opportunity to install toilets with green technology to stop the use of septic tanks for recreational facilities. 4

The EPA appreciates the opportunity to be a part of the early stages of the NEPA process. NEPA provides a significant opportunity to take a holistic look at the project operations and evaluate opportunities to improve environmental conditions. This new FERC license could serve to correct past actions from previous licenses and mitigate (if any) environmental impacts discovered by the proposed studies and new data collection.

We thank you in advance for the opportunity to work with you during the FERC relicensing process. Please feel free to contact Ms. Maria Clark, at 404-562-9513 or by e-mail at clark.maria@epa.gov if you have any questions.

Sincerely,



Christopher A. Militscher
Chief, NEPA Program Office
Resource Conservation and Restoration Division

RESPONSE TO U.S. ENVIRONMENTAL PROTECTION AGENCY COMMENT LETTER DATED NOVEMBER 2, 2018

Response 1

Georgia Power appreciates the U.S. Environmental Protection Agency's (EPA's) recommendations on the water quality study and has adopted the recommendation to monitor the dissolved oxygen (and temperature) in the tailrace year-round for a one-year period beginning in May 2019 in the proposed Water Resources Study Plan. Georgia Power will work cooperatively with state and local agencies to obtain water quality data downstream within the study area. In addition to these agencies, Georgia Power will incorporate relevant data into its Water Resources Study collected by local "adopt-a-lake" volunteer groups.

In the Water Resources Study Plan, Georgia Power proposes to use its existing dataset of seasonal water quality profiles collected annually in Lake Jackson for the years 2000 through 2017 for analyzing water quality conditions in the reservoir. The dataset spans many years including drought years and wet years. For this reason, collection of additional water quality profiles from within Lake Jackson is not being proposed.

Response 2

The evaluation of the potential wetland changes over time will be evaluated in the Terrestrial, Wetland, and Riparian Resources Study. A temporal analysis of shoreline conditions will be performed by reviewing historic aerial photography for representative areas along the shoreline.

Response 3

The Geology and Soils Resource Study includes a shoreline reconnaissance survey of Lake Jackson and the Lloyd Shoals tailrace area. Six sites will be selected in the tailrace area. This will be conducted in summer 2019 to inventory and characterize existing sources of erosion and sedimentation.

Response 4

Georgia Power appreciates EPA's input on future plans for updating recreational facilities around Lake Jackson. This phase of the Integrated Licensing Process is focused on preparing a Study Plan that will address information needs for describing the existing environment and evaluating the potential impacts of continued project operation. The study findings will be incorporated into Georgia Power's Preliminary Licensing Proposal (PLP). The PLP will provide a draft environmental analysis of the impacts of continued project operation and propose measures for protecting, mitigating impacts to, or enhancing resources affected by the Project. Upon conclusion of the resource studies, we will evaluate appropriate measures to include in our relicensing proposal.

Due to their unavailability, I have not yet been able to make contact with local representatives of EPD nor DNR.

Thank you for hearing my concerns,

Sincerely,

Julia M. Haar
Jackson Lake Homeowners Association

From: JANET JERNIGAN [mailto:jjernigan30035@yahoo.com]
Sent: Sunday, July 08, 2012 4:39 PM
To: bg_manley@hotmail.com; bjernigan1@windstream.net; nancykinghargis@gmail.com; beth.rogers@conglobe.com; mppcpa@netzero.net
Subject: Fw: MASSIVE FISH KILL JACKSON LAKE

Picture was taken last week of dead fish located in a cove off of Jackson Lake

JACKSON LAKE IN PERIL: PART 1 - Worst Case Scenario

by Janet Jernigan

Last week, a massive fish kill of approximately 2,300 fish along with unnumbered turtles occurred in a cove of Jackson Lake near Elizabeth Circle in

Butts County.

Years of natural and man-caused silt flowing downstream from one of the three rivers that come together to form Jackson Lake has caused a continuing build-up at the entrance to this cove. As a result, the fish and turtles were trapped in the isolated cove, now virtually a pond, without proper oxygen and they suffocated.

Auburn University professor, Alan Wilson, who specializes in the study of lakes and reservoirs, warned of just such an occurrence when he spoke at the June meeting of the Jackson Lake Homeowners Association. He showed slides made from the Google Earth website of Jackson Lake. The website slides made from 1988 to present shows the result of silt accumulation on the lake and this cove.

As South River flows past the mouth of the Elizabeth Circle cove, the river curves and the silt is forced by current to accumulate. The river is 93 miles long originating near Atlanta Hartsfield Airport in East Point. Along the way, construction sites with no silt fences or improperly constructed ones at best, mass grading, illegal dumping and at one point a small dam was built to collect water for irrigating Sugar Creek Golf Course in Decatur causing the river to

change its flow and take the soil with it. Along with these transgressions is the natural wearing away of creeks and river banks by erosion.

Adding to the normal trauma of South River is the drought. As the water level decreased, the silt accumulation at the entrance to the cove at Elizabeth Circle rose and cut off the cove to the river water.

Elizabeth Circle cove residents, the Ledfords, notified the Department of Natural Resources, Georgia Power and Atlanta Fox 5 television about the fish kill. Fox 5 came out twice last week to report. DNR Officer, Jimmy Evans, who received a report from two of his officers who saw the fish, said there was nothing they could do since they could not get a boat into the cove and officers went up to their knees in mud when trying to get to the fish. He said that wildlife that feeds on dead fish and turtles would take care of the problems naturally.

In the meantime, residents are left with a horrible stench and trying to dispose of the dead fish on their own which is what Sean Ledford and his father attempted on the 4th of July.

Dredging open the entrance to the cove would be an answer to reestablishing the cove to the river, but residents were told Georgia Power was not planning to do so.

Mr. Wilson explained that as silt accumulates in a lake, it reduces light penetration thus preventing plants from producing oxygen which can destroy an important habitat for fish in the bottom of the cove and lake. Without the production of oxygen by plants, fish are vulnerable to suffocation. Decomposition of decaying matter near the lake bottom by bacteria not only further reduces oxygen concentrations, but also promotes disease that could harm pets and humans.

In this recent fish kill, low water levels, reduced oxygen concentrations and high temperatures were to blame. The Worst Case Scenario has occurred.

Jackson Lake in Peril: Part 2 - Dirty Water and Trash

September 24, 2018

FERC P-2336-094 STUDY IMPACT REQUESTS

In compliance with NEPA, as a stakeholder, I, Julia Haar, living at 470 Lakeshore Drive, Alcovy Shores make a request for the following studies to be considered by FERC as a necessity for qualification to relicense the Lloyd Shoals Dam Hydro Project, (Ferc Project #2336).

1. Study of Cyanobacteria in the Jackson Lake watershed, as it relates directly to the extinction of the Bald Eagle in reports made in 2008 by GA Power Biologist Tom Broadwell due to the food chain of eagles feeding on migrating coots that feed on the hydrilla plant which hosts the cyanobacteria. And a study of how the presence of the cyanobacteria in the watershed impacts the community at large. To include a study of the levels and areas of concentration of cyanobacteria in the Jackson Lake watershed and a look at reversal measures of the most concentrated locations. 1

   (December2008HaarJasperCountyBOCMTG)
   (August2014ToledoOhioIncidentHaar-GAPowerTonyDodd)

   (June 2012AlanWilsonReportFinal)

2. Silt progressions and consequences in the South River, Yellow River, Alcovy River, and Jackson Lake area and development of a proposal to manage this for the future health of the Lake. Reference: June 2012 Jackson Lake Homeowners Association Meeting Report by Auburn University Professor Alan Wilson with the conclusion that Jackson Lake has water quality issues with “Algal blooms and severe silt problems”. Jackson Lake is shrinking in size due to unmanaged and untreated silt build up. 2

   (June 2012AlanWilsonReportFinal)

3. The July 2012 "Fish Kill" near Elizabeth Circle at the end of South River, as reported in Monticello News by news reporter Janet Jernigan. What happened and what was done about it? by whom? What measures need to be taken to avoid this occurrence in the future? Requesting GA Power to set up a responsible plan to address this issue. 3

(July 2012 MonticelloNewsFISHKILLJanetJernigan Pages 1-3)

4. An AMENDMENT to the GA Power Lloyd Shoals Dam Relicensing Brief: Water Resources To include a charted statistical study over the past 10 years to serve as evidence of regular and conscientious monitoring of the progression and/or treatment of known toxic substances in the Jackson Lake watershed to include urban runoff contamination for PCB's, Chlordane and TWR, Ph, total nitrogen, phosphorus loading, dissolved oxygen, fecal coliform, water temperature, and cyanobacteria readings during the "bloom season", mercury in fish tissue, or any other substance that would prove to be a threat to the residence or visitors at Lake Jackson and/or to support the claim by GA Power in their Relicensing Brief to FERC that Lake Jackson is safe to be used as a source of drinking water, that fish caught are safe to consume, and recreational activities are safe in contact with Jackson Lake water. 4

(September 2018 GA Power LS-Water Resources)
(September 2018 NewsReporterJJERNIGAN follow-up notes).

5. Request that any water quality readings and findings be made available to the public in an **annual** statistical report. 5

6. Request that an **annual** fish consumption report be made available to the public. 6

Thank you.

Julia M. Haar

470 Lakeshore Drive

Jackson Lake, GA

(404) 277-3118

December 1, 2008

Board of Commissioner's Meeting
Jackson County, Monticello, GA 31064

Julia M. Haar
470 Lakeshore Drive
Monticello, GA 31060

TOPIC: Microcystis/Cyano Algae

FACT SHEET MICROCYSTIS ALGAE (ATTACHED)

In August of 2008, I began communications with GA POWER with regard to my concerns of the water quality of Alcovy Shores Jackson Lake area.

I was referred to Tom Broadwell, resident Biologist of the Southeast Region, to discuss my concerns of the evidence of brown foam and yellow "streaking" in the water. I requested a visit to Alcovy Shores and water testing results.

Mr. Broadwell told me that he was familiar with the symptoms I was referring to and that tests were made last year in August of 2007 @ the Beach, Alcovy River and Yellow River. The results that were sent to the USAP LAB in Kansas showed variations of levels of Microcystis Cyano Algae, ranging from .18 to 3.8 micrograms.

FYI: Citings been made in the watersheds of other states as well. Extremely high levels have been found in Michigan and Wisconsin watersheds with the consequence of WILDLIFE, FISH, FOWL, AND HUMAN FATALITIES. A reading of over 10 micrograms was cited in Australia. The World Health has cited as high as 20 micrograms in some locations. It has become a matter of global concern.

Further communications with Tom Broadwell informed me that the extinction of the Eagle in the Lake Jackson area has been traced back to the fact that the Eagle feeds on the Coot, which feeds on the Hydrilla plant, which is a host plant for the Microcystis Cyano Algae. So there is substantial evidence to support the fact that there have already been fatalities cited in the Jackson Lake area due to the Mycrocystis Cyano Algae.

GA POWER'S final communications with me were that they have done VISUALS of the algae this year and did NOT NEED to do testing and that "THEY WERE ON TOP OF IT". They also stated that there would be representatives sent to Home Owner's Associations for up-to-date information regarding the algae's development. There was no follow-up on this promise with the Alcovy Shore's Homeowner's Association.

Not being satisfied with this lack of response, I made contact with the offices of both the EPD and DNR, who promptly referred me to the County Offices. I have spoken with Greg Williams, County Manager, who shared my concerns, but who referred the issue to Raymond Rogers of Code Enforcement, who referred the issue to Chris Anderson, Department Head of Code Enforcement, who referred me back to GA POWER, (since they own and operate the lake).

In light of the obvious "run-around", it is apparent that this issue is either not taken seriously or intentionally ignored. I have found that it has repeatedly been documented nationally and internationally by the Bureau of Environmental Health via the Environmental Toxicology Program with specifics as to symptoms and negative consequences of this toxicity to watershed communities affecting humans, pets, wildlife, fish and foul.

The responses I have received in my communications regarding this issue have ranged from, "The tests are rather expensive" (EPD), "It is still undetermined what levels are toxic" (Tom Broadwell, Biologist), to "We don't want to create a crisis" (GA POWER).

I am not naive to the fact that this issue might have some impact on the traffic and profit making ventures with regard to the lake, but I would hope that this is not in any way a reason for information not being forthcoming. I can only hope that the safety of the community would take precedence, especially since we are talking about a potentially lethal health hazard and a community that has NO KNOWLEDGE at this time of these risk factors.

My suggestion to Chris Anderson, Jackson County Code Enforcement Department Head, was to appeal to GA POWER on behalf of the community, with the urgency of the matter to provide accountability and transparency with regard to this issue. And, even though, as GA POWER argued, visuals of the "algae condition" are sufficient in determining levels of toxicity, the National Department of Health and Human Services (EOHHS) Environmental Toxicology Program, has determined that WATER TESTING is the only way to be certain that toxic levels are not present.

Therefore, I would like to suggest to the Board of Commissioners, that ANNUAL water testing of Jackson Lake is of utmost importance, and should become a priority. Secondly, I would like to request that GA POWER become transparent by providing SEASONAL AND ANNUAL REPORTS of these testing results as a part of PUBLIC AWARENESS. Thirdly, that GA POWER provides applicable notifications, restrictions, or warnings by way of mailings, postings, and newspaper notices throughout the season, GIVING THE LOCAL COMMUNITY NECESSARY AWARENESS AND THE OPPORTUNITY TO AVOID EXPOSURE TO THIS TOXIN, ESPECIALLY WHEN IT IS "IN BLOOM' SEASON.

Finally, a quite ambitious idea or suggestion that I would like to present is to consider an experiment with a RESTORATION POLICY. For example, in 1992 a Swedish restoration policy initiated NUTRIENT LOADING and FOOD-WEB MANIPULATION to replace the monoculture of Microcystis by a diverse phytoplankton community. In addition they, ESTABLISHED A CONSTRUCTED WETLAND to reduce phosphorus and nitrogen and also added PROTECTION ZONES along the feeder streams. These methods all been documented as being successful in transforming the wetland to a healthier state.

Since I have not heard any progress report from the Jackson County Code Enforcement Department, I am appealing to the Board of Commissioners to consider the importance of this issue.

Respectfully Submitted,

Julia M. Haar, Resident
470 Lakeshore Drive
Monticello, GA 31064

jmhaar@msn.com

From: Julia M Haar <jmhaar@msn.com>
Sent: Friday, September 14, 2018 4:49 PM
To: Julia M Haar
Subject: FW: Citizen request Georgia Power to provide current public information regarding Cyanobacteria Algae in Jackson Lake

From: Julia M Haar
To: Anthony Ray Dodd
Cc: Cheryl Wheeler ; jmhaar@msn.com
Sent: Sunday, August 03, 2014 9:03 PM
Subject: A toxic algae bloom has left 500,000 people in Ohio

Us Senator Rob Portman, "We do have a problem with these toxic algae blooms" which affect both drinking water safety and Lake Erie's fishing and tourism industries, he said.
Read more at http://www.toledoblade.com/local/2014/08/02/City-of-Toledo-issues-do-no-drink-water-advisery.html#K4UZ81u4OtXrkH7j.99

On August 3, 2014 National News reported and confirmed that a toxic cyanobacteria algae bloom in Lake Erie left 500,000 people in Toledo, OH area without drinking water.

Georgia Power Biologist, Tom Broadwell, has confirmed that this same algae is present in the Jackson Lake watershed. Statistics confirm that this algae is toxic at ANY level when it is in bloom.

The national news in Toledo, Ohio, only confirms how important it is to take this environmental issue seriously. Current research will tell us that there are preventative steps that can be taken to minimize the presence of the algae and even halt it's growth. As I said at the initial meeting in December 2008, it takes long term planning, proactive cooperative work, and a financial investment, but WATER QUALITY and HUMAN LIVES ARE WORTH THE INVESTMENT!

I'm sure those who manage the lakes in the Toledo, OHIO watershed are now wishing they had another chance to take this issue seriously as they scramble to find solutions to deal with the crisis of a whole community being exposed to this high level of toxicity in their water supply. Unfortunately, the toll taken on this whole community of being exposed to this type and level of toxicity is YET TO BE DETERMINED and WILL BE SOON DISCOVERED!

As you know AUGUST and SEPTEMBER are the times to be testing the water here at Jackson Lake, BEFORE AND AFTER there are VISUALS of ALGAE BLOOM.

As a resident of Jackson Lake, I am requesting Georgia Power at this time to provide a public ANNUAL WATER QUALITY REPORT OF JACKSON LAKE to include the findings of multiple OFFICIAL SAMPLE READINGS in MULTIPLE LOCATIONS of the presence of CYANOBACTERIA ALGAE to be communicated to ALL JACKSON LAKE HOMEOWNERS and SURROUNDING COMMUNITIES OF JACKSON LAKE, with the purpose of transparency on this issue and to diffuse concerns citizens currently have of the status of the water quality of Jackson Lake.

In addition, since there has been FATALITIES documented in Georgia Lakes as recent as JULY 2014 due to VIBRIO VULNIFICUS, "flesh eating bacteria". I would like to request that Georgia Power add this test to the annual water quality report, as well.

I trust that at this time Georgia Power will be compelled to take these water quality issues seriously! I'M SURE TOLEDO, OHIO, NEVER THOUGHT IT COULD HAPPEN TO THEIR WATERSHED OR THEIR WATER SUPPLY!

Thank you in advance for your attention to all issues concerning the water quality at Jackson Lake,

Julia Haar
470 Lakeshore Drive
jmhaar@msn.com
(404) 277-3118

----- Original Message -----
From: Dodd, Anthony Ray
To: Julia Haar
Cc: Wheeler, Cheryl L.
Sent: Tuesday, August 12, 2014 8:40 AM
Subject: Reply

Dear Ms. Haar,

Georgia Power appreciates the information you forwarded regarding the algae bloom story in Ohio. We have been engaged in tracking this issue for well over a decade now, and try to stay current on any important development. As you may know, our industry is a highly regulated one, with numerous air, water and waste regulatory obligations, among others. And Georgia Power strives every day to be in full compliance with the law. With respect to cyanobacteria, there are no regulatory requirements or specific water quality obligations for Georgia Power to follow. Nonetheless, the Company has been and will continue to be proactive in understanding and learning more about this particular algae and the impacts it can have. In fact, the Company has developed a protocol to inspect, sample and monitor its lakes for algae blooms. This protocol also includes communications with the Georgia Environmental Protection Division ("EPD") and other agencies when and if the Company learns of a significant algae bloom.

Further, the Company has directly engaged EPD regarding the need to collaborate and pay attention to this issue, and we will continue to work with EPD to ensure that there is knowledge exchange as the underlying science emerges. We believe you can also be helpful in contacting EPD with information regarding this algae, as a water quality concern.

Georgia Power will continue to review its inspection, sampling and monitoring protocol, and make appropriate adjustments as we learn more. Please rest assured that the Company will endeavor to pay attention to this matter. Thank you for your input.

Sincerely,

Tony Dodd
Environmental Affairs

Water quality issues in Jackson Lake

Alan Wilson – Auburn University
wilson@auburn.edu

Tom Broadwell – Georgia Power
TLBROADW@southernco.com

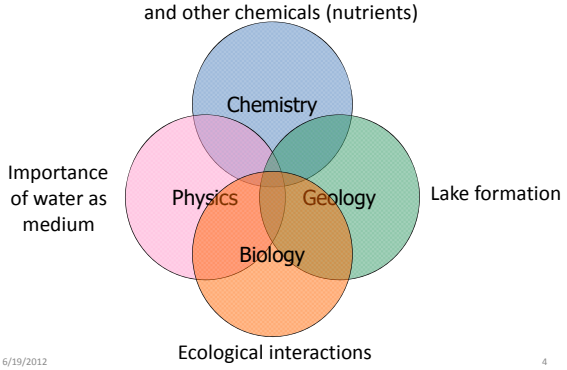
Tony Dodd – Georgia Power
ARDODD@southernco.com

Jackson Lake Homeowners Association
22 June 2012

Discussion topics

- Algal and cyanobacterial blooms
  - Phytoplankton and cyanobacteria
  - Phytoplankton resources
  - Consequences of algal blooms
- Silt
  - Causes and consequences in lakes
- Jackson Lake historical water quality patterns

Synergy of sciences



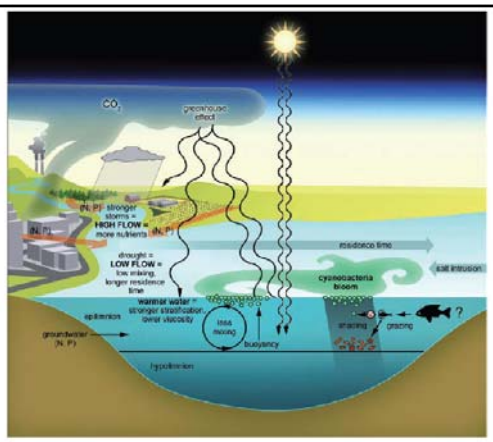
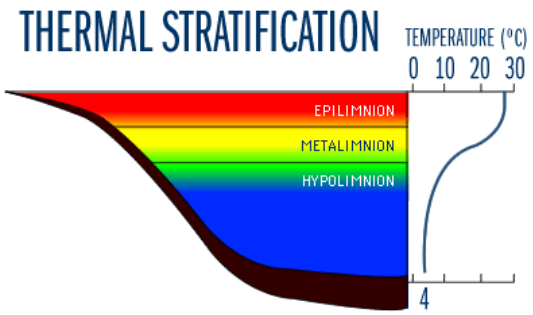
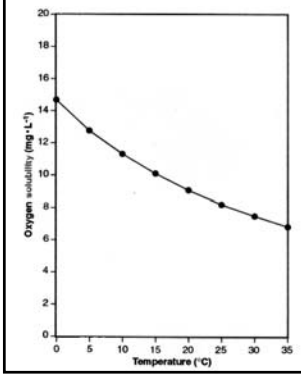


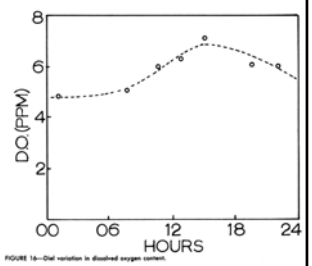
Fig. 4. Conceptual figure, illustrating the environmental controls of cyanobacterial bloom dynamics, and the direct and indirect effects of climate change on these dynamics.

Stratification



Dissolved oxygen





7

Seasonal mixing patterns

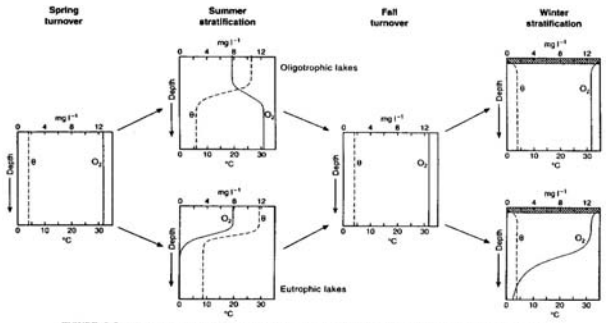


FIGURE 9-2 Idealized vertical distribution of oxygen concentrations and temperature (Θ) during the four main seasonal phases of an oligotrophic and a eutrophic dimictic lake.

Effects of flow

FLOW

Greater mixing
Less algal growth
Higher oxygen
Greater water use
Greater siltation
Greater erosion

Conserve water
Reduced siltation
Algal blooms
Hypoxia/Anoxia
Reduced mixing

6/19/2012 9

Discussion topics

- Algal and cyanobacterial blooms
  - Phytoplankton and cyanobacteria
  - Phytoplankton resources
  - Consequences of algal blooms
- Silt
  - Causes and consequences in lakes
- Jackson Lake historical water quality patterns

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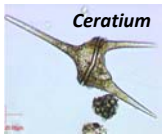
Phytoplankton

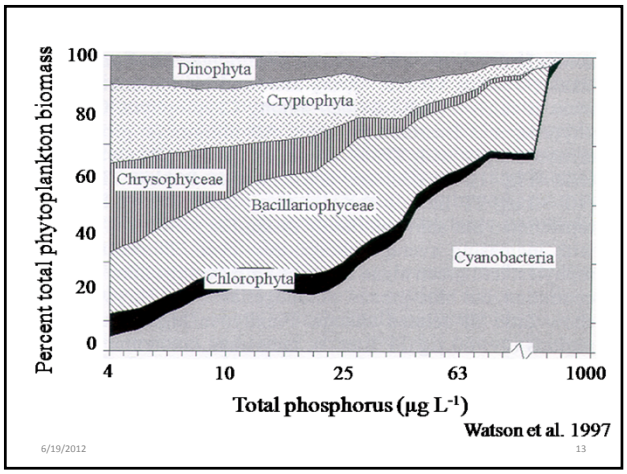


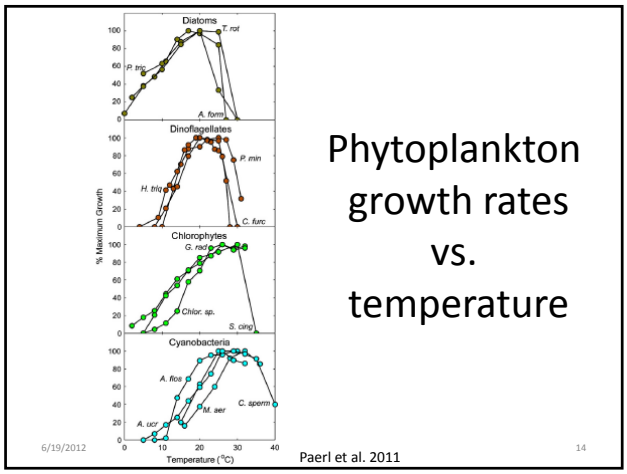
Phytoplankton resources

Water
Light
Carbon – CO_2
Major nutrients – Phosphorus, Nitrogen
Minor nutrients – Si, K, Mg, Ca, Na, Cl, etc.

Photosynthesis

$6\ CO_2 + 12\ H_2O \longrightarrow C_6H_{12}O_6 + 6\ H_2O + 6\ O_2$

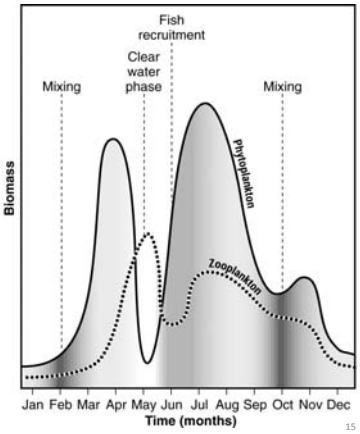


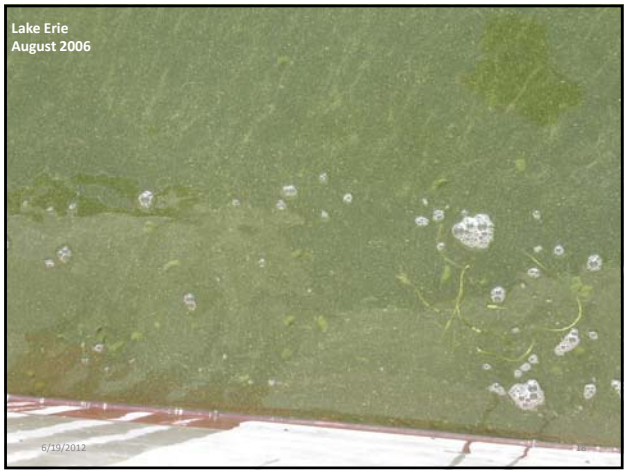


Phytoplankton growth rates vs. temperature

Paerl et al. 2011

Plankton seasonal patterns (for temperate <u>dimictic</u> lakes)





Effects of cyanobacterial blooms

Toxic chemicals

Off-flavor chemicals

Common cyanobacterial toxins

Toxin	Produced by
Neurotoxins	
Anatoxin-a	*Anabaena, Aphanizomenon, Oscillatoria* (*Planktothrix*)
Homo-Anatoxin-a	
Anatoxin-a(s)	*Anabaena, Oscillatoria* (*Planktothrix*)
Paralytic shellfish poisons (saxitoxins)	*Anabaena, Aphanizomenon, Cylindrospermopsis*, Lyngbya
Liver toxins	
Cylindrospermopsin	*Aphanizomenon, Cylindrospermopsis*, Umezakia
Microcystins	*Anabaena, Aphanocapsa, Hapalosiphon, Microcystis, Nostoc, Oscillatoria* (*Planktothrix*)
Nodularins	*Nodularia* (brackish to saline waters)
Contact irritant-dermal toxins	
Debromoaplysiatoxin, lyngbyatoxin	*Lyngbya* (marine)
Aplysiatoxin	*Schizothrix* (marine)

Paerl and Huisman 2009

Effects of cyanobacterial blooms

Coroner cites algae in teen's death *Milwaukee Journal Sentinel, 5 Sept 2003*

...Two days after swallowing water while splashing and diving in a scum-covered pond at a Dane County (WI) golf facility in July 2002, Dane Rogers went into shock and suffered a seizure before his heart failed, according to Coroner John Stanley's report...Tests of stool and blood samples found the common blue-green algae, known as *Anabaena flos-aquae*, and its toxin, anatoxin-a...

Anabaena

Control techniques for cyanobacteria

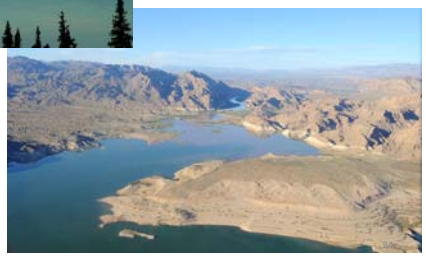
1. Reduced nutrient inputs
2. Shading
3. Mixing
4. Chemicals
5. Filtration
6. Harvesting
7. Ecology

Dean Wilson Farms, AL
July 2009

Discussion topics

- Algal and cyanobacterial blooms
  - Phytoplankton and cyanobacteria
  - Phytoplankton resources
  - Consequences of algal blooms
- Silt
  - Causes and consequences in lakes
- Jackson Lake historical water quality patterns

Silt



Causes of siltation

- Erosion
  - Natural weathering
  - Poor land use
  - Elevated flow

Consequences of siltation

- Loss of aesthetics and property values
- Reduced light penetration
- Reduced primary production
- Reduced depth/navigational issues
- Damaged spawning habitat for fishes

Discussion topics

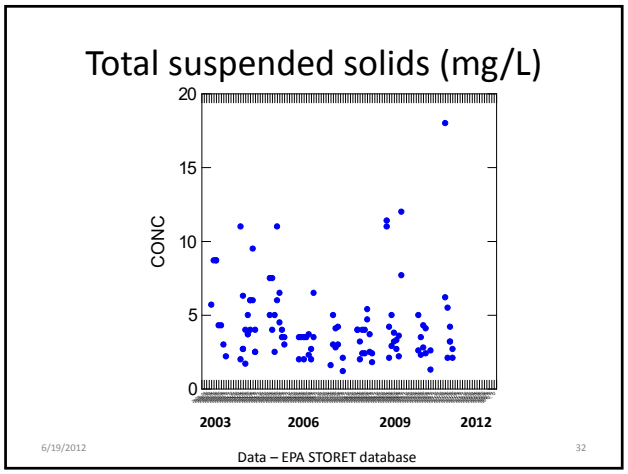
- Algal and cyanobacterial blooms
  - Phytoplankton and cyanobacteria
  - Phytoplankton resources
  - Consequences of algal blooms
- Silt
  - Causes and consequences in lakes
- Jackson Lake historical water quality patterns

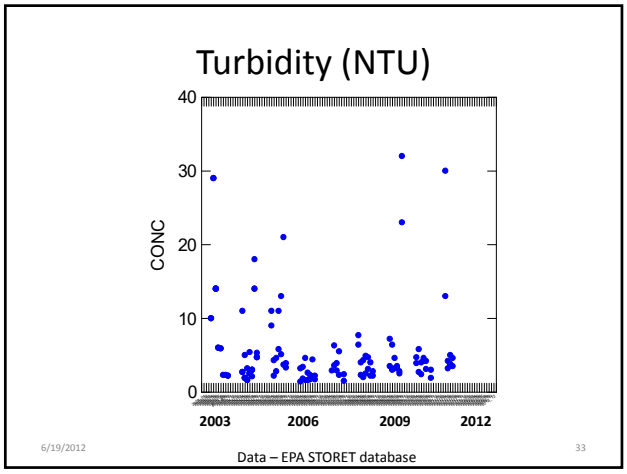
Facts about Jackson Lake

- **About Lake**
  Shoreline: 135 miles
  Surface area: 4,750 acres
  Formed by: Lloyd Shoals Dam
  Source: Alcovy, Yellow and South Rivers
- **About Lloyd Shoals Dam**
  Management: Central Georgia Hydro Group
  Generation: Lloyd Shoals Hydroelectric Plant
  Capacity: 14,400 kilowatts, six units
  Type: Concrete-Masonry
  Height: 100 feet
  Span: 1,070 feet
  Completed: 1911

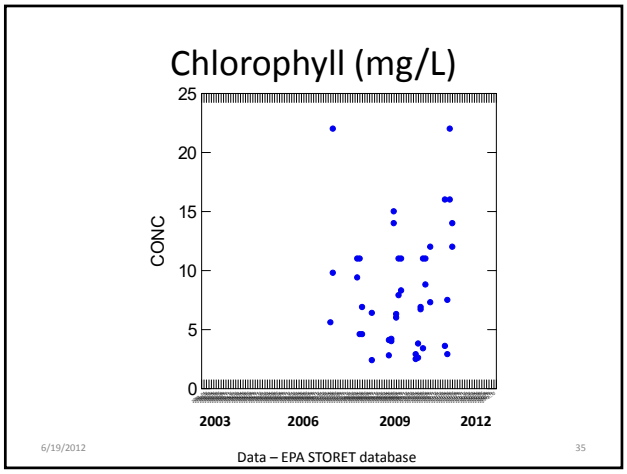
From Georgia Power website

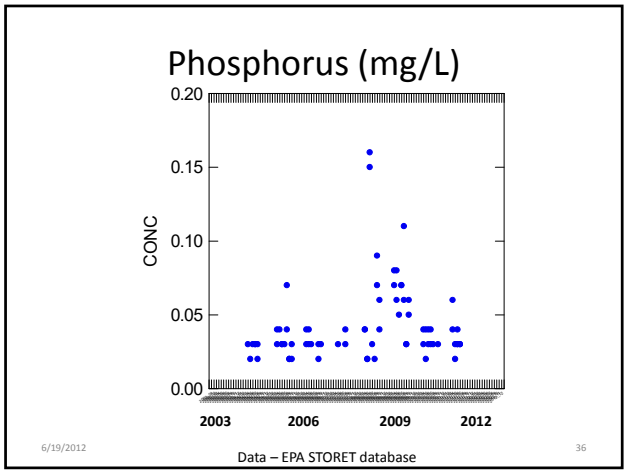

Silt issues
Jackson Lake, Georgia
Jackson Lake
January 2012
Image USDA Farm Service Agency


Total suspended solids (mg/L)
CONC
20
15
10
5
0
2003
2006
2009
2012
6/19/2012
Data – EPA STORET database
32

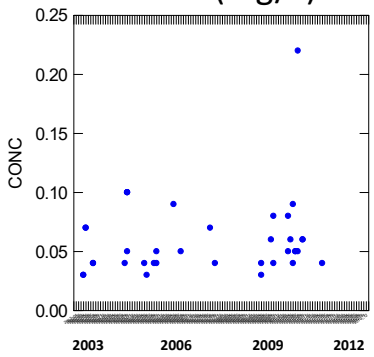

Turbidity (NTU)
CONC
40
30
20
10
0
2003
2006
2009
2012
6/19/2012
Data – EPA STORET database
33


Algal bloom issues
Jackson Lake
September 2007
T. Broadwell, GA Power


Chlorophyll (mg/L)
CONC
25
20
15
10
5
0
2003
2006
2009
2012
6/19/2012
Data – EPA STORET database
35

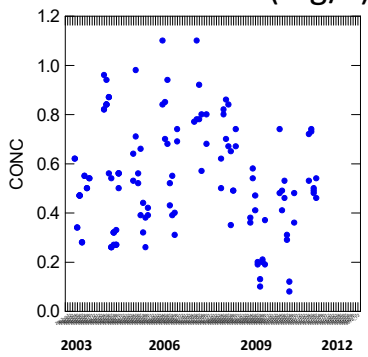

Phosphorus (mg/L)
CONC
0.20
0.15
0.10
0.05
0.00
2003
2006
2009
2012
6/19/2012
Data – EPA STORET database
36

Ammonia (mg/L)



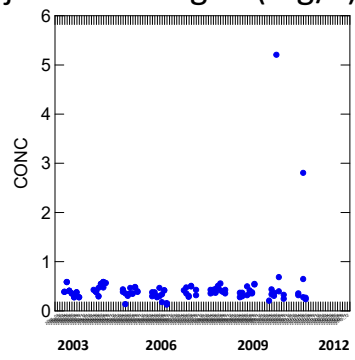
6/19/2012 Data – EPA STORET database 37

Nitrate and Nitrite (mg/L)



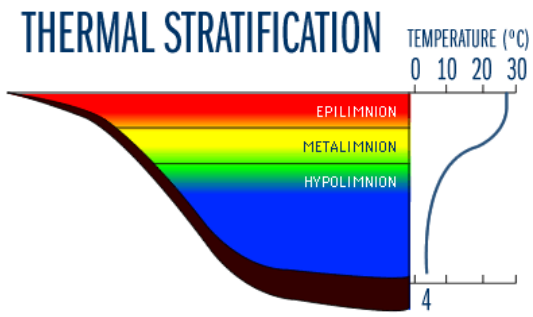
6/19/2012 Data – EPA STORET database 38

Kjeldahl nitrogen (mg/L)



6/19/2012 Data – EPA STORET database 39

Stratification



6/19/2012 40

Seasonal mixing patterns

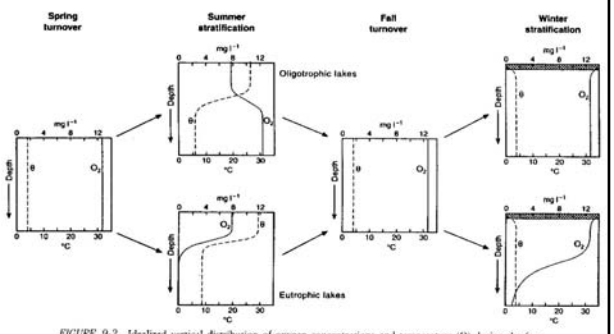
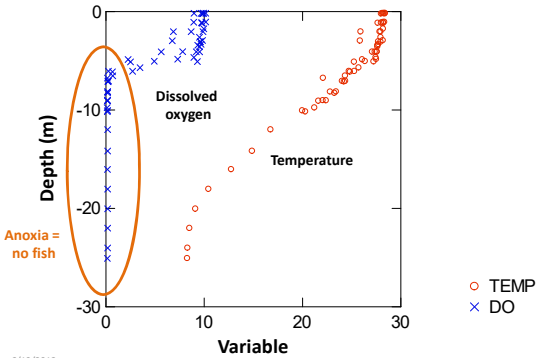


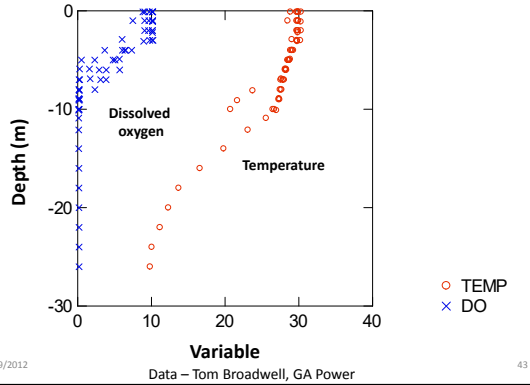
FIGURE 9-2 Idealized vertical distribution of oxygen concentrations and temperature (Θ) during the four main seasonal phases of an oligotrophic and a eutrophic dimictic lake.

Depth profiles – June 2007



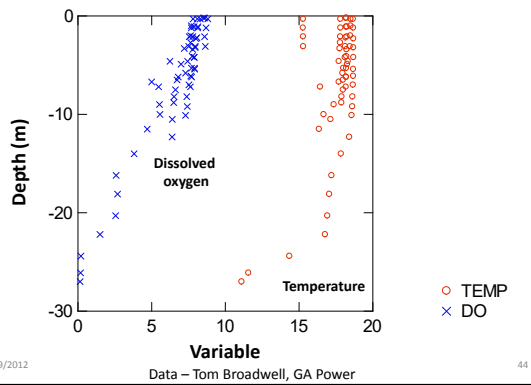
6/19/2012 Data – Tom Broadwell, GA Power 42

Depth profile – August 2009



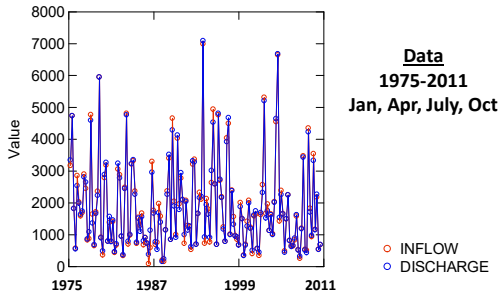
Data – Tom Broadwell, GA Power

Depth profile – November 2003



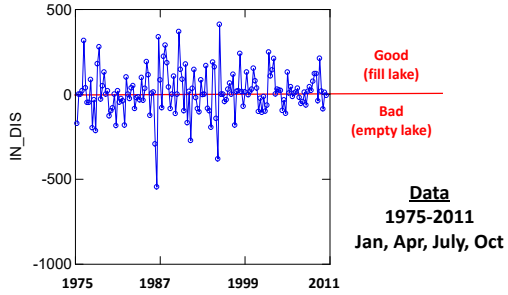
Data – Tom Broadwell, GA Power

Flow (cfs)



Flow – cubic feet per second – Lloyd Shoals and Ocmulgee River near Jackson, GA
Data from Fred Cox – GA Power

Flow (cfs)
Difference between inflow and discharge



Flow – cubic feet per second – Lloyd Shoals and Ocmulgee River near Jackson, GA
Data from Fred Cox – GA Power

Conclusions

- Jackson Lake has water quality issues
  - Algal blooms and silt are problems
- Need to manage nutrients and inorganic solid inputs
- Flow is important in reservoirs and can alleviate or exacerbate problems
- GA Power, JLHA, and other stakeholders should work together to solve issues
  - Consider each group's needs for long-term solutions

Contact Information

Alan Wilson – Auburn University
wilson@auburn.edu
http://www.wilsonlab.com

Tom Broadwell – Georgia Power
TLBROADW@southernco.com

Tony Dodd – Georgia Power
ARDODD@southernco.com

Georgia Power

Lloyd Shoals Dam
Lake Jackson

Relicensing Brief: WATER RESOURCES

- Georgia Power maintained a routine water quality monitoring program for Lake Jackson between the 1980s and Fall 2017. Water quality parameters included nutrients, oxygen demanding constituents, pH, temperature, turbidity, alkalinity, dissolved oxygen, specific conductivity, and hardness. Lake Jackson has exhibited good overall water quality conditions throughout this monitoring period.
- Lake Jackson's waters typically stay well mixed for most of the year (fall to spring). The lake thermally stratifies in the summertime. Georgia Power's historical water quality data indicate normal seasonal patterns with highest dissolved oxygen concentrations in the winter months and lowest during summer months.
- Lake Jackson is a popular recreation destination and a popular fishery comprised of a diversity of sport- and gamefishes.
- Georgia Environmental Protection Division (EPD) classifies the section of the Ocmulgee River from Lloyd Shoals Dam to Wise Creek as drinking water use, which it is currently meeting. Georgia EPD classifies water use for Lake Jackson from the South River at Georgia Highway 36, from the Yellow River at Georgia Highway 36, and from the Alcovy River at Newton Factory Road Bridge to Lloyd Shoals Dam as recreation use.
- Based on Georgia EPD's 2016 Water Quality in Georgia report, the Yellow River arm, South River arm, Tussahaw Creek arm, Alcovy River arm, and dam pool reaches of Lake Jackson were listed as not supporting their designated uses for recreation. The designation was due to non-point source and urban runoff contamination for polychlorinated biphenyls (PCBs), chlordane, and Trophic Weighted Residue Value of mercury in fish tissue (TWR). A fish consumptive guidance has been issued for Lake Jackson by Georgia EPD, and Total Maximum Daily Loads were established in 1998 for chlordane and PCB and in 2002 for TWR.
- Georgia EPD's chlorophyll-*a* standard for Lake Jackson is set at a concentration not to exceed 20 µg/L. 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. The chlorophyll-*a* standard is monitored by sampling and analyzing lake water at a location approximately 2 miles downstream of the confluence of the South and Yellow Rivers at the junction of Butts, Newton, and Jasper Counties at a frequency of more than once in a five-year period.
- There are several other water quality standards set for Lake Jackson by Georgia EPD that include pH, total nitrogen, phosphorus loading, dissolved oxygen, fecal coliform, and water temperature.
- Georgia EPD has limited maximum phosphorus loading standards at four major tributaries of Jackson Lake: South River at Island Shoals, Yellow River at GA Highway 212, Alcovy River at Newton Factory Bridge Road, and Tussahaw Creek at Fincherville Road.

Bottom Line Take Away: Lake Jackson supports its designated uses for drinking water and is a popular recreational destination with a diverse fishery.

Issue Contact: Tony Dodd

jmhaar@msn.com

From: JANET JERNIGAN <jjernigan30035@yahoo.com>
Sent: Monday, September 17, 2018 10:41 AM
To: Julia M Haar
Subject: massive fish kill 2012 questions

History 2012-I was contacted by a homeowner who lived beside a cove on South River that had thousands of dead fish at their shoreline. I think I remember the homeowners were trying to get DNR to clean up the fish, which they refused, and desperation turned to necessity and the homeowners had to get out around July 4th, dig ditches to bury the fish and later dig or dredge out the sediment that preventing fresh water flow.

I just happened to speak with a professor from Auburn University who was doing a study on algae bloom.He said this was not a massive fish kill caused by algae bloom, but a narrow mouth into the cove that had been closed by sediment. I believe that DNR or someone dredged the sediment to get the cove opened. All the fish in the closed up cove could not get oxygen and died.

This professor was well aware of the problem and of algae bloom. He told me about some books related to Jackson Lake. We also discussed how Jackson Lake is losing its depth by unrelenting sediment and trash coming down the rivers and creeks that feed the lake. In the future, Over the years since 191? when dam was built the acreage of Jackson Lake has been reducing again with sediment, trash, people dumping yard waste, you name it.

As long as there is enough water going over the dam to produce electricity then Georgia Power will not do anything.

As far as pollution, up stream from Jackson Lake are two water treatment plants that pour millions of gallons of "treated" water into South River. When there is a powerful rain causing stormwater runoff or power outage, this water is poured into the river untreated. You may remember the sewage pipe that was found damaged in Dekalb County a year or so ago. It had been damaged for who knows how long, citizens had complained of odors. One interesting discovery I made is a 25 mile tunnel that was built as an overflow tunnel to be used for emergency use such as power outage, grid failure or nuclear attack. This tunnel was funded in Dekalb County budget.

Another major concern for Jackson Lake Homeowners should be development around the lake. Homeowners are not responsible or fined for dumping grass trimmings, cut trees and branches, runoff after fertilizing their lawns, no sculpting of land to keep top soil from washing into the lake. It has been rumored that a company that cleans out septic tanks in this area empties that waste into the river.

On every cove there is so much trash built up over years. A homeowner on Chickadee Drive collects items that wash up on his boat ramp and stacks it into a huge pile. There is also a picture and story about his pile of junk in the Monticello News. Currently there is a fund raiser being operated by Jackson Lake Homeowners Association to install a trash trap upstream from the lake. The brochure says that Dekalb County will take care of the trash pickup from the trap.

Sediment and trash from rivers and creeks feeding Jackson Lake will continue to cause problems as it is unabated.

As far as pollution with dangerous chemicals, it is highly possible that these chemicals are being dumped in a clandestine manner, as well as thousands of old tires and anything else you can imagine.

In your own county, there is a huge coal ash lake in Juliette. EPA has given Georgia Power many years to get rid of the coal ash lake. See their website. In Dekalb County there are two huge mountains of trash right next to I-275. Over the years we have wanted more and more and now we are reaping the results of these rewards. Burning coal for cheap electricity has caused hundreds of coal ash lakes around the country. These lakes hold water and ash known to be filled with arsenic and other dangerous chemicals. Vast amount of trash is picked up every day and there is no where left to put it, so Dekalb and other places around the country have turned to building mountains from it, covering it in a membrane. The mountains in Dekalb first produced methane gas, but later that stopped and now the mountains are covered in solar panels. In Jasper County, our landfill goes daily. Last year it caught on fire and burned for days. Millions of gallons of water was used to try and put it out, but finally it was left to just burn its self out. Imagine the pollutants put into the air. People in Henry County complained about the smell and smoke.

As we have learned from reporting from Hurricane Florence, North Carolina not only has coal ash lakes, dangerous byproducts of burning coal for fuel, but they also have many pig farms with lakes of feces and urine. We don't even know what kind of dangers such as these are washing into the rivers and creeks around here.

I have given you some food for thought. Unfortunately the fish kill was not caused by pollution but excessive sediment caused by nature and by overzealous building on the riverbanks without adhering to any rules to keep soil, yard waste, vegetation and just pure trash from washing into the rivers and creeks. Got an old washing machine, drop it over the bridge.

Hopefully some of this email can help in your analysis.

Personally I don't know if the dam generates enough electricity to justify its existence and the expenses. At any time Georgia Power could dismantle the dam and return the river to its original flow.

My home phone number is 706-468-9363

jjernigan30035@yahoo.com" <jjernigan30035@yahoo.com>

Cc: Julia M Haar <jmhaar@msn.com>
Sent: Friday, September 14, 2018 7:57 PM
Subject: IMPORTANT: Regarding Your Report on Massive Fish Kill at Jackson Lake in 2012

Hello Janet Jernigan,

I am a home owner and resident of Jackson Lake, GA.

Southern Company on behalf of Georgia Power has filed it’s notice of intent to relicense the Lloyd Shoals Hydro Project (Jackson Lake) (FERC Project #2336) in 2018.

This provides a perfect opportunity to address environmental and water quality issues directly with FERC regarding Jackson Lake. I have been going through my files of past and present water quality issues, etc., to find topics relevant to submit for consideration and investigation by FERC as a pre-requisite for qualification for renewal of the license.

Besides my dialogue since 2008 with Georgia Power about concerns about the presence of the toxic cyanobacteria in our watershed, I have been concerned also about illegal dumping by sewage plants and construction sights on the Yellow and Red Rivers that flow through Atlanta and pollute the water shed on its way and shovel trash to Jackson Lake. I am also challenging Georgia Power with their

documented claims that Jackson Lake water and fish are fresh and consumable. Your reporting is a prime example that disclaims this fact.

Specifically, I was hoping to get some further documentation from you regarding your reporting on the 2010 “fish kill” and any surrounding facts that might be relevant to incite research, investigation, or accountability. (Or any other matter that you have information pertinent with the purpose of raising environmental consciousness and bringing well needed accountability).

I trust that this letter finds you well. Belated thanks to you for great reporting on the “Fish Kill” in 2012 and for making the topic relevant.

I would love to have opportunity to talk with you. Please feel free to call me @ 404-277-3118

Sincerely,

Julia M Haar
470 Lakeshore Drive
Monticello, GA 31064

RESPONSE TO JULIA HAAR STUDY REQUEST COMMENTS DATED SEPTEMBER 24, 2018

Georgia Power appreciates the input of Ms. Julia Haar regarding her concerns for sedimentation and water quality in Lake Jackson. Our responses below are numbered according to the numbered items in that part of the filing titled "FERC P-2336-094 Study Impact Requests."

Response 1

Georgia Power proposes in the Water Resources Study Plan to conduct a literature review and analysis of the occurrences of harmful algal blooms in Lake Jackson, factors that could lead to harmful algal blooms, and their relationship, if any, to project operations. The literature review of cyanobacteria occurrence and factors potentially influencing algal abundance in Lake Jackson will include but not necessarily be limited to the following sources:

- Georgia Environmental Protection Division (GEPD).
- Georgia Power algal reports and sampling information.
- Research program of phycologist Dr. Kalina Manoylov of Georgia College and State University.
- Research program of community ecologist Dr. Alan Wilson of Auburn University.
- The University of Georgia's CyanoTracker Project.
- Scientific literature.

Regarding Bald Eagles and their food chain, since 2008 there has been one active Bald Eagle nest on Lake Jackson with no known adverse impacts to the eagles' normal breeding, feeding, or roosting behavior. In addition, there has been no evidence to date of Hydrilla (*Hydrilla verticillata*) occurrence in the reservoir.

Response 2

Georgia Power proposes in the Geology and Soils Study Plan to conduct a shoreline reconnaissance survey of Lake Jackson and the Lloyd Shoals tailrace area to inventory and characterize existing sources of erosion and sedimentation. The survey will visually assess various shoreline attributes (e.g., buffer zone condition, bank stability, vegetative protection) and inventory adjacent land uses and potential causes of erosion, both project and non-project related. In addition, a temporal analysis of available historic aerial photography will be performed to identify and evaluate any trends in sedimentation in representative areas of the reservoirs, including coves, tributary embayments, and other areas of the reservoir.

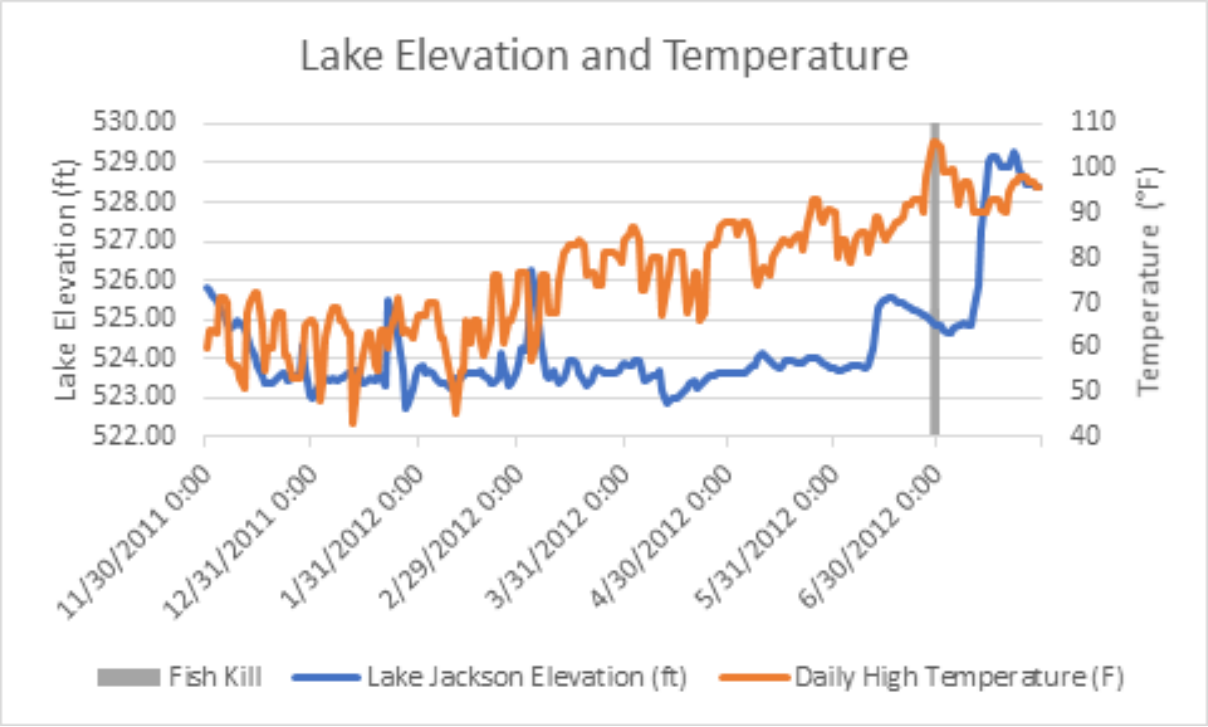
Response 3

On July 16, 2012, Georgia Power notified the Federal Energy Regulatory Commission (FERC) of the July 2012 fish kill and provided a copy of the investigation report prepared by the Georgia Department of Natural Resources (GDNR), Wildlife Resources Division, Fisheries Section. The

GDNR fish kill report is attached to Georgia Power's response to the FERC Additional Information Requested issued November 5, 2018, which is also part of this filing package.

According to the GDNR report, the fish-kill occurred on June 30 or July 1, 2012 in approximately 8 acres of shallow water in the cove on the west side of the South River arm of Lake Jackson immediately upstream of the Georgia Highway 36 bridge. This cove is bounded on the south by Elizabeth Circle and on the north by Southern Shores Road. GDNR biologists counted 2,471 dead juvenile and adult fish, including gizzard shad, crappie, catfish, largemouth bass, and sunfish. The cove had been cut off from the South River arm due to low inflow from the South River over the spring and the low level in the reservoir, which was about 4 ft below normal pool level. Prior to and during the fish kill, the region was experiencing severe drought and the weather was hot, with air temperatures above 100°F on both June 30 and July 1. The fish apparently succumbed to low DO levels and high temperatures in the shallow water. GDNR had stated that similar fish kills were happening all over the state at the time due to the combined effects of drought and record high temperatures. No further action was taken.

The fish kill occurred on a day when air temperatures in the region reached a high of 106°F, as measured at the closest National Weather Service weather station located at Atlanta Hartsfield-Jackson International Airport (see figure below). The average high temperature for the 8-day period from June 29 through July 6, 2012 was over 102°F.



A factor contributing to the low level of the reservoir before the fish kill was the planned drawdown that had been conducted for installation of the Obermeyer gates on the Lloyd Shoals spillway. The

drawdown began November 16, 2011 (timed to coincide with the drawdown for homeowners), reached a minimum level of 522.63 feet (ft) plant datum (4.37 ft below normal low pool) and ended on July 13, 2012. The contractor demobilized from the site on June 5, 2012, and the reservoir was refilling but could not do so quickly because of low inflows into the project. Refill was well underway by the time of the fish kill, and in fact, the reservoir never dropped below 524.75 ft on June 30 and July 1, 2012.

As part of the proposed Fish and Aquatic Resources Study, Georgia Power will request and review available reports and information from GDNR on any other documented fish kills in the project waters and describe these events in the resource study report. GDNR is the primary source of such information in Georgia.

Response 4

The Relicensing Brief for water resources provided introductory background information about the Project for early stakeholder meetings. The Pre-Application Document (PAD) provides more detailed information on water resources. Table 7 of the PAD summarizes the water chemistry data collected by Georgia Power on Lake Jackson for the period 2000-2017. Table 8 summarizes GEPD water chemistry data for the years 2001-2014.

The water chemistry analyses have not included PCBs, chlordane, and mercury because their occurrence in fish tissue is unrelated to the operation of the Lloyd Shoals Project. PCBs and chlordane originated in stormwater runoff and nonpoint source pollution upstream of the Project, they persist in sediments but not in the water column, they have been banned from use, and their levels are decreasing over time. Mercury is naturally occurring and may also come from municipal and industrial sources unrelated to project operations.

GEPD monitors these chemicals in fish tissue and publishes fish consumption guidelines for Georgia Lakes (see Response 6). Numerous other large lakes in Georgia have similar fish consumption advisories based on PCBs and mercury. GEPD's updated fish consumption guidelines for 2018 do not include PCBs for Lake Jackson, further reflecting the declining trend.

Response 5

Georgia Power proposes to conduct a Water Resources Study for relicensing that will include presentation and analysis of water quality data collected by Georgia Power on Lake Jackson in 2000-2017, review of water quality data collected by GEPD and the Adopt-a-Lake member Jackson Lake Association, and one year of continuous monitoring of water quality in the Lloyd Shoals tailrace area. The Water Resources Study Report will be made available to stakeholders and the public for review and comment by May 19, 2020, in accordance with the Process Plan and Schedule in Table 1 of the PAD.

Response 6

GEPD annually publishes *Guidelines for Eating Fish from Georgia Waters*, available on its website at: https://epd.georgia.gov/fish-consumption-guidelines. Georgia Power does not propose to sample fish tissue at Lake Jackson because available information indicates that operation of the project is unrelated to contaminants in fish tissue.

Josh Williford, Greenville, SC.
Lloyd Shoals Hydroelectric Project (P-2336-094)

Questions/Comments:

1. In “Relicensing Brief: Value of Hydropower,” Georgia Power claims that “Hydropower is 100 percent renewable,” and that it is a “clean, efficient, low-emission resource that generates no waste for disposal.”

All hydroelectric reservoirs and dams have a finite lifespan, subject to sedimentation rates, concrete deterioration, and changes in cost efficiency. How can this be considered “100 percent renewable” in the context of Lloyd Shoals Dam and Lake Jackson, which are already over a hundred years old?

According to the article “Reservoir Surfaces as Sources of Greenhouse Gases to the Atmosphere: A Global Estimate: Reservoirs are sources of greenhouse gases to the atmosphere, and their surface areas have increased to the point where they should be included in global inventories of anthropogenic emissions of greenhouse gases” by Vincent L. St. Louis, Carol A. Kelly, Éric Duchemin, John W. M. Rudd, David M. Rosenberg:

"Following flooding of landscapes to create any kind of reservoir, terrestrial plants die and no longer assimilate carbon dioxide (CO2) by photosynthesis… resulting in the loss of a sink for atmospheric CO2. In addition, bacteria decompose the organic carbon that was stored in plants and soils, converting it to Carbon Dioxide (CO2) and methane (CH4), which are then released to the atmosphere."

Will this phenomenon be studied or considered for the Lloyd Shoals EA? What stance will the Commission take on the issue of Climate Change in the context of this hydropower license?”

Does the accumulated sediment in Lake Jackson, which contains Mercury and polychlorinated biphenyls (PCBs), not qualify as “waste for disposal?” It will eventually have to be disposed of to protect the dam and its operations, either by dredging, flushing, or some other means.

How much of Lake Jackson’s storage capacity has been displaced by sediment? How has Georgia Power dealt with it so far, and how do they plan to address this in the future?

1

2. In “Relicensing Brief: Water Resources,” Georgia Power says, “the Yellow River arm, South River arm, Tussahaw Creek arm, Alcovy River arm, and dam pool reaches of Lake Jackson were listed as not supporting their designated uses for recreation… due to non-point source and urban runoff contamination for PCBs, chlordane, and Trophic Weighted Residue Value of mercury in fish tissue (TWR).”

2

Knowing this, and the health risks associated with those contaminants, how is it ethical to promote the lake's sport fishing opportunities, as in the document "Relicensing Brief: Fisheries?"

What role have the concentrating effects of impoundment played in the amounts of contaminants found in aquatic species in Lake Jackson? How might this phenomenon change its use designation? Is there currently a plan to address the issue of these contaminants?

...2

3. In "Relicensing Brief: Generating Capacity," Georgia Power says Hydropower generation is a cheaper source of generating capacity than fossil-fuel generation."

While this is true, and coal was once the only main alternative for generating energy in this area, it is not the only alternative now. According to the March 14, 2018 article "Georgia Power Continues Renewable Energy Growth Through 2018," found on their website, Georgia Power claims they have "added 970 Megawatts (MW) of solar capacity in Georgia in recent years…"

Will the cost benefits (including power generation, operating costs, hazard risks, and environmental compliance costs) of solar be a weighed against those of the Lloyd Shoals Project in the EA? How might those findings effect the Commission's decision whether or not to relicense the Lloyd Shoals Project?

3

Thank you for your time,
Josh Williford

RESPONSE TO JOSH WILLIFORD COMMENTS DATED OCTOBER 11, 2018

Georgia Power appreciates the input of Mr. Josh Williford regarding his concerns for greenhouse gas emissions, sedimentation, and water quality at the Lloyd Shoals Project. Our responses below are numbered according to the numbered Questions/Comments in the filing.

Response 1

The U.S. Energy Information Administration (EIA) defines renewable energy in terms of the source of the energy and listed hydro in 2017 as the top renewable energy generation source in the U.S.

Georgia Power does not propose to study greenhouse gas emissions because the project reservoir was built over 100 years ago and the organic matter originally flooded has mostly decomposed. The loading of organic matter and nutrients to the reservoir comes from the upstream watershed, which includes southeast metro Atlanta, and lacks any nexus with project operations. Furthermore, nutrient loading has been reduced in recent decades.

Regarding sediment in Lake Jackson, Georgia Power has not measured change in storage volume of the reservoir because project operations and project-related recreation have not been affected. Existing Total Maximum Daily Loads (TMDLs) for mercury and polychlorinated biphenyls (PCBs) do not indicate any need to remove sediment from the reservoir. Available data interpreted by the U.S. Environmental Protection Agency (EPA, 2002) using a conservative risk-based approach indicate that Lake Jackson is attaining the applicable water quality standard for mercury and a TMDL is not needed, but a Consent Decree in the case of Sierra Club v. EPA required that one be developed. The predominant source of mercury loading to the lake is air deposition. The use of PCBs was banned in the U.S. in the late 1970s, loadings have been removed or reduced to zero, and levels are decreasing in the water column, sediments, and fish tissues over time. For Lake Jackson, the reduction has been conservatively estimated at 5 percent per year (EPA, 1998). There is no longer a fish consumption advisory for PCBs in Lake Jackson, further reflecting the declining trend.

Response 2

In Georgia, the Georgia Environmental Protection Division (GEPD) has been delegated permitting authority under the Clean Water Act. GEPD establishes the water quality standards, designates uses, and every two years assesses whether waters are supporting their designated uses. GEPD's 2016 list of impaired waters indicates that PCBs detected in fish tissue is the only parameter for which Lake Jackson currently is not supporting designated Recreation use. See Response No. 1 regarding the applicable TMDL.

Regarding the lake's sport fishing opportunities, the Georgia Department of Natural Resources' Wildlife Resources Division manages the fishery resources of Lake Jackson and publishes fishing prospects for the reservoir. In addition, Georgia Power and others provide boating and bank fishing

access to the lake. GEPD monitors fish tissue and publishes guidelines on how often certain species of fish can be safely eaten. The guidelines are based on conservative risk-based calculations.

As described in the applicable TMDL, the sources of PCBs in fish tissue have been upstream urban runoff and nonpoint sources. The impoundment has not been identified as providing a concentrating effect.

Response 3

Regarding solar electricity as an alternative renewable energy source, Georgia Power is committed to advancing solar technology and using reliable, cost-effective, renewable energy sources. Hydropower and solar power are complementary. Solar power generation is intermittent, affected by weather patterns, humidity, and haze. Hydropower facilities have the flexibility to switch on and off with ease to respond to changes in intermittent sources.

Jenifer D Hilburn, Richmond Hill, GA.
Lloyd Shoals Hydroelectric Project (P-2336-094)

To whom it may concern,
I hope today finds you well.
Altamaha Riverkeeper is a community-driven 501(c)3 dedicated to the protection and defense of Georgia's largest river system, including its lakes. Jackson Lake's Lloyd Shoals Hydroelectric Project is currently going through review. Concerned citizens have asked Riverkeeper to review the permit application. As this was just brought to our attention and comments are due today, November 5th, we have not had a chance to thoroughly investigate this permit, but I hope to highlight a couple of our concerns below:

Altamaha Riverkeeper is concerned that there is nothing in the PAD, SD1 that indicates that Georgia Power will be looking at the accumulated sediment behind the dam. Not only does the water temperature change and prey-predator interactions change, but accumulated pollutants can be found in high levels in accumulated sediment. Georgia Power should be required to, at the very least, monitor the water and sediment quality near the dam

Georgia Power intends to continue to perform water quality testing and sampling in a variety of the areas of around the lake. This reporting needs to be reported in a way that characterizes whether that area is meeting Georgia Water Quality Standards for designated uses. This is critical in a lake that is used for a variety of activities from drinking water, recreation and fishing to hydro-power.

Minimum low flow is currently 400 cfs at the dam. As a user of the Ocmulgee River below the dam, paddling the river at this low flow can be more of a "dragging" of the boat, than a paddle. We would argue that 400cfs is not enough to protect species in the river below, particularly in the summer/fall which is the hottest time of the year. Georgia Power should be required to increase this flow for the re-licensing.

Cyanobacteria can be a problem at many lakes, but Jackson Lake has endured such a heavy load of cyanobacteria that has been implicated in heavy fish-loads, which are in turn eaten by Bald Eagles, and have caused unusual death counts of this species over the last several years. Georgia Power should be specifically working to address these high cyanobacteria counts.

1

Thank you for your time and consideration in this matter.
Jen Hilburn, Altamaha Riverkeeper

RESPONSE TO ALTAMAHA RIVERKEEPER COMMENT LETTER DATED NOVEMBER 6, 2018

Georgia Power appreciates the input of Ms. Jenifer Hilburn of Altamaha Riverkeeper regarding her concerns for sedimentation, water quality, downstream minimum flows, and cyanobacteria at the Lloyd Shoals Project.

Response 1

Regarding sediment in Lake Jackson, Georgia Power does not propose to study sediment quality because Lake Jackson is attaining applicable Georgia water quality standards for designated except for elevated concentrations legacy polychlorinated biphenyls (PCBs) detected in fish tissue, attributed to urban runoff and nonpoint source pollution. The upstream watershed includes large areas of southeastern metro Atlanta. The Total Maximum Daily Load (TMDL) for PCBs in Lake Jackson (U.S. Environmental Protection Agency [EPA], 1998) does not indicate any need to remove sediment from the reservoir. The use of PCBs was banned in the U.S. in the late 1970s, loadings have been removed or reduced to zero, and levels are decreasing in the water column, sediments, and fish tissues over time (EPA, 1998). For Lake Jackson, the reduction has been conservatively estimated at 5 percent per year (EPA, 1998).

Regarding water quality monitoring, Georgia Power proposes in the Water Resources Study to conduct one year of continuous water quality monitoring in the tailrace area downstream of Lloyd Shoals Dam. The data collected will be analyzed and presented in a manner to allow comparison with the applicable Georgia water quality standards.

Regarding the downstream minimum flow, Georgia Power proposes in the Fish and Aquatic Resources Study to evaluate the effects of continued project operations on riverine aquatic habitat using the previously conducted Instream Flow Incremental Methodology (IFIM) study, ongoing conservation efforts for the state endangered Robust Redhorse, and other relevant existing information and data. As described in the Pre-Application Document and in Georgia Power's scoping meeting presentation, the IFIM study results showed that a minimum flow release of 400 cubic feet per second would provide for 91 percent and 92 percent of the maximum weighted usable area on average for the spawning and non-spawning seasons, respectively.

Regarding cyanobacteria, Georgia Power proposes in the Water Resources Study Plan to conduct a literature review and analysis of the occurrences of harmful algal blooms in Lake Jackson, factors that could lead to harmful algal blooms, and their relationship, if any, to project operations.

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, D.C. 20426
November 5, 2018

OFFICE OF ENERGY PROJECTS

Project No. 2336-094 – Georgia
Lloyd Shoals Hydroelectric Project
Georgia Power Company

Courtenay O'Mara, P.E.
Hydro Licensing and Compliance Supervisor
Southern Company Generation
241 Ralph McGill Boulevard, NE
BIN 10193
Atlanta, GA 30308-3374

Reference: Staff Comments on the Pre-Application Document and Preliminary Study Proposals for the Lloyd Shoals Hydroelectric Project

Dear Ms. O'Mara:

We have reviewed the Pre-Application Document (PAD) for the Lloyd Shoals Hydroelectric Project No. 2336-094 (Lloyd Shoals Project), filed on July 3, 2018, and participated in the scoping meetings for the project during the week of October 8, 2018.

Based on staff's review of the PAD and the scoping meetings, we need additional information and clarification on the material presented in the PAD. Unless otherwise indicated in the specific request, the information requested (*see* attached Schedule A) should be filed with the proposed study plan on, or before, December 20, 2018. If the requested information is not readily available, the proposed study plan should discuss Georgia Power's plans for gathering the information prior to filing the final license application. In addition, if the requested information causes another part of the PAD to be inaccurate, that part must be revised and provided as well. Please be aware that further requests for additional information may be sent to you at any time before the Commission takes final action on your application. We also provide comments on the preliminary study proposals in Schedule B.

If you have any questions, please contact Navreet Deo at (202) 502-6304, or navreet.deo@ferc.gov.

Sincerely,

Stephen Bowler, Chief
South Branch
Division of Hydropower Licensing

Attachments: Schedule A
Schedule B

SCHEDULE A
ADDITIONAL INFORMATION REQUESTS

Project Description

1. The PAD, on page 7, states that a 19-foot by 12-foot trash gate is located within the spillway section of the dam. Please provide a description of the trash gate, including the capacity, and clarify whether the gate is currently operable. Please describe the past and present uses of the gate (if operable).

2. The PAD, on page 8, describes steel trash rack structures in front of the powerhouse intake(s). The PAD indicates that the trash racks have a clear bar spacing of 1.3125 inches. No other design specifications are provided. To assist us in our review of the project, please include in the Preliminary Licensing Proposal (PLP) and license application: (a) the overall dimensions of each trash rack panel protecting the project intake(s); (b) the number and width of the individual bar racks; and (c) an estimate of the intake velocity for the trash racks, along with the calculations and/or methods used to develop the estimate(s). If any of this information is not available, such information should be obtained as part of the project's study plan.

3. The PAD, on page 8, states that in 2012 an Obermeyer gate system was installed to replace the spillway flashboards. Please provide a description of the Obermeyer gates, including the: (a) composition; (b) operation, including the time required to inflate and deflate each section of gates; (c) conditions under which the gates would fail; and (d) method and frequency of repair.

4. The PAD, on page 8, describes a 500-foot-long auxiliary spillway topped with 10-foot-high flashboards. Please provide: (a) the crest elevation of the auxiliary spillway; (b) the conditions under which the spillway is operated, including the design flow or reservoir elevation which would trigger use of the spillway, and the frequency of use; and (c) a description of the auxiliary spillway flashboards, including the (i) composition, (ii) method of installation, (iii) reservoir elevation at which the flashboards are designed to fail, and (iv) method and frequency of repair.

5. The PAD, on page 9, describes a substation located at the west dam abutment. Please clarify whether the substation is project-owned.

6. Please provide a description of the intake headgates, including the number, composition, and method of operation.

7. Please provide a description of the project tailrace, including the dimensions and normal surface water elevation.

Project Operation

8. The PAD, on page 8, states that the maximum hydraulic capacity of each turbine unit is 620 cubic feet per second. Please provide the minimum hydraulic capacity of each unit.

9. The PAD, on page 9, states that the project is operated in a modified run-of-river mode, where inflow is temporarily stored during periods outside of peak power demand (off-peak hours) and released through the powerhouse to generate energy during periods of peak power demand (on-peak hours). You state that this cycle repeats daily and varies seasonally with peak power demands. Please provide the average number, timing, and duration of peak power demand periods per day, seasonally.

10. The PAD, on page 9, states that the dependable capacity of the project is 22.5 megawatts (MW), while the nameplate rated capacity of the project is 18 MW. Please explain how, and under what conditions, the dependable capacity of the project exceeds the rated generating capacity of the project.

11. The PAD, on page 9, describes two, 2.3-kilovolt project generator leads, which exit the powerhouse and goes to two step-up transformers located in the substation at the west dam abutment. Please provide the length of each generator lead.

12. The PAD, on page 9, states that the project is operated to maintain reservoir elevations between approximately 530 feet and 527 feet Plant Datum[1] (PD) year-round, excluding planned drawdowns. Please provide a record of all planned and unplanned drawdowns that have occurred at the project, including emergency, homeowner maintenance, and dam maintenance drawdowns. For each record please provide the cause, duration, frequency, and extent (feet) of the drawdown, as well as any adverse impacts observed to the aquatic environment.

13. The PAD, on page 10, states that the U.S. Geological Survey (USGS) gage No. 02210500, used to develop the flow and discharge statistics for the Lloyd Shoals Project, is located on the Ocmulgee River, 1.5 miles downstream from Lloyd Shoals Dam (Ocmulgee River near Jackson, Georgia). The PAD, on

[1] Plant datum = mean sea level elevation (NAVD88, or North American Vertical Datum of 1988) + 0.45 feet.

page 19, states that this gage is located approximately 1 mile downstream from the project dam. Please clarify the location of this gage relative to Lloyd Shoals Dam.

14. The PAD, on page 10, states that during high-flow events, all flows are first passed through the turbine-generator units and, once the maximum hydraulic capacity of the units is exceeded, spillway gates are opened incrementally to approximate inflow. Please clarify the order in which each of the three sections of Obermeyer spillway gates are operated (lowered or deflated) to pass inflow.

15. During the scoping meetings held on October 9, 2018, Georgia Power presented a graph which showed that dissolved oxygen (DO) dropped below the minimum state standard of 4.0 milligrams per liter (mg/L) when the existing draft tube aeration system is offline. To assist us in our review of the project, please provide information on: (a) the frequency and duration of any periods during which the aeration system has not been operational since its installation; (b) the reasons for the system not operating; (c) the ability of the existing minimum flow to maintain the state's DO standard[2] when the system is not operating; and (d) any known effects of low DO on the fish and aquatic community in the Ocmulgee River downstream from Lloyd Shoals Dam.

Geology and Soil Resources

16. The PAD, on page 18, states that potential impacts of continued project operation on geology and soil resources would be limited mainly to Lake Jackson and the tailrace area downstream from the dam. To assist us in determining whose lands and property may be affected by erosion and sedimentation, please provide a map delineating ownership of lands along the reservoir and tailrace shorelines. Please indicate whether land is privately or project-owned. If this information is not available, please obtain the information as part of the project's study plan.

17. The PAD, on page 18, states that the effects of project operations on shoreline erosion and sedimentation within the project boundary will be evaluated. To assist us in our review of erosion and sedimentation issues at the project, please provide any available historical data, including bathymetry, topography, and/or aerial photography that shows how erosion and sedimentation within the project boundary has changed over time.

[2] The applicable DO standard for the project includes a daily average DO of 5.0 mg/L, and no less than 4.0 mg/L DO, at all times.

18. On February 26, 1993, Georgia Power submitted an application to amend the existing license to implement a small dredging permit program at the project, which was approved by the Commission on June 28, 1993. The permit program authorizes Georgia Power to issue permits for minor dredging activities involving 1 to 500 cubic yards of material within the project boundary (e.g., for repair of bulkheads and boat docks), and requires the filing of an annual report listing any dredging permits issued for between 25 and 500 cubic yards of material. To assist our review of how project operation may affect geology and soil resources, for all dredging permits issued at the project please provide: (a) a description of each event, including the purpose, volume of material removed, and equipment used; (b) the date(s) and duration of each event; (b) the location and site characteristics (e.g. soil or substrate composition, vegetative cover, proximity to wetland habitats, etc.) of each event, including a map; (c) the location and characteristics of all disposal sites, including a map; and (d) methods used to prevent turbidity and the transport of the disturbed material downstream.

Water Quality, Fisheries, and Aquatic Resources

19. During the environmental site review on October 10, 2018, Georgia Power staff referenced a 2014 Ocmulgee Water Quality Study. The PAD does not appear to reference this study. Please describe the study referenced during the site review and provide a copy of the final study report.

20. During the October 9, 2018, scoping meetings, there was mention of work done in 2012 by Dr. Alan Wilson, an Auburn University Professor, regarding water quality issues (e.g., algal blooms [including cyanobacteria], sedimentation, nutrients, etc.) in Lake Jackson. This work was also referenced by Ms. Julia Haar in her September 25, 2018, filing with the Commission. More specifically, Ms. Haar provided a copy of a presentation given to the Jackson Lake Homeowners Association (Homeowners Association) on June 22, 2012, by Dr. Wilson and two Georgia Power staff members that addressed water quality issues in Lake Jackson. The PAD does not reference Dr. Wilson's work, and it is unclear if the June 22, 2012, presentation to the Homeowners Association is based on a report, or some other work done by Dr. Wilson.[3] To assist us in understanding the issues being raised in the September 25, 2018, filing, and at the October 9, 2018, scoping meeting, please provide a copy of any report(s) that served as the basis for the June 22, 2012, presentation to the Homeowners Association, if available.

[3] We are aware that Dr. Alan Wilson helped produce a water quality report for Alabama in 2012.

21. The PAD, on page 24, describes the DO issues that occurred historically at the project. The PAD states that, in 2006, Georgia Power fitted three of the project's six turbine units with passive draft tube aeration systems. We observed one of the units operating (with the aeration system on) during the October 10, 2018, environmental site review. The PAD, however, does not describe the systems or their operation. Therefore, please provide: (a) a detailed description of the aeration technology, and its installation and operation at the Lloyd Shoals Project; (b) a description of which units are equipped with the draft tube aeration systems; (c) the dates when the systems are turned on and turned off for the year; and (d) the number of times, since the systems were installed, that any or all of the system(s) were not operating during their normal operational period, and, for each event, a description why the system(s) were not operating and any known consequence (e.g., a drop in DO concentrations and any effects on the downstream aquatic community). Item (d) can be addressed as part of your response to AIR#15.

22. The PAD, on page 8, states that the invert elevation of the project intake is 495 feet PD, which is 35 feet below the normal full-pool elevation of Lake Jackson. To assist us in reviewing water quality issues at the project, please describe the relationship between the intake's invert elevation and the typical depth at which thermal and DO stratification occurs in Lake Jackson.

23. The PAD, on pages 25 and 26, lists a variety of information that is available to: (a) characterize the fish and aquatic resources in the vicinity of the Lloyd Shoals Project; and (b) evaluate the potential resource effects of continued project operation. None of the references are provided as part of the PAD. Please provide copies of:

    a. the instream flow study report prepared by EA Engineering, Science, and Technology, Inc. (1990);
    b. the angler catch data collected by the Georgia Bass Chapter Federation for Lake Jackson and other Georgia lakes from bass tournaments for the past 20 years (GBCF, 1996-2015);
    c. the American shad habitat plan (Georgia DNR, 2014) and the American shad stocking plan for the Altamaha River (Atlantic States Marine Fisheries Commission, 2013);
    d. the scientific literature on the distribution of fishes in the Ocmulgee River (Bart *et al*., 1994; Nuckols and Roghair, 2004), habitat use and movements of robust redhorse (Jennings and Shepard, 2003; Grabowski and Jennings, 2009; Pruitt, 2013), and spawning migrations and habitat use of Atlantic sturgeon in the Altamaha River basin (Ingram and Peterson, 2016); and
    e. Georgia DNR-Nongame Conservation Section's records of mollusks in the

upper Ocmulgee River Basin, 2008-2014; and the scientific literature on the distribution of, and suitable host fishes for, freshwater mussels from the Altamaha River Basin (Wisniewski *et al*., 2005; Johnson *et al*., 2012).

24. The PAD, on page 27, references the Ocmulgee Candidate Conservation Agreement with Assurances for Robust Redhorse (Georgia Power, 2016, as cited in the PAD). The agreement is described in some detail in the PAD on pages 45 and 46. Please file a copy of this agreement. In addition, the PAD, on page 30, indicates that this agreement expires with the current license term in December 2023. The PAD is silent with regard to any new agreement for the robust redhorse. Please clarify whether Georgia Power intends to pursue an extension of the existing agreement, or a new agreement for the species.

25. Ms. Julie Haar, in a September 25, 2018, filing, and in speaking at the October 9, 2018, scoping meeting, presented documentation (including a picture) of a fish kill in a cove of Lake Jackson near Elizabeth Circle in Butts County, Georgia. This fish kill also involved an unspecified number of turtles. The PAD provides no information on this event, or any other similar events. To assist us in understanding such occurrences, including cause and severity, please provide: (a) a description of the fish kill that occurred in 2012, as referenced in the September 25, 2018, filing, including its cause, severity, and what measures, if any, were taken to prevent future fish kills; (b) a list of other species that were affected by the event; and (c) a description of any other known fish kills that have occurred during the current license term at the Lloyd Shoals Project, including their cause, severity, and measures taken to address them.

Wildlife, Botanical Resources, and Threatened and Endangered Species

26. The PAD, on pages 46 and 47, describes the Ocmulgee Candidate Conservation Agreement for Mollusks of the Altamaha River Basin (Georgia Power, 2017b, as cited in the PAD). Please file a copy of this agreement.

27. The PAD, on pages 36, 39 and 40, references previous studies conducted by Georgia Power for the prior relicensing effort that identified upland and wetland plant community/cover types. To facilitate our review of the project and environmental analysis regarding changes to the project area since the previous relicensing, please file a copy of *Wetland plant communities of the Lloyd Shoals hydroelectric project (Gaddy, 1989*).

28. The PAD, on page 38, indicates that Georgia Power's timber and land management activities on undeveloped lands within, and next to, the project boundary support wildlife habitat and avoid disturbance to active bald eagle nests

on Lake Jackson. To facilitate our review of timber and land management activities at the project, please file any existing Georgia Power timber and/or land management plans, programs, and/or policies that apply to Lake Jackson and the lands around it described above.

29. The PAD, on page 39, mentions Georgia Power's efforts to control non-native invasive plants[4] within the project boundary.[5] However, it does not describe the methods used to treat non-native invasive terrestrial and aquatic plants, or any other regular vegetation management practices within the project boundary. To facilitate our review of the project's potential effects on botanical resources and wildlife habitat, please provide a more detailed description of existing vegetation management practices throughout the Lloyd Shoals Project area (e.g., project recreation sites, access roads, and other project facilities or areas that Georgia Power maintains). Specifically, please include detailed information on: (a) the areas of vegetation that are maintained; (b) the goals, objectives, and methods of vegetation management (e.g., manual, mechanical, or chemical treatments, regular plantings) used in each area; (c) the frequency of treatments; and (d) any vegetation monitoring that is conducted. If the information is not currently compiled, please include a provision to gather and provide information on existing and proposed invasive species and vegetation management practices with the results of your proposed Wildlife and Botanical Resource Study and Wetlands, Riparian, and Littoral Habitat Study.

30. Section 5.6(d)(3)(vi) of the Commission's regulations require that the PAD include estimates of acreage for each type of wetland, riparian, and littoral habitat, including variability in such availability as a function of storage at a project that is not operated in a run-of-river mode. The PAD, on pages 39 and 110, provides estimates of total wetland acreage in the project boundary, but does not discuss the variability in these habitats associated with project operation. The Lloyd Shoals Project is operated in a modified run-of-river mode, with up to a 3-foot reservoir drawdown on a daily basis. Thus, if available, please provide the estimated

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[4] Table 16 on page 100 of the PAD lists the noxious weeds and non-native invasive plants (i.e., Category 1 and Category 1 Alert Invasive Plant Species) identified in Butts, Henry, Jasper, and Newton Counties, and in the Oconee National Forest and Piedmont National Wildlife Refuge (Georgia Exotic Pest Plant Council, 2006).

[5] "Georgia Power proactively monitors the occurrence of and periodically treats invasive terrestrial and aquatic plants within the project boundary…and has occasionally treated the emergence of aquatic weeds in Lake Jackson. Identified taxa include the cyanobacteria *Microcystis* spp., *Lyngbya* spp., and *Cylindrospermopsis raciborskii*; and the vascular aquatic plant alligatorweed (*Alternanthera philoxeroides*)."

variability (in acres) of each type of wetland, riparian, and littoral habitat as a function of storage at the project. If this information is not currently available, please collect it as part of your study plan and include the results in the proposed Wildlife and Botanical Resource Study Report and/or Wetlands, Riparian, and Littoral Habitat Study Report.

31. The PLP and the license application are required to include information regarding the potential effects of existing and proposed project operation, maintenance, and project-related recreation on project resources, including botanical and wildlife resources; wetlands, riparian, and littoral habitat; and RTE species and habitats (§5.16(b)(3); §5.18(b)(5)(ii)(B)). Therefore, please file an evaluation of project effects on the aforementioned environmental resources, as well as other project resources, with the PLP and the license application.

Recreation and Land Use

32. The PAD, on pages 50 through 52, refers to resource management plans for three Regional Commissions (RC): Three Rivers RC, Northeast Georgia RC, and Atlanta RC. To facilitate our review, please file these resource management plans with the Commission.

33. The PAD mentions Georgia Power's general guidelines for the management of shorelines. To ensure that recreation facilities are managed for the term of a new license, the PLP should contain information about the plans for developing and implementing any new recreation enhancements, operation and maintenance of recreation facilities, and plans for periodic monitoring and review of recreation use and needs.

34. The PAD, on page 53, states that Georgia Power's existing Shoreline Management Guidelines include general permitting steps applicable to all Georgia Power lakes, as well as specific requirements for Lake Jackson. To facilitate our review of shoreline management policies at the project, please file a copy of the existing Shoreline Management Guidelines and, if available, a shoreline management plan for Lake Jackson. In addition, please note that because Commission licenses are project-specific, any shoreline management plans and guidelines filed with the PLP and license application should be specific to the Lloyd Shoals Project (i.e., and not include requirements or guidelines for other projects).

35. The PAD, on page 47, indicates that there are four project recreation facilities at the project: Lloyd Shoals Park, Lloyd Shoals Tailrace Fishing Pier, Ocmulgee River Park Public Access, and Jane Lofton Public Access Area. While a

schematic drawing was included for Lloyd Shoals Park, which allows us to see distances between amenities, no such drawings (only photographs) were included for the three remaining facilities. Please include a map or drawing for each facility which shows all amenities, to scale, including parking areas. Please also provide the lengths of the trails/paths at Lloyd Shoals Tailrace Fishing Pier and Ocmulgee River Park Public Access.

36. The PAD, in Table 22, lists several non-project recreation facilities that are located within the project boundary. To facilitate our review of all the existing recreation facilities at the project, please identify these facilities on a map(s) with respect to the project boundary.

37. In an incident report filed on September 14, 2018, Georgia Power described damage to two sections of the auxiliary spillway flashboards that was caused by a brush fire which occurred at the east spillway abutment on September 2, 2018. Please describe the location where the fire originated, and any authorized recreational uses within that location. In addition, please describe the location of any formal and/or informal fire pits at the project recreation sites, including any that exist at the swimming beach near the auxiliary spillway.

SCHEDULE B
COMMENTS ON PRELIMINARY STUDY PROPOSAL

PRELIMINARY STUDY PROPOSAL COMMENTS

Geology and Soil Resources

1. The proposed *Geology and Soils* study consists of a shoreline reconnaissance survey of the reservoir and tailrace area to inventory and characterize existing sources of erosion and sedimentation, and a literature review and analysis of the effects of shoreline structural stabilization practices. When you characterize the erosion areas, please denote whether the erosion is project related, non-project related, or a combination of both. Further, to assist us in our analysis of the effects of project operations and project-related recreation on both existing and historic sedimentation and erosion, please include a provision to analyze spatial and temporal changes in geomorphology through a comparison of new and historical data, such as bathymetry, topography, and/or aerial photography. Also, please include a description of existing available sources of data, and a methodology to collect additional field data if necessary.

Fish and Aquatic Resources

2. The proposed *Fish and Aquatic Resources* study includes an evaluation of the potential for fish entrainment and turbine-induced mortality at the project through a desktop study. The description of the proposed methodology for the study indicates that you would apply trends and data from other hydroelectric sites to the physical, operational, and fisheries characteristics of the Lloyd Shoals Project. To assist us in our analysis of fish entrainment and mortality, as well as the need for potential fish protection measures at the project, please develop, as part of the study plan, an estimate of the total number of fish entrained annually, by species, size class, and season.

Wildlife, Botanical Resources, and Threatened and Endangered Species

3. In the wildlife and botanical resources; wetlands, riparian, and littoral habitat; and rare, threatened, and endangered (RTE) species sections of the PAD (sections 4.5, 4.6, and 4.7, respectively), you provide some local and regional-level information on terrestrial natural resources, including a list of non-native, invasive species that may occur in the project vicinity. You also propose to conduct reconnaissance-

level surveys to document wildlife and botanical resources; wetlands, riparian, and littoral habitat; and RTE species[6] and suitable RTE habitat in the project area.

We will need sufficient project-specific information for our analysis of potential project-related effects on these natural resources, including information regarding non-native invasive species, RTE species, and their habitats. Please ensure that your proposed study plans include methodologies for collecting sufficient detail for us to: (a) accurately describe the existing natural resources in the project area; and (b) assess potential project-related effects on those resources within the project boundary, including at existing formal and informal project facilities (e.g., recreation access sites), and at any areas under consideration for potential development as part of the licensing proposal. In addition, please ensure that the timing of the surveys for the botanical RTE coincides with each species' flowering or fruiting period, as appropriate, for accurate identification.

4. The proposed *Rare, Threatened and Endangered Species* study includes the following objectives: (a) reviewing the lists of federal and state RTE plant and animal species, and species currently under federal status review, with known occurrence records near the project; (b) identifying the habitat requirements of these species; and (c) describing the distributions and habitat use of RTE species presently occurring near the project. Please ensure that the results of the RTE Species study include an assessment of the potential effects of project operation on these species and/or their habitats. In addition, please file documentation of occurrences of federally-listed species, or their habitats, with the Commission as "Not for Public Disclosure, Privileged."

Recreation and Land Use

5. The proposed *Recreation and Land Use* study states Georgia Power will review and analyze recreation use and assess the adequacy of existing facilities. To facilitate our review, please also address the condition of the project recreation facilities, including any erosion due to project-related recreational use at the four project recreation facilities.

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[6] As noted in scoping document 1, little amphianthus, Michaux's sumac, relict trillium, and black-spored quillwort were included in the official species list for the Lloyd Shoals Project generated on the U.S. Fish and Wildlife Service's (FWS) ECOS-IPaC website (https://ecos.fws.gov/ipac/) on August 3, 2018, and filed on August 6, 2018. In addition, Georgia Power identified Gulf moccasinshell, oval pigtoe, shinyrayed pocketbook, purple bankclimber, red-cockaded woodpecker, robust redhorse, Altamaha arcmussel, inflated floater, and reverse pebblesnail in the PAD.

Cultural

6. The proposed *Cultural Resources* study indicates that the area of potential effects (APE) will be identified in consultation with Georgia Historic Preservation Division (Georgia HPD) and the Commission, and will preliminarily include the area between the lower daily water pool elevation and the project boundary. As part of the cultural resources study, please prepare map(s) that clearly identify the APE in relation to the project boundary, and provide documentation of concurrence on the proposed APE from the Georgia HPD and potentially-affected Indian tribes. Please file with the Commission a letter transmitting this information, including the map(s). Please mark the document, "Not for Public Disclosure, Privileged."

RESPONSE TO FEDERAL ENERGY REGULATORY COMMISSION COMMENTS ON PRELIMINARY STUDY PROPOSAL (SCHEDULE B) DATED NOVEMBER 5, 2018

Response 1

Georgia Power proposes in the Geology Soils Study Plan to denote potential sources of erosion during the shoreline reconnaissance survey as project related, non-project related, or a combination of both. Methods are included for the shoreline survey site selection and visual assessment methods. In addition, available aerial photography of the study area will be inspected to qualitatively characterize spatial and temporal changes in shoreline conditions occurring over the current license term. Imagery sets will be obtained, as available, from sources such as the U.S. Department of Agriculture National Aerial Photography Program and the University of Georgia Map and Government Information Library.

Response 2

Georgia Power has incorporated estimating the magnitude, species composition and relative abundance, size distribution, and seasonal distribution of annual entrainment into the Fish and Aquatic Resources Study Plan.

Response 3

Regarding FERC staff's need for sufficient project-specific information for analysis of potential project-related effects on wildlife and botanical resources and threatened and endangered species, the requested elements have been incorporated into the Terrestrial, Wetland, and Riparian Resources Study Plan and the Rare, Threatened, and Endangered (RTE) Species Study Plan.

Response 4

This RTE Species Study Plan incorporates the requested elements. Georgia Power will file documentation of occurrences of federally-listed species or their habitats as "Not for Public Disclosure, Privileged."

Response 5

Georgia Power has incorporated addressing the condition of the project recreation facilities, including any erosion due to project-related recreational use, into the proposed Recreation and Land Use Study Plan. The shoreline survey proposed in the Geology and Soils Study will identify potential sources of erosion at shoreline sites, including project recreation facilities.

Response 6

Regarding maps of the area of potential effects (APE) and documentation of concurrence on the proposed APE from the Georgia Historic Preservation Division and potentially-affected Indian tribes, these elements have been incorporated into the proposed Cultural Resources Study Plan.