

July 3, 2018

FERC Project No. 2336

Lloyd Shoals Project

Notice of Intent to Relicense Lloyd Shoals Dam, Preliminary Application Document,
Request for Designation under Section 7 of the Endangered Species Act and Request for Authorization to
Initiate Consultation under Section 106 of the National Historic Preservation Act

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 indicate our intent to relicense the Lloyd Shoals Hydroelectric Project, FERC Project No. 2336 (Lloyd Shoals Project). We will file a complete application for a new license for Lloyd Shoals Project utilizing the Integrated Licensing Process (ILP) in accordance with the Federal Energy Regulatory Commission's (Commission) regulations found at 18 CFR Part 5. The proposed Process, Plan and Schedule for the ILP proceeding is provided in Table 1 of the Preliminary Application Document included with this filing.

We are also requesting through this filing designation as the Commission's non-federal representative for consultation under Section 7 of the Endangered Species Act and authorization to initiate consultation under Section 106 of the National Historic Preservation Act.

There are four components to this filing:

- 1) Cover Letter (Public)
- 2) Notification of Intent (Public)
- 3) Preliminary Application Document (Public)
- 4) Preliminary Application Document – Appendix C (CEII)

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

Sincerely,



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

Notification of Intent
submitted by
Georgia Power Company
for a
New License for the Lloyd Shoals Project
FERC Project Number 2336
July 3, 2018

The following information regarding the Lloyd Shoals Project (Project) is provided pursuant to 18 CFR § 5.5(b):

18 CFR 5.5 (b)(1) The licensee's name and address.

Georgia Power Company
c/o Herbie N. Johnson
Hydro General Manager
Southern Company Generation
Bin 10193
241 Ralph McGill Boulevard, NE
Atlanta, Georgia 30308-3374

ATTN: Courtenay R. O'Mara
Hydro Licensing and Compliance Supervisor

18 CFR 5.5 (b)(2) The project number.

The FERC Project Number is 2336.

18 CFR 5.5 (b)(3) The license expiration date.

The license expiration date is December 31, 2023.

18 CFR 5.5 (b)(4) An unequivocal statement of the licensee's intention to file or not to file an application for a new license.

Georgia Power Company intends to file an application for a new power license for the Lloyd Shoals Project (FERC # 2336) utilizing the Commission's Integrated Licensing Process in accordance with 18 CFR Part 5.

18 CFR 5.5 (b)(5) The type of principal project works licensed, such as dam and reservoir, powerhouse or transmission lines.

The Project consists of a reservoir (Lake Jackson), a concrete gravity dam founded on rock, a powerhouse integral with the dam, a spillway section with Obermeyer gates and a trash gate, voltage transformation with connection directly to the primary transmission system, and appurtenant facilities.

Lloyd Shoals Dam has a crest elevation of 525.2 feet (elevation at bottom of the Obermeyer gates), a maximum height of about 105 feet, and a length of 1,599.5 feet. The project works across the main dam consist of the following components (and their length) from west to east:

- West concrete non-overflow section (143 feet);
- Powerhouse intake section (198 feet);
- Concrete spillway section with Obermeyer gates and one trash gate (728.5 feet);
- East earth embankment tie-in to bank (530 feet).

18 CFR 5.5 (b)(6) The location of the project by state, county, and stream, and, when appropriate, by city or nearby city.

The Lloyd Shoals Project is located on the Ocmulgee River in central Georgia. Lloyd Shoals Dam is located at river mile 250.2, just south of the confluence of the Alcovy, Yellow, and South Rivers. Lloyd Shoals Dam is about 7 air miles east-northeast of the City of Jackson in Butts County, 9 air miles northwest of the City of Monticello in Jasper County, 19 air miles south of the City of Covington in Newton County, and 19 air miles east-southeast of the City of McDonough in Henry County. Lloyd Shoals Dam is about 35 air miles north-northwest of the City of Macon and 40 air miles southeast of the City of Atlanta. The Lloyd Shoals powerhouse is on the west side of the river in Butts County. The spillway portion of the dam is on the east side of the river, mostly in Jasper County. Lloyd Shoals Dam discharges directly into the Ocmulgee River. The dam is about 1.1 river miles upstream of the Georgia Highway 16 bridge and about 19 river miles upstream of Juliette Dam.

Lands and waters within the FERC project boundary are located within Butts, Henry, Jasper, and Newton Counties. Lake Jackson extends upstream from the dam about 13 river miles into the South and Yellow Rivers each, 11 miles into the Alcovy River, and 8 miles into Tussahaw Creek.

18 CFR 5.5 (b)(7) The installed plant capacity.

The nameplate generating capacity of the Lloyd Shoals Project is 18 MW.

18 CFR 5.5 (b)(8) The names and addresses of:

(8)(i) Every county in which any part of the project is located, and Federal facility that is used or to be used by the project is located:

County	Contact Name	Mailing Address
Butts County	Mr. Steve Layson	625 West 3rd Street Jackson, GA 30233 Phone: 770-775-8200 slayson@buttscounty.org
Henry County	Chairwoman June Wood	140 Henry Parkway McDonough, GA 30253 Phone: 770-288-6001

		jwood@co.henry.ga.us
Jasper County	Chairman Carl Pennamon	126 W. Greene St., Suite 18 Monticello, GA 31046 Phone: 762-435-9766 cpennamon@jaspercountyga.org
Newton County	Chairman Marcello Banes	1124 Clark Street Covington, GA 30014 Phone: 678-625-1201 mbanes@co.newton.ga.us

18 CFR 5.5 (b)(8)(ii)(A) Every city, town, or similar political subdivision in which any part of the project is or is to be and any Federal facility that is or is to be used by the project is located:

The Lloyd Shoals Project is not located within any city or town limits.

18 CFR 5.5 (b)(8)(ii)(B) Every city, town, or similar political subdivision that has a population of 5,000 or more people and is located within 15 miles of the existing or proposed project dam:

City/Town	Contact Name	Mailing Address
City of Jackson	Mayor Kay Pippin	P.O. Box 838 Jackson, GA 30233 Phone: 770-328-1251 kay.pippin@cityofjacksonga.com
City of Locust Grove	Mayor Robert Price	3644 Highway 42 Locust Grove, GA 30248 Phone: 770-692-2311 rprice@locustgrove-ga.gov

18 CFR 5.5 (b)(8)(iii)(A) Every irrigation district, drainage district, or similar special purpose political subdivision in which any part of the project is or is proposed to be located and any Federal facility that is or is proposed to be used by the project is located:

Political Subdivision	Contact Name	Mailing Address
Georgia Soil and Water Conservation Commission	Mr. Mitch Attaway, Executive Director	4310 Lexington Road Athens, GA Phone: 706-552-4470 https://gaswcc.georgia.gov/
Metropolitan North Georgia Water Planning District (Metro Water District)	Mr. Danny Johnson	229 Peachtree Street, NE Suite 100 Atlanta, GA 30303 Phone: 470-378-1552 djohnson@atlantaregional.org
Middle Ocmulgee Water Planning Region	Mr. James A. Capp Branch Chief	Georgia Environmental Protection Division 2 MLK Jr. Drive Suite 1152 E Atlanta, GA 30334 Phone: 404-463-4911 james.capp@dnr.ga.gov

18 CFR 5.5 (b)(8)(iii)(B) Every irrigation district, drainage district, or similar special purpose political subdivision that owns, operates, maintains, or uses any project facility or any Federal facility that is proposed to be used by the project:

None

18 CFR 5.5 (b)(8)(iv) Every other political subdivision in the general area of the project that there is reason to believe would be likely to be interested in, or affected by, the notification:

Other Political Subdivisions	Contact Name	Mailing Address
City of Flovilla	Mayor Beth Burns Ogletree	308 Heard St. Flovilla, GA 30216 Phone: 770-775-5661 info@flovilla.org
City of Jenkinsburg	Mayor Eddie Ford	211 Maple Drive Jenkinsburg, GA 30234 Phone: 770-775-4850 cityclerk@cityofjenkinsburg.com
City of Mansfield	Mayor Jefferson Riley	P.O. Box 35 Mansfield, GA 30055 Phone: 770-786-7235 jriley@mansfieldga.gov
City of Monticello	Mayor Bryan Standifer City Manager Doug White	123 West Washington Street P.O. Box 269 Monticello, GA 31064

		Phone: 706-468-6062 bstandifer@bellsouth.net dwhite@monticelloga.org
City of McDonough	Mayor Billy Copeland	136 Keys Ferry St. McDonough, GA 30253 Phone: 678-782-6210 bcopeland@mcdonoughga.org
City of Covington	Mayor Ronnie Johnston	2194 Emory St. Covington, GA 30014 Phone: 770-262-1001 rjohnston@cityofcovington.org
U.S. Forest Service, Chattahoochee-Oconee National Forest	Ms. Betty Jewett	1755 Cleveland Highway Gainesville, GA 30501 Phone: 770-297-3000 bettyjewett@fs.fed.us

18 CFR 5.5 (b)(8)(v)**Potentially Affected Indian Tribes**

Note: There are no extant federally recognized tribal lands in the State of Georgia. (U.S. Department of the Interior, 1993). There are, however, a number of federally recognized tribes (Federal Register, Vol. 73, No. 66, April 4, 2008) that occupied the project region historically. The following list includes Indian tribes that may have an interest in the relicensing of the Wallace Dam Project. At this time, it is unclear whether and to what extent these Indian tribes will be affected by the notification.

Tribe	Contact Name	Mailing Address
Cherokee Nation of Oklahoma	Principal Chief Bill John Baker	Cherokee Nation of Oklahoma P.O. Box 948 Tahlequah, OK 74465
Eastern Band of Cherokee Indians	Mr. Russel Townsend	THPO Eastern Band of Cherokee Indians Qualla Boundary P.O. Box 455 Cherokee, NC 28719
Muskogee (Creek) Nation	Principal Chief James Floyd	Muskogee (Creek) Nation P.O. Box 580 Okmulgee, OK 74447
United Keetoowah Band of Cherokee Indians	Chief George Wickliffe	United Keetoowah Band of Cherokee Indians P.O. Box 746 Tahlequah, OK 74464
Alabama-Quassarte Tribal Town	Chief Nelson Harjo	Alabama-Quassarte Tribal Town P.O. Box 187 Wetumka, OK 74883
Alabama-Coushatta Tribe of Texas	Chairperson Jo Ann Battise	Alabama-Coushatta Tribe of Texas 571 State Park Road 56 Livingston, TX 77351
Coushatta Tribe of Louisiana	Chairman David Sickey	Coushatta Tribe of Louisiana P.O. Box 818 Elton, LA 70532
Kialegee Tribal Town	Town King Jeremiah Hobia	Kialegee Tribal Town P.O. Box 332 Wetumka OK 74883
Thlopthlocco Tribal Town	Town King Ryan Morrow	Thlopthlocco Tribal Town P.O. Box 188 Okemah, OK 74859
Poarch Band of Creek Indians	Chairwoman Stephanie Bryan	Poarch Band of Creek Indians 5811 Jack Springs Road Atmore, AL 36502

Potentially Interested Agencies

Interested Agency	Contact Name	Mailing Address
U.S. Fish and Wildlife Service	Ms. Tamara Johnson	105 Westpark Drive Athens, GA 30606 Phone: 706-613-9493 x222 alice_lawrence@fws.gov
U.S. Environmental Protection Agency Region 4	Mr. Dan Holliman	61 Forsyth Street, S.W. Atlanta, GA 30303 Phone: 404-562-9531 holliman.daniel@epa.gov
Georgia Department of Natural Resources - Environmental Protection Division	Dr. Elizabeth Booth	2 MLK, Jr. Drive, S.W., Suite 1152 Atlanta, GA 30334 Phone: 404-675-6232 elizabeth.booth@dnr.state.ga.us
Georgia Department of Natural Resources - Wildlife Resources Division	Mr. Matt Thomas	2070 U.S. Highway 278, S.E. Social Circle, GA 30025 Phone: 770-918-6406 Matt.thomas@dnr.ga.gov
Georgia Department of Natural Resources - Historic Preservation Division	Dr. David Crass	254 Washington Street, SW Ground Level Atlanta, GA 30334 Phone: 404-656-2840 david.crass@dnr.state.ga.us



Pre-Application Document

Lloyd Shoals Hydroelectric Project

FERC Project Number 2336

Prepared with:

Southern Company Generation Hydro Services

Geosyntec 
consultants

and

Kleinschmidt

July 2018

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ACRONYMS AND ABBREVIATIONS

ARC	Atlanta Regional Commission
BBS	breeding bird surveys
BOD	biological oxygen demand
CBC	Christmas Bird Count
CBD	Center for Biological Diversity
CCA	Candidate Conservation Agreement
CCAA	Candidate Conservation Agreement with Assurances
CEII	Critical Energy Infrastructure Information
CFR	Code of Federal Regulations
cfs	cubic feet per second
Commission	Federal Energy Regulatory Commission
DO	dissolved oxygen
EA	EA Engineering, Science, and Technology, Inc.
EDDMapS	Early Detection and Distribution Mapping System
EFH	Essential Fish Habitat
EPA	U.S. Environmental Protection Agency
EPPC	Exotic Pest Plant Council
FC	fecal coliform
FCCLA	Family, Career, and Community Leaders of America
FERC	Federal Energy Regulatory Commission
FPA	Federal Power Act
FS	U.S. Forest Service
ft	feet
FWS	U.S. Fish and Wildlife Service
GBCF	Georgia Bass Chapter Federation
GDNR	Georgia Department of Natural Resources
Georgia Power	Georgia Power Company
GEPD	Georgia Environmental Protection Division
GMNH	Georgia Museum of Natural History
HCWA	Henry County Water Authority
HD	Historic District
hp	horsepower
HUC	Hydrologic Unit Code
Hwy	highway
ILP	Integrated Licensing Process
K _n	relative condition factor

kV	kilovolt
lb	pound
MGD	million gallons per day
mg/L	milligrams per liter
MOU	Memorandum of Understanding
MW	megawatt
MWA	Macon Water Authority
MWh	megawatt hours
µg/L	micrograms per liter
National Register	National Register of Historic Places
NEPA	National Environmental Policy Act
NF	National Forest
NOI	Notification of Intent
NWR	National Wildlife Refuge
PAD	Pre-Application Document
PCB	polychlorinated biphenyls
PD	plant datum
PLP	Preliminary Licensing Proposal
PM&E	protection, mitigation, and enhancement
PMWUA	percentage maximum weighted usable area
PSP	Proposed Study Plan
RC	Regional Commission
RIR	Regionally Important Resources
rpm	revolutions per minute
RTE	rare, threatened, and endangered
SAFMC	South Atlantic Fishery Management Council
SCORP	Statewide Comprehensive Outdoor Recreation Plan
SHPO	State Historic Preservation Officer
SP	state park
sq mi	square miles
TMDL	total maximum daily load
USGS	U.S. Geological Survey
WMA	Wildlife Management Area
WRD	Wildlife Resources Division

1.0 INTRODUCTION

Georgia Power Company (Georgia Power) is filing with the Federal Energy Regulatory Commission (FERC, the Commission) its Notification of Intent (NOI) to file an application for a new license for its existing 18-megawatt (MW) Lloyd Shoals Hydroelectric Project (FERC No. 2336) (Lloyd Shoals Project, the Project). The Lloyd Shoals Project is an existing project consisting of Lloyd Shoals Dam, a powerhouse, and 4,750-acre Lake Jackson on the Ocmulgee River in Butts, Henry, Jasper, and Newton Counties, Georgia (Figures 1 and 2). Georgia Power is not proposing to add capacity or make any major modifications to the Lloyd Shoals Project under the new license. The Project does not occupy federal lands. The current license expires December 31, 2023.

Georgia Power is using FERC's Integrated Licensing Process (ILP) for all pre-application activities leading up to filing of the Lloyd Shoals license application by December 31, 2021. The ILP is designed to create an efficient and timely licensing process by integrating the applicant's pre-filing consultation with FERC's scoping pursuant to the National Environmental Policy Act (NEPA). The ILP also establishes firm time frames for all pre-application activities and stakeholder participation (Section 2).

In accordance with the ILP regulations (18 Code of Federal Regulations [CFR] Part 5), this Pre-Application Document (PAD) is being filed simultaneously with the NOI and distributed to Federal and state resource agencies, local governments, Indian tribes, members of the public, and others likely to be interested in the proceeding.

1.1 Purposes

The purposes of this PAD are to:

- Describe the existing facilities and the current and proposed operations of the Lloyd Shoals Project.
- Provide existing, reasonably available information characterizing the affected environment and potential resource impacts of continued project operation.
- Serve as a precursor to the environmental analysis section of Georgia Power's Preliminary Licensing Proposal (PLP) and Exhibit E of the final license application.

The information provided herein will enable resource agencies and other entities interested in the relicensing proceeding to identify potential resource issues and any related information needs during the NEPA scoping process to be conducted by FERC staff. Section 2 provides the detailed schedule for all pre-application activities in the proceeding.

Georgia Power exercised due diligence in preparing this PAD by contacting appropriate agencies and other stakeholders potentially having existing, relevant, and reasonably available information characterizing the affected environment and potential resource impacts of continued project operation and describing or summarizing that information herein. Georgia Power also identified and took into consideration potentially applicable Federal and state comprehensive plans filed with the Commission. To facilitate the gathering of relevant information, Georgia Power distributed a PAD Questionnaire to agencies. In addition, Georgia Power held two relicensing information sessions on November 16, 2017, in the City of Jackson near the Project. These sessions involved dissemination of information about the Project and the relicensing process by members of the Georgia Power relicensing team, who were available for one-on-one discussions with stakeholders.

Appendix A documents the contacts made and meetings held by Georgia Power in connection with preparing this PAD. Appendix B provides the completed PAD Questionnaires received to date from several agencies.

1.2 Document Organization

This PAD follows the form and content requirements at 18 CFR § 5.6(c) and (d) and includes the following sections:

- **Section 2** – Process plan and schedule for all pre-application activity, 18 CFR § 5.6(d)(1), including a protocol for distributing information in this proceeding.
- **Section 3** – Description of the project location, facilities, and operations of the Project, 18 CFR § 5.6(d)(2).
- **Section 4** – Description of the existing environment and resource impacts, including: a general description of the river basin (18 CFR § 5.6(d)(3)(xiii)); and for each of 11 resource areas, a description of the existing environment, summaries of existing data or studies regarding the resource, a description of any known or potential adverse impacts and issues, and a description of any existing or proposed project facilities, operations, or management activities undertaken for the purpose of protecting, mitigating impacts to, or enhancing resources affected by the Project (18 CFR § 5.6(d)(3)(i)-(xii)).
- **Section 5** – Preliminary resource issues and potential studies or information gathering needs associated with the issues, 18 CFR § 5.6(d)(4).
- **Section 6** – Literature and information sources cited in the descriptions and summaries of existing resource data, 18 CFR § 5.6(c)(2).

- **Appendices** – Summary of contacts made in preparing this document (18 CFR § 5.6(d)(5)); and completed PAD Questionnaires, diagrams, current license requirements, flow duration curves, and related information supporting the sections above.

2.0 PROCESS PLAN AND SCHEDULE

On July 3, 2018, Georgia Power is filing this PAD and its NOI to file a license application seeking a new license for the Lloyd Shoals Project. Pursuant to 18 CFR Part 5, the filing of the NOI is the first step in the relicensing process. It initiates scheduling for the subsequent pre-application activities.

Table 1 provides a detailed Process Plan and Schedule outlining the responsibilities, time frames, and deadlines for all pre-application activities in the Lloyd Shoals proceeding. The Process Plan and Schedule incorporates the time frames set forth in 18 CFR Part 5. It is important that all relicensing participants familiarize themselves with the Process Plan and Schedule milestones and adhere to the time frames required by the ILP regulations. The Commission and Georgia Power will provide additional information regarding scheduling in subsequent notifications and communications in accordance with 18 CFR Part 5, as appropriate.

2.1 Tribal Consultation

The Commission's Policy Statement on Consultation with Indian Tribes in Commission Proceedings (18 CFR Part 2) recognizes the sovereignty of tribal nations and the Commission's trust responsibility to Indian tribes. Federally recognized tribes potentially having an interest in the Lloyd Shoals relicensing proceeding are listed in Section 4.12. Within 30 days following the filing of the NOI and PAD, a tribal consultation meeting will be held between each Indian tribe likely to be affected by the license application and Commission staff, if the affected Indian tribes agree to such a meeting (18 CFR § 5.7). The deadline is August 2, 2018 (Table 1); the date and location of the meeting will be determined by the Commission.

2.2 Scoping Meeting and Site Visit

As set forth at 18 CFR § 5.8, the Commission will issue a notice of commencement of the Lloyd Shoals relicensing proceeding and Scoping Document 1 (SD1) within 60 days of the filing of the NOI and PAD, or by September 4, 2018 (Table 1). The Commission will hold a public scoping meeting and site visit within 30 days of issuing the notice of commencement. The scoping meeting(s) and site visit will be held on September 13 and 14, 2018. The scoping meeting locations and times have yet to be determined by the Commission and will be provided to all interested parties by the Commission as set forth at 18 CFR § 5.8(e).

2.3 Distribution Protocol

Georgia Power proposes the following protocol for distributions and communications for relicensing participants. All participants, including Georgia Power, will communicate with other participants by telephone, e-mail, or any other available electronic means to distribute information and communicate as necessary in a timely and efficient manner. Participants will

distribute their respective input consistent with the time frames established in the Process Plan and Schedule (Table 1).

In addition, Georgia Power will share information on its Lloyd Shoals Relicensing Website. The project website will be maintained as a readily accessible repository of Georgia Power's relicensing documents and information, including the PAD, Process Plan and Schedule, study plans, progress reports, preliminary licensing proposal, license application, and other relevant pre-filing information.

The internet address for Georgia Power's Lloyd Shoals Relicensing Website is:

<https://www.georgiapower.com/company/energy-industry/generating-plants/lloyd-shoals-dam-project.html>

All relicensing documents issued and received by FERC, including all filings by relicensing participants, will be available on the Internet using the eLibrary feature of FERC's website. The quick reference guide (eLibrary – Quick Help) and Detailed Online Help available on the FERC website describe the information needed to navigate eLibrary. Georgia Power encourages all relicensing participants to sign up to utilize FERC's Online resources, not only to monitor the relicensing proceeding (eLibrary) but to file their documents (eFiling) and to track all relicensing filings by receiving ongoing e-mail filing notices from FERC (eSubscriptions).

The internet addresses for FERC's hydropower website and the eLibrary feature are:

<http://www.ferc.gov/industries/hydropower.asp>

<http://www.ferc.gov/docs-filing/elibrary.asp>

3.0 PROJECT LOCATION, FACILITIES, AND OPERATION

3.1 Applicant's Authorized Agent

The exact name, business address, and telephone number of the person authorized to act as agent for Georgia Power as the applicant in this proceeding are:

Herbie N. Johnson
Hydro General Manager
Southern Company Generation
Bin 10193
241 Ralph McGill Boulevard NE
Atlanta, Georgia 30308-3374
205-257-1359

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Hydro Licensing and Compliance Supervisor
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3.2 Project Location

The Lloyd Shoals Project is located on the Ocmulgee River in central Georgia (Figure 1). Lloyd Shoals Dam is located at river mile 250.2, just south of the confluence of the Alcovy, Yellow, and South Rivers (Figure 2). Lloyd Shoals Dam is about 7 air miles east-northeast of the City of Jackson in Butts County, 9 air miles northwest of the City of Monticello in Jasper County, 19 air miles south of the City of Covington in Newton County, and 19 air miles east-southeast of the City of McDonough in Henry County. Lloyd Shoals Dam is about 35 air miles north-northwest of the City of Macon and 40 air miles southeast of the City of Atlanta. The Lloyd Shoals powerhouse is on the west side of the river in Butts County. The spillway portion of the dam is on the east side of the river, mostly in Jasper County. Lloyd Shoals Dam discharges directly into the Ocmulgee River. The dam is about 1.1 river miles upstream of the Georgia Highway (Hwy) 16 bridge and about 19 river miles upstream of Juliette Dam.

Lands and waters within the FERC project boundary are located within Butts, Henry, Jasper, and Newton Counties. The Lloyd Shoals project reservoir, known as Lake Jackson, has a surface area of 4,750 acres at the normal full-pool elevation of 530 feet (ft) plant datum (PD)¹ and has 135 miles of shoreline (Figure 3). The full-reservoir gross storage capacity is approximately 107,000 acre-feet. Lake Jackson extends upstream from the dam about 13 river

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

miles into the South and Yellow Rivers each, 11 miles into the Alcovy River, and 8 miles into Tussahaw Creek.

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. Only three percent of the project boundary is marked by metes-and-bounds property lines (Georgia Power, 2017a).

On May 22, 2018, the Commission approved Georgia Power's application filed July 27, 2017 to amend the project boundary for the Lloyd Shoals Project to remove lands not needed for project purposes. In areas where Georgia Power owns residential lease lots adjacent to the project reservoir, the project boundary was changed from the 545-ft PD elevation contour to the 530-ft PD contour. This change removed 662 acres of land from the project boundary, making the boundary more consistent around the reservoir (it follows the 530-ft contour where privately-owned residential lots abut the reservoir), and removed 588 residential buildings from the project boundary where the underlying lands were not needed for project purposes.

Georgia Power maintains four project recreation access areas within the project boundary, including Lloyd Shoals Park, the Tailrace Fishing Pier, Ocmulgee River Park, and the Jane Lofton Public Access Area (Figure 3) (Section 4.8.1). The project boundary extends downstream of Lloyd Shoal Dam approximately 0.5 miles to encompass Ocmulgee River Park.

Project lands provide a buffer for aesthetics, wildlife habitat, water quality protection, and recreation. Through fee-simple ownership, Georgia Power controls approximately 1,138 acres of lands within the Lloyd Shoals project boundary, including approximately 106 miles of shoreline. Included in these numbers are 606 leased lots and 1,351 lots on which Georgia Power owns a strip of land between the shoreline and the privately owned residential property. Georgia Power possesses flood rights beyond the project boundary on 326 additional lots. Georgia Power manages the shoreline of Lake Jackson under its Shoreline Management Guidelines to ensure compliance with the Lloyd Shoals FERC license and other applicable federal and state laws and regulations (Georgia Power, 2015a).

3.3 Project Facilities

The Lloyd Shoals Project began operation in 1911. The Project consists of a reservoir (Lake Jackson), a concrete gravity dam founded on rock, a powerhouse integral with the dam, a spillway section with Obermeyer gates and a trash gate, voltage transformation with connection directly to the primary transmission system, and appurtenant facilities (Figure 4).

Lloyd Shoals Dam has a crest elevation of 525.2 ft (elevation at bottom of the Obermeyer gates), a maximum height of about 105 ft, and a length of 1,599.5 ft.

The project works across the main dam consist of the following components (and their length) from west to east (Figure 4):

- West concrete non-overflow section (143 ft);
- Powerhouse intake section (198 ft);
- Concrete spillway section with Obermeyer gates and one trash gate (728.5 ft); and
- East earth embankment tie-in to bank (530 ft).

The west non-overflow and powerhouse intake sections have a crest elevation of 540 ft PD. The powerhouse intake section contains six, 12-ft by 12-ft octagonal, cast-in-place concrete water passages that supply water to the turbines. The invert elevation of the intake is 495 ft PD, which is 35 ft below the normal full-pool elevation of Lake Jackson. Steel trash racks in front of the intake consist of vertical bars with clear spacing between bars of 1.3125 inches.

The concrete-and-brick powerhouse contains six turbine-generator units, numbered 1 through 6 from west to east (Table 2). The turbines are horizontal, Francis-type, double-runner units each rated 5,650 horsepower (hp) at 96.8 ft of head and 550 cubic feet per second (cfs) of discharge. The turbine runner diameter is 39 inches for Units 1-4 and 42 inches for Units 5 and 6. The rated normal turbine speed of all six units is 300 revolutions per minute (rpm). The maximum hydraulic capacity of each turbine unit is 620 cfs, for a total powerhouse maximum hydraulic capacity of 3,720 cfs.

The spillway section contains from west to east a 30-ft-wide bottom-hinged 19-ft by 12-ft trash gate; a 98.5-ft-wide section of 2-ft-high Obermeyer gates; a 420-ft-wide section of 5-ft-high Obermeyer gates; and a 180-ft-wide section of 2-ft-high Obermeyer gates. The top of the spillway gates is elevation 530 ft PD. The crest of the concrete spillway is elevation 525.2 ft PD, at the bottom of the Obermeyer gates. The Obermeyer gate system was installed in 2012 to replace spillway flashboards and improve the control of reservoir levels during high-flow operations, as described below.

A 2,100-ft-long saddle dike is located along Jackson Lake Road (County Road 364) about 3,000 ft upstream of the east end of the main dam. A 500-ft-long auxiliary spillway is located about 900 ft southwest of the main dam (Figure 4). The auxiliary spillway contains 10-ft-high flashboards maintained in the dry by a 6-ft-high 560-ft-long sacrificial earth embankment.

Lake Jackson covers a surface area of 4,750 acres at the normal full-pool elevation of 530 ft PD. The full-reservoir gross storage capacity is approximately 107,000 acre-feet. The upstream drainage area of the Ocmulgee River basin at Lloyd Shoals Dam is about 1,400 square miles (sq mi).

The nameplate rating generating capacity of the Lloyd Shoals Project is 18 MW. The dependable capacity of the Project is 22.5 MW in the summertime, the most critical power-demand season. Dependable capacity is defined as the maximum average capacity available for 8 hours each day for 5 consecutive days using average summer inflows. Average annual generation for the years 1997 through 2016 was 63,139 megawatt-hours, distributed by month as shown in Table 3.

There are no transmission lines included in the Lloyd Shoals Project. Two 2.3-kilovolt (kV) project generator leads exit the powerhouse to two, three-phase outdoor step-up transformers rated 10/12-megavoltampere (MVA) and 10-MVA, located in the substation at the west dam abutment. Connection to existing 69-kV and 115-kV transmission lines is made within the substation. Appendix C provides a single-line drawing depicting the transfer of electricity from the Lloyd Shoals Project to the transmission grid within the substation.

3.4 Current Operation

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 with renewable, waste-free, low-emission power. Water for generation at Lloyd Shoals Dam comes from precipitation in the Ocmulgee River basin upstream. There are no large dams reregulating streamflow upstream of the Project. Thus, project inflows depend primarily on the timing, duration, and volume of precipitation. Inflows are stored for short periods of time, generally no longer than 24 hours, and then released through the generating turbines during peak power demand periods. The following description of current operation comes from the Lloyd Shoals Operations Primer. The primer contains additional information, including numerous figures depicting operations since 1997, and is provided in Appendix D of this PAD.

3.4.1 Normal Operation

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. The reservoir rises slightly as inflow is temporarily stored during periods outside of peak power demand (i.e., off-peak hours). As power demand increases into the peak power demand period, Lloyd Shoals is operated to release water through the powerhouse turbines to produce energy from the plant generators. This cycle repeats daily and varies seasonally with peak power demands.

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 (Appendix D). Since the installation of the Obermeyer gate system in 2012, daily reservoir fluctuations were reduced for 2013-2015.

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, as required by Article 402 of the current license. An instream flow study conducted in 1990 for the previous Lloyd Shoals relicensing showed that a minimum flow of 400 cfs (increased from 100 cfs) would optimize aquatic habitat across multiple fish species life stages (see Section 4.4.1, *Downstream Ocmulgee River*).

Table 4 summarizes Lloyd Shoals project generation and outflow records for the 5-year period 2012 through 2016. Generation typically is highest during late winter and early spring (February-April), when project inflow is also the highest (Appendix D). Discharge in Table 4 was calculated using the U.S. Geological Survey (USGS) gage data from the Ocmulgee River 1.5 miles downstream of Lloyd Shoals Dam (Ocmulgee River near Jackson, GA [No. 02210500]), adjusted for the drainage area at Lloyd Shoals Dam being 98.6 percent of that at the gage.

3.4.2 High-Flow Operation

During high-flow events at the Lloyd Shoals Project, all flows are first run through the turbine/generator units, where electricity is generated. As inflow to the powerhouse exceeds the maximum hydraulic capacity of the turbines, spillway gates are opened incrementally to approximate inflow. Water is not released in advance of a storm because oftentimes predicted storms do not materialize. Water is only released as an increase in inflows is evident at the dam. The Obermeyer gate system installed in 2012 provides Georgia Power much better control of the reservoir level during the course of high-flow operations than the previous flashboard system. These gates allow the plant discharges to be more closely matched with inflows into the Project.

3.4.3 Drought Operation

During low-flow periods or extended drought at Lloyd Shoals Dam, calculated inflows often drop below the 400-cfs minimum flow requirement. During the most recent drought during the summer/fall of 2016, the lowest recorded elevation of Lake Jackson was 525 ft PD (by comparison, the target low-level elevation during the last homeowner drawdown in 2015 was 523 ft). During this time, Lloyd Shoals Dam supplemented flows in the river downstream of the Project with a 250-cfs minimum release to ensure adequate stream flows for aquatic life and other downstream uses, such as the Butts County and Macon Water Authority water supply intakes. These supplemental flows were provided for approximately 64 days causing the reservoir elevations to decline. During the refill period after the drought, Georgia Power continued to release 250-cfs minimum flow to raise the elevation of Lake Jackson prior to increasing discharges from the Project. In 2016, calculated daily inflows were less than 400 cfs on 28.1 percent of the days and less than 250 cfs on 20.5 percent of the days (Appendix D).

For the period 1997-2016, daily average discharge from the Project to the Ocmulgee River downstream exceeded 250 cfs on 98 percent of the days, 400 cfs on 84 percent of the days, and 1,000 cfs on 50 percent of the days (Appendix D).

3.5 Proposed Operation

Georgia Power proposes to continue operating the Lloyd Shoals Project as it is currently operated.

3.6 Other Project Information

This section provides other project information required at 18 CFR § 5.6(d)(2).

3.6.1 Current License Requirements

A complete description of the current license requirements for the Lloyd Shoals Project as amended during the license term is provided in Appendix E. The current license for the Project was issued for a period of 30 years and has an effective date of January 1, 1994.

3.6.2 Compliance History

A review of readily available electronic Georgia Power correspondence and FERC compliance documentation shows that the Lloyd Shoals Project has been, and continues to be, in compliance with the terms and conditions of the current license. The only exceptions are two known instances of potential non-compliance summarized below.

- Article 402 of the license requires “a continuous minimum flow of 400 cfs, or inflow to the project reservoir”. Certain modifications may be allowed, and FERC must be notified. On March 26, 2002, Georgia Power filed a notification that plant discharges were less than 400 cfs for a 20-hour period, reaching a minimum of 373 cfs during that period. In its May 21, 2007 letter, FERC found this operational error to be a violation of Article 402 of the license.
- On August 14, 2017, Georgia Power filed with FERC a notification of a deviation of minimum flow. Plant discharges were less than 400 cfs for a 90-minute period, reaching a minimum of 225 cfs during that period. In its November 15, 2017 letter, FERC found this operational error to be a violation of Article 402 of the license.

3.6.3 Current Net Investment

Georgia Power’s current net investment (book value) at the Lloyd Shoals Project is \$10,501,552 as of December 31, 2017.

4.0 DESCRIPTION OF EXISTING ENVIRONMENT AND RESOURCE IMPACTS

4.1 General Description of the River Basin

The Lloyd Shoals Project is located on the Ocmulgee River at river mile 250.2 in the upper Ocmulgee River basin of the greater Altamaha River basin (Figure 1). The Altamaha River basin includes the Ocmulgee, Oconee, and Altamaha Rivers. The headwater streams of the Ocmulgee River, including the South, Yellow, and Alcovy Rivers, originate in the Piedmont physiographic province, drain the southeastern and eastern portions of metropolitan Atlanta, and converge at Lake Jackson to form the Ocmulgee River. Tussahaw Creek, a large tributary stream, also enters Lake Jackson from the west. From Lloyd Shoals Dam, the Ocmulgee River flows south and then east-southeast for 250 miles to its confluence with the Oconee River in the Coastal Plain physiographic province to form the Altamaha River. The Altamaha River flows 137 miles southeast to the Atlantic Ocean. The Altamaha River basin drains an area of 14,000 sq mi and is located entirely within Georgia.

The Ocmulgee River basin drains a watershed area of 6,085 sq mi in central Georgia (Georgia Environmental Protection Division [GEPD], 2003). The watershed upstream of Lloyd Shoals Dam covers an area of 1,400 sq mi., comprising about 23 percent of the Ocmulgee River basin (Figure 1). From Lloyd Shoals Dam, the river flows south toward Macon. The Towaliga River, a larger tributary, enters the Ocmulgee River from the west about 17 river miles downstream of Lloyd Shoals Dam. As it approaches Macon, the Ocmulgee River enters the Fall Line area, the transition zone between the Piedmont and Coastal Plain physiographic provinces. Downstream of Macon, the river meanders through the Coastal Plain in wide floodplains to its confluence with the Oconee River.

4.1.1 Dams in the Basin

Two dams are located on the Ocmulgee River: Lloyd Shoals Dam and Juliette Dam. No other dams are on the main stems of either the Ocmulgee or Altamaha Rivers. Juliette Dam, located about 19 miles downstream of Lloyd Shoals Dam, is a 20-ft-high concrete gravity dam built in 1921. It creates a 78-acre impoundment. Juliette Dam poses a barrier to the upstream passage of diadromous and highly migratory fish migrating upstream into the upper Ocmulgee River basin. Formerly operated by Eastern Hydroelectric Corporation as the East Juliette Hydroelectric Project (FERC No. 7019), FERC revoked the license in October 2014 because the licensee failed to comply with the terms of the license pertaining to an approved fishway that was never constructed (FERC, 2015). In July 2016, Thomas Hydropower, JV LLC, filed a draft application for exemption from licensing for the East Juliette Project. The applicant's draft operations proposal includes upstream fish passage at Juliette Dam utilizing existing bypass reaches. No final application for exemption has been filed for the project.

Two small hydroelectric dams are on the Yellow River upstream of the Lloyd Shoals Project. Porterdale Dam is located 11 river miles upstream of Lake Jackson in Newton County. The

dam is 12-ft high and forms a 5-acre impoundment. The Porterdale Hydroelectric Project previously operated under a FERC exemption from licensing (FERC No. 2568) but the exemption was surrendered effective June 2016 (W. B. King, FERC, June 9, 2016 letter to R. Cavagnaro, VClear Resources, LLC). The project's gated intake was sealed and the dam remains in-place. The Milstead Hydroelectric Project (FERC No. 7141), with a capacity of 1 MW and currently authorized under a licensing exemption, is located 15 miles farther upstream on the Yellow River in Rockdale County. The project includes a low-head dam, headrace canal, and powerhouse.

Several reservoirs are in tributary systems upstream of the Lloyd Shoals Project, including water supply reservoirs. Tussahaw Reservoir, a 1,466-acre water supply reservoir of the Henry County Water Authority (HCWA), is located on Tussahaw Creek about 3.5 miles upstream of Lake Jackson in Butts and Henry Counties (Figure 2). Other reservoirs upstream of the Project include 850-acre Lake Varner in the Alcovy River system (Newton County); 650-acre Randy Poynter Lake in the Yellow River system (Rockdale County); 600-acre Lake Spivey in the South River System (Henry and Clayton Counties); 260-acre Blalock Reservoir in the South River System (Henry County); and others.

Reservoirs on tributaries to the Ocmulgee River downstream of the Project include a network of water supply reservoirs operated by HCWA in the Towaliga River system: Cole Reservoir (1,100 acres), Rowland Reservoir (277 acres), Gardner Reservoir (209 acres), and Strickland Reservoir (121 acres). High Falls Lake (650 acres) impounds the Towaliga River at High Falls State Park (SP) (Figure 2). Lake Juliette, a 3,600-acre reservoir constructed to provide cooling water for Georgia Power's Plant Scherer, is located on Rum Creek (Figure 2), which enters the Ocmulgee River about 10 river miles downstream of Juliette Dam. Note that Lake Juliette is an impoundment of Rum Creek and is distinct from Juliette Dam on the Ocmulgee River.

4.1.2 Major Land Uses

The Ocmulgee River basin drains all or portions of 30 counties in central Georgia. More than 100 cities and towns are located within the basin. Major cities upstream of the Project are Covington, Conyers, and McDonough, with populations of 13,977, 15,919, and 23,964, respectively (U.S. Census Bureau, 2016). Their land uses comprise significant portions of the watershed upstream of Lake Jackson. The southeastern portion of metropolitan Atlanta is also within the Ocmulgee River basin upstream of the Project. The closest cities to the Project are Jackson to the west and Monticello to the east, with populations of 5,071 and 2,618, respectively (U.S. Census Bureau, 2016). These small cities are within tributary watersheds that drain downstream of the Project.

The upper Ocmulgee River basin in the vicinity of the Lloyd Shoals Project includes portions of two water management planning regions in Georgia: the Metropolitan North Georgia Water Planning District (Metro Water District) and the Middle Ocmulgee Water Planning Region.

The 15-county Metro Water District, centered on metro Atlanta, includes 982 sq mi of the upper Ocmulgee River basin upstream of Lake Jackson in Clayton, DeKalb, Fulton, Gwinnett, Henry, and Rockdale Counties (CH2M and Black & Veatch, 2017). The northern basin in Gwinnett and DeKalb Counties is predominantly suburban in character. More densely developed urban areas occur in headwaters of the South River in the cities of Atlanta and Decatur. Overall, land use is predominantly residential, with 36 percent remaining undeveloped as agricultural or forest lands, open space, water, or wetlands. About 100 miles of interstate highway corridors traverse this upper portion of the basin. Watershed imperviousness is high throughout much of the upper basin and exceeds thresholds considered detrimental to stream stability, water quality, aquatic habitat, and biotic integrity (CH2M and Black & Veatch, 2017).

The Middle Ocmulgee Water Planning Region includes Lake Jackson; surrounding Butts, Newton, and Jasper Counties; and nine counties extending downstream past Macon to the upper Coastal Plain (GEPD, 2017a). The Lloyd Shoals Project is in the upstream end of the planning region. Land use in the region transitions from suburban in northern areas near metro Atlanta to rural in the south. Approximately 54 percent of the region's land area is covered by forested land, 19 percent by agriculture, 10 percent by wetlands, and 9 percent by urban development (GEPD, 2017a).

Land uses adjacent to the Project include the 500-acre Georgia FFA-FCCLA Center in Newton County, a premier camp facility and conference center for the National FFA Organization and Family, Career, and Community Leaders of America (FCCLA). The facility is open year-round and serves 30,000 campers annually.

The 116,731-acre Oconee National Forest (NF), part of the overall Chattahoochee-Oconee NF, lies generally east of the Lloyd Shoals Project in eight central Georgia counties (U.S. Forest Service [FS], 2004a, 2012). The southern section of Oconee NF extends west to the Ocmulgee River beginning about 1 mile downstream of Lloyd Shoals Dam, on the east side of the river and south of Georgia Hwy 16 (Figure 2). Oconee NF includes 30,312 acres in Jasper County (FS, 2012), the majority being within the Ocmulgee River basin downstream of the Project. No NF lands are located within the Lloyd Shoals project boundary.

Piedmont National Wildlife Refuge (NWR) adjoins Oconee NF to the south and lies east of the Ocmulgee River (Figure 2). The U.S. Fish and Wildlife Service (FWS) manages Piedmont NWR to conserve land for fish, wildlife, botanical resources, and their habitats (FWS, 2010). The refuge covers 34,955 acres, including 28,552 acres in Jones County and 6,403 acres in Jasper County.

Rum Creek Wildlife Management Area (WMA) is located south of the Project on the west side of the Ocmulgee River in Monroe County (Figure 2). The WMA consists of 5,739 acres surrounding Lake Juliette and offers hunting opportunities for deer, turkey, dove, waterfowl,

and small game. Charlie Elliott Wildlife Center/Clybel WMA, located east of Lake Jackson, is in the adjacent Oconee River basin.

Parks in the upper Ocmulgee River basin include Panola Mountain SP and Stone Mountain Park upstream of the Project, and Indian Springs SP, High Falls SP, and Jarrell Plantation Historic Site downstream of the Project.

4.1.3 Major Water Uses

Public water supply is a major water use in the upper Ocmulgee River basin. In the Metro Water District, the upper Ocmulgee River basin is the primary drinking water supply source for all or parts of three counties, including Clayton, Henry, and Rockdale Counties (CH2M and Black & Veatch, 2017). Surface water from storage reservoirs serves as the main source of water supply. Drinking water supply watersheds upstream of the Project include headwaters and tributaries of the Alcovy River, Yellow River, South River, and Tussahaw Creek. Existing permitted surface water supply withdrawals in the upper Ocmulgee River basin within the Metro Water District total a monthly average daily withdrawal of 121.5 million gallons per day (MGD); actual annual average withdrawals are about 46.7 MGD (CH2M and Black & Veatch, 2017).

Public water supply is also a primary use of the Ocmulgee River basin downstream of Lake Jackson. Butts County, et al. Water and Sewer Authority (WSA) (partnership with the cities of Jackson and Jenkinsburg) operates a water supply intake on the river just downstream of Lloyd Shoals Dam. The City of Macon has a water supply intake on the river about 38 river miles downstream of Lloyd Shoals Dam.

As estimated by USGS, the principal uses of water withdrawals (surface water and groundwater) in the Middle Ocmulgee planning region (in descending order of magnitude) are public supply, thermo-electric generation², irrigation use, industrial use, domestic use, mining, livestock and aquaculture, and commercial use (Lawrence, 2016). Counties upstream of the Fall Line (Piedmont) rely mainly on surface water sources, while counties downstream (Coastal Plain) withdraw more water from principal aquifers.

The upper Ocmulgee River also serves as a primary receiving water for assimilating treated sanitary effluent in the basin. In the Metro Water District, the upper Ocmulgee River basin has 18 municipal wastewater treatment facilities with a permitted capacity of 132 MGD average daily flow for maximum-month flow (CH2M and Black & Veatch, 2017). Surface-water returns in the Middle Ocmulgee planning region total about 59 MGD and include public

² Georgia Power's Plant Scherer is located in Monroe County, just north of Macon, and uses Lake Juliette as part of a closed-cycle recirculating cooling water system.

wastewater (85 percent), industrial (8 percent), and surface mining (7 percent) returns (Lawrence, 2016).

The water and wastewater systems of the Metro Water District upstream of the Project are interconnected. With interbasin transfers being common within counties that straddle two or more river basins, the upper Ocmulgee River receives a net estimated water gain of about 54.6 MGD (CH2M and Black & Veatch, 2017).

The Middle Ocmulgee Regional Water Plan (GEPD, 2017a), developed as part of Georgia's state-wide water planning process, assesses current and future water and wastewater needs and in the 12-county region that includes the Lloyd Shoals Project. The surface water availability resource assessment indicated that surface water sources in the region are generally adequate to meet future water demands. The plan recommends appropriate water management practices to be employed by local governments/water utilities and other permitted water users through 2050. The Middle Ocmulgee Water Planning Council recommended that GEPD evaluate the current minimum instream flow assumptions used in the surface water availability resource assessment. An Ocmulgee River flow regime pilot study is being conducted in 2018 (GEPD, 2018).

4.1.4 Tributary Streams

Four tributaries converge at Lake Jackson to form the Ocmulgee River. They include the following streams in descending order of watershed area (Figures 2 and 3):

- South River – originates in southeast metro Atlanta in DeKalb, Fulton, and Clayton Counties; flows southeast through Rockdale, Henry, and Newton Counties; becomes the South River arm of Lake Jackson; drainage area of 544 sq mi.
- Yellow River – originates in Gwinnett County; flows south through DeKalb, Rockdale, and Newton Counties; becomes the Yellow River arm of Lake Jackson; drainage area of 448 sq mi.
- Alcovy River – originates in Gwinnett County, flows southeast then south through Walton and Newton Counties; becomes the Alcovy River arm of Lake Jackson; drainage area of 255 sq mi.
- Tussahaw Creek – originates in Henry County; flows east into Butts County; becomes impounded by Tussahaw Reservoir before continuing to flow east into the Tussahaw Creek arm of Lake Jackson; drainage area of 72 sq mi.

4.1.5 Climate

The Ocmulgee River basin is characterized by mild winters and hot summers. Average daily temperatures vary from 31-55°F in January to 67-90°F in July (Weather Channel, 2017). Winter low temperatures fall below freezing for only short periods. Average annual precipitation is 40 to 52 inches per year. Rainfall occurs throughout the year. The wettest month is March and the driest month is October (GEPD, 2003).

4.2 Geology and Soils

4.2.1 Existing Environment

The Lloyd Shoals Project lies in the Washington Slope District of the Piedmont physiographic province (Clark and Zisa, 1976) (Figure 5). The Piedmont is a hilly upland province underlain by crystalline metamorphic and igneous rocks. The topography is gently rolling and descends gradually from around 700-ft elevation near its northern limits to about 500-ft elevation at its southern margin. Streams in the Washington Slope District occupy broad, shallow valleys separated by broad, rounded divides. Local relief typically varies from 50 to 100 ft, except near the Ocmulgee River, which flows in a steep-walled valley 150-200 ft below the adjacent area (Clark and Zisa, 1976).

The Washington Slope District is bordered to the south by the Fall Line Hills District, a dissected transitional zone between the Piedmont and Coastal Plain provinces where unconsolidated Coastal Plain sediments are deposited over Piedmont metamorphic and igneous rocks (Griffith et al., 2001). The Fall Line Hills District begins about 43 river miles downstream of Lloyd Shoals Dam near the City of Macon.

The Project is in the Southern Outer Piedmont ecoregion (Figure 5). This ecoregion has low hills, major forest types of loblolly-shortleaf pine, underlying rocks of gneiss, schist and granite, fine sandy loam soils, and a deep, red clayey subsoil (Griffith et al., 2001; Edwards et al., 2013). Most of soils in the ecoregion are Kanhapludults (Griffith et al., 2001).

The Lake Jackson shoreline is characterized by gently sloping topography in most areas. 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. Significant stretches of undeveloped, forested shoreline occur along the Tussahaw Creek arm of the reservoir, west of Georgia 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.

4.2.2 Potential Resource Impacts

Potential impacts of continued operation of the Lloyd Shoals Project to geology and soils resources would be limited mainly to Lake Jackson and the tailrace area immediately downstream of the dam. Georgia Power will evaluate the effects of project operations on reservoir shoreline erosion and sedimentation within the project boundary as part of the license application.

No specific protection, mitigation, and enhancement (PM&E) measures are proposed at this time. Depending upon the resource studies and analyses completed subsequent to NEPA scoping, and consultation with the resource agencies and other relicensing participants, Georgia Power will consider and may propose PM&E measures to address geology and soil resources as part of its PLP (Table 1).

4.3 Water Resources

A substantial amount of existing information and data are available for characterizing water 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:

- Georgia Power seasonal water quality data collected in Lake Jackson at multiple reservoir locations, typically on a quarterly basis, from 2000 to 2017. These data include vertical profile measurements and water chemistry analyses of grab samples.
- Ocmulgee River basin management plan developed by GEPD under a river planning approach (GEPD, 2003) and Middle Ocmulgee Regional Water Plan (GEPD, 2017a) developed under the Georgia State-wide Water Management Plan.
- MNGWPD Water Resource Management Plan (CH2M and Black & Veatch, 2017) for the 15-county Metro Water District, which includes the upper Ocmulgee River basin upstream of the Project and integrates plans for water supply and conservation, wastewater management, and watershed management for the region.
- 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.

- 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.

4.3.1 Existing Environment

USGS divides the Ocmulgee River into three sub-basins with corresponding 8-digit Hydrologic Unit Codes (HUCs). The Lloyd Shoals Project, with an upstream drainage area of 1,400 sq mi, is located within HUC 03070103 (upper Ocmulgee River basin) (Figure 1). The upper Ocmulgee River basin extends from the headwaters in southeastern and eastern metro Atlanta counties downstream through the Piedmont province to the City of Macon at the Fall Line.

Water Quantity

Stream Flow

The nearest stream gage to Lloyd Shoals Dam is on the Ocmulgee River about 1 mile downstream at the Hwy 16 bridge (USGS No. 02210500, Ocmulgee River near Jackson, Georgia) (Figure 3). The gage represents a watershed area of 1,420 sq mi and has a continuous discharge record from 1987 to the present. Drainage area accretion between the dam and the USGS gage is small (20 sq mi), consisting mainly of one tributary stream (Herds Creek) entering from the east.

Georgia Power calculated a daily inflow record at Lloyd Shoals Dam based on flows measured at the Ocmulgee River gage (No. 02210500). Daily inflow was calculated as discharge plus a 24-hour change in Lake Jackson storage. Monthly minimum, mean, and maximum calculated inflows at Lloyd Shoals Dam for the period January 1997 through December 2016 are provided in Table 5 for each month of the year. Mean flows ranged from a low of 908 cfs in August to a high of 2,995 cfs in March. The highest mean daily flows occurred in December-April. The lowest mean daily flows occurred in August-October. Appendix F provides daily inflow duration curves by month and annually for the period January 1997 through December 2016.

Water Withdrawals

Surface-water withdrawals for public supply comprise the majority of water uses in the four-county project vicinity (Lawrence, 2016). The largest surface-water withdrawals occur in Henry and Newton Counties upstream of the Project. Other surface water uses in the project vicinity are golf-course irrigation, livestock/aquaculture, and industry. Although an important overall water use in the basin downstream, there are no withdrawals for thermo-electric power use in the four-county project vicinity. Groundwater withdrawals in the project vicinity are small and serve domestic uses, public supply, irrigation of golf courses and crops, and mining.

There are no existing permitted surface-water withdrawals for public water supply on Lake Jackson (GEPD, 2017b). Tussahaw Creek Reservoir, located upstream of Lake Jackson in Henry and Butts Counties, began operation in 2007 and has a permitted monthly average daily withdrawal of 32 MGD; actual annual average withdrawal was 7.5 MGD in 2014 (CH2M and Black & Veatch, 2017). Several other water supply reservoirs are in the South, Yellow, and Alcovy River systems farther upstream in the river basin.

Butts County, et al. WSA operates a public water supply intake on the Ocmulgee River 0.7 miles downstream of Lloyd Shoals Dam outside of the project boundary. The permitted monthly average daily withdrawal is 9.7 MGD (GEPD, 2017b). Withdrawals are treated at the Emerson L. Burford plant, which has a capacity of 4.0 MGD (Butts County, et al. WSA, 2016).

Other permitted surface-water withdrawals on the mainstem Ocmulgee River downstream of the Lloyd Shoals Project include the following (GEPD, 2017b):

- Georgia Power, Plant Scherer – intake located about 25 river miles downstream of Project in Monroe County; permitted for monthly average withdrawal of 231 MGD; water is pumped to Lake Juliette for use in a closed-cycle recirculating cooling water system.
- Macon Water Authority (MWA) – public water supply intake located about 38 river miles downstream of Project in Bibb County, upstream of Macon; permitted for monthly average withdrawal of 110 MGD; water is pumped to MWA’s Javors Lucas Lake water storage reservoir, which has an area of 589 acres and an estimated storage capacity of 5.8 billion gallons of raw water at normal full pool.
- Graphic Packaging, Inc. – intake located in Bibb County downstream of Macon; permitted for monthly average withdrawal of 16 MGD for industrial use.

Treated Wastewater Discharges

In 2017, there were five water treatment plants, 12 land application permits, and 8 National Pollutant Discharge Elimination System permitted discharges in the four-county area surrounding Lake Jackson in the Ocmulgee River basin (GEPD, 2017c). There are many more discharges, including the City of Atlanta and Dekalb County that discharge into the South River 20-30 miles upstream of Lake Jackson. These discharges are primary sources of nutrients to the reservoir and led to eutrophication of the reservoir documented since the 1970s (U.S. Environmental Protection Agency [EPA], 1975).

Water Quality

Water Use Classifications

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 (Figure 3). 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. In addition to general criteria applicable to all waters, specific criteria apply to these water uses, including numeric criteria for bacteria (fecal coliform), dissolved oxygen (DO), pH, and temperature (GEPD, 2015). The applicable DO numeric criteria for the project waters, which support warm-water species of fish, are a daily average of 5.0 milligrams per liter (mg/L) and no less than 4.0 mg/L at all times.

GEPD (2016) lists Lake Jackson as not supporting its designated use due to elevated concentrations of legacy polychlorinated biphenyls (PCB) detected in fish tissue, attributed to urban runoff and nonpoint source pollution. A total maximum daily load (TMDL) was completed for PCBs in Lake Jackson (EPA, 1998). PCBs have been banned in the U.S., and their levels are declining and will continue to decline. The occurrence of PCBs in fish tissue at Lake Jackson is unrelated to Lloyd Shoals project operations. The fish consumption guidelines (Georgia Department of Natural Resources [GDNR], 2017a) recommend limiting consumption of larger size classes of channel catfish and largemouth bass in Lake Jackson to one meal per week due to PCBs and mercury, respectively. There are no prescribed limits for the other common sport fishes tested.

Numerous tributary streams to Lake Jackson upstream of the Project are listed as not supporting their designated uses due to fecal coliform violations, fish community impacts, or fish consumption guidelines (Table 6; Figure 6). Several streams are listed for violations of more than one parameter. Urban runoff and nonpoint source pollution are the likely causes of impairment for each of these streams. The South River, the major tributary coming from metro Atlanta, also has combined sewer overflows as a potential cause. Within the upper Ocmulgee River basin portion of the Metro Water District (i.e., upstream of the Project), 406 miles or 80 percent of the 506 miles of streams assessed are listed as not supporting their designated uses (CH2M and Black & Veatch, 2017). Seventy percent of the assessed streams in the Metro Water District do not meet water quality criteria for fecal coliform bacteria because of nonpoint source pollution.

Historically, Lake Jackson exhibited rapidly accelerating eutrophication in the 1960s and 1970s caused by an excessive input of nutrients, mainly from point-source discharges on the South River and to a lesser extent the Yellow River (EPA, 1975). Symptoms included fish kills, algal blooms, hypolimnetic anoxia, and floating debris. As major improvements were

made to wastewater treatment systems throughout the upper Ocmulgee River basin through the 1970s and 1980s, primarily through phosphorus reduction and diversions of treated wastewater, Lake Jackson made a remarkable recovery from these highly eutrophic conditions (Kamps, 1989). However, point sources and urban and agricultural nonpoint sources continued to contribute nutrients and sedimentation to the reservoir, especially to the South River arm. In 1997, GEPD implemented site-specific criteria for chlorophyll *a* (April-October), total phosphorus loadings for the reservoir and its four major tributaries, and total nitrogen in the photic zone. These site-specific standards further addressed eutrophication by helping control nutrient loading and reducing associated seasonal problems with water quality and algal blooms. Subsequent reservoir monitoring results have indicated compliance with the site-specific water quality standards for Lake Jackson (GEPD, 2003, 2016).

GEPD (2016) lists the Ocmulgee River downstream of Lloyd Shoals Dam for the first 3 miles as supporting its designated Drinking Water use. The next 14-mile segment of the river (to Towaliga River) is listed as “assessment pending,” because fish tissue data indicate the reach is supporting its designated uses, but no other types of data are currently available to confirm the assessment. The 10-mile segment of the Ocmulgee River from the Towaliga River confluence downstream to Hwy 18 has not been assessed. The next 19 miles of the Ocmulgee River from Hwy 18 downstream to Walnut Creek in Macon have been assessed as supporting their designated uses.

Existing Water Quality

Lake Jackson

At normal full-pool elevation of 530 ft PD, Lake Jackson covers 4,750 acres and has 135 miles of shoreline. The full-reservoir gross storage capacity is approximately 107,000 acre-feet. Mean depth is 22.5 ft and the retention time is 32 days.

Georgia Power collects seasonal water quality data within Lake Jackson at several representative locations as shown in Figure 7. The locations and frequency of monitoring have varied over time, but for the last several years, sampling typically has occurred three times per year (spring, summer, and fall) at these six reservoir locations:

- Station JA1 – forebay area of Lloyd Shoals Dam;
- Station JA2 – bridge at Barnettts Bridge Road in the Tussahaw Creek embayment, near Kersey Marina;
- Station JA3 – mid-channel at the confluence of the Tussahaw Creek embayment and the main channel of the reservoir;

- Station JA4 – mid-channel about 0.5 mile downstream of the confluence of the South River and Yellow River embayments, near Walker Harris Marina;
- Station JA5 – mid-channel at the confluence of the South/Yellow River embayment and Alcovy River embayment; and
- Station JA6 – mid-channel in the Alcovy River embayment under the transmission line crossing.

Water quality data collected at these stations typically have included vertical profile measurements of water temperature, DO concentration, pH, specific conductance (conductivity), and turbidity taken at 1-meter (m) intervals from the surface to the bottom. In addition, various water chemical parameters, including nutrients and metals, have been analyzed in surface grab samples, and in mid-depth and bottom samples at some stations. The project generally has exhibited good water quality conditions throughout the monitoring period. The water quality data are described in more detail below.

Water quality profiles have been measured seasonally at the six sampling stations throughout Lake Jackson since at least 2000. Winter samples were not collected in all years. Older data for Lake Jackson exist in Georgia Power records, but only data since 2000 were examined for the PAD. Figure 8 shows vertical temperature and DO profiles collected at Station JA1 in the dam forebay each summer over 10-years from 2008 through 2017. The summertime profiles clearly show the typical reservoir vertical stratification, with warmer surface temperatures, a pronounced thermocline, and cooler, low-DO water below 10 m.

Figure 9 shows seasonal vertical temperature and DO profiles for spring, fall, and winter at Station JA1. Although the wintertime profile measurements were limited to three years, the seasonally mixed nature of the reservoir is evident in these non-summertime profiles. This seasonal pattern of summertime vertical stratification and mixing in the winter is typical of southeastern reservoirs.

Water quality grab samples for chemical analysis have also been collected for Lake Jackson for four of the six stations described above (JA1, JA2, JA4, and JA6). Georgia Power has data going back decades with varying regularity. For the past three years, samples have been collected three times per year: spring, summer, and fall. From 2000-2014, data were collected from a single station near the dam (JA1). These samples were analyzed for nutrient and some metal parameters. The results are summarized in Table 7. Additional data have been collected by GEPD from Lake Jackson from two locations, one in the forebay near the dam and the other near the confluence of the Alcovy and South River embayments. These data, available in EPA's STORET system, are summarized in Table 8. The overall reservoir water quality is good except for occasional elevated concentrations of fecal coliform bacteria and chlorophyll *a* related to nutrient inputs and nonpoint sources in the upstream watershed.

Lloyd Shoals Tailrace

Water quality data collection in the Lloyd Shoals tailrace has been limited since Georgia Power demonstrated the performance of passive draft tube aeration systems installed in the powerhouse in 2006.

In 1991, due to low DO concentrations downstream of the dam identified in the previous relicensing studies, GEPD required the installation of an oxygenating labyrinth weir in the tailrace. With the installation of the weir, GEPD also required a DO monitoring study, which continued through 1997. The weir increased DO levels but depressions below 4.0 mg/L continued in the tailrace up to 16 percent of the time. In 1994, the weir was damaged in a flood which led Georgia Power to evaluate the use of turbine venting to increase summer DO concentrations.

By 2006, Georgia Power had fitted three of the six turbines with passive draft tube aeration systems, which produced substantial improvements in water quality in the tailrace downstream of Lloyd Shoals Dam. The aeration systems were effective in increasing and stabilizing DO levels consistently at or near saturation. The demonstrated improvements in water quality supported the designated uses of the river downstream and substantially exceeded the DO improvements provided by the weir. Subsequently, and with GDNR and FERC approval, Georgia Power removed the tailrace labyrinth weir in 2008.

After the installation of the draft tube aeration system on three turbines in 2006, Georgia Power monitored the DO during summer months in 2006 and 2007. As shown in Figure 10, the aeration in summer 2006 significantly improved DO conditions in the tailrace. When the aeration was turned off for 3 days in July, DO concentrations immediately decreased both at the labyrinth weir and the Butts County water intake. When the aeration was on, even when DO concentrations upstream of Lloyd Shoals Dam were below the instantaneous numeric criterion of 4 mg/L, significant improvement was observed downstream of the dam demonstrating the effectiveness of the draft tube aeration system. Table 9 shows a summary of the number of observations recorded in the summer of 2006 and 2007.

4.3.2 Potential Resource Impacts

Potential impacts of continued project operation on water resources would be limited to Lake Jackson and the Ocmulgee River downstream of Lloyd Shoals Dam to the MWA public water supply intake near Macon. Georgia Power will evaluate the effects of project operations on water resources in the license application.

Georgia Power is not proposing any PM&E measures at this time. Depending upon the resource studies and analyses completed subsequent to NEPA scoping, and consultation with the resource agencies and other relicensing participants, Georgia Power will consider and may propose PM&E measures to address water resources as part of its PLP.

4.4 Fish and Aquatic Resources

Abundant 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:

- The Wildlife Resources Division (WRD) of GDNR, 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 Nongame Conservation Section, and 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 HUC 10 watershed for fish species of conservation concern, prepared by GDNR's Nongame 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. These efforts have established a long-term dataset of catch statistics for detecting changes in the largemouth bass fishery over time.
- The American shad habitat plan (GDNR, 2014) and stocking plan (Atlantic States Marine Fisheries Commission [ASMFC], 2013) for the Altamaha River. These plans identify migration barriers, fish passage goals, and stocking objectives for the Altamaha River basin.
- 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 Nongame 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).

4.4.1 Existing Environment

The Lloyd Shoals Project is located in the upper Ocmulgee River basin within the larger Altamaha River basin. The Altamaha River basin drains south and east to the Atlantic Ocean. Lake Jackson and its tributaries are located entirely within the Piedmont physiographic province. The upper Ocmulgee River basin principally supports warm-water fishes. The impounded waters of Lake Jackson dominate aquatic habitats within the project boundary and, therefore, the principal fisheries inhabiting project waters are reservoir fisheries. Lloyd Shoals Dam discharges into the Ocmulgee River, which supports a riverine fishery downstream of the Project. The project boundary extends downstream of the dam 0.4 mile to encompass Georgia Power's Ocmulgee River Park on the east side of the river.

Juliette Dam, located about 19 river miles downstream of the Project, is the first dam encountered by diadromous and highly migratory fish migrating upstream from the Altamaha and lower Ocmulgee Rivers. Juliette Dam poses an impassable barrier to the upstream passage of fish; the dam is passable to fish only in the downstream direction.

Distribution of Fishes in the Project Vicinity

The upper Ocmulgee River basin upstream of Juliette Dam supports a diverse fish fauna, consisting of about 60 species in 12 families (Table 10) (Straight et al., 2009). The families with the most species are minnows, sunfishes, catfishes, suckers, and perches. Lake Jackson supports over 30 species of fish. The principal sport fishes inhabiting the reservoir include largemouth bass, spotted bass, black crappie, channel catfish, blue catfish, flathead catfish, striped bass, white bass-stripped bass hybrids (hybrid bass), and a variety of sunfishes (GDNR, 2017b).

The largest tributary systems to Lake Jackson (South River, Yellow River, Alcovy, River, and Tussahaw Creek) support a total of about 47 species of fish in stream habitats upstream of the project boundary (Table 10). At least 60 species of fish have been documented as occurring in the Ocmulgee River downstream in the reach between the Project and Juliette Dam. Additional fish species occur downstream of Juliette Dam in the Ocmulgee River, including species associated with lower-gradient stream habitats typical of the Coastal Plain.

No federally listed threatened or endangered fish species occur within the Lloyd Shoals project boundary, in tributaries to Lake Jackson upstream of the Project, or in the Ocmulgee River downstream of the Project to Juliette Dam. Two state protected fish species occur in free-flowing streams either upstream or downstream of the Project. Altamaha shiner (*Cyprinella xaenura*), a Georgia threatened species, occurs in tributary systems upstream of Lake Jackson and is common in the Ocmulgee River downstream of the Project. The species is endemic to the Piedmont of the upper Altamaha River basin. Robust redhorse (*Moxostoma robustum*), a Georgia endangered species, occurs in the mainstem Ocmulgee River downstream of the Project, having been stocked in 2002 and 2005 to establish a refugial population (Grabowski and Jennings, 2009). Through the Ocmulgee Candidate Conservation Agreement with Assurances for Robust Redhorse (Ocmulgee CCAA for robust redhorse), Georgia Power has participated in a multi-stakeholder partnership to advance conservation of the robust redhorse in the Ocmulgee River (Georgia Power, 2016). These efforts have included reintroducing the species to historic habitat by stocking hatchery-reared fish downstream of the Project and monitoring their movements and recruitment status (Jennings and Shepard, 2003; Grabowski and Jennings, 2009; Georgia Power, 2016) (see Section 4.7.1, *Candidate Conservation Agreements*).

About 12 fish species believed to be introduced or non-native to the Ocmulgee River basin have been reported in the project vicinity (Table 10). Nine of these species occur in Lake Jackson within the project boundary. They include blue catfish and flathead catfish, which have become important components of the recreational fishery in Lake Jackson. The current lake records for blue catfish and flathead catfish exceeded 43 pounds (lb) and 50 lb, respectively.

Lake Jackson

Lake Jackson supports a popular fishery for largemouth bass, spotted bass, striped bass and hybrid bass, catfish, crappie, and a variety of sunfishes. GDNR performs annual standardized fisheries surveys of Lake Jackson targeting sport fishes at 10 sampling stations throughout the reservoir and maintains a comprehensive database of fishery population data. The surveys consist of a sampling event each fall using boat electrofishing and gillnetting collection methodologies. The unpublished data include fish length, weight, and relative condition by species and are used by GDNR to evaluate the overall health of the fishery and make management decisions. GDNR has been conducting annual surveys since at least 1983. Fisheries investigations for the previous Lloyd Shoals relicensing presented and analyzed GDNR standardized sampling data for the reservoir from 1983-1989 (EA, 1990a). Georgia Power has obtained the GDNR fishery database for Lake Jackson for the years 2007-2017 for use in characterizing the sport-fish populations of Lake Jackson and analyzing the effects of continued project operations on fishery resources in the studies supporting the license application (GDNR, 2018a).

The GDNR standardized fishery survey data indicate the presence of a relatively diverse and overall healthy reservoir fishery similar in species composition, relative abundance, and trophic structure to other southeastern Piedmont reservoirs. The sport fish targeted by electrofishing in the five most recent years of surveys (2013 – 2017) included largemouth bass, spotted bass, black crappie, blue gill, redear sunfish, and redbreast sunfish (Table 11). The relative condition factors (K_n) of these species indicate that sportfish populations in Lake Jackson vary in condition from slightly below average (<1.00) to good condition (>1.00) compared to average length-weight relationships for the same species in Georgia³. The gill netting catch was numerically dominated by black crappie, gizzard shad, channel catfish, hybrid bass, and blue catfish during the five most recent years of surveys (Table 12). The top five most abundant species in gill nets comprised 83 to 95 percent of the catch by number each year. Hybrid bass outnumbered striped bass in the gillnet catch in each year. Gizzard shad and/or longnose gar dominated the biomass of the gill netting catch. Other dominant species by weight were channel catfish, blue catfish, and black crappie.

Tournament fishing is popular on Lake Jackson and primarily targets bass, both largemouth bass and spotted bass. GBCF, which has gathered and compiled angler catch data from bass tournaments annually for Lake Jackson and numerous other Georgia reservoirs, has established a long-term dataset of catch statistics for detecting changes in the bass fishery over time. Table 13 summarizes 20 years of Lake Jackson catch data for the years 1996-2015. The average tournament bass weight over that period ranged from 1.35 to 1.77 lb. The average largest bass reported Lake Jackson tournaments ranged from 3.12 to 4.38 lb. The tournament catch data show that largemouth bass used to predominate, comprising 90 percent or more of the bass catch prior to 1999. Since that time, the introduced population of spotted bass has grown rapidly and comprised 50 percent or more of the tournament bass catch in some years (Table 13). Largemouth bass currently comprise over 50 percent of the black bass population, with spotted bass abundance having stabilized in recent years (GDNR, 2017b).

GDNR first stocked striped bass into Lake Jackson in 2005 to provide an additional sportfish option (GDNR, 2018b). GDNR now annually stocks both striped bass and hybrid bass in the reservoir (K. Weaver, GDNR, personal communication with P. O'Rourke, Georgia Power, January 30, 2018). More hybrid bass are stocked than striped bass at a ratio of about 2.3 to 1. The current preferred stocking rates are 7 fingerlings per acre for hybrid bass (33,250 fish) and 3 fingerlings per acre for striped bass (14,250 fish). Stocking rates have been similar for the past five years. The annual stockings have produced the potential for a quality fishery, with the opportunity to catch trophy-size striped bass. Striped bass in Lake Jackson typically average 4 to 5 lb, with fish more than 18 lb having been reported (GDNR 2018b).

³ Condition factors are indices used to compare the “fatness” or “well-being” of fish and are based on the premise that heavier fish of a given length are in better condition. Relative condition (K_n) represents the weight of each fish as a proportion of the length-specific mean weight for a fish in the reference population. Thus, average fish of all lengths and species have a K_n value of 1.00.

Downstream Ocmulgee River

The Ocmulgee River downstream of Lloyd Shoals Dam flows freely for about 19 miles to the pool created by Juliette Dam. Popular sport fishes in this reach include largemouth bass, shoal bass, spotted bass, striped bass, hybrid bass, channel catfish, redbreast sunfish, bluegill, and redear sunfish (GDNR, 2018b). Shoal bass from the upper Flint River (Apalachicola River basin) were introduced into the upper Ocmulgee River below Lake Jackson in 1975 and have since spread throughout the Piedmont portions of the watershed (Bart et al., 1994). Striped bass and hybrid bass stocked into Lake Jackson are known to occasionally pass through the Lloyd Shoals turbines and add to the tailrace fishery downstream (GDNR, 2018b). Channel catfish are relatively abundant in the Ocmulgee River downstream of Lloyd Shoals Dam. Introduced flathead catfish are also now present in the river above Juliette Dam. Flathead catfish pose a risk of direct predation and potentially negative population effects on native species such as suckers, catfish, and sunfish (Bart et al., 1994).

Fisheries investigations for the previous Lloyd Shoals relicensing included one year of quarterly sampling of the Ocmulgee River at four stations in 1988 (EA, 1990b). 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 gear were used exclusively. The Ocmulgee River fish community downstream of Lloyd Shoals Dam included 45 total species. The top ten numerically abundant species overall were (in descending order of abundance) redbreast sunfish, threadfin shad, Ocmulgee shiner, Altamaha shiner, bluegill, spottail shiner, snail bullhead, American eel, largemouth bass, and blackbanded darter. These species comprised 86 percent of the total catch. Sport fish made up 43 percent of the total catch by number and 33 percent by weight.

Electrofishing sampling at two sites downstream of Lloyd Shoals Dam in fall 1987, as part of the instream flow study (EA, 1990c; see below), yielded fish species composition and relative abundance data very similar to the quarterly sampling in 1988. Of the 30 species collected, redbreast sunfish, spottail shiner, snail bullhead, Altamaha shiner, spotted sucker, and American eel comprised 75 percent of the total catch by number.

Studies funded by Georgia Power have documented the movements and habitat use of hatchery-reared robust redhorse stocked downstream of Lloyd Shoals Dam to establish a refugial population. Jennings and Shepard (2003) released and monitored 30 fish via radio telemetry in 2002 and found that tagged fish moved gradually downstream. Sixty-six percent of the fish remained in the reach upstream of Juliette Dam, while 34 percent moved downstream beyond the dam. Grabowski and Jennings (2009) released 30 radio-tagged into the river below Lloyd Shoals Dam in 2006 and monitored their movements weekly over the course of a year. The radio-tagged fish exhibited an initial exploratory pattern of movement, mostly in the downstream direction, and consistently remained in the main channel associated

with current, deep water, and woody debris. Two-thirds remained in the reach upstream of Juliette Dam; however, relatively few of the fish seemed to locate suitable spawning habitat and participate in spawning activities.

An instream flow study conducted for the previous FERC relicensing of Lloyd Shoals (EA, 1990c) informed operational flow control decisions in the current license for the protection and enhancement of fish and wildlife resources in the Ocmulgee River that resulted in the continuous minimum flow requirement of 400 cfs, or inflow to the project reservoir, whichever is less. In practice, no flows less than 250 cfs have been released from the Project in recent years when inflow has been less than 250 cfs (Section 3.4.3). Assurances in the Ocmulgee CCAA for robust redhorse include the minimum flow regime provided for in the current license. The Ocmulgee CCAA for robust redhorse expires with the current license term in December 2023.

The instream flow study for the Project (EA, 1990c) applied the Instream Flow Incremental Methodology (IFIM) developed by FWS (Bovee, 1982). This habitat-based approach estimates the relationship between stream flow and the area of suitable habitat for fish species life stages of interest. The study was conducted in consultation with GDNR and FWS. The study area extended from Lloyd Shoals Dam downstream approximately 16.8 river miles to the Georgia Hwy 83 bridge. Habitat suitability criteria were developed from site-specific studies of fish habitat use in the upper Ocmulgee River and the Chattooga River (Savannah River basin) for 12 species/life stages:

- Altamaha shiner (juveniles and adults);
- Redeye bass (young-of-year [YOY], juveniles, and adults);
- Shoal bass (YOY and adults);
- Redbreast sunfish (spawning and adults);
- Striped jumprock (juveniles and adults); and
- Silver redhorse⁴ (adults).

The Physical Habitat Simulation (PHABSIM) model integrated the results of hydraulic simulations over a range of flows and the habitat suitability criteria to produce discharge versus weighted usable area relationships for each species and life stage. Figure 11 plots discharge versus average percentage of maximum weighted usable area (PMWUA) for all species and

⁴ Previously considered a form of silver redhorse, this species now considered in the Altamaha River basin to be notchlip redhorse (Jenkins and Burkhead, 1993; Straight et al., 2009).

life stages within the spawning and non-spawning seasons⁵. A matrix analysis was used to identify a minimum flow that would optimize habitat across multiple species and life stages. The matrix showed available habitat (expressed as PMWUA) for each species/life stage at 20 different discharges ranging from 50 cfs to 3,500 cfs (Table 14). The IFIM study results showed that a minimum flow release of 400 cfs would provide for 91 percent and 92 percent of the maximum weighted usable area on average for the spawning and non-spawning seasons, respectively (EA, 1990c).

The matrix of IFIM study results also shows that a flow of 250 cfs, which in recent years has been the lowest flow Georgia Power releases from the Project when inflows are 250 cfs or less, provides for 87 percent and 82 percent of the maximum weighted usable area on average for the spawning and non-spawning seasons, respectively (Table 14). Releases this low usually occur only during drought periods, which are most likely to occur in late summer or fall, after the peak spawning and rearing seasons of most fishes in the Ocmulgee River. Discharges less than 250 cfs produce lower average habitat values (Figure 11, Table 14).

Freshwater Mollusks

The Altamaha River basin is inhabited by a unique freshwater mussel fauna, consisting of about 18 species, 7 of which are endemic to the basin (Johnson et al. 2012; Wisniewski et al., 2005). Most of these species typically inhabit free-flowing streams and rivers. Table 15 lists recent occurrence records of freshwater mollusks in the project vicinity from 2008-2014, provided by the GDNR Nongame Conservation Section. The database includes records of live specimens and dead shells of mussels and snails from Lake Jackson, tributaries to the reservoir, and in the Ocmulgee River downstream of the Project.

Three freshwater mussel species presently occur in Lake Jackson within the project boundary: Altamaha arc mussel, inflated floater, and paper pondshell. Altamaha arc mussel, a Georgia threatened species, is endemic to the Altamaha River basin, and is primarily known from riverine habitats in the Coastal Plain (Wisniewski, 2008; NatureServe, 2017). Inflated floater is also endemic to the Altamaha River basin in south-central Georgia (Wisniewski et al., 2005; NatureServe, 2017). Paper pondshell is widely distributed from the Great Lakes and Mississippi River to Gulf Coast and Atlantic Coast drainages (Williams et al., 2008). All three species inhabit silt, mud, and/or fine sand substrates in streams, rivers, and backwaters. One snail taxon has also been documented as occurring in Lake Jackson (Table 15).

The Alcovy River upstream of Lake Jackson supports two species of mussels (Carolina lance and Eastern creekshell) and three taxa of snails, the latter including the reverse pebblesnail (Table 15). Although not listed as a federally or state threatened or endangered species, the

⁵ The spawning season (May-October) fish assemblage consisted of juvenile and adult life stages present year-round and the spawning/YOY life stages. The non-spawning season (November-April) fish assemblage consisted entirely of juvenile and adult life stages.

reverse pebblesnail is known only from the Alcovy River and Yellow River in Newton County upstream of Lake Jackson (FWS, 2018; NatureServe, 2017). The Center for Biological Diversity (CBD) petitioned the reverse pebblesnail for federal listing in 2010 (FWS, 2011). The species' status is currently under review by FWS. The snail inhabits boulders, gravel, and vegetation in rapidly flowing water and is absent from silt substrates.

Recent surveys of the Ocmulgee River downstream of Lloyd Shoals Dam have detected the occurrence of four taxa of mussels and four taxa of snails (Table 15). The mussel species identified include Altamaha arc mussel, Carolina lance, and Alabama slabshell. None of the mussel or snail species detected are listed as federally or state threatened or endangered.

Studies of host fishes for the early life stages (glochidia) of Altamaha River mussels identified several suitable hosts for endemic mussel species (Johnson et al., 2012, and references cited therein). These included bluegill, fathead minnow, largemouth bass, eastern mosquitofish, species of bullheads (*Ameiurus* spp.). All of these potential host fish species are common throughout the upper Ocmulgee River basin, with fathead minnow being a commonly used baitfish.

Georgia Power plans to conduct mollusk surveys in Lake Jackson and the river downstream in fall 2018 as part of conservation actions under a Candidate Conservation Agreement (CCA) for mollusk species in the Altamaha River basin (see Section 4.7.1, *Candidate Conservation Agreements*). The surveys will be conducted in consultation with GDNR and FWS to coincide with a shoreline maintenance drawdown and dam safety work scheduled for October-November 2018.

Migratory Fishes

The Lloyd Shoals Project is about 387 river miles upstream of the Atlantic Ocean (Figure 1) and 43 river miles upstream of the Fall Line Hills District between the Piedmont and Coastal Plain provinces (Figure 5). Juliette Dam, located 19 river miles downstream, and situated above the Fall Line, impedes or blocks diadromous⁶ and other migratory riverine fishes from migrating upstream into the project area.

Eight highly migratory and/or diadromous species presently occur in portions of the Altamaha River basin, including six anadromous⁷ species, one catadromous species⁸, and one migratory riverine species:

- Shortnose sturgeon (*Acipenser brevirostrum*) – anadromous; federally endangered;

⁶ Diadromous species migrate between freshwater and marine/estuarine environments to complete their life cycles.

⁷ Anadromous species migrate from marine/estuarine to freshwater environments to spawn.

⁸ Catadromous species migrate from freshwater to marine environments to spawn.

- Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*) – anadromous; federally endangered;
- American shad (*Alosa sapidissima*) – anadromous;
- Blueback herring (*Alosa aestivalis*) – anadromous;
- Hickory shad (*Alosa mediocris*) – anadromous;
- Striped bass – anadromous or highly migratory;
- American eel – catadromous; and
- Robust redhorse – highly migratory riverine.

Of the eight species, striped bass and robust redhorse are the only species presently known to occur within the Lloyd Shoals project boundary. Striped bass occur in Lake Jackson and in the Ocmulgee River downstream as a result of GDNR's stocking efforts in Lake Jackson. Fish stocked in Lake Jackson occasionally pass through the turbines into the downstream river. There is no evidence of successful natural reproduction of striped bass in the project area. Juliette Dam blocks the upstream migration of springtime spawning runs from estuarine and marine environments.

Robust redhorse, a migratory riverine sucker species, inhabits the Ocmulgee and Oconee Rivers in the Altamaha River basin. As part of the Ocmulgee CCAA for robust redhorse, the species was reintroduced to the Ocmulgee River downstream of Lloyd Shoals Dam through stocking in 2002-2005. Surveys conducted in 2010-2011 showed that stocked redhorse had survived and were participating in spawning activities in the Lloyd Shoals tailrace, but evidence of successful recruitment had not been confirmed (Georgia Power, 2016). Georgia Power has been participating in ongoing visual and field-sampling surveys to assess whether successful spawning and recruitment is occurring in the Ocmulgee River population. The population extends downstream of Juliette Dam into the lower Ocmulgee River. GDNR collected, tagged, and released four adult robust redhorse from a shoal below Juliette Dam in May 2018 (GDNR, 2018c).

GDNR began experimental stocking of American shad upstream of dams in the Altamaha River basin in 2014 to help conserve the Altamaha River stock (ASMFC, 2013). Historical evidence suggests the species formerly occurred as far upstream in the Ocmulgee basin as the vicinity of Covington, Georgia, upstream of the present-day Project (GDNR, 2014). Successful natural reproduction of American shad stocked into Lake Jackson would not be expected to occur upstream of the reservoir. Downstream in the Ocmulgee River, American shad migrate upstream as far as Juliette Dam and likely spawn in the Ocmulgee River downstream of that dam.

American eels presently range upstream in the Ocmulgee River basin as far as Lloyd Shoals Dam, and there are historic records of the species in the South River, Alcovy River, and Tussahaw Creek upstream of Lake Jackson (Straight et al., 2009). Eels were collected at all four stations downstream of Lloyd Shoals Dam during the fisheries investigations for the previous relicensing (EA, 1990b). Juliette Dam poses less of a barrier to the upstream migration of American eels than to other diadromous species. Eels can occasionally navigate low-head obstacles such as wetted spillways, or by moving overland across low tributary divides on rainy nights.

Shortnose sturgeon and Atlantic sturgeon, both listed as federally endangered species, use the Altamaha River and lower Ocmulgee River and/or Oconee River for spawning runs. The National Marine Fisheries Service has designated critical habitat for Atlantic sturgeon to include the Ocmulgee River upstream to Juliette Dam but not extending upstream of Juliette Dam to Lloyd Shoals Dam (National Oceanic and Atmospheric Administration, 2017). Atlantic sturgeon have been documented as seasonally occurring as far upstream in the Ocmulgee River as Macon (GDNR, 2018d). A monitoring study of the seasonal movements and spawning migrations of Atlantic sturgeon using telemetry documented the maximum extent of Atlantic sturgeon upriver migrations to extend to a point about 98 river miles downstream of Juliette Dam in the upper Coastal Plain (Ingram and Peterson, 2016). Shortnose sturgeon have been reported as occurring no farther upstream than the lower Ocmulgee River in the Coastal Plain, well downstream of Macon (Straight et al., 2009).

Blueback herring have been documented as occurring as far upstream in the Ocmulgee River as Juliette Dam, while hickory shad have been documented as migrating upstream no farther than the lower Ocmulgee River in the Coastal Plain (Straight et al., 2009).

Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act requires federal agencies to consult with National Oceanic and Atmospheric Administration Fisheries on all actions that may adversely affect Essential Fish Habitat (EFH). The Lloyd Shoals Project, located upstream of the Fall Line in the Piedmont province (Figures 1 and 5), does not affect any EFH for the maintenance of suitable marine fishery habitat quality and quantity under the Magnuson-Stevens Fishery Conservation and Management Act.

The South Atlantic Fishery Management Council (SAFMC) has not designated EFH for any species of fish or shellfish found in the vicinity of the Lloyd Shoals Project (SAFMC, 2018). The Lloyd Shoals Project is located 387 river miles upstream of the Atlantic Ocean, above one other existing major dam on the Ocmulgee River (Juliette Dam).

4.4.2 Potential Resource Impacts

Potential impacts of continued project operation on fish and aquatic resources would be limited mainly to Lake Jackson and the Ocmulgee River extending downstream of Lloyd Shoals Dam to Juliette Dam. Juliette Dam impedes upstream passage of fish into the project area, and the Towaliga River, which joins the Ocmulgee River a short distance upstream of Juliette Dam, adds substantial watershed area and tributary inflow, diminishing project operation effects. Georgia Power will evaluate the effects of project operations on fish and aquatic resources in the license application. Potential impacts may include:

- Effects of project operations and shoreline permitting on fish habitat and aquatic resources in Lake Jackson;
- Effects of project operations on habitat for primary sport fish species, including largemouth bass and stocked striped bass, in Lake Jackson;
- Effects of project operations on riverine fish and mussel habitat;
- Effects of project operations on aquatic habitat in the Ocmulgee River downstream;
- Fish entrainment and turbine-induced mortality; and
- Invasive aquatic species within the project boundary.

Georgia Power is not proposing any PM&E measures at this time. Depending upon the resource studies and analyses completed subsequent to NEPA scoping, and consultation with the resource agencies and other relicensing participants, Georgia Power will consider and may propose PM&E measures to address fish and aquatic resources as part of its PLP.

4.5 Wildlife and Botanical Resources

4.5.1 Existing Environment

Vegetation

Major forest types in the Southern Outer Piedmont ecoregion include loblolly-shortleaf pine, oak-hickory, and oak-pine forests (Griffith et al., 2001; FS, 2004b). Edwards et al. (2013) characterized the predominant forest type of the Georgia Piedmont as being oak-pine-hickory forest and identified the dominant vegetation species. The dominant canopy species include varying mixtures of loblolly pine (*Pinus taeda*), shortleaf pine (*Pinus echinata*), white oak (*Quercus alba*), post oak (*Quercus stellata*), southern red oak (*Quercus falcata*), other oak species, pignut hickory (*Carya glabra*), and mockernut hickory (*Carya tomentosa*). Subcanopy species typically include winged elm (*Ulmus alata*), red maple (*Acer rubrum*), black gum (*Nyssa sylvatica*), sourwood (*Oxydendrum arboretum*), and flowering dogwood

(*Cornus florida*). Loblolly and shortleaf pine are common on disturbed sites as early successional species. Shrubs and vines may include deerberry (*Vaccinium stamineum*), mountain laurel (*Kalmia latifolia*), eastern sweetshrub (*Calycanthus floridus*), blueberries (*Vaccinium* sp.), muscadine (*Vitis rotundifolia*), eastern poison ivy (*Toxicodendron radicans*), viburnums (*Viburnum* sp.), greenbriers (*Smilax* sp.), Virginia creeper (*Parthenocissus quinquefolia*), and bursting-heart (*Euonymus americanus*).

Studies conducted by Georgia Power for the prior relicensing effort identified four upland and six wetland plant community/cover types (Gaddy, 1989). The upland community/cover types included mixed pine, pine-mixed hardwood, mixed hardwood-pine, and mixed hardwood. The wetland community/cover types included floodplain hardwood, water-tupelo-overcup oak, willow-shrub, alluvial/deltaic flat, non-woody emergent, and floating aquatic. Descriptions of each community type and lists of plants are provided in the previous study (Gaddy, 1989).

The Piedmont ecoregion has a history of intensive agriculture, primarily cotton and tobacco farming, which were important economies for the region and major determinants of the vegetative composition of the region (Edwards et al., 2013). Silvicultural activities in the region began in the late 1800's, when large areas were harvested for timber. Those areas have subsequently regenerated to hardwood-dominated woodlands and pine forests, either through natural succession or planting programs. Population growth and subsequent urbanization have also been major determinants of the current vegetative patterns and distribution in the Piedmont ecoregion.

Invasive plant species are any species, including its seeds, spores, or other biological material capable of propagating that species, that is not native to a particular ecosystem; and that causes or is likely to cause environmental harm if introduced (Georgia Exotic Pest Plant Council [EPPC], 2006). The Georgia EPPC maintains invasive plant species lists, monitors the spread of invasive species, and works to educate the public on harmful effects of invasive species. County distribution maps for invasive plant species are available online through the Early Detection and Distribution Mapping System (EDDMapS) developed by the University of Georgia Center for Invasive Species and Ecosystem Health (2017).

Georgia invasive plants are separated into various categories based on their abundance and potential degree of harm to native plant communities. Category 1 species pose serious problems because they extensively invade native plant communities and displace native species. Category 1 Alert species have significant potential to become serious problems but have not yet reached the level of harm of a Category 1 species. Category 1 and Category 1 Alert invasive plant species were identified for Butts, Henry, Jasper, and Newton Counties based on the list compiled by Georgia EPPC (2006) and the EDDMapS distribution maps (Table 16).

Some of the most problematical invasive plants in the Georgia Piedmont are Chinese privet, kudzu, autumn olive, bicolor lespedeza, Chinese wisteria, Japanese stiltgrass, and Japanese honeysuckle (Edwards et al., 2013). Chinese privet, Japanese honeysuckle, and Japanese stiltgrass are especially common in floodplains (Ward, 2002; Burton et al., 2005; Loewenstein and Loewenstein, 2005). Chinese privet has achieved a widespread distribution, occupying up to 59 percent of the floodplain of the adjacent upper Oconee River basin (Ward, 2002). It forms dense thickets, especially in floodplain habitats and bottomland forests, and spreads easily through the movement of its seeds by humans and wildlife and through prolific root sprouting (Miller, 2003). Additionally, Chinese privet, Japanese honeysuckle, and Japanese stiltgrass are known to occur within the nearby Oconee NF and Piedmont NWR (FS, 2011, FWS 2010). The spread of invasive plants is often linked to urbanization, residential development, and anthropogenic disturbance of riparian habitats.

Wildlife

Characteristic terrestrial mammal species of oak-pine-hickory forests in the Georgia Piedmont include white-tailed deer (*Odocoileus virginianus*), gray fox (*Urocyon cinereoargenteus*), bobcat (*Lynx rufus*), eastern chipmunk (*Tamias striatus*), gray squirrel (*Sciurus carolinensis*), southern flying squirrel (*Glaucomys volans*), northern raccoon (*Procyon lotor*), Virginia opossum (*Didelphis virginiana*), striped skunk (*Mephitis mephitis*), eastern cottontail (*Sylvilagus floridanus*), white-footed mouse (*Peromyscus leucopus*), woodland vole (*Microtus pinetorum*), southern short-tailed shrew (*Blarina carolinensis*), and cotton mouse (*Peromyscus gossypinus*) (Edwards et al., 2013; FS, 2004b; GMNH, 2008). Bats occurring in these forests can include big brown bat (*Eptesicus fuscus*), tri-colored bat (*Perimyotis subflavus*), evening bat (*Nycticeius humeralis*), hoary bat (*Lasiurus cinereus*), and eastern red bat (*Lasiurus borealis*) (Edwards et al., 2013; GMNH, 2008).

A wide variety of birds use diverse wetland, upland, and open water habitats in the project vicinity, including neotropical migrant songbirds, raptors, waterfowl, and shorebirds. Numerous species seasonally migrate through the area while many others reside locally and breed in the area. The USGS conducts annual breeding bird surveys (BBS) around the U.S. to monitor bird populations and trends (Sauer et al., 2017). Three routes in the Georgia Piedmont, the Rutledge, Juliette, and Piedmont NWR routes, are in the vicinity of the Lloyd Shoals Project. The Rutledge route is located east of Lake Jackson in Jasper and Morgan Counties. The Juliette route is located south-southwest of Lake Jackson in Butts and Monroe Counties. The Piedmont NWR route is located south of Lake Jackson in Jasper and Jones Counties. Competent birders have surveyed the routes annually, since 1975 for the Rutledge and Juliette routes, and between 1991 and 2003 for the Piedmont NWR route. The surveys were conducted along roadsides during the peak of the breeding season, usually in June, during daylight hours.

Table 17 summarizes the relative abundance of the bird species recorded since 1994 along each BBS route in the project vicinity. The abundance estimate represents the number of birds that

a competent birder would encounter in about 2.5 hours of roadside birding in the area near the BBS route (Sauer et al., 2017). Commonly observed species along the survey routes include: American crow, northern cardinal, tufted titmouse, eastern towhee, pine warbler, blue jay, mourning dove, indigo bunting, Carolina wren, yellow-breasted chat, northern mockingbird, red-bellied woodpecker, red-eyed vireo, Carolina chickadee, and common grackle. About 106 species have been documented along the Rutledge, Juliette, and Piedmont NWR routes.

The National Audubon Society (2010) coordinates the annual Christmas Bird Count (CBC) through the use of volunteer birders.⁹ The CBC documents the avifauna that winters within North America and the extent of southward migration of many water-dependent species, such as ducks and other waterfowl. The BBS and CBC provide complementary measures of long-term trends in the health and status of bird populations. CBCs are conducted during the period December 14 to January 5. Volunteers follow specified routes through a designated 15-mile diameter circle, counting every bird they see or hear all day. A CBC circle is located south of Lake Jackson in the Piedmont NWR. Table 17 lists 160 species of birds detected and the numbers observed during the CBC between 1994 and 2016.

The bald eagle, a Georgia threatened species, occurs year-round within the project area. In 2017, one known active nest was located on Lake Jackson within or near the Lloyd Shoals project boundary (GDNR, 2017 unpublished data). Georgia Power timber and land management activities on undeveloped lands within and next to the Project support wildlife habitat and avoid disturbance to active bald eagle nests on Lake Jackson.

Table 18 lists reptile and amphibian species that occur in the Georgia Piedmont, many of which may occur in the project vicinity. Common amphibian and reptile species occurring in the project vicinity include the five-lined skink, eastern fence lizard, green anole, northern cricket frog, spring peeper, bullfrog, eastern narrow-mouthed toad, barking treefrog, eastern box turtle, pond slider, common snapping turtle, marbled salamander, mud salamander, red-spotted newt, corn snake, northern watersnake, copperhead, timber rattlesnake, and pygmy rattlesnake (Edwards et al., 2013; Jensen et al., 2008; GMNH, 2008).

4.5.2 Potential Resource Impacts

Georgia Power's proposal to continue operating the Project would not involve activities directly affecting upland terrestrial habitats for wildlife and botanical resources. Georgia Power will evaluate the effects of the proposed project, if any, on upland invasive species in the license application.

Georgia Power is not proposing any PM&E measures at this time. Depending upon the resource studies and analyses completed subsequent to NEPA scoping, and consultation with

⁹ CBC data are provided by National Audubon Society and through the generous efforts of Bird Studies Canada and countless volunteers across the western hemisphere.

the resource agencies and other relicensing participants, Georgia Power will consider and may propose PM&E measures to address wildlife and botanical resources as part of its PLP.

4.6 Wetlands, Riparian, and Littoral Habitat

4.6.1 Existing Environment

Wetland and Aquatic Vegetation

The wetlands surrounding the Lloyd Shoals Project are primarily palustrine forested, scrub-shrub, and emergent wetlands associated with Lake Jackson. These wetlands typically have shallow water, permanent or seasonally flooded hydrology, and a variety of rooted, hydrophytic vegetation. Overall, there are approximately 399 acres of wetlands within the project boundary, and forested/shrub wetlands are the dominant type (Table 19; Figure 12). An additional 631 acres of forested/shrub and emergent wetlands occur within 2,000 ft beyond the project boundary. This zone was included to encompass a conservatively large area for describing the existing environment. These wetlands also are dominated by forested/shrub wetlands and are associated primarily with tributary streams.

Deep water habitats in the project area are classified as lake and riverine aquatic habitats (Table 19; Figure 12). About 3,513 acres of deep water habitats are present within the project boundary, all of which are located within Lake Jackson, the tailrace within the Ocmulgee River, and the upstream reaches of the South, Yellow, and Alcovy Rivers. Beaver ponds may be found on smaller creeks flowing into the project reservoir outside of the project boundary.

Georgia Power identified six wetland plant/community cover types during resource studies for the prior relicensing effort. These include floodplain forest, water tupelo-overcup oak, willow-shrub, alluvial/deltaic flat, non-woody emergent communities, and floating aquatic (Gaddy, 1989). These wetland types, with the exception of the alluvial/deltaic flat and the water tupelo-overcup oak types, were generally found on the upper reaches of the lake along Tussahaw Creek, and Yellow, South, and Alcovy Rivers. The studies found that the floodplain forest type, dominated by green ash, red maple, and sweet gum was the most widespread wetland type, representing approximately 45 percent of the total wetland area (Gaddy, 1989). Descriptions of each community type and lists of plants are provided in the previous study (Gaddy, 1989).

Wetlands and littoral habitats surrounding Lake Jackson provide diverse 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 *Microcystis* spp., *Lyngbya* spp., and *Cylindrospermopsis raciborskii*; and the vascular aquatic plant alligatorweed (*Alternanthera philoxeroides*). Alligatorweed is a Category 1 invasive pest plant species (Table 16).

Riparian Habitat

The Ocmulgee River near the Lloyd Shoals Project is characterized by broad floodplains with deep alluvial deposits of silt, sand, and clay. A complex river bottomland natural community, a landform less common in the Piedmont, characterizes the floodplain of the Alcovy River upstream of Lake Jackson at the Alcovy Conservation Center (Edwards et al., 2013). The floodplain is characterized by mature water tupelo stands, leading both Wharton (1978) and Radford and Martin (1975) to acclaim these river swamps as among the most significant natural communities of the Piedmont region of the eastern United States. Forested stands found on floodplains of Lake Jackson were characterized by green ash, red maple, and sweet gum in the canopy, box elder, and red maple within the understory, and river birch and willow along the water's edge (Gaddy, 1989). Natural shoreline vegetation and riparian habitat within the floodplains of Lake Jackson has been reduced by development, primarily from residential developments and various businesses.

Wetland and Aquatic Wildlife

A variety of waterfowl and wading birds occur year-round in the Lloyd Shoals project area (Table 17). Wood duck, mallard, Canada goose, and pied-billed grebe are common waterfowl species in the region. Commonly observed wading bird species in the project vicinity include great blue heron, green heron, and great egret. The aquatic bird double-crested cormorant is also common. The wetlands, riparian, and littoral habitat within and adjacent to Lake Jackson provide a variety of habitats preferred by waterfowl and wading birds. Waterfowl hunting is prohibited in the main portion of Lake Jackson, with only those portions lying north of Hwy 36 and Newton Factory Bridge Road being open.

The American beaver (*Castor canadensis*), muskrat (*Ondatra zibethicus*), and northern river otter (*Lutra canadensis*) commonly inhabit wetland and aquatic habitats in the project area (GMNH, 2008). The long-tailed weasel (*Mustela frenata*) occurs throughout the southeastern U.S. and utilizes swamp and wetland habitats with thickets of low-growing shrubs or riparian, sparsely wooded second growth forest (Whitaker and Hamilton, 1998). The mink (*Mustela vison*) is another mammal commonly found around lakes and wetland habitats extending as far south as the lower Southern Piedmont (Whitaker and Hamilton, 1998).

4.6.2 Potential Resource Impacts

Potential impacts of continued project operation on wetlands, riparian, and littoral habitat would be limited to Lake Jackson and the tailrace area within the project boundary. Georgia Power will evaluate the effects of project operations on these resources in the license application.

Potential impacts may include:

- Effects of project operations and shoreline development on reservoir wetland and littoral habitats and associated wildlife; and
- Nuisance invasive aquatic vegetation.

Georgia Power is not proposing any PM&E measures at this time. Depending upon the resource studies and analyses completed subsequent to NEPA scoping, and consultation with the resource agencies and other relicensing participants, Georgia Power will consider and may propose PM&E measures to address wetlands, riparian, and littoral habitat as part of the PLP.

4.7 Rare, Threatened, and Endangered Species

4.7.1 Existing Environment

Information on rare, threatened, and endangered (RTE) species potentially occurring in the Ocmulgee River basin of Butts, Henry, Jasper, and Newton Counties, Georgia was obtained from rare species databases maintained by the GDNR Nongame 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 20 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 threatened and endangered species potentially occur within the 4-county project vicinity (Table 20). These include four plant species, and one bird species, and four invertebrate (mussel) species:

- Pool sprite (or 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 (*Lampsilis subangulata*) – endangered.

Brief accounts of the four federally protected plant species and one federally protected bird species are provided below. The four freshwater mussel species, although reported for Henry County, do not occur in the Ocmulgee River basin; the mussels inhabit the adjacent Flint River basin and are endemic to the Apalachicola-Chattahoochee-Flint River (ACF) basin of Florida, Alabama and Georgia (FWS, 2007). Moreover, the Lloyd Shoals project is not within the designated critical habitat for these species. There are no known occurrences of federally threatened or endangered species within the Lloyd Shoals project boundary.

Pool Sprite

Pool sprite is a diminutive, annual herb that occurs in the Piedmont exclusively in shallow, flat bottomed depressions on granite outcrops, where vernal pools form after rainfall (Patrick et al., 1995; Chafin, 2007). The numbers of plants in pools range from a dozen to several thousand (FWS, 2008). Pool sprite begins flowering in February or March and continues until the habitat becomes desiccated later in the spring. The seeds remain dormant until suitable moisture and light conditions for germination occur in late autumn. In Georgia, pool sprite is found on about seven preserves and parks, with the pools containing the species totaling less than 1 acre (Chafin, 2007). Limited populations of 1 to 5 pools of pool sprite are supported in Henry county at Arabia Mountain Heritage Area (Ecos, 2006). Historically known from sites in Newton County, these populations have since been lost and are no longer supported (FWS, 2008). The species is not presently known to occur within the Lloyd Shoals project boundary.

Black-spored quillwort

Black-spored quillwort is an inconspicuous perennial herb and fern ally that is restricted to shallow, seasonally flooded, flat bottomed pools on granite outcrops (Patrick et al., 2005; Chafin, 2007). These vernal pools are entirely rock-rimmed, generally occur near the summit, and typically have a depth less than 1 ft. The plants produce spores in early May to June. The species is endemic to the Piedmont of Georgia. Historically known from 15 sites in central Georgia, black-spored quillwort currently exists at only 8 sites in Georgia, including one in Butts County (FWS, 2008) located outside of the Lloyd Shoals project boundary.

Michaux's sumac

Michaux's sumac is a low-growing, colonial shrub that occurs on dry, open rock, or sandy woodlands over bedrock rich in calcium, magnesium, or iron (Chafin, 2007). Plants require some form of periodic disturbance to maintain the open quality of its habitat and are often found in areas that are artificially disturbed, such as highway and railroad rights-of-way, pine plantations, edges of cultivated fields and other cleared lands (FWS, 1989, Nature Serve, 2017). Michaux's sumac flowers from April to June and fruits from August to October. Only two sites with populations of Michaux's sumac are currently known in Georgia, including one in Newton County (FWS, 2014). The species is not presently known to occur within the Lloyd Shoals project boundary.

Relict trillium

Relict trillium is a perennial herb that occupies mature hardwood forests in rich ravines and on stream terraces in the southeastern U.S. (Patrick et al., 1995; Chafin, 2007, NatureServe, 2017). Urbanization and road improvement projects are two factors that destroy or degrade available habitat. The plant flowers mid-March to April and fruits from May to June. Approximately 40 populations of relict trillium are currently known in 18 Georgia counties, including one in Jasper County (FWS, 2015).

Red-cockaded woodpecker

The red-cockaded woodpecker is a small woodpecker that is endemic to open, mature and old-growth pine ecosystems in the southeastern U.S. (Ozier and Schneider, 2010; FWS, 2003). Red-cockaded woodpeckers excavate roosting and nesting cavities almost exclusively in old, living pines. Cavity trees are usually infected with red-heart disease, which softens the heartwood. The birds typically nest and roost in longleaf, slash, or loblolly pine trees; the excavation may take several years. Red-cockaded woodpeckers are cooperative breeders that live in family groups consisting of a breeding pair and often one to three helper male offspring from previous years. Georgia has five remaining population centers. One of these is the Piedmont Recovery Unit (FWS, 2003), which includes a population on Piedmont NWR in Jones County located south of the Lloyd Shoals Project. FWS manages 22,500 acres of upland pine and 3,000 acres of upland hardwood to create conditions suitable for red-cockaded woodpeckers (FWS, 2010). The species is not presently known to inhabit pine forests within the Lloyd Shoals project boundary, where stands of large pine trees are relatively small.

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 20). 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 20). The freshwater mussel species Altamaha arc mussel is currently present in the Ocmulgee River downstream of Lloyd Shoals Dam and was also recently discovered in Lake Jackson (Georgia Power, 2017b). The species typically occurs in sloughs, oxbows, or depositional areas in large creeks to large rivers with silt, mud, and/or sand substrates, primarily in the Coastal Plain (Wisniewski, 2008; Meador et al., 2011), and has now been documented in a Piedmont reservoir.

Of the three fish species, Altamaha shiner and robust redhorse presently occur in the project vicinity. The Altamaha shiner, a Georgia threatened species, is endemic to the Piedmont of the upper Altamaha River basin in north-central Georgia. It has been reported from recent collections in tributary streams upstream of Lake Jackson, including the South River, Yellow River, and Tussahaw Creek systems (GDNR, 2018d). Altamaha shiners inhabit small streams and rivers, where they are most often found in small pools with rocky or sandy substrates (Freeman et al., 2008).

The robust redhorse, a Georgia endangered species, is a migratory riverine sucker that occurs in large rivers of the Atlantic slope in Georgia, South Carolina, and North Carolina (Freeman et al., 2009; Rhode et al., 2009). It inhabits the Oconee and Ocmulgee Rivers in the Altamaha River basin. Through the Ocmulgee CCAA for robust redhorse, the species was reintroduced to historic habitat in the Ocmulgee River downstream of Lloyd Shoals Dam through stocking. Robust redhorse seasonally congregate in potential spawning habitats available in the Lloyd Shoals tailrace area within the project boundary, but there has been no evidence of successful natural reproduction and recruitment (see also Section 4.4, *Downstream Ocmulgee River and Migratory Fishes*). The species does not occur upstream of Lloyd Shoals Dam. CBD petitioned the robust redhorse for federal listing in 2010. 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 vegetated, spring-fed headwaters and creeks in the Coastal Plain downstream in the basin and is unlikely to occur at the Project.

One established nesting pair of bald eagles occurs along Lake Jackson, either within or immediately adjacent to the project boundary (Section 4.5.1). Although the species has recovered in the lower 48 states and was removed from the federally threatened species list, it remains 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 and is most often associated with well drained, xeric, sandy soils, where longleaf pine and/or scrub oaks are the characteristic woody vegetation and wiregrass is a significant component of the groundcover (Jensen and Owers, 2009). A single specimen from near Lake Jackson represents the only Piedmont record of this species in Georgia; however, 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 20). These include 17 plants, one mussel, two freshwater snails, four fish, one amphibian, one reptile, one bird, and one bat. The mussel species (inflated floater) inhabits pools and slackwater areas in rivers and reservoirs with soft substrates (Meador et al. 2011). The inflated floater is presumably endemic to the Altamaha River Basin and has been found in the Ocmulgee River including Lake Jackson (Georgia Power, 2017b). The reverse pebblesnail inhabits shoals with rapidly flowing water and is known from two locations in Newton County including Factory Shoals on the Alcovy River and Cedar Shoals on the Yellow river; both locations are upstream of the project boundary (Georgia Power, 2017b) (see also Section 4.4.1, *Freshwater Mollusks*). 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.

Candidate Conservation Agreements

Ocmulgee CCAA For Robust Redhorse, Ocmulgee River

The Ocmulgee CCAA for robust redhorse was implemented between Georgia Power, GDNR, and FWS in January 2002 to advance reintroduction of the robust redhorse into historic habitat in the Ocmulgee River between river miles 230.9 and 250.2, the reach bounded upstream by Lloyd Shoals Dam and downstream by Juliette Dam. The purpose of the agreement was to implement conservation measures for the robust redhorse through reintroduction, monitoring, and research efforts. The objectives of the agreement were to establish a refugial population of robust redhorse in the Ocmulgee River and increase understanding of habitat requirements and life history of robust redhorse through the following conservation actions:

- Stock the reach of the Ocmulgee River with approximately 4,000 hatchery-reared robust redhorse fingerlings each year for five years to establish a refugial population.
- Study the movement of introduced juvenile robust redhorse during two surveys, one in year 1 and one in year 3 of the agreement.

- Monitor abundance and distribution of introduced robust redhorse during six survey events in alternate years of the agreement.
- Estimate population size during three surveys following the establishment of an adult refugial population.

Under the Ocmulgee CCAA for robust redhorse, Georgia Power volunteered to participate in the reintroduction efforts and provide funding for critical telemetry studies on the reintroduced fish, and some population monitoring and reporting. In return, Georgia Power received assurances that if the robust redhorse was ever federally listed as threatened or endangered under the agreement term. FWS would not require additional land, water, or resource restrictions beyond those voluntarily committed to under the agreement. These assurances include the flow regime provided for under the current FERC license. The Ocmulgee CCAA for robust redhorse expires with the current license on December 31, 2023.

CCA – Mollusks of the Altamaha River Basin, Georgia

Georgia Power entered into the Candidate Conservation Agreement for Mollusks of the Altamaha River Basin (Altamaha CCA for mollusks) in April 2017 with FWS and GDNR to ensure that five mollusk species in the Altamaha River Basin known to occur within Georgia Power project areas do not require future protection under the federal Endangered Species Act. Three of the species are mussels and snails known to occur either within the Lloyd Shoals project boundary or in the immediate vicinity. They include Altamaha arc mussel (Georgia threatened), inflated floater, and reverse pebblesnail (under review for federal listing) (Table 15). The objectives of the Altamaha CCA for mollusks are to: increase the understanding of the species' range, habitat requirements, taxonomy, and/or life histories; and implement conservation measures to conserve existing populations of these species within Georgia Power project areas in the Altamaha River basin.

The Altamaha CCA for mollusks objectives are being accomplished through the implementation of conservation measures, including field-based, laboratory-based, and watershed-based activities. Field-based activities include intensive surveys for species occurrence. Laboratory-based activities include molecular genetics research and conducting host fish trials and life history studies. Watershed-based activities include management actions protective of riparian buffer habitat.

The geographic extents of surveys and conservation actions at the Lloyd Shoals Project include shoreline segments within the FERC project boundary and free flowing reaches of the Ocmulgee River downstream of Lloyd Shoals Dam. Conservation actions at Lloyd Shoals are scheduled in 2018, 2023, 2028, 2033, 2038, and 2043. The Altamaha CCA for mollusks is in effect for 30 years through 2047, at which time the agreement may be extended. Planned Altamaha CCA for mollusks conservation actions in 2018 include a mollusk survey of Lake

Jackson and the Ocmulgee River downstream of Lloyd Shoals Dam (Section 4.4.1, *Freshwater Mollusks*).

4.7.2 Potential Resource Impacts

Presently, there are no known occurrences of federally threatened or endangered species of plants or wildlife within the Lloyd Shoals project boundary that would be affected by continued project operation.

Georgia Power will consult with FWS and GDNR to avoid impacts to any federally or state threatened or endangered species within the project boundary; address bald eagle management pursuant to the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act; and propose PM&E measures as appropriate for avoiding or minimizing impacts to state listed and other species of concern.

4.8 Recreation and Land Use

4.8.1 Existing Environment

Existing Recreational Facilities

This section describes the existing Georgia Power project recreation facilities and other public and private sites providing access to Lake Jackson and Lloyd Shoals Dam. Figure 3 shows the location of these recreation facilities as well as their proximity to the project boundary. There are four sites located within the project boundary that are owned and operated by Georgia Power providing direct access to the Project and are thus considered project recreation sites:

- Lloyd Shoals Park;
- Tailrace Fishing Pier;
- Ocmulgee River Park; and
- Jane Lofton Public Access Area.

Table 21 provides the address and recreational amenities offered at these sites as well as eight additional privately-owned, or non-Georgia Power, locations that provide access to the Project. Table 22 summarizes the publicly available recreation amenities in the Project boundary, including a total of seven boat launch areas with 13 lanes that are at an estimated 35-percent capacity utilization (Georgia Power, 2015b). There are three marinas, also at 35-percent capacity, and two barrier free fishing platforms, one in the tailrace and one on Lake Jackson at Lloyd Shoals Park. Figures 13 and 14 illustrate the recreation facilities provided near Lloyd Shoals dam (Lloyd Shoals Park and Tailrace Fishing Pier) and Ocmulgee River Park,

respectively. The recently established Jane Lofton Public Access Area is located at the south end of the auxiliary spillway (Figure 4).

Form 80 Licensed Hydropower Development Recreation Report

Georgia Power collects a variety of recreation data at its projects to comply with 18 C.F.R. § 8.11, which requests “information respecting use and development of public recreational opportunities”. Article 405 of the current license for the Lloyd Shoals Project (issued March 22, 1993 and amended May 17, 2013) requires that Georgia Power report on recreational use at the project. Recreation use is reported in a Recreation Monitoring Report which is filed in conjunction with the FERC Form No. 80, the most recent of which was published in 2015, for data compiled during the calendar year ending December 31, 2014. Georgia Power estimated recreational use from trail cameras/traffic counts (40 percent), attendance records (40 percent), staff observation (10 percent) and staff estimates (10 percent). The actual trail cameras/traffic counts sample survey size represented 10 percent of the year, including 22 weekdays, 3 weekends (6 days), and 3 holidays (9 days). These methods are briefly described below:

- Trail Cameras – Cameras were installed in areas that allowed for the best visibility of the boat ramps and parking lots and were validated via trial sessions to ensure data could be calculated accurately and the locations were suitable. Cameras were set to motion detect with a 30-minute delay and the pictures taken were copied to a computer. Once the pictures were downloaded, technicians would count the number of axles and vehicles seen and would record this information. These data were then averaged and extrapolated out to recreational visits by season by multiplying the average visits times the number of days per season.
- Traffic Counters – The counters were installed at entrances to recreation areas and configured based on whether vehicles would run over the counter once or twice. A multi-axle dividing factor was established for vehicles with trailers after monitoring and consultation with GDNR staff. The counters were set before the sampling period began and then later recorded and reset again after the sampling period. Georgia Power used the axle dividing factor to obtain the number of vehicles. These data were then averaged and extrapolated out to recreational visits by season by multiplying the average visits times the number of days per season.
- Attendance Records – These records are based on receipts collected at Lloyd Shoals on an honor system. These data were collected based on both revenue and usage records.
- Staff Observation and Estimation – Georgia Power staff who routinely observed and inspected sites around the project areas contributed their institutional knowledge to the calculations. Staff contributed local knowledge in order to account for limited

equipment malfunctions and for those non-Georgia Power facilities that did not respond to the questionnaire.

- Visitor Counts/Surveys – This method was used to gather information from various non-Georgia Power-owned land and recreation access areas around the various projects via a questionnaire.

The 2014 Form 80 reported a total of 74,226 annual visits to all recreational areas at the Lloyd Shoals Project (in recreation days), of which 5.3 percent (3,917 visits) were nighttime. The peak weekend average in 2014 was 5,006 visits. The construction, operation, and maintenance costs (\$66,156) of operating the project recreation facilities exceeded the \$50,990 in annual recreation-related revenue in 2014. The distribution of these annual visits by use varies greatly depending on the season. For example, boat fishing represents 20 percent of recreation use in the summer yet represents the majority, 70 percent, in the winter. In contrast, 70 percent of the recreation use in the summer is for picnicking/beach use and pleasure boating (Georgia Power, 2015b).

Recreation Areas of Importance

There are a variety of important recreation resources in the four-county project vicinity, and in adjacent counties, providing both similar and unique recreational experiences (Table 23, Figure 2). Nearby state parks include Indian Springs and High Falls. High Falls SP has tent and trailer camping, hiking trails, a waterfall, and a popular fishing lake. Indian Springs SP has tent and trailer camping, rental cottages, hotel, mineral springs, and a museum. The Oconee NF also provides camping and hiking. Nearby towns of Covington, Oxford, Jackson, and Monticello, which feature antebellum architecture, attract tourists. Other area attractions are Jarrell Plantation, the Piedmont NWR, and the Dauset Trails Nature Center. Charlie Elliott Wildlife Center, owned and operated by GDNR, is located approximately 20 miles to northeast of Lloyd Shoals Dam near Mansfield and offers 6,400 acres of wooded land with 22 ponds for fishing, plus:

- 28 hotel-style guest rooms;
- Banquet hall and conference center;
- Visitor center & museum;
- Archery and shooting ranges;
- Boat ramp; and
- Primitive campsites.

The southern section of the Oconee Ranger District of Oconee NF extends west to the Ocmulgee River beginning about 1 mile downstream of Lloyd Shoals Dam in Jasper County (Figure 2). This section of the forest near the river contains the Ocmulgee Bluff Trail System, which includes the Ocmulgee River Horse, Bike and Hiking Trail. This area has parking for many vehicles and horse trailers and can accommodate large groups of riders. The trail generally follows the Ocmulgee River, but does move away from the river on some recently added loops. This trail is the compilation of several smaller trails to comprise nearly 30 miles of riding, biking, and hiking opportunities (FS, 2017).

Located in central Georgia, Lake Jackson is also close to Lakes Sinclair, Oconee, and Juliette, all of which are operated by Georgia Power. Lake Sinclair, located near Milledgeville, Georgia, was impounded in 1952 and comprises 15,330 acres with 417 miles of shoreline. Georgia Power provides fishing facilities in the tailrace area, as well as several boat launches and day-use recreation areas. Georgia Power also makes land available to a private operator for a campground, marina, camping, and day-use area. Lake Sinclair is about 35 miles east-southeast of Lake Jackson. Lake Oconee is the largest of Georgia Power's central Georgia lakes. Filled in 1980, Lake Oconee covers 19,050 acres. Georgia Power owns and maintains several public recreation areas and access areas at Lake Oconee, including picnic areas, swimming, camping, fishing, boating, and other related recreation facilities. Lake Oconee is about 35 miles east of Lake Jackson. Lake Juliette is located about 20 miles south of Lake Jackson, near Forsyth, Georgia. It is the newest and smallest of the central Georgia lakes, impounded in 1981 and comprising 3,600 acres. Georgia Power owns and maintains two public recreation areas that include fishing, hiking, boating, picnicking, and related facilities (Georgia Power, 2009).

Existing State and Regional Recreation Plans

This section describes the state and regional recreation plans reviewed to identify current and future recreation needs for the project area. These plans include the Statewide Comprehensive Outdoor Recreation Plan (SCORP) for Georgia (Georgia State Parks, 2016), as well as the resource management plans for the three relevant Regional Commissions (RCs): Three Rivers RC (Butts County), Northeast Georgia RC (Jasper, Newton Counties) and the Atlanta RC (Henry County) (Carl Vinson Institute of Government, University of Georgia, 2017). These resource management plans identify Regionally Important Resources (RIR), which are defined as natural or historic resources of sufficient size or importance to warrant special consideration by the local governments having jurisdiction over that resource.

Three Rivers RC Regionally Important Resources Plan - This plan addresses RIRs on the western side of the project area in Butts County, one of 10 counties in the Three Rivers RC (Three Rivers RC, 2012).

Categorized as either water, conservation or cultural / heritage resources, the RIR's in Butts County include:

- Water: water supply watersheds, two small groundwater recharges, wetlands, Ocmulgee River, and Lake Jackson.
- Conservation: Conservation RIR's in Butts County include Indian Springs SP and a small portion of High Falls SP (majority is in Monroe County). Indian Springs SP is located 10 miles southwest of the Project near Jackson and Flovilla. This 528-acre park offers a museum (open seasonally); 10 cottages; 88 tent, trailer, or RV campsites; a pioneer campground; 7 picnic shelters; a large group shelter; and a group camp for scouts. High Falls SP is a 1,050-acre park located approximately 18 miles to southwest of the Project. Visitors are drawn to the SP by High Falls Lake, a 35-ft waterfall, a pedestrian bridge, and trails that provide scenic views.
- Butts County is home to the O'Neal Farm which is considered a "Centennial Family Farm," meaning it has been owned by members of the same family for 100 years or more and is not listed in the National Register of Historic Places (National Register). National Register sites include the County Courthouse, built in 1898 in the High Victorian Eclectic style and Indian Springs Hotel.

Northeast Georgia RC Resource Management Plan for Regionally Important Resources: This plan addresses RIRs on the northern and eastern side of the project area in Jasper and Newton counties, two of 12-counties in the Northeast Georgia RC (Northeast Georgia RC, 2011). The following RIR's are found in Jasper or Newton County:

- The Piedmont NWR, nine miles south of Monticello, is partially located in southern Jasper County and provides recreational opportunities not only for Jasper County, but also, adjacent counties.
- The 452-acre Georgia FFA-FCCLA Center is approximately 15 miles north of Lloyd Shoals Dam in south-central Newton County. Owned by the State, it hosts more than 30,000 campers and serves approximately 140,000 meals annually. The FFA-FCCLA Center is located contiguous to the Factory Shoals County Park and the Alcovy River Greenway RIRs. The Alcovy River Greenway is approximately 80 miles in length with portions in Newton County.
- Lake Varner is a 1.3-sq mi drinking-water reservoir that supplies water to approximately 150,000 people in Newton, Walton, and Jasper Counties (as well as the municipalities of Covington, Oxford, Porterdale, Newborn, and Mansfield). Located 30 miles north of Lloyd Shoals Dam, it is a well-known and well-used fishing lake, and features shoreline walking trails and picnic areas for public use.

- Oxford College of Emory University consists of approximately 145 acres in Newton County. Dating back to the late 1830s, the campus is a historic RIR as well as offering significant open space for active and passive recreation opportunities.

Atlanta Regional Commission (ARC) 2016 Regional Resource Plan Update: The northwestern tip of the project along the South River embayment is in Henry County. This plan identifies the RIRs for the Atlanta region, including areas of conservation or recreational value, historic and cultural resources, and areas of agricultural and scenic value (ARC, 2015). It notes the following resources located in Henry County:

- The South River is a “protected river corridor,” which means planning efforts should focus on preserving the land adjacent to it to support a diversity of wildlife, recreational interests, and water quality.
- The Arabia Mountain National Heritage Area offers a unique showcase of natural, cultural and historic legacies concentrated in portions of DeKalb, Rockdale, and Henry Counties. The land that comprises the Heritage Area includes active quarries, rolling topography, rural landscapes and unique granite outcroppings – a singular habitat feature of the Georgia Piedmont Region. Included within the Heritage Area are unique resources, including Panola Mountain SP, the Davidson-Arabia Mountain Nature Preserve, and the Monastery of the Holy Spirit.
- Ten National Register sites and two National Historic Districts (HDs), the Lawrenceville Street HD and the McDonough HD. Nash Farm Battlefield is a Historic Park managed by Henry County.
- Multiple sites that participate in the Georgia Centennial Farm and Agritourism Programs, including Moss Clark Farm, Fieldstone Farm, Southern Belle Farms and the Yule Forest/ The Pumpkin Patch. These programs foster greater awareness of agritourism destinations by working with local farms to provide signage and other resources to increase visibility.

Statewide Comprehensive Outdoor Recreation Plan

The Georgia SCORP for 2017-2021 (Georgia State Parks, 2016) reports on the state of parks and greenspaces and offers guidance to state and local decision-makers and citizens on ways to promote healthy communities, enhance economic vitality, and conserve natural resources. A public parks inventory shows that less-populated Jasper County has about 18 percent of its area available for outdoor recreation (including Oconee NF), while Butts, Henry, and Newton Counties have less than 3 percent available. For many recreators, the quality of their experience depends in large part on the quality of the facilities they use. In recognition of this importance, about 60 percent of Land and Water Conservation Fund awards to local

governments between 2006 and 2015 were targeted toward the rehabilitation of existing facilities.

A public survey was conducted by telephone to assess demand and preferences for outdoor recreation. About 63 percent of survey respondents self-identified as being outdoor recreators, enjoying such activities as walking, jogging, running, picnicking, swimming, and observing wildlife and nature. Reasons to recreate included having fun, being with family and friends, relaxing, being healthy and exercising, and enjoying nature. Seventy-percent of respondents had visited a park in the past year, and the vast majority of these recreators had visited parks at least several times. About 20 to 30 percent of recreators indicate that physical limitations can be a barrier, indicating the continuing importance of addressing this challenge in the planning, development, and rehabilitation of parks.

Shoreline Buffer Zones and Management Policies

Georgia Power manages the natural resources surrounding the project to benefit both human and wildlife uses, including cooperative efforts with local and state agencies and private entities to assure shoreline access to the Project. The current project boundary generally follows the full pool elevation of 530 ft, except in some areas where it follows metes-and-bounds property lines, including areas for public recreation and around the powerhouse. There are approximately 135 miles of shoreline and 1,800 acres of project lands inside the project boundary. Project lands provide a reservoir buffer for aesthetics, wildlife habitat, water quality protection, and recreation. The shoreline is managed under Georgia Power's Shoreline Management Guidelines to ensure compliance with the FERC license and other applicable federal and state laws and regulations. Georgia Power leases 606 residential lots around the project and maintains another 1,231 license agreements through which residents on privately-owned lots may access the shoreline.

Georgia Power continues to protect its reservoir habitats and shoreline stability, while providing for appropriate joint public and nonexclusive private use of areas surrounding reservoirs in accordance with private property laws. The Shoreline Management Guidelines (Georgia Power, 2015a) list the requirements for landowners building residential structures along reservoir shorelines. The guidelines include general permitting steps applicable to all Georgia Power lakes as well as specific requirements for Lake Jackson. Landowners must first obtain a valid lease agreement (Georgia Power lots) or access lease agreement (deeded lots) and a Georgia Power permit before beginning any construction, renovation, clearing, tree removal, grading, etc. on Georgia Power land as well as dredging activities. The guidelines specify that all new construction (dwellings and additions) should be above the project boundary. If this is not feasible, new construction shall meet setback requirements in the guidelines and satisfy county guidelines. The Shoreline Management Guidelines also provide specifications for constructing outbuildings, gazebos/picnic shelters/decks, seawalls, ramps

(only maintenance and renovation), wharves, boat slips, boat houses, docks and combinations of these features (Georgia Power, 2015a).

Georgia Power executed a Memorandum of Understanding (MOU) with the Georgia State Historic Preservation Officer (SHPO) on May 14, 2018, to address any historic properties on the 662 acres of lands recently removed from the project boundary between the 545-ft and 530-ft elevation contours (J. Charles, Georgia Power, May 15, 2018 letter to K.D. Bose, FERC) (Section 3.2). The MOU establishes a process whereby Georgia Power, in coordination with building owners, reviews proposed material modifications to buildings located between the 545-ft and 530-ft elevation contours, determines whether buildings fifty years or older are listed or eligible for listing on the National Register, and consults with SHPO on potential effects to buildings identified as listed or eligible for listing on the National Register. The MOU also provides for Georgia Power review and consultation with SHPO on archaeological sites listed, eligible, or unknown for listing on the National Register that may be affected.

Land Use

The land uses within the project boundary, as well as an additional zone extending to 2,000-ft beyond the project boundary, are illustrated in Figure 15 and summarized in Table 24. The areas presented in Table 24 are based on the project boundary prior to the recent Commission order amending the project boundary (Section 3.2). The project boundary now includes approximately 4,533 acres, of which 80 percent is the open water of Lake Jackson. The balance of the lands within the project boundary are primarily undeveloped and are either deciduous forest, evergreen forest, forested wetlands. Clusters of low-intensity urban uses are generally found along the northwestern edge of the Project, along the South and Yellow Rivers in Henry and Newton counties.

Table 24 also includes the land use for an additional zone extending 2,000-ft beyond the project boundary; these acreages do not include land within the project boundary. Of these over 20,000 acres adjacent to the Project, approximately 57 percent is either deciduous or evergreen forests while 17 percent is being utilized for row crops or pasture. These agricultural lands are found along the Project's southeastern edge. Low intensity urban uses represent 1 percent of adjacent acreages and are mostly related to the residential areas and amenities along the northern portion of the Project generally in Newton and Henry counties.

4.8.2 Potential Resource Impacts

Potential impacts of continued project operation on recreation and land use would be limited mainly to Lake Jackson and the tailrace area within the project boundary. Georgia Power will evaluate the effects of continued project operations on recreation and land use in the license application. Potential impacts may include the effects of project operations on lake recreation, downstream recreation in the project tailrace area, on public recreational access and facilities and on shoreline management. In November 2012, GDNR concurred with Georgia Power's

proposal to eliminate the recreational monitoring portion of Article 405 and focus efforts on enhancements to fishing opportunities on the lake and lake-wide fish habitat.

Georgia Power is not proposing any PM&E measures at this time. Depending upon the resource studies and analyses completed subsequent to NEPA scoping, and consultation with the resource agencies and other relicensing participants, Georgia Power will consider and may propose PM&E measures to address recreation and land use resources as part of the PLP.

4.9 Aesthetic Resources

4.9.1 Existing Environment

This section describes the visual characteristics of the project facilities, lands, and waters. Public access points offer diverse views of the project impoundment, shorelines, and tailrace areas. Georgia Power's Shoreline Management Guidelines help to protect the vegetative buffer surrounding Lake Jackson and preserve and enhance the aesthetic value of the reservoir.

Generally, the central and southern portions of Lake Jackson, downstream of Hwy 36 and Hwy 212 provide the most developed views, including low-density residential, marinas, commercial areas, and various public and private recreation access areas. The shoreline vegetative buffer zone in these parts of the reservoir includes a mix of landscaped, landscaped-natural, and natural conditions. Isolated stretches of undeveloped, forested shoreline occur along Tussahaw Creek and the South and Yellow River embayments. Viewsheds include Lloyd Shoals Dam, low-density residential beyond the shoreline, boat ramps, public marinas, commercial areas, and private and public recreational access areas, and roadway crossings.

The portions of Lake Jackson along Tussahaw Creek and the South and Yellow Rivers upstream of Hwys 36 and 212 provide the most rural and undeveloped views, including significant stretches of undeveloped shoreline. The shoreline vegetative buffer zone in these parts of the reservoir include a mix of landscaped-natural and natural conditions. Viewsheds in these parts include forested, agricultural, silvicultural, and low-density residential land uses beyond the shoreline.

There are various public access points around Lake Jackson that show various degrees of development. Viewsheds from throughout the reservoir show a variety of development from undeveloped at the shoreline to residential areas and public access points such as picnic areas and boat ramps. Viewsheds from various locations around the reservoir are shown in Figures 16 through 18.

4.9.2 Potential Resource Impacts

Georgia Power's proposal to continue operating the Project would not involve activities directly affecting aesthetic resources. No potential impacts are anticipated, and therefore, Georgia Power is not proposing any PM&E measures at this time.

4.10 Cultural Resources

4.10.1 Existing Environment

The Lloyd Shoals project area was used for thousands of years before European settlers arrived in the region. The cultural resources of the project area have been well-studied through a variety of survey methodologies and for various project purposes. Brockington & Associates (1988) provides a thorough description and evaluation of the cultural resources known from the project area. Although the general project region was dominated by the Creek Indians during the historic Aboriginal period, detailed information indicates that the project area was only sporadically inhabited. No references have been found documenting European settlement within the Lloyd Shoals project area prior to the early nineteenth century. Historic examination of the area indicates the area was of great agricultural and timbering importance to early settlers.

Brockington and Associates (1988) conducted a thorough investigation and inventory of cultural resources within the project boundary during the previous relicensing. Six of these sites are included in Georgia Power's cultural resources management plan (CRMP) for the Lloyd Shoals Project (Georgia Power, 1991). 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) and are monitored and reported to FERC annually (Georgia Power, 2017c).

Utilization of swift-water sections for power production had a major effect on industrial development in the project area. Initial reference to the power production potential of the Lloyd Shoals area occurred in the 1880 Census report. Construction began in 1908, was completed in mid-1910, and power began transmitting in 1911 (Georgia Power, 1991). Lloyd Shoals was originally built to provide base load power, but primarily serves today as a producer of peak-load power. The most significant change to the original plant occurred in 1983 when a fire destroyed the upper level of the powerhouse. The Lloyd Shoals project holds historical significance at a regional level in the development of hydroelectricity (EDAW, 1991).

4.10.2 Potential Resource Impacts

Presently there are no known potential impacts to historic properties that would result from Georgia Power's proposal to continue operating the Lloyd Shoals Project. Georgia Power will

evaluate potential impacts to archaeological and historic hydro-engineering resources in the license application, including:

- Potential eligibility of project facilities for the National Register; and
- Effects of project operations on archeological historic properties.

Georgia Power will consult with the GDNR Historic Preservation Division, affected tribes, and Advisory Council on Historic Preservation in developing a Historic Properties Management Plan for the Project and implementing a Programmatic Agreement for the Project to avoid impacts to historic properties.

4.11 Socio-economic Resources

4.11.1 Existing Environment

This section provides information on the socioeconomic conditions within the Lloyd Shoals project vicinity, including population and sources of employment, based on information developed by the U.S. Census Bureau (2017). The population trends for the four-county area surrounding the Lloyd Shoals Project are summarized in Table 26. Population density is greatest in the northeast portion of the project area, particularly in Henry County, with a population of 221,768 documented in the 2016 census. Another 106,999 people reside in Newton County, which is located on the north side of the Project. Jasper County, the smallest in terms of population size (13,654 people), occupies the largest land area of the four counties at 373 sq mi. Between 2010 and 2016, Jasper County experienced a population decline of 1.8 percent. During the same period, Butts County experienced a slight population increase (0.7 percent), and Henry and Newton Counties experienced larger increases (8.8 and 7.0 percent, respectively) in population size (U.S. Census Bureau, 2017).

The economic status of the four-county region varies. Henry County is the wealthiest county with a median income of \$60,424 and poverty rate of 9.9 percent between 2001 and 2015. In contrast, the poorest county, Butts County, reported a median income of \$41,667 and poverty rate of 19.0 percent (the highest of the four counties) during the same period (US. Census Bureau, 2017). Jasper County had a median household income of \$42,368 and poverty rate of 17.4 percent during the period between 2011 and 2015, and Newton County had a median household income of \$49,179 and poverty rate of 14.9 percent during the same period. The only county that bested the national average in either median household income or percent persons in poverty is Henry County, which performed better than the national average in both categories. The labor force for the four-county region from 2001 to 2015 was 230,896 individuals, with 8,069 workers from Jasper County, 67,837 from Newton County, 142,819 from Henry County, and 12,170 from Butts County (U.S. Census Bureau, 2017).

Jasper County, covering 373 sq mi, is the largest of the four counties in the project area but provides only 3 percent of the labor force for the four-county region. In 2016, 24.9 percent of the labor force of Jasper County were employed in the goods producing sector, 42.0 percent of the labor force were employed in the service producing sector, and 33.1 percent of the labor force were employed by the government (Bureau of Labor Statistics, 2017).

Henry County contributes 60 percent of the population and 64 percent of the labor force for the four-county region. In 2016, 9.0 percent of the labor force of Henry County worked in the goods producing sector, 74.8 percent worked in the service producing sector, and 16.2 percent worked in government. Henry County covers 327 sq miles and has five commission districts. About two-thirds of the county is zoned residential agricultural (RA) (Henry County Government, 2017).

Newton County contributes 32 percent of the population and 26 percent of the labor force for the four-county region. In 2006, 28.3 percent of the labor force was employed in services, 23.5 percent were employed in manufacturing, 19.6 percent were employed in government, and 11.8 percent were employed in retail trade. The Newton County school system was the largest employer in the county in 2006, providing 1,600 jobs. In the services sector, healthcare was the dominant employer. Newton County's 279 sq mi are subdivided into five commission districts. As of 2006, just over 46 percent of county land was classified as agriculture/forestry, the bulk of which lies in the eastern portion of the county. Twenty five percent of county land was used for residential purposes, predominantly single family, and mostly in the western part of the county. Commercial and industrial uses took up less than 1 percent of county land each and fell predominantly within the municipal boundary of Covington, where approximately 56 percent of the County's jobs are located (Jordan, Jones & Goulding, 2006).

Butts County employs 7 percent of the labor force for the four-county region. In 2016, 21.1 percent of the Butts County labor force were in the goods producing sector, 52.9 percent were employed in the service producing sector, and 26.0 percent were employed in government (Bureau of Labor Statistics, 2017). The 188 sq mi county has four commission districts and is primarily rural. Aside from the county's three urban centers, most of the land is zoned agricultural retention, for agriculture and single-family residences (Butts County, Georgia, 2017).

The Lloyd Shoals Project lies in the Middle Ocmulgee Water Planning Region. Primary employment sectors for this region are government, health care, service industries, and agriculture. Agriculture is strongest in the region's southern counties, below the project location. Forested land comprises about 51 percent of the region. Agriculture follows at 20 percent, wetlands at 9 percent, and urban areas at 8 percent of lands covered (GEPD, 2017a).

4.11.2 Potential Resource Impacts

Continued operation of the Lloyd Shoals Project would not involve activities directly affecting socioeconomic resources, and therefore, no potential impacts are anticipated.

4.12 Tribal Resources

4.12.1 Existing Environment

There are no extant federally recognized tribal lands in the State of Georgia. There are, however, a number of federally recognized tribes that occupied the project region historically. Consistent with the National Historic Preservation Act and implementing regulations (36 CFR 800), on March 1, 2018, FERC made initial contact inviting the following tribes to participate in the Lloyd Shoals Project relicensing: Alabama-Quassarte Tribal Town, Alabama-Coushatta Tribe of Texas, Coushatta Tribe of Louisiana, Kialegee Tribal Town, Muscogee (Creek) Nation, Thlopthlocco Tribal Town, and the Poarch Band of Creek Indians. Tribal consultation is conducted on a “government to government” basis, with FERC representing the U.S. government. After a relationship has been established with interested tribes, Georgia Power will be involved in the consultation process as FERC’s non-federal designee.

4.12.2 Potential Resource Impacts

Georgia Power will address any effects of continued project operation on tribal resources through consultation conducted in a manner consistent with the Commission’s *Policy Statement on Consultation with Indian Tribes in Commission Proceedings* (18 CFR Part 2). Georgia Power is not currently aware of any potential impacts to tribal resources that would occur as a result of the proposed continued operation of the Lloyd Shoals Project.

5.0 PRELIMINARY ISSUES AND STUDIES LIST

5.1 Issues Pertaining to the Identified Resources

This section identifies potential resource issues pertaining to Georgia Power's continued operation of the Lloyd Shoals Project based on the existing resource information and data summarized in Section 4, Georgia Power's contacts with resource agencies and other interested stakeholders (Appendix A), and agency responses to the PAD Questionnaire (Appendix B). During the Commission's public scoping process (see Section 2.2), Federal and state resource agencies, Indian tribes, non-governmental organizations, and individuals will be invited to participate in refining the resource issues to be analyzed in Georgia Power's license application. The preliminary list of potential issues for consideration include:

Geology and Soils

- Effects of project operations on reservoir and tailrace shoreline erosion and sedimentation.

Water Resources

- Effects of project operations on water quality in Lake Jackson and the Ocmulgee River downstream.

Fish and Aquatic Resources

- Effects of project operations and shoreline permitting on fish habitat and aquatic resources in Lake Jackson;
- Effects of project operations on habitat for primary sport fish species, including largemouth bass and stocked striped bass, in Lake Jackson;
- Effects of project operations on riverine fish and mussel habitat downstream in the Ocmulgee River;
- Fish entrainment and turbine-induced mortality; and
- Invasive aquatic species within the project boundary.

Wildlife and Botanical Resources

- Upland exotic invasive plants within the project boundary.

Wetlands, Riparian, and Littoral Habitat

- Effects of project operations and shoreline development on reservoir wetland and littoral habitats and associated wildlife; and
- Reservoir exotic invasive aquatic vegetation.

Rare, Threatened, and Endangered Species

- Effects of project operations on Federal and state protected plants and wildlife; and
- Effects of project operations on state species of concern.

Recreation and Land Use

- Effects of daily water level changes on recreational opportunities in Lake Jackson;
- Effects of project operations on downstream recreation in the Ocmulgee River;
- Public recreational access and facilities; and
- Shoreline management.

Aesthetic Resources

- None currently known.

Cultural Resources

- Potential eligibility of project facilities for the National Register; and
- Effects of project operations on archeological historic properties.

Socio-economic Resources

- None currently known.

Tribal Resources

- None currently known.

5.2 Potential Studies or Information Gathering

This section identifies potential studies or information gathering that may be needed to fully analyze the potential resource issues identified in Section 5.1. Based upon the substantial

amount of relevant information and data available for Lake Jackson and the project vicinity (Section 4), Georgia Power believes that existing information is sufficient for most of the evaluation of resource impacts of continued project operation. However, some resource studies and additional information gathering may be necessary to fully inform the development of license requirements for the Project. Accordingly, Georgia Power lists below the resource studies it believes may be necessary to meet the information needs for FERC's NEPA review. Pending the completion of NEPA scoping and further contacts with relicensing participants, Georgia Power plans to develop these preliminary studies into detailed study plans in the Proposed Study Plan (PSP). Georgia Power will distribute the PSP for review by December 20, 2018 (Table 1).

After filing the PSP, Georgia Power will consult with the resource agencies and other participants in a Study Plan Meeting held by January 22, 2019 (Table 1). The goal of the meeting will be to discuss information gathering needs and informally resolve differences between the PSP and study requests filed by the participants. After the 90-day PSP comment period, Georgia Power will file a Revised Study Plan by April 19, 2019.

5.2.1 Preliminary Studies List

This section lists the resource studies proposed by Georgia Power for further detailed development in the PSP. The preliminary objectives, study area, and key study elements are identified for each study.

Geology and Soils

- **Objectives:** 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 data.
- **Study area:** Lands and waters within the FERC project boundary around Lake Jackson and the tailrace area; tributary watersheds upstream of the project boundary for literature review.
- **Key study elements:** A single shoreline reconnaissance survey of the project reservoir and tailrace area in 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; and literature review and analysis of the effects of shoreline structural stabilization practices on littoral zone aquatic habitats.

Water Resources

- **Objectives:** 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.
- **Study area:** Project reservoir and tailrace area within the project boundary; watershed upstream for literature review; Ocmulgee River downstream to the MWA public water supply intake near Macon.
- **Key study elements:** Analysis of seasonal water quality monitoring of the project reservoir conducted annually through 2017, including vertical profiles and water chemistry; tailrace water quality monitoring in summer 2019; and literature-based analysis of water quantity and water quality.

Fish and Aquatic Resources

- **Objectives:** Characterize representative shoreline and littoral-zone aquatic habitats occurring in the reservoir; evaluate the occurrence and distribution of native mollusks within the project boundary consistent with the Altamaha CCA for mollusks and mollusk surveys scheduled for 2018; evaluate the effects of continued project operations on summer reservoir water quality and habitat for representative sport fishes of interest, such as largemouth bass, spotted bass, and/or stocked striped bass; evaluate the effects of continued project operations on riverine aquatic habitat downstream of the Project using existing information and data from the previously conducted IFIM study and ongoing implementation of Ocmulgee CCAA for robust redhorse conservation actions through 2019; and evaluate the potential for fish entrainment and turbine-induced mortality through a desktop study.
- **Study area:** FERC project boundary around the project reservoir and tailrace area, and the Ocmulgee River downstream to Juliette Dam.
- **Key study elements:** A shoreline aquatic habitat survey conducted as part of the shoreline reconnaissance survey for erosion and sedimentation; analysis of native mollusk occurrence and habitat use within the project boundary based on existing data and a mussel survey during a scheduled drawdown of the project reservoir in fall 2018 as part of the Altamaha CCA for mollusks; analysis of GDNR standardized fisheries survey data for the project reservoir for primary sport fishes of interest; 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 CCAA for robust redhorse; desktop analysis of fish entrainment and mortality by applying trends and data from other hydroelectric sites to the physical, operational, and fisheries characteristics of the Lloyd Shoals Project.

Wildlife and Botanical Resources

- **Objectives:** Describe terrestrial wildlife and botanical resources occurring in the project area, including lists of plant and animal species that use representative habitats, and to identify invasive species.
- **Study area:** The project boundary around Lake Jackson and project lands adjacent to Lloyd Shoals Dam and the tailrace area, including the project recreation facilities.
- **Key study elements:** A single field reconnaissance survey in spring/early summer 2019 to observe and document representative terrestrial communities and associated wildlife habitat; this survey will be conducted concurrently with field surveys for wetlands, riparian, and littoral habitat and RTE species.

Wetlands, Riparian, and Littoral Habitat

- **Objectives:** Describe floodplain, wetlands, riparian habitats, and littoral habitats occurring in the project area, including lists of representative plant and animal species; identify invasive species; and prepare a map delineating wetland, riparian, and littoral habitat.
- **Study area:** The project boundary around Lake Jackson and the tailrace area.
- **Key study elements:** A single field reconnaissance survey in spring/early summer 2019 to characterize wetland, riparian, and littoral habitats; this survey will be conducted concurrently with field surveys for wildlife and botanical resources and RTE species; review of existing aerial photography, wetlands mapping, and other existing information sources.

RTE Species

- **Objectives:** List federal and state RTE plant and animal species, and species currently under federal status review, with known occurrence records near the Project; identify habitat requirements; and describe distributions and habitat use of RTE species presently occurring near the Project. Information compiled in the PAD will be reconsidered and updated based on the findings of field surveys, consultation with the resource agencies, and other new information.

- **Study area:** The project boundary around Lake Jackson, and project lands adjacent to Lloyd Shoals Dam, including the project recreation facilities.
- **Key study elements:** A field survey of the study area in 2019 to identify potentially suitable habitats for RTE species within the study area; findings will be incorporated from the concurrent field surveys for wildlife and botanical resources and wetlands, riparian, and littoral habitats; and from the analysis of fish and aquatic resources; literature review and consultation with federal and state agencies on known element of occurrence records in the project vicinity.

Recreation and Land Use

- **Objectives:** 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; evaluate the need for additional recreational access or facilities at Lake Jackson.
- **Study area:** The project boundary around Lake Jackson and the Lloyd Shoals tailrace area within the project boundary, including the project recreation facilities.
- **Key study elements:** Review and analysis of Form 80 recreational use information gathered at project recreation facilities in 2014 based on car counters, cameras, and visual observations; review and analysis of available fishing tournament information; assess the adequacy of existing facilities, determine individual access site pressure and user conflicts, and estimate the number of recreation user days per year.

Cultural Resources

- **Objectives:** Summarize known historic properties through literature site file review and review of existing archaeological and historic hydro-engineering studies and data; conduct testing and/or recovery of selected sites currently being monitored by Georgia Power to assist the development of future management plans; evaluate the potential for effects upon historic resources by the continued operation of the Project or by activities conducted along the shoreline of the project reservoir.
- **Study area:** The area of potential effect, to be identified and delineated in consultation with Georgia HPD and FERC; preliminarily to include the area between the lower daily water pool elevation and the project boundary.
- **Key study elements:** Research of existing information about the project area; further assessment of the sites being monitored by Georgia Power to determine the effectiveness of the current management plan; and development of research design in consultation with SHPO and FERC for data recovery/management at mill site (9HS23).

5.2.2 Study Requests

Although Georgia Power will be proposing the resource studies listed above, relicensing participants have the opportunity, when filing comments on this PAD, to request information gathering and studies. Comments and study requests will be due by November 5, 2018 (Table 1). FERC requires that any information or study requests address the following criteria set forth in the ILP regulations at 18 CFR § 5.9(b):

1. Describe the goals and objectives of each study proposal and the information to be obtained.
2. If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied.
3. If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study.
4. Describe existing information concerning the subject of the study proposal, and the need for additional information.
5. 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.
6. Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.
7. 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.

5.3 Relevant Comprehensive Waterway Plans

Section 10(a)(2)(A) of the Federal Power Act (FPA), 16 U.S.C. § 803(a)(2)(A), requires the Commission to consider the extent to which a project is consistent with Federal or state comprehensive plans for improving, developing, or conserving a waterway or waterways affected by the project.

On April 27, 1988, the Commission issued Order No. 481-A, revising Order no. 481, issued October 26, 1987, establishing that the Commission will accord FPA Section 10(a)(2)(A) comprehensive plan status to any Federal or state plan that:

- is a comprehensive study of one or more of the beneficial uses of a waterway or waterways;
- specifies the standards, the data, and the methodology used; and
- is filed with the Secretary of the Commission.

FERC (2018) currently lists 36 comprehensive plans for the state of Georgia. Table 27 lists 23 of those plans potentially relevant to the Project.

5.4 Relevant Resource Management Plans

5.4.1 Georgia Comprehensive State-wide Water Management Plan

The Georgia Comprehensive State-wide Water Management Plan (State Water Plan) was adopted by the Georgia General Assembly in 2008 and provides for the development of a series of regional water planning documents. The Middle Ocmulgee Regional Water Plan was one of 10 regional plans developed in Georgia to define sustainable practices to meet regional water resource needs through 2050. The Middle Ocmulgee Water Planning Region includes Lake Jackson; surrounding Butts, Newton, and Jasper Counties; and nine counties extending downstream past Macon to the upper Coastal Plain (GEPD, 2017a). The Lloyd Shoals Project is in the upstream end of the planning region. Approximately 76 percent of the region lies in the Ocmulgee River basin. The initial Plan was completed in 2011. Updates were completed in 2017. The Plan describes current water resource conditions, projects future demands, identifies resource issues, and recommends appropriate water management practices to be employed through 2050.

With the Middle Ocmulgee region's population projected to increase by 32 percent by 2050, annual average daily water demand is projected to increase 36 percent by 2050 (GEPD, 2017a). The surface water availability assessment indicates that surface water resources in the region are generally adequate to meet future water demands. High nutrient loadings, primarily nitrogen, are predicted in Lake Jackson and its tributary watersheds, including contributions from point sources in the upstream Metro Water District (Atlanta). The Plan suggests that advanced treatment eventually may be needed for wastewater treatment facilities located upstream of Lake Jackson to reduce nitrogen loadings into the reservoir.

5.4.2 Metropolitan North Georgia Water Planning District Water Management Plan

The 15-county Metro Water District, centered on Atlanta and including 982 sq mi of the upper Ocmulgee River basin upstream of Lake Jackson, coordinates its water resource management planning efforts with other regional water resource planning efforts to ensure that plans are complementary and that shared goals can be realized effectively. The Metro Water District's Water Resource Management Plan (CH2M and Black & Veatch, 2017) integrates in one document the plans for Water Supply and Conservation, Wastewater Management, and Watershed Management. It describes existing conditions and projects future conditions of the region's water resources and its water, wastewater, and watershed management infrastructure.

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TABLES

TABLE 1

Process Plan and Schedule for Relicensing the Lloyd Shoals Project (FERC No. 2336)

Activity	Responsibility	Time Frame	Date
Relicensing Information Sessions	Georgia Power	Not required	November 16, 2017
Applicant files Notice of Intent (NOI) and Pre-Application Document (PAD)	Georgia Power	18 CFR § 5.3, § 5.5, § 5.6	July 3, 2018
Initial Tribal Consultation Meeting (if necessary)	FERC	Within 30 days of filing NOI & PAD (up to Day 30) 18 CFR § 5.7	August 2, 2018
FERC notices NOI/PAD and issues Scoping Document 1 (SD1)	FERC	Within 60 days of filing NOI & PAD (up to Day 60) 18 CFR § 5.8	September 4, 2018
FERC holds Scoping Meetings/Site Visit	FERC	Within 30 days of NOI & PAD Notice & Issuance of SD1 (up to Day 90) 18 CFR § 5.8	September 13-14, 2018
Comments on PAD, SD1, and Study Requests	Stakeholders	Within 60 days of NOI & PAD notice and issuance of SD1 (up to Day 120) 18 CFR § 5.9	November 5, 2018
Applicant files Proposed Study Plan (PSP)	Georgia Power (PSP)	Within 45 days of deadline for filing comments on SD1 (up to Day 165) 18 CFR § 5.11, § 5.10	December 20, 2018
FERC issues SD2 if necessary	FERC (SD2)		
Study Plan Meeting	Georgia Power	Within 30 days of deadline for filing PSP (up to Day 195) 18 CFR § 5.11	January 22, 2019
Comments on Proposed Study Plan (PSP) filed	Stakeholders	Within 90 days after PSP is filed (up to Day 255) 18 CFR § 5.12	March 20, 2019
Revised Study Plan (RSP) filed for FERC approval	Georgia Power	Within 30 days of deadline for comments on PSP (up to Day 285) 18 CFR § 5.13	April 19, 2019
Comments on Revised Study Plan (RSP) filed	Stakeholders	Within 15 days following RSP (up to Day 300) 18 CFR § 5.13	May 6, 2019
FERC issues Study Plan Determination	FERC	Within 30 days following RSP (up to Day 315) 18 CFR § 5.13	May 20, 2019
Mandatory conditioning agencies file Notice of Formal Study Dispute Resolution if necessary	Stakeholders	Within 20 days of issuing Study Plan Determination 18 CFR § 5.14	June 10, 2019

TABLE 1

Process Plan and Schedule for Relicensing the Lloyd Shoals Project (FERC No. 2336)

Activity	Responsibility	Time Frame	Date
Determination of Formal Study Dispute if necessary	FERC	Within 70 days of Notice of Formal Study Dispute 18 CFR § 5.14	August 19, 2019
First Season Studies		May 2019 – April 2020	
Study Progress Report filed	Georgia Power	18 CFR § 5.15	January 31, 2020
Study Report filed	Georgia Power	To be filed no later than 1 year after FERC approval of Study Plan 18 CFR § 5.15	May 20, 2020
Study Results Meeting	Georgia Power	Within 15 days of Study Reports 18 CFR § 5.15	June 4, 2020
File Study Results Meeting Summary	Georgia Power	Within 15 days of Study Results Meeting 18 CFR § 5.15	June 19, 2020
File Study Results Meeting Summary Disagreements and/or Modified or New Study Requests	Stakeholders	Within 30 days of Study Results Meeting Summary filing 18 CFR § 5.15	July 20, 2020
File Response to Study Results Meeting Summary Disagreements and/or Modified or New Study Requests	Georgia Power	Within 30 days of filing response to Study Results Meeting Summary Disagreements and/or Modified or New Study Requests 18 CFR § 5.15	August 19, 2020
FERC resolves disagreements (and modifies Study Plan if necessary)	FERC	Within 30 days of filing response to Study Results Meeting Summary Disagreements and/or Modified or New Study Requests 18 CFR § 5.15	September 18, 2020
Second Season Studies (if necessary)		May 2020 – April 2021	
Study Progress Report Filed	Georgia Power	18 CFR § 5.15	January 29, 2021
Updated Study Report filed	Georgia Power	To be filed no later than 2 years after FERC approval of Study Plan 18 CFR § 5.15	May 20, 2021
Updated Study Results Meeting	Georgia Power	Within 15 days of Updated Study Reports 18 CFR § 5.15	June 3, 2021
Conduct Preliminary Licensing Proposal Meeting	Georgia Power	Not required	June 3, 2021
File Updated Study Results Meeting Summary	Georgia Power	Within 15 days of Updated Study Results Meeting 18 CFR § 5.15	June 18, 2021

TABLE 1

Process Plan and Schedule for Relicensing the Lloyd Shoals Project (FERC No. 2336)

Activity	Responsibility	Time Frame	Date
File Preliminary Licensing Proposal (PLP)	Georgia Power	No later than 150 days before License Application is filed 18 CFR § 5.16	July 1, 2021
File Updated Study Results Meeting Summary Disagreements	Stakeholders	Within 30 days of Updated Study Results Meeting Summary filing 18 CFR § 5.15	July 19, 2021
File Response to Updated Study Results Meeting Summary Disagreements	Georgia Power	Within 30 days of filing response to Updated Study Results Meeting Summary Disagreements 18 CFR § 5.15	August 18, 2021
FERC resolves Meeting Summary Disagreements	FERC	Within 30 days of filing response to Updated Study Results Meeting Summary Disagreements 18 CFR § 5.15	September 17, 2021
Comments due on Preliminary Licensing (PLP) Proposal	Stakeholders	Within 90 days of filing PLP 18 CFR § 5.16	September 29, 2021
File License Application	Georgia Power	2 years prior to current license expiration 18 CFR § 5.17	December 31, 2021

TABLE 2
Nameplate Generating Capacity and Hydraulic Capacity of the Lloyd Shoals Turbine Units

Unit	Nameplate Capacity of Turbines (hp)	Nameplate Capacity of Generators (MW)	Maximum Hydraulic Capacity (cfs)	Commercial Operation Date
1	5,650	3	620	1911
2	5,650	3	620	1911
3	5,650	3	620	1911
4	5,650	3	620	1911
5	5,650	3	620	1916
6	5,650	3	620	1917
Total	33,900	18	3,720	

TABLE 3
Lloyd Shoals Average Monthly and Average Annual Generation for 1997-2016

Month	1997 through 2016 Average Generation (MWh)
January	7,085
February	7,743
March	8,359
April	6,994
May	5,482
June	4,312
July	3,946
August	3,234
September	2,950
October	2,967
November	4,086
December	5,980
Annual	63,139

TABLE 4
Summary of Lloyd Shoals Project Generation and Outflow Records for 2012-2016

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Total	Monthly Min	Monthly Max
Monthly Generation (MWh):															
2012	4,742	3,559	6,046	2,089	1,205	447	1,469	607	297	2,153	405	4,156	27,175	297	6,046
2013	5,843	8,587	9,289	9,142	9,060	9,134	11,237	6,990	2,937	2,215	2,323	7,539	84,296	2,215	11,237
2014	8,051	9,034	8,621	10,126	6,198	3,167	3,044	2,737	2,705	2,905	3,261	5,396	65,245	2,705	10,126
2015	7,658	7,438	8,517	10,701	6,565	5,411	3,186	4,079	3,490	5,669	10,701	5,998	79,413	3,186	10,701
2016	8,714	10,171	9,987	7,769	4,508	2,155	1,762	1,618	782	873	753	2,312	51,404	753	10,171
Average	7,002	7,758	8,492	7,965	5,507	4,063	4,140	3,206	2,042	2,763	3,489	5,080	61,507	1,831	9,656
Monthly Discharge (cfs)^a:															
2012	595	1,264	763	550	468	270	461	316	254	654	256	1,063		254	1,264
2013	1,282	6,734	2,754	2,059	1,956	2,399	2,992	1,601	748	563	590	2,841		563	6,734
2014	1,197	2,284	2,251	2,385	1,583	870	837	908	749	864	921	1,823		749	2,385
2015	876	2,602	1,696	4,545	1,540	1,371	850	1,021	907	1,331	4,844	8,981		850	8,981
2016	3,912	4,423	1,967	1,512	950	658	609	561	361	283	251	604		251	4,423
Average	1,572	3,461	1,886	2,210	1,299	1,114	1,150	881	604	739	1,372	3,063		534	4,757

^a The drainage basin for Lloyd Shoals Dam is 98.6 percent of the drainage basin of the USGS gage Ocmulgee River near Jackson, GA (No. 02210500).

TABLE 5
 Monthly Minimum, Mean, and Maximum Calculated Inflow by Month at Lloyd Shoals Dam, 1997-2016

Month	Minimum Flow (cfs)	Mean Flow (cfs)	Maximum Flow (cfs)
January	923	2,138	5,236
February	970	2,772	6,714
March	1,413	2,995	6,668
April	654	2,199	4,654
May	444	1,644	6,780
June	346	1,296	3,968
July	366	1,409	6,565
August	269	908	2,838
September	218	1,125	5,037
October	151	970	3,514
November	289	1,452	5,035
December	611	2,105	8,144

TABLE 6

Tributaries to Lake Jackson Not Supporting Designated Use Classifications

Stream Name	Location Description	Criterion Violated ^b	Potential Causes ^c	Notes
Alcovy River	Wrights Creek to Bear Creek/Jackson Lake	FC	NP	None
Almand Branch ^a	Tanyard Branch to Snapping Shoals	FC	UR	TMDL completed FC (2002 & 2007).
Big Cotton Indian Creek ^a	Panther Creek to Brush Creek	FC	NP	TMDL completed FC 2002.
Tusshaw Creek	Wolf Creek to Lake Jackson	FC, Bio F	NP	TMDL completed FC (2002 & 2007).
Snapping Shoals Creek ^a	Almand Branch to South River	FC, Bio F	UR	TMDL completed FC (2002 & 2007) & Bio F (2007).
Big Haynes Creek ^a	Little Haynes Creek to Yellow River	FC	UR	TMDL completed FC (2002 & 2007).
Brown Branch ^a	Headwaters (Locust Grove) to Wolf Creek	Bio F	NP	TMDL completed Bio F (2002 & 2007).
Peeksville Creek ^a	Headwaters to Tusshaw Creek	Bio F	NP	None
Malholms Creek ^a	Headwaters(Jenkinsburg) to Tusshaw Creek	Bio F	NP	TMDL completed Bio F (2002 & 2007).
Island Shoal Creek ^a	Headwaters to Mackey Creek	Bio F	NP	TMDL completed Bio F 2007.
Dried Indian Creek ^a	Headwaters to Yellow River	Bio F	UR, NP	TMDL completed Bio F (2007).
Honey Creek ^a	Headwaters to South River	FC	NP	TMDL completed FC (2002 & 2007).
McClain Branch ^a	Headwaters to Honey Creek	FC	UR	TMDL completed FC (2002 & 2007).
Rocky Creek	Headwaters to Lake Jackson	Bio F	NP	TMDL completed Bio F (2002 & 2007).
South River	Hwy 20 to Snapping Shoals Creek	FC, FCG(PCBs)	NP	TMDLs completed FC (2007), FCG(PCBs) (2002).
South River ^a	Pole Bridge Creek to Hwy 20	FC, FCG(PCBs)	UR, CSO	TMDLs Completed FC (2002 & 2007), FCG(PCBs) 2002.
Tributary to Tusshaw Creek ^a	Headwaters to Tusshaw Creek	Bio F	NP	None

TABLE 6
Tributaries to Lake Jackson Not Supporting Designated Use Classifications

Stream Name	Location Description	Criterion Violated ^b	Potential Causes ^c	Notes
Tussahaw Creek	Wolf Creek to Lake Jackson	Bio F	NP	TMDL completed FC (2002 & 2007)
Walnut Creek ^a	Downstream McDonough Walnut Creek WPCP	FC	NP, UR	None
Yellow River	Big Haynes Creek to Jackson Lake	FC	UR	TMDL completed FC (2002 & 2007).
Caney Fork Creek ^a	Headwaters to Beaverdam Creek	Bio F	NP, UR	None
Wolf Creek ^a	Headwater to Little Cotton Indian Creek	Bio F	UR	None

Source: GEPD (2016).

^a Noncontiguous with project boundary.

^b FC = fecal coliform; Bio F = biota (fish community); FCG = fish consumption guidelines; PCBs = polychlorinated biphenyls.

^c NP = non-point source; UR = urban runoff; CSO = combined sewer overflow.

TABLE 7
 Summary of Georgia Power Water Chemistry Data for the Lloyd Shoals Project, 2000-2017

Analyte	Units	Criterion	JA1				JA2			
			Number	Minimum	Average	Maximum	Number	Minimum	Average	Maximum
Alkalinity	mg/L	NA	53	15	29	40	12	11	26	39
Ammonia	mg/L	NA	50	0	0.041	0.18	11	0.03	0.059	0.1
Calcium	mg/L	NA	51	4.7	8.3	14	9	4	7.4	11
Chlorophyll-a	µg/L	20 ¹⁰	55	0.4	6.0	16	11	2.2	9.8	17
Fecal Coliform	Col/100mL	NA	43	0	5.1	64	Not analyzed			
Hardness	mg/L	NA	52	0	28.4	45	9	16	26.4	36
Iron	ug/L	NA	3	0.12	4.4	13	Not analyzed			
Magnesium	mg/L	NA	51	1.3	2.0	3.9	9	1.3	2.0	2.6
Manganese	mg/L	NA	3	0.096	3.2	7.9	Not analyzed			
Nitrate	mg/L	10	53	0	0.46	1.09	11	0.0269	0.32	0.768
Nitrite	mg/L	NA	53	0	0.012	0.0793	11	0	0.010	0.0398
Total Phosphorus	mg/L	NA	54	0	0.017	0.070	11	0.010	0.018	0.030
Turbidity	NTU	NA	53	1.4	6.9	90	12	2.3	5.8	27

Analyte	Units	Criterion	JA4				JA6			
			Number	Minimum	Average	Maximum	Number	Minimum	Average	Maximum
Alkalinity	mg/L	NA	12	24	32	54	12	11	26	40
Ammonia	mg/L	NA	11	0.05	0.079	0.12	11	0.02	0.045	0.11
Calcium	mg/L	NA	9	7.5	11.1	20	9	4	7.4	11
Chlorophyll-a	µg/L	20 ⁶	11	1.4	6.6	19	11	2.3	12.6	21
Fecal Coliform	Col/100mL	NA	Not analyzed				Not analyzed			
Hardness	mg/L	NA	9	27	38.7	63	9	15	26.7	38
Iron	ug/L	NA	Not analyzed				Not analyzed			
Magnesium	mg/L	NA	9	2	2.7	3.4	9	1.2	2.0	2.5
Manganese	mg/L	NA	Not analyzed				Not analyzed			
Nitrate	mg/L	10	11	0.434	1.32	2.2	11	0.0862	0.37	0.82
Nitrite	mg/L	NA	11	0	0.013	0.0636	11	0	0.015	0.084
Total Phosphorus	mg/L	NA	11	0.030	0.042	0.060	11	0.020	0.027	0.040
Turbidity	NTU	NA	12	6.7	17.5	35	12	2.2	8.4	38

¹⁰ Chlorophyll-a criterion: for the months of April through October, the average of monthly midchannel photic zone composite samples shall not exceed 20 µg/L 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 more than once in a five-year period.

TABLE 8
 Summary of GEPD Water Chemistry Data for Lake Jackson, 2001-2014

Parameter	Units	Number	Minimum	Average	Maximum
Alkalinity	mg/L	168	10	26.3	43
Ammonia as NH3	mg/L	168	ND	0.015	0.22
BOD	mg/L	166	NB	0.17	2.7
Calcium carbonate	mg/L	37	13	24.1	39
Carbon, Total Organic (Toc)	mg/L	207	1.8	3.7	7.4
Chlorophyll-a	µg/L	78	0.87	10.7	24
Fecal Coliform	MPN	180	ND	27	900
Hardness, Ca, Mg	mg/L	204	7.6	28.1	58
Nitrate and nitrite as N	mg/L	207	ND	0.53	1.2
Kjeldahl nitrogen	mg/L	199	ND	0.43	5.2
Orthophosphate as P	mg/L	111	ND	0.001	0.04
pH	s.u.	105	6.7	7.6	9.2
Phosphate-phosphorus as P	mg/L	93	ND	0.02	0.04
Solids, Fixed	mg/L	74	1.7	7.2	29
Turbidity	NTU	205	1.2	6.8	40

Source: EPA's STORET (2017) from two locations in the lake (in the forebay near the dam and near the confluence of the Alcovy and South River embayments); data for the two stations are combined.

TABLE 9
Summary of Lloyd Shoals Tailrace Dissolved Oxygen in Summer 2006 and 2007 with Turbine Aeration On for Three Units

Parameter	July-September 2006			June-August 2007	
	Unit 2 Intake ¹	Weir ²	Butts Co. Water Intake ³	Unit 2 Intake ¹	Weir ²
Number of hourly observations	9,537	7,613	8,172	9,302	9,064
Number < 4 mg/L	3,073	19	402	8,046	1
Percent < 4 mg/L	32%	0.2%	4.9%	86.5%	0.01%
Number of daily averages	104	85	93	98	95
Number < 5 mg/L	43	0	25	93	0
Minimum DO (mg/L)	0.04	6.0	3.4	0.01	6.4
Maximum Daily Average (mg/L)	9.8	11.6	8.1	9.2	8.4
Average DO (mg/L)	5.45	8.56	5.83	1.88	7.27

¹ Intake was measured at a fixed elevation on the upstream side of the Unit 2 turbine.

² Upstream end of labyrinth weir downstream of the dam. Monitor installed at fixed elevation below top of weir.

³ Butts County WSA intake location was approximately 1 mile downstream of the dam and was monitored only in 2006.

TABLE 10

Fishes Known to Occur in the Vicinity of the Lloyd Shoals Project Based on Historical and Recent Records

Family/Scientific Name	Common Name	Lake Jackson	Tributaries to Lake Jackson				Ocmulgee River to Juliette Dam
			South River	Yellow River	Alcovy River	Tusahaw Creek	
GARS:							
<i>Lepisosteus osseus</i>	longnose gar	X		X	X	X	X
FRESHWATER EELS:							
<i>Anguilla rostrata</i>	American eel		X		X	X	X
HERRINGS AND SHADS:							
<i>Alosa sapidissima</i>	American shad						X
<i>Dorosoma cepedianum</i>	gizzard shad	X	X	X	X	X	X
<i>Dorosoma petenense</i>	threadfin shad ^a	X	X	X	X	X	X
MINNOWS:							
<i>Campostoma pauciradii</i>	bluefin stoneroller						X
<i>Cyprinella callisema</i>	Ocmulgee shiner		X	X	X	X	X
<i>Cyprinella lutrensis</i>	red shiner ^a		X				
<i>Cyprinella xaenura</i>	Altamaha shiner ^b		X	X	X	X	X
<i>Cyprinus carpio</i>	common carp ^a	X	X		X	X	X
<i>Hybognathus regius</i>	Eastern silvery minnow						X
<i>Hybopsis rubrifrons</i>	rosyface chub		X	X	X	X	X
<i>Nocomis leptcephalus</i>	bluehead chub		X	X	X	X	X
<i>Notemigonus crysoleucas</i>	golden shiner	X	X	X	X	X	X
<i>Notropis amplamalma</i>	longjaw minnow		X		X	X	X
<i>Notropis hudsonius</i>	spottail shiner	X	X	X	X	X	X
<i>Notropis longirostrus</i>	longnose shiner					X	
<i>Notropis lutipinnis</i>	yellowfin shiner		X	X	X	X	X
<i>Notropis petersoni</i>	coastal shiner				X		X
<i>Notropis texanus</i>	weed shiner					X	
<i>Opsoeodus emiliae</i>	pugnose minnow						X

TABLE 10

Fishes Known to Occur in the Vicinity of the Lloyd Shoals Project Based on Historical and Recent Records

Family/Scientific Name	Common Name	Lake Jackson	Tributaries to Lake Jackson				Ocmulgee River to Juliette Dam
			South River	Yellow River	Alcovy River	Tussahaw Creek	
SUCKERS:							
<i>Carpiodes sp. cf. cyprinus</i>	quillback	X					X
<i>Carpiodes sp. cf. velifer</i>	highfin carpsucker						X
<i>Erimyzon oblongus</i>	creek chubsucker		X			X	X
<i>Minytrema melanops</i>	spotted sucker	X				X	X
<i>Moxostoma collapsum</i>	notchlip redhorse		X	X	X	X	X
<i>Moxostoma robustum</i>	robust redhorse ^c						X
<i>Moxostoma rupiscartes</i>	striped jumprock		X	X	X	X	X
<i>Moxostoma sp. cf. lachneri</i>	brassy jumprock		X	X			X
CATFISHES:							
<i>Ameiurus brunneus</i>	snail bullhead	X	X	X	X	X	X
<i>Ameiurus catus</i>	white catfish	X	X	X	X	X	X
<i>Ameiurus natalis</i>	yellow bullhead	X	X	X	X	X	X
<i>Ameiurus nebulosus</i>	brown bullhead	X	X	X	X	X	X
<i>Ameiurus platycephalus</i>	flat bullhead	X					X
<i>Ictalurus furcatus</i>	blue catfish ^a	X			X	X	
<i>Ictalurus punctatus</i>	channel catfish	X	X	X	X	X	X
<i>Noturus insignis</i>	marginated madtom		X	X	X	X	X
<i>Noturus leptacanthus</i>	speckled madtom		X			X	X
<i>Pylodictus olivaris</i>	flathead catfish ^a	X					X
PIKES:							
<i>Esox americanus</i>	redfin pickerel					X	X
<i>Esox niger</i>	chain pickerel	X	X	X	X	X	X
SILVERSIDES:							
<i>Labidesthes sicculus</i>	brook silverside	X					

TABLE 10

Fishes Known to Occur in the Vicinity of the Lloyd Shoals Project Based on Historical and Recent Records

Family/Scientific Name	Common Name	Lake Jackson	Tributaries to Lake Jackson				Ocmulgee River to Juliette Dam
			South River	Yellow River	Alcovy River	Tussahaw Creek	
LIVEBEARERS:							
<i>Gambusia holbrooki</i>	eastern mosquitofish	X	X	X	X	X	X
TEMPERATE BASSES:							
<i>Morone chrysops</i>	white bass ^a	X			X	X	X
<i>Morone saxatilis</i>	striped bass	X					X
<i>Morone chrysops</i> x <i>M. saxatilis</i>	hybrid bass	X	X	X	X	X	X
SUNFISHES:							
<i>Centrarchus macropterus</i>	flier						X
<i>Lepomis auritus</i>	redbreast sunfish	X	X	X	X	X	X
<i>Lepomis cyanellus</i>	green sunfish ^a	X	X	X	X	X	X
<i>Lepomis gulosus</i>	warmouth	X	X	X	X	X	X
<i>Lepomis macrochirus</i>	bluegill	X	X	X	X	X	X
<i>Lepomis marginatus</i>	dollar sunfish	X					X
<i>Lepomis megalotis</i>	longear sunfish ^a	X				X	X
<i>Lepomis microlophus</i>	redecor sunfish	X	X	X	X	X	X
<i>Micropterus cataractae</i>	shoal bass ^a						X
<i>Micropterus punctulatus</i>	spotted bass ^a	X					X
<i>Micropterus salmoides</i>	largemouth bass	X	X	X	X	X	X
<i>Micropterus sp. cf. coosae</i>	redecor bass					X	X
<i>Micropterus sp.</i>	Altamaha bass						X
<i>Pomoxis annularis</i>	white crappie ^a	X	X	X			X
<i>Pomoxis nigromaculatus</i>	black crappie	X	X	X	X	X	X
PERCHES:							
<i>Perca flavescens</i>	yellow perch ^a	X	X	X	X	X	X
<i>Percina nigrofasciata</i>	blackbanded darter						X

TABLE 10

Fishes Known to Occur in the Vicinity of the Lloyd Shoals Project Based on Historical and Recent Records

Family/Scientific Name	Common Name	Lake Jackson	Tributaries to Lake Jackson				Ocmulgee River to Juliette Dam
			South River	Yellow River	Alcovy River	Tussehaw Creek	
<i>Etheostoma hopkinsi</i>	Christmas darter						X
<i>Etheostoma inscriptum</i>	turquoise darter		X		X	X	X
<i>Etheostoma olmstedi</i>	tessellated darter						X
<i>Etheostoma parvipinne</i>	goldstripe darter						X
Estimated Number of Taxa		34	37	31	36	43	61

Data sources: EA (1990a, 1990b, 1990c); Straight et al. (2009); GDNR (2018a, 2018b); Bart et al. (1994); Grabowski and Jennings (2009); Nuckols and Roghair (2004); Pruitt (2013); Lee et al. (1980).

^a Introduced, non-native to the Altamaha River basin (GEPD, 2003; Bart et al., 1994; Lee et al., 1980).

^b Altamaha shiner is Georgia state-listed as threatened.

^c Robust redhorse is Georgia state-listed as endangered and is under review for federal listing.

TABLE 11
Summary of GDNR Electrofishing Data for Lake Jackson, 2013-2017

Common Name	Mean Catch per Hour (CPH) ^a and Standard Error (SE) ^b									
	2013		2014		2015		2016		2017	
	CPH	SE	CPH	SE	CPH	SE	CPH	SE	CPH	SE
Bluegill	44.92	7.82	17.27	3.13	30.30	7.71	58.79	4.95	31.82	5.44
Largemouth bass	40.63	7.39	33.94	5.42	25.87	2.56	38.18	7.12	39.09	8.32
Black crappie	22.42	3.22	21.21	7.11	26.26	2.02	60.61	21.21	37.37	24.14
Redear sunfish	19.15	5.46	25.93	3.82	32.66	5.19	33.03	6.72	32.32	4.34
Spotted bass	12.05	3.31	12.73	2.20	39.39	8.97	23.23	7.42	15.66	3.36
Redbreast sunfish	13.48	4.05	7.58	1.71	20.20	7.61	26.89	7.69	17.88	4.37

Common Name	Mean Relative Condition Factor (K _n) ^c and Standard Error (SE) ^b									
	2013		2014		2015		2016		2017	
	K _n	SE	K _n	SE	K _n	SE	K _n	SE	K _n	SE
Bluegill	0.99	0.02	1.00	0.02	1.04	0.02	1.00	0.01	1.01	0.02
Largemouth bass	0.88	0.01	0.86	0.01	0.93	0.01	0.92	0.01	0.94	0.02
Black crappie	0.91	0.01	0.88	0.01	0.91	0.01	0.92	0.01	0.90	0.01
Redear sunfish	1.03	0.02	1.12	0.01	1.18	0.02	1.03	0.01	1.06	0.01
Spotted bass	1.01	0.02	0.99	0.02	0.96	0.01	0.97	0.02	1.03	0.03
Redbreast sunfish	0.98	0.04	0.96	0.03	1.03	0.03	0.94	0.02	1.00	0.02

Source: GDNR (2018a) unpublished standardized survey data; electrofishing data are summarized for selected sport fish species.

^a Calculated as the annual mean of the station catch rates (catch per hour) by species.

^b Standard error of the mean.

^c Calculated as the annual mean of the mean relative condition factor (K_n) by species per station.

TABLE 12
Summary of GDNR Gill Netting Data for Lake Jackson, 2013-2017

Common Name	Mean Catch per Effort (CPE) ^a and Standard Error (SE) ^b										Percent Total Weight ^c				
	2013		2014		2015		2016		2017		2013	2014	2015	2016	2017
	CPE	SE	CPE	SE	CPE	SE	CPE	SE	CPE	SE					
Black crappie	17.00	7.41	17.50	5.26	11.10	1.63	25.20	6.23	17.80	3.32	6.7	12.3	6.1	18.4	9.1
Gizzard shad	7.63	1.14	28.22	19.59	9.40	1.30	11.39	2.17	5.11	0.95	15.1	46.6	37.4	45.0	14.9
Channel catfish	4.38	0.91	4.90	1.30	6.40	0.87	5.70	0.52	6.50	1.04	15.5	10.0	13.0	13.9	13.4
Hybrid bass	2.00	0.00	5.00	2.12	5.67	1.24	3.43	0.72	5.75	2.95	0.5	3.2	9.8	3.4	5.7
Blue catfish	1.50	0.50	4.00	0.68	5.88	1.67	2.71	0.78	4.60	1.86	3.3	22.6	15.8	14.1	8.8
Longnose gar	5.19	1.03	0.00	--	2.75	0.85	0.00	--	2.08	0.57	54.9	0.0	10.4	0.0	23.1
Striped bass	1.00	0.00	1.33	0.33	1.00	0.00	1.67	0.67	4.80	2.13	0.5	1.2	3.9	1.8	8.4
Spotted bass	1.00	0.00	1.40	0.40	1.33	0.33	1.83	0.54	2.60	1.36	0.0	0.8	0.5	0.8	1.3
Spotted sucker	1.50	0.50	0.00	--	1.00	0.00	0.00	--	1.90	0.35	1.4	0.0	0.4	0.0	13.3

Source: GDNR (2018a) unpublished standardized survey data; gill netting data are summarized for selected sport fish and forage species.

^a Calculated as the annual mean of the station catch rates (catch per net night) by species.

^b Standard error of the mean.

^c Calculated as the total species weight in a given year divided by the total weight for all species in that year.

TABLE 13

Bass Tournament Statistics for Lake Jackson, 1996-2015

Year	Number of Tournaments Analyzed	Number of Angler Hours	Bass Weighed-in/ Angler Hour	Lbs. Weighed-in/ Angler Hour	Average Bass Weight (lbs)	Average Largest Bass (lbs)	Percent Bass as Largemouth
1996	55	NA	0.142	0.203	1.56	3.79	95.5
1997	55	7,456	0.208	0.304	1.47	3.99	95.2
1998	53	6,708	0.178	0.244	1.43	3.60	89.9
1999	43	5,778	0.215	0.307	1.42	3.68	81.6
2000	53	6,393	0.191	0.268	1.45	3.54	75.0
2001	50	6,428	0.164	0.226	1.37	3.51	74.9
2002	48	5,556	0.209	0.296	1.50	3.71	62.8
2003	32	3,339	0.233	0.353	1.62	3.76	56.3
2004	41	4,695	0.210	0.331	1.69	3.91	55.4
2005	38	4,201	0.223	0.371	1.69	4.38	57.3
2006	26	3,019	0.229	0.364	1.60	4.20	52.4
2007	44	4,696	0.270	0.418	1.57	3.49	43.2
2008	36	3,851	0.263	0.391	1.52	4.16	37.9
2009	28	2,854	0.251	0.384	1.56	3.68	41.9
2010	21	1,827	0.186	0.294	1.65	3.12	52.1
2011	23	2,283	0.236	0.418	1.77	4.09	50.4
2012	13	1,571	0.239	0.375	1.65	4.09	37.3
2013	14	1,986	0.283	0.374	1.35	3.15	41.9
2014	12	1,338	0.290	0.432	1.52	3.96	42.3
2015	15	1,553	0.275	0.387	1.44	3.65	28.8

Source: GBCF (1996-2015).

TABLE 14

Summary of Available Habitat Expressed as Percentage of Maximum Weighted Usable Area (PMWUA) for Each Species Life Stage versus Discharge in the Ocmulgee River

Species – Life Stage ^a	Discharge (cfs)																			
	50	75	100	125	150	175	200	250	300	350	400	450	600	800	1000	1300	1500	2000	2500	3500
Altamaha shiner – YOY	52	65	71	77	81	84	86	91	95	97	99	100	97	93	83	72	64	43	31	20
Altamaha shiner – adult	48	57	64	70	76	80	83	88	92	96	98	97	100	97	92	82	75	60	49	33
Redeye bass – YOY	90	94	97	98	99	100	100	99	98	96	94	91	83	74	66	56	51	40	32	21
Redeye bass – juvenile	65	70	73	77	80	83	84	87	90	94	95	96	100	100	98	93	87	71	57	34
Redeye bass – adult	39	46	53	58	63	67	71	75	77	82	86	89	94	98	100	96	93	83	74	55
Redbreast sunfish – spawn	84	90	93	96	98	99	100	100	100	98	97	96	87	78	69	59	54	45	40	31
Redbreast sunfish – adult	67	74	77	82	84	87	89	92	93	95	97	98	100	100	98	90	85	68	49	29
Shoal bass – YOY	93	98	98	100	99	98	96	92	88	86	82	77	65	52	42	31	26	19	15	11
Shoal bass – adult	41	47	54	58	62	67	70	76	82	87	91	93	97	100	97	90	86	74	59	41
Striped jumprock – YOY	98	99	99	100	99	98	96	90	84	81	75	69	54	39	27	20	17	14	11	8
Striped jumprock – adult	45	53	61	66	71	75	79	85	90	92	95	97	99	100	97	91	87	74	62	39
Silver redhorse – adult	39	47	52	57	60	64	67	72	77	80	83	85	91	99	99	100	99	89	74	50

Source: Instream flow study conducted by EA (1990c).

Note: Highlighting indicates the current Lloyd Shoals minimum flow target of 400 cfs (or inflow whichever is less).

^a YOY = young-of-year.

TABLE 15
Freshwater Mollusk Occurrences in the Vicinity of the Lloyd Shoals Project, 2008-2014

Scientific Name	Common Name	Lake Jackson ^{a,b}	Yellow River ^a	Alcovy River ^a	Ocmulgee River ^b
MUSSELS:					
Unionidae:					
<i>Alasmidonta arcula</i>	Altamaha arc mussel ^d	X			X
<i>Elliptio</i> sp. cf. <i>angustata</i>	Carolina lance			X ^c	X
<i>Elliptio hopetonensis</i>	Alabama slabshell				X
<i>Elliptio</i> sp.	Elliptio				X
<i>Pyganondon gibbosa</i>	Inflated floater	X			
<i>Utterbackia imbecillis</i>	Paper pondshell	X	X		
<i>Villosa delumbis</i>	Eastern creekshell			X	
SNAILS:					
Hydrobiidae:					
<i>Somatogyrus alcoviensis</i>	Reverse pebblesnail ^e			X	
Viviparidae:					
<i>Campeloma</i> sp.	Campeloma	X			X
Pleuroceridae:					
<i>Elimia catenaria</i>	Gravel elimia			X	
<i>Elimia</i> sp.	Elimia			X	X
Physidae:					
<i>Physa</i> sp.	Physa				X
Planorbidae:	Ramshorn				X

Source: GDNR Nongame Conservation Section file data; Georgia Power (2017b).

^a Newton County.

^b Jasper County.

^c Based on dead shell(s) only.

^d Georgia state-listed as threatened.

^e Petitioned for federal listing; under review.

TABLE 16

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

Scientific Name	Common Name	Category	Aquatic- Wetland/Riparian	Oconee NF	Piedmont NWR
<i>Ailanthus altissima</i>	tree-of-heaven	1	--	X	--
<i>Albizia julibrissin</i>	mimosa	1	--	X	X
<i>Alternanthera philoxeroides</i>	alligatorweed	1	X	--	--
<i>Arthraxon hispidus</i>	small carpetgrass	1 Alert	--	--	--
<i>Celastrus orbiculatus</i>	Oriental bittersweet	1 Alert	--	--	--
<i>Elaeagnus umbellata</i>	autumn olive	1	--	X	--
<i>Hedera helix</i>	English ivy	1	--	X	--
<i>Imperata cylindrica</i>	cogongrass	1 Alert	--	--	X
<i>Lespedeza bicolor</i>	shrubby lespedeza	1	--	X	--
<i>Lespedeza cuneata</i>	sericea lespedeza	1	--	X	--
<i>Ligustrum sinense</i>	Chinese privet	1	X	X	X
<i>Lonicera japonica</i>	Japanese honeysuckle	1	X	X	X
<i>Melia azedarach</i>	chinaberry	1	--	X	X
<i>Microstegium vimineum</i>	Japanese stiltgrass	1	X	X	X
<i>Murdannia keisak</i>	marsh dayflower	1	X	--	--
<i>Paulownia tomentosa</i>	princess tree	1	--	X	--
<i>Pueraria montana</i>	kudzu	1	--	X	X
<i>Rosa multiflora</i>	multiflora rose	1	--	X	--
<i>Wisteria sinensis</i>	Chinese wisteria	1	--	X	X

Sources: Georgia EPPC (2006); University of Georgia Center for Invasive Species and Ecosystem Health (2017); FS (2011); FWS (2010).

TABLE 17

Summary of Bird Surveys Conducted in the Vicinity of the Lloyd Shoals Project Since 1994

Scientific Name	Common Name	Breeding Bird Surveys (Average Birds/Route)			CBC (Average Birds/Count)
		Rutledge Route (1994-2009)	Juliette Route (1994-2016)	Piedmont NWR Route (1994-2003)	Piedmont NWR (1994-2016)
<i>Corvus brachyrhynchos</i>	American Crow	59.5	77.1	29.8	262.0
<i>Cardinalis</i>	Northern Cardinal	46.6	53.5	44.1	133.1
<i>Passerina cyanea</i>	Indigo Bunting	36.3	15.9	14.3	
<i>Zenaida macroura</i>	Mourning Dove	32.4	18.3	15.1	104.6
<i>Thryothorus ludovicianus</i>	Carolina Wren	25.6	12.5	23.0	68.8
<i>Pipilo erythrophthalmus</i>	Eastern Towhee	22.6	26.8	38.9	102.0
<i>Baeolophus bicolor</i>	Tufted Titmouse	20.9	33.9	34.9	95.6
<i>Quiscalus quiscula</i>	Common Grackle	19.5	12.4	1.9	146.5
<i>Mimus polyglottos</i>	Northern Mockingbird	19.5	20.8	0.2	27.6
<i>Sturnella magna</i>	Eastern Meadowlark	18.9	5.6		25.3
<i>Cyanocitta cristata</i>	Blue Jay	18.5	34.2	13.1	100.3
<i>Setophaga pinus</i>	Pine Warbler	17.7	20.2	54.9	119.6
<i>Melanerpes carolinus</i>	Red-bellied Woodpecker	17.4	11.5	13.7	62.1
<i>Icteria virens</i>	Yellow-breasted Chat	14.9	16.6	18.6	
<i>Polioptila caerulea</i>	Blue-gray Gnatcatcher	14.1	1.5	9.3	0.1
<i>Sturnus vulgaris</i>	European Starling	14.0	5.4		103.8
<i>Passerina caerulea</i>	Blue Grosbeak	13.8	2.9	2.3	
<i>Spizella passerina</i>	Chipping Sparrow	12.9	10.0	4.7	599.3
<i>Agelaius phoeniceus</i>	Red-winged Blackbird	12.1	1.6	0.2	929.3
<i>Poecile carolinensis</i>	Carolina Chickadee	11.9	13.7	14.4	119.2
<i>Sialia sialis</i>	Eastern Bluebird	10.4	14.9	1.6	128.7
<i>Molothrus ater</i>	Brown-headed Cowbird	9.8	1.7	1.5	22.0
<i>Vireo olivaceus</i>	Red-eyed Vireo	9.7	6.6	37.3	
<i>Contopus virens</i>	Eastern Wood-Pewee	9.4	6.4	14.0	
<i>Myiarchus crinitus</i>	Great Crested Flycatcher	8.9	10.8	20.6	
<i>Hylocichla mustelina</i>	Wood Thrush	8.9	9.5	20.7	
<i>Piranga rubra</i>	Summer Tanager	8.9	5.5	29.5	
<i>Vireo griseus</i>	White-eyed Vireo	8.2	8.1	2.6	0.6
<i>Colinus virginianus</i>	Northern Bobwhite	8.1	3.7	5.0	6.4
<i>Sayornis phoebe</i>	Eastern Phoebe	7.9	8.4	0.2	37.9

TABLE 17

Summary of Bird Surveys Conducted in the Vicinity of the Lloyd Shoals Project Since 1994

Scientific Name	Common Name	Breeding Bird Surveys (Average Birds/Route)			CBC (Average Birds/Count)
		Rutledge Route (1994-2009)	Juliette Route (1994-2016)	Piedmont NWR Route (1994-2003)	Piedmont NWR (1994-2016)
<i>Chaetura pelagica</i>	Chimney Swift	7.8	14.9	0.9	
<i>Hirundo rustica</i>	Barn Swallow	7.5	6.5	0.1	
<i>Toxostoma rufum</i>	Brown Thrasher	7.5	12.2	2.3	11.2
<i>Passer domesticus</i>	House Sparrow	7.5	0.5		8.1
<i>Tyrannus tyrannus</i>	Eastern Kingbird	6.6	2.9	1.5	0.0
<i>Coccyzus americanus</i>	Yellow-billed Cuckoo	6.4	4.1	6.1	
<i>Setophaga discolor</i>	Prairie Warbler	6.2	4.3	19.4	0.0
<i>Spizella pusilla</i>	Field Sparrow	6.1	4.7	4.6	53.9
<i>Progne subis</i>	Purple Martin	6.1	6.0	0.7	
<i>Columba livia</i>	Rock Pigeon (Feral Pigeon)	5.8	1.0		39.3
<i>Picoides pubescens</i>	Downy Woodpecker	5.5	1.6	5.5	36.6
<i>Anas platyrhynchos</i>	Mallard	5.5	0.3		105.7
<i>Haemorhous mexicanus</i>	House Finch	5.4	1.3		33.9
<i>Spinus tristis</i>	American Goldfinch	5.1	0.7	1.8	145.3
<i>Ammodramus savvarum</i>	Grasshopper Sparrow	4.9	0.1		
<i>Geothlypis trichas</i>	Common Yellowthroat	4.7	5.2	0.7	3.6
<i>Sitta pusilla</i>	Brown-headed Nuthatch	4.5	8.7	8.4	133.0
<i>Cathartes aura</i>	Turkey Vulture	4.4	5.4	1.0	132.7
<i>Empidonax vireescens</i>	Acadian Flycatcher	3.8	1.6	6.0	
<i>Turdus migratorius</i>	American Robin	3.6	21.3	0.1	111090.9
<i>Coragyps atratus</i>	Black Vulture	3.1	3.4	0.2	66.7
<i>Streptopelia decaocto</i>	Eurasian Collared-Dove	3.1	0.7		1.9
<i>Icterus spurius</i>	Orchard Oriole	3.1	1.2	0.2	
<i>Vireo flavifrons</i>	Yellow-throated Vireo	3.0	0.1	2.3	
<i>Branta canadensis</i>	Canada Goose	2.7	1.3	1.9	144.0
<i>Parula americana</i>	Northern Parula	2.3	3.0	9.6	
<i>Buteo lineatus</i>	Red-shouldered Hawk	2.3	2.7	0.9	7.1
<i>Dryocopus pileatus</i>	Pileated Woodpecker	2.1	1.5	5.4	27.1
<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker	2.1	2.5	3.6	26.9
<i>Oporornis formosus</i>	Kentucky Warbler	1.9		3.2	

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		Rutledge Route (1994-2009)	Juliette Route (1994-2016)	Piedmont NWR Route (1994-2003)	Piedmont NWR (1994-2016)
<i>Charadrius vociferus</i>	Killdeer	1.8	0.1		37.5
<i>Colaptes auratus</i>	(Yellow-shafted Flicker) Northern Flicker	1.7	2.0	4.6	36.3
<i>Buteo jamaicensis</i>	Red-tailed Hawk	1.2	1.1	0.3	21.2
<i>Wilsonia citrina</i>	Hooded Warbler	1.1	0.6	2.8	
<i>Corvus ossifragus</i>	Fish Crow	1.1	0.2		7.2
<i>Dumetella carolinensis</i>	Gray Catbird	1.1	3.5	0.1	1.0
<i>Archilochus colubris</i>	Ruby-throated Hummingbird	1.1	1.2	0.8	0.0
<i>Parkesia motacilla</i>	Louisiana Waterthrush	1.0	0.1	1.2	
<i>Mniotilta varia</i>	Black-and-white Warbler	0.9		1.0	0.3
<i>Lanius ludovicianus</i>	Loggerhead Shrike	0.8	0.2		1.7
<i>Picoides villosus</i>	Hairy Woodpecker	0.8	0.1	0.5	5.1
<i>Stelgidopteryx serripennis</i>	Northern Rough-winged Swallow	0.6	0.8		
<i>Meleagris gallopavo</i>	Wild Turkey	0.6	0.8	3.6	38.2
<i>Aix sponsa</i>	Wood Duck	0.6		3.0	190.2
<i>Megaceryle alcyon</i>	Belted Kingfisher	0.5	0.2	0.4	13.0
<i>Caprimulgus carolinensis</i>	Chuck-will's-widow	0.5	2.4		
<i>Vireo solitarius</i>	Blue-headed Vireo	0.4	1.5	6.1	6.5
<i>Ardea herodias</i>	Great Blue Heron (Blue form)	0.4	0.6		20.0
<i>Piranga olivacea</i>	Scarlet Tanager	0.4		0.7	
<i>Caprimulgus vociferus</i>	Eastern Whip-poor-will	0.4	0.1	3.3	
<i>Bombycilla cedrorum</i>	Cedar Waxwing	0.3			223.8
<i>Spiza americana</i>	Dickcissel	0.3			
<i>Strix varia</i>	Barred Owl	0.1		0.5	2.3
<i>Accipiter cooperii</i>	Cooper's Hawk	0.1	0.0		2.1
<i>Ardea alba</i>	Great Egret	0.1			4.2
<i>Butorides virescens</i>	Green Heron	0.1	0.2	0.4	0.7
<i>Eremophila alpestris</i>	Horned Lark	0.1			
<i>Nyctanassa violacea</i>	Yellow-crowned Night-Heron	0.1			0.0
<i>Scolopax minor</i>	American Woodcock	0.1			1.8

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		Rutledge Route (1994-2009)	Juliette Route (1994-2016)	Piedmont NWR Route (1994-2003)	Piedmont NWR (1994-2016)
<i>Icterus galbula</i>	Baltimore Oriole	0.1			
<i>Troglodytes aedon</i>	House Wren	0.1	0.1		2.0
<i>Seiurus aurocapilla</i>	Ovenbird	0.1			
<i>Accipiter striatus</i>	Sharp-shinned Hawk	0.1	0.0	0.3	1.2
<i>Limnothlypis swainsonii</i>	Swainson's Warbler	0.1			
<i>Anas rubripes</i>	American Black Duck				4.5
<i>Fulica americana</i>	American Coot				1059.0
<i>Falco sparverius</i>	American Kestrel				5.2
<i>Anthus rubescens</i>	American Pipit				36.6
<i>Anas americana</i>	American Wigeon				62.8
<i>Peucaea aestivalis</i>	Bachman's Sparrow			8.1	1.0
<i>Haliaeetus leucocephalus</i>	Bald Eagle				1.6
<i>Tyto alba</i>	Barn Owl				0.0
<i>Melanitta americana</i>	Black Scoter				0.1
<i>Icteridae sp.</i>	blackbird sp.				183.4
<i>Anas discors</i>	Blue-winged Teal				2.1
<i>Chroicocephalus philadelphia</i>	Bonaparte's Gull				7.3
<i>Euphagus cyanocephalus</i>	Brewer's Blackbird				1.8
<i>Certhia americana</i>	Brown Creeper				1.5
<i>Buteo platypterus</i>	Broad-winged Hawk			0.4	
<i>Bucephala albeola</i>	Bufflehead				30.3
<i>Buteo sp.</i>	Buteo sp.				0.7
<i>Aythya valisineria</i>	Canvasback				2.0
<i>Spizella pallida</i>	Clay-colored Sparrow				0.0
<i>Petrochelidon pyrrhonota</i>	Cliff Swallow		2.0		
<i>Bucephala clangula</i>	Common Goldeneye				0.3
<i>Columbina passerina</i>	Common Ground-Dove		0.0		0.2
<i>Gavia immer</i>	Common Loon				7.2
<i>Junco hyemalis hyemalis/carolinensis</i>	Dark-eyed Junco (Slate-colored)				7427.0
<i>Phalacrocorax auritus</i>	Double-crested Cormorant				17.5

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		Rutledge Route (1994-2009)	Juliette Route (1994-2016)	Piedmont NWR Route (1994-2003)	Piedmont NWR (1994-2016)
<i>Anatinae sp.</i>	duck sp.				10.5
<i>Calidris alpina</i>	Dunlin				1.8
<i>Podiceps nigricollis</i>	Eared Grebe				7.0
<i>Megascops asio</i>	Eastern Screech-Owl				4.2
<i>Sterna forsteri</i>	Forster's Tern				0.1
<i>Passerella iliaca</i>	Fox Sparrow				9.3
<i>Anas strepera</i>	Gadwall				91.2
<i>Aquila chrysaetos</i>	Golden Eagle				0.1
<i>Regulus satrapa</i>	Golden-crowned Kinglet				51.7
<i>Bubo virginianus</i>	Great Horned Owl			0.2	1.4
<i>Aythya marila</i>	Greater Scaup				1.2
<i>Tringa melanoleuca</i>	Greater Yellowlegs				0.1
<i>Aythya marila/affinis</i>	Greater/Lesser Scaup				0.4
<i>Anas crecca carolinensis</i>	Green-winged Teal (American)				83.9
<i>Larinae sp.</i>	gull sp.				0.4
<i>Ammodramus henslowii</i>	Henslow's Sparrow				0.0
<i>Catharus guttatus</i>	Hermit Thrush				37.0
<i>Larus argentatus</i>	Herring Gull				1.3
<i>Lophodytes cucullatus</i>	Hooded Merganser				73.6
<i>Podiceps auritus</i>	Horned Grebe				20.0
<i>Regulus sp.</i>	kinglet sp.				0.3
<i>Calidris minutilla</i>	Least Sandpiper				22.5
<i>Aythya affinis</i>	Lesser Scaup				137.7
<i>Clangula hyemalis</i>	Long-tailed Duck				0.1
<i>Cistothorus palustris</i>	Marsh Wren				0.1
<i>Falco columbarius</i>	Merlin				0.0
<i>Ictinia mississippiensis</i>	Mississippi Kite			0.1	
<i>Circus cyaneus</i>	Northern Harrier				2.2
<i>Anas acuta</i>	Northern Pintail				2.3
<i>Anas clypeata</i>	Northern Shoveler				24.7

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<i>Oreothlypis celata</i>	Orange-crowned Warbler				0.7
<i>Pandion haliaetus</i>	Osprey		0.0		0.2
<i>Gavia pacifica</i>	Pacific Loon				0.0
<i>Troglodytes pacificus/hiemalis</i>	Pacific/Winter Wren				3.3
<i>Setophaga palmarum</i>	Palm Warbler				5.5
<i>Calidris sp. (peep sp.)</i>	peep sp.				0.4
<i>Podilymbus podiceps</i>	Pied-billed Grebe				61.6
<i>Spinus pinus</i>	Pine Siskin				3.3
<i>Haemorhous purpureus</i>	Purple Finch				5.7
<i>Mergus serrator</i>	Red-breasted Merganser				8.6
<i>Sitta canadensis</i>	Red-breasted Nuthatch				0.5
<i>Picoides borealis</i>	Red-cockaded Woodpecker			3.9	25.7
<i>Aythya americana</i>	Redhead				6.4
<i>Gavia stellata</i>	Red-throated Loon				0.0
<i>Larus delawarensis</i>	Ring-billed Gull				47.9
<i>Aythya collaris</i>	Ring-necked Duck				785.7
<i>Pheucticus ludovicianus</i>	Rose-breasted Grosbeak				0.0
<i>Regulus calendula</i>	Ruby-crowned Kinglet				131.7
<i>Oxyura jamaicensis</i>	Ruddy Duck				11.0
<i>Euphagus carolinus</i>	Rusty Blackbird				92.0
<i>Grus canadensis</i>	Sandhill Crane				3.0
<i>Passerculus sandwichensis</i>	Savannah Sparrow				39.2
<i>Cistothorus platensis</i>	Sedge Wren				0.3
<i>Chen caerulescens</i>	Snow Goose				0.0
<i>Melospiza melodia</i>	Song Sparrow		0.0		221.8
<i>Emberizidae sp. (sparrow sp.)</i>	sparrow sp.				89.5
<i>Actitis macularius</i>	Spotted Sandpiper				0.5
<i>Melanitta perspicillata</i>	Surf Scoter				0.1
<i>Melospiza georgiana</i>	Swamp Sparrow				112.9
<i>Accipiter sp.</i>	Accipiter sp.		0.0		0.7

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<i>Poocetes gramineus</i>	Vesper Sparrow				0.8
<i>Parulidae sp.</i>	warbler sp. (Parulidae sp.)				0.6
<i>Calidris mauri</i>	Western Sandpiper				0.8
<i>Sitta carolinensis</i>	White-breasted Nuthatch				8.6
<i>Zonotrichia leucophrys</i>	White-crowned Sparrow				0.3
<i>Zonotrichia albicollis</i>	White-throated Sparrow				210.3
<i>Gallinago delicata</i>	Wilson's Snipe				1.2
<i>Gallinago delicata/gallinago</i>	Wilson's/Common Snipe				1.7
<i>Troglodytes hiemalis</i>	Winter Wren				1.7
<i>Picidae sp.</i>	woodpecker sp.				0.7
<i>Helmitheros vermivorum</i>	Worm-eating Warbler			0.3	
<i>Troglodytidae sp.</i>	wren sp.				0.2
<i>Sphyrapicus varius</i>	Yellow-bellied Sapsucker				36.7
<i>Setophaga coronata coronata</i>	Yellow-rumped Warbler (Myrtle)				123.0
<i>Setophaga dominica</i>	Yellow-throated Warbler		0.2	2.7	
Total Individuals		698.1	607.9	598.1	127,361.5
Total Species		94	86	76	160

Sources: Sauer et al. (2017); National Audubon Society (2017).

TABLE 18
 Reptiles and Amphibians of the Piedmont Ecoregion in Georgia

Scientific Name	Common Name
SNAKES:	
<i>Agkistrodon contortix</i>	Copperhead
<i>Agkistrodon piscivorus</i>	Cottonmouth
<i>Carphophis amoenus</i>	Eastern Wormsnake
<i>Cemophora coccinea</i>	Scarlet Snake
<i>Coluber constrictor</i>	Black Racer
<i>Crotalus horridus</i>	Timber Rattlesnake
<i>Diadophis punctatus</i>	Ringneck Snake
<i>Elaphe guttata</i>	Corn Snake
<i>Elaphe obsoleta</i>	Rat Snake
<i>Heterodon platirhinus</i>	Eastern Hognose Snake
<i>Lampropeltis calligaster</i>	Mole Kingsnake
<i>Lampropeltis getula</i>	Common Kingsnake
<i>Lampropeltis triangulum elapsoides</i>	Scarlet Kingsnake
<i>Masticophis flagellum</i>	Coachwhip
<i>Nerodia erythrogaster</i>	Plain-bellied Watersnake
<i>Nerodia sipedon</i>	Northern Watersnake
<i>Nerodia taxispilota</i>	Brown Watersnake
<i>Opheodrys aestivus</i>	Rough Green Snake
<i>Regina septemvittata</i>	Queen Snake
<i>Sistrurus miliaris</i>	Pygmy Rattlesnake
<i>Storeria dekayi</i>	Brown Snake
<i>Storeria occipitomaculata</i>	Red-bellied Snake
<i>Tantilla coronata</i>	Southeastern Crowned Snake
<i>Thamnophis sauritus</i>	Eastern Ribbon Snake
<i>Thamnophis sirtalis</i>	Garter Snake
<i>Virginia striatula</i>	Rough Earth Snake
<i>Virginia valeriae</i>	Smooth Earth Snake
LIZARDS AND SKINKS:	
<i>Anolis carolinensis</i>	Green Anole
<i>Cnemidophorus sexlineatus</i>	Six-lined Racerunner
<i>Euneces fasciatus</i>	Five-lined Skink
<i>Euneces inexpectatus</i>	Southeastern Five-lined Skink
<i>Euneces laticeps</i>	Broadhead Skink
<i>Ophisaurus attenuatus</i>	Slender Glass Lizard
<i>Ophisaurus ventralis</i>	Eastern Glass Lizard
<i>Sceloporus undulatus</i>	Eastern Fence Lizard
<i>Scincella lateralis</i>	Ground Skink
FROGS AND TOADS:	
<i>Acris crepitans</i>	Northern Cricket Frog
<i>Bufo americanus</i>	American Toad

TABLE 18
Reptiles and Amphibians of the Piedmont Ecoregion in Georgia

Scientific Name	Common Name
<i>Bufo fowleri</i>	Fowler's Toad
<i>Gastrophryne carolinensis</i>	Eastern Narrow-mouthed Toad
<i>Hyla avivoca</i>	Bird-voiced Treefrog
<i>Hyla chrysoscelis</i>	Cope's Gray Treefrog
<i>Hyla cinerea</i>	Green Treefrog
<i>Hyla gratiosa</i>	Barking Treefrog
<i>Hyla squirella</i>	Squirrel Treefrog
<i>Pseudacris crucifer</i>	Spring Peeper
<i>Pseudacris feriarum</i>	Upland Chorus Frog
<i>Rana catesbeiana</i>	Bullfrog
<i>Rana clamitans</i>	Green Frog
<i>Rana palustris</i>	Pickerel Frog
<i>Rana sphenocephala</i>	Southern Leopard Frog
<i>Scaphiopus holbrookii</i>	Eastern Spadefoot
TURTLES	
<i>Apalone spinifera</i>	Spiny Softshell Turtle
<i>Chelydra serpentina</i>	Common Snapping Turtle
<i>Chrysemys picta</i>	Painted Turtle
<i>Kinosternon baurii</i>	Striped Mud Turtle
<i>Kinosternon subrubrum</i>	Eastern Mud Turtle
<i>Pseudemys concinna</i>	River Cooter
<i>Sternotherus minor</i>	Loggerhead Musk Turtle
<i>Sternotherus odoratus</i>	Common Musk Turtle
<i>Terrapene carolina</i>	Eastern Box Turtle
<i>Trachemys scripta</i>	Pond Slider
SALAMANDERS	
<i>Ambystoma maculatum</i>	Spotted Salamander
<i>Ambystoma opacum</i>	Marbled Salamander
<i>Ambystoma talpoideum</i>	Mole Salamander
<i>Desmognathus conanti</i>	Spotted Dusky Salamander
<i>Eurycea bislineata</i>	Southern Two-lined Salamander
<i>Eurycea guttolineata</i>	Three-lined Salamander
<i>Gyrinophilus porphyriticus</i>	Spring Salamander
<i>Hemidactylum scutatum</i>	Four-toed Salamander
<i>Noyophthalmus viridescens</i>	Red eft (Red-spotted Newt)
<i>Plethodon chlorobryonis</i>	Atlantic Coast Slimy Salamander
<i>Plethodon glutinosus</i>	Slimy Salamander
<i>Pseudotriton montanus</i>	Mud Salamander
<i>Pseudotriton ruber</i>	Red Salamander

Sources: Jensen et al., 2008; GMNH, 2008.

TABLE 19
Wetland Habitats in the Lloyd Shoals Project Area

NWI Wetland Type	Project Boundary		Additional Zone Extending to 2,000 ft Beyond Project Boundary	
	Area (Acres)	Percent of Total	Area (Acres)	Percent of Total
Freshwater Emergent Wetland	65	1.6	16	1.8
Freshwater Forested/Shrub Wetland	333	8.4	615	69.3
Freshwater Pond	36	1.0	41	4.6
Lake	3,383	85.7	43	4.8
Riverine	130	3.3	173	19.5
Total Wetland Cover	3,948		888	

Source: NWI data source, FWS.

Note: Areas are based on the project boundary prior to the May 22, 2018 license order amending the project boundary (Section 3.2). The 2,000-ft zone does not include area within project boundary.

TABLE 20

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 ^e	County
PLANTS:						
<i>Amphianthus pusillus</i>	Pool sprite	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
<i>Anemone caroliniana</i>	Carolina windflower			G5	Openings in seepage swamps over Iredell soils; wet meadows.	Jasper
<i>Carex seorsa</i>	Weak stellata sedge			G5	Moist depressions in forests and deciduous swamps.	Newton
<i>Cyperus lupulinus ssp. Macilentus</i>	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
<i>Cypripedium acaule</i>	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
<i>Dryopteris celsa</i>	Log fern			G4	Wet slopes, hammocks and swamps with calcareous soils.	Jasper
<i>Eriocaulon koernickianum</i>	Dwarf hatpins		E	G2	Seepage areas and wet depressions on granite outcrops, often with horned bladderwort.	Newton
<i>Eurybia avita</i>	Alexander rock aster			G3	Granite outcrops; rooted in shallow soils of moist depressions in light shade.	Newton
<i>Eurybia jonesiae</i>	Piedmont bigleaf aster			G3?	Rich deciduous forests bordering rivers and streams; moist ravines	Butts
<i>Glyceria septentrionalis</i>	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
<i>Gratiola graniticola</i>	Granite hedge-hyssop			G3	Restricted to ephemeral vernal pools on granite outcrops.	Butts, Newton

TABLE 20

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 ^e	County
<i>Isoetes melanospora</i>	Black-spored quillwort	LE	E	G1	Shallow, temporarily flooded, flat-bottomed pools formed by natural erosion on granite outcrops.	Butts, Newton
<i>Listera australis</i>	Southern twayblade			G4	Low, moist woods with rich humus and a shady understory.	Jasper
<i>Panax quinquefolius</i>	American ginseng			G3G4	Rich, cool, moist but not extremely wet woods under a closed canopy.	Jasper
<i>Pilularia americana</i>	American pillwort			G5	Granite outcrops, seasonally exposed muddy shores.	Butts
<i>Portulaca umbraticola</i> ssp. <i>Coronata</i>	Wingpod purslane			G5T2	Sandy soils of granite and sandstone outcrops	Newton
<i>Quercus oglethorpensis</i>	Oglethorpe oak		T	G3	Wet clay soils of seepage swamps, stream terraces, and moist hardwood forests.	Jasper
<i>Quercus prinoides</i>	Dwarf chinquapin oak			G5	Roadsides, hillside pastures, and barren slopes with dry rocky or sandy soils.	Newton
<i>Quercus similis</i>	Swamp post oak			G4	Rich, moist bottom lands; pineywoodys, gulf prairies, and marshes.	Jasper
<i>Rhus michauxii</i>	Michaux's sumac	LE	E	G2G3	Sandy or rocky open woods in areas where disturbance has provided open ares.	Newton
<i>Sedum pusillum</i>	Granite stonecrop		T	G3	Granite outcrops, usually in mats of moss beneath cedar trees	Henry, Newton
<i>Silene ovata</i>	Mountain catchfly		R	G3	Rich, deciduous forests over limestone or amphibolite in the Coastal Plain and in Fall Line Ravines.	Jasper
<i>Solidago porteri</i>	Porter's goldenrod			G1Q	Dry woods and barrens; mix of native grasslands and oak savannah).	Jasper
<i>Stewartia malacodendron</i>	Silky camellia		R	G4	Rich ravine and slope forests; lower slopes of sandhills above bogs and creek swamps.	Butts
<i>Trillium reliquum</i>	Relict trillium	LE	E	G3	Mature hardwood forests in rich ravines and on stream terraces on amphibolite or limestone.	Jasper

TABLE 20

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 ^e	County
<i>Zanthoxylum americanum</i>	Northhern prickly-ash			G5	Along riverbanks and in moist ravines, thickets, and woods; upland rocky hillsides, bluffs, and open woods.	Newton
MUSSELS:						
<i>Alasmidonta arcula</i>	Altamaha arc mussel		T	G2	Sloughs, oxbows, or depressional areas in large creeks to large rivers with silt, mud, and/or sand substrates.	Jasper, Newton
<i>Elliptoideus sloatianus</i>	Purple bankclimber	LT			Small to large rivers with sandy to silty substrates and moderate current.	Henry
<i>Lampsilis subangulata</i>	Shinyrayed pocketbook	LE			Medium streams to large rivers with slight to moderate current and sandy to muddy substrates.	Henry
<i>Medionidus penicillatus</i>	Gulf moccasinshell	LE			Small streams to large rivers moderate flow and sandy substrates.	Henry
<i>Pleurobema pyriforme</i>	Oval pigtoe	LE			Small streams to large rivers with moderate flow and sand or gravel substrates.	Henry
<i>Pyganodon gibbosa</i>	Inflated floater			G3Q	Rivers with soft substrates of mud, silts, or fine sands; pool and slackwater habitats of rivers.	Jasper, Newton
CRAYFISH:						
<i>Cambarus howardi</i>	Chattahoochee crayfish		T	G3Q	Clear, free-flowing waters in riffle habitat in small tributaries to large rivers.	Newton
FRESHWATER SNAILS:						
<i>Elimia mutabilis</i>	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
<i>Somatogyus alcoviensis</i>	Reverse pebblesnail	UR		G1Q	Shoals with rapidly flowing water, on surfaces of gravel, cobble, boulder, and bedrock, as well as vegetation.	Newton

TABLE 20

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 ^e	County
FISH:						
<i>Cyprinella xaenura</i>	Altamaha shiner		T	G2G3	Small tributaries and rivers; often found in small pools with rocky to sandy substrates.	Butts, Henry, Jasper, Newton
<i>Etheostoma parvipinne</i>	Goldstripe darter		R	G4G5	Small streams, spring seeps, and runs with aquatic vegetation; occurs below the Fall Line.	Butts, Jasper
<i>Micropterus cataractae</i>	Shoal bass			G3	Rocky riffles and pools of creeks and small to medium rivers; shoal areas of rivers of and creeks.	Butts, Henry, Jasper
<i>Micropterus sp.</i>	Altamaha bass				Rocky riffles and pools of creeks and small to medium rivers; shoal areas of rivers of and creeks.	Butts
<i>Moxostoma robustum</i>	Robust redhorse	UR	E	G1	Medium to large rivers, shallow riffles to deep flowing water; moderately swift current.	Butts, Jasper
<i>Notropis chalybaeus</i>	Ironcolor shiner			G4	Low gradient creeks and small rivers with sandy substrate; pools and slow runs; clear well-vegetated water.	Jasper
<i>Moxostoma sp. 4</i>	Brassy jumprock			G4	Silty to rocky pools and slow runs of large creeks; small to medium rivers; impoundments.	Butts, Newton
AMPHIBIANS:						
<i>Hemidactylium scutatum</i>	Four-toed salamander			G5	Under objects or among mosses in swamps, boggy streams, and wet areas near quite pools.	Butts, Jasper, Newton
REPTILE:						
<i>Heterodon simus</i>	Southern hognose snake		T	G2	Long leaf pine and/or scrub oak areas with well drained, xeric, sandy soils; wiregrass understory.	Butts

TABLE 20

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 ^e	County
<i>Lampropeltis calligaster rhombomaculata</i>	Mole kingsnake			G5T5	Areas of soft soil, including abandoned or cultivated fields; adept burrowers and rarely encountered aboveground.	Henry, Jasper
BIRDS:						
<i>Haliaeetus leucocephalus</i>	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
<i>Picoides borealis</i>	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
<i>Tyto alba</i>	Barn owl			G5	Nests in large hollow trees or old barns in areas with pasture, grassland, or open marsh.	Henry, Newton
MAMMAL:						
<i>Perimyotis subflavus</i>	Tri-colored bat			G2G3	Forested landscapes and along waterways; foraging occurs in riparian areas and roosting occurs near openings.	Jasper

Sources: GDNR (2018c); 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.^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.^e Habitat descriptions from GDNR (2018b), Chafin (2007), NatureServe (2017), Reznicek et al. (2011), Wade et al. (2015), Lockwood and Bachman (2013), Duncan and Kartesz (1981), Kenny et al. (2017a), Kenny et al. (2017b), Watson (2000).

TABLE 21

Recreation Facilities Providing Access to the Lloyd Shoals Project

Park/Facility	County	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 switchback 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	8 parking spaces, 1-lane boat ramp; picnic/day use area; bank fishing, trail to eastern tailrace
Jane Lofton Public Access Area ^a	Butts	Just off Hendricks Road @ Dam Road / Power Plant Road	Bank fishing, gravel parking, and a trash can.
Other Publicly or Privately Owned and Operated Facilities:			
Bear Creek Marina	Jasper	60 Bear Creek Marina Rd, Mansfield, GA 30055	50 parking spaces (with trailer slots), boat ramp, swimming, store and restrooms with full service campground. Privately operated.
Berry's Marina	Newton	330 Waters Bridge Cir, Covington, GA 30014	75 parking spaces (with trailer slots), boat ramp, restrooms, store, marina. Privately operated.
Factory Shoals Park	Newton	50 Newton Factory Bridge Road, Covington, GA 30014	200 parking spaces (without trailers), Alcovy River access. 450 acres, open area (signage limiting horses, etc.) picnicking, playground, swimming, hiking, fishing, restrooms. Operated by Newton County.
Georgia FFA/FCCLA Center	Newton	720 FFA FHA Camp Road Covington, GA 30014	Canoeing & kayaking, swimming. Operated by Georgia FFA/FCCLA.
Martin's Marina (Lakeview Restaurant)	Jasper	8726 Jackson Lake Rd, Monticello, GA 31064	35 parking spaces (with trailer slots), full service campground, restrooms, boat ramps, marina, gas, food, store. Privately operated.
Reasor's Landing	Butts	278 Marina Cir, Jackson, GA 30233	50 estimated parking spaces (with trailer slots), Boat ramp, boat storage, gas, tackle, food, restaurant, restrooms and mechanic. Privately operated.
Sandy's Highway 36 Marina	Butts	2571 GA-36, Jackson, GA 30233	Boat ramp. Privately operated.
Tussahaw Creek/Highway 36 bridge	Butts	2088 GA-36, Jackson, GA 30233	Bank fishing. Public access.
Walker Marina	Newton	440 Lang Rd, Covington, GA 30014	Boat ramp, bank fishing. Privately operated.

^a Previously referred to as the Emergency Spillway South End Fishing Access.

TABLE 22
Publicly Available Recreation Facilities within the Lloyd Shoals Project Boundary

Recreation Amenity Type	Number of Recreation Amenities			Total Units	Capacity Utilization (%)
	User Free	User Fee	FERC Approved		
Boat Launch Areas. Improved areas having one or more boat launch lanes (enter number in column e) and are usually marked with signs, have hardened surfaces, and typically have adjacent parking.	1	6	7	13 Lanes	35
Marinas. Facilities with more than 10 slips on project waters, which include one or more of the following: docking, fueling, repair and storage of boats; boat/equipment rental; or sell bait/food (see Glossary FERC approved).	–	3	3	N/A	35
Tailwater Fishing. Platforms, walkways, or similar structures to facilitate below dam fishing.	1	–	1	N/A	30
Reservoir Fishing. Platforms, walkways, or similar structures to facilitate fishing in the reservoir pool or feeder streams.	–	1	1	N/A	30
Swim Areas. Sites providing swimming facilities (bath houses, designated swim areas, parking and sanitation facilities).	–	1	1	2 Acres	75
Picnic Areas. Locations containing one or more picnic sites (each of which may include tables, grills, trash cans, and parking).	2	1	2	6 Sites	35
Overlooks/Vistas. Sites established to view scenery, wildlife, cultural resources, project features, or landscapes.	1	–	1	15 Acres	10
Campsites. Sites for tents, trailers, recreational vehicles [RV], yurts, cabins, or a combination of temporary uses.	–	24	–	N/A	35
Informal Use Areas. Well used locations which typically do not include amenities, but require operation and maintenance and/or public safety responsibilities	1	–	–	–	1

Source: Georgia Power (2015b).

TABLE 23
Other Recreational Resources in the Project Vicinity

County	Recreation Resource	Operator
PROJECT COUNTIES:		
Butts	Indian Springs State Park	GDNR – State Parks & Historic Sites
Butts	High Falls State Park (majority is in Monroe County)	GDNR – State Parks & Historic Sites
Henry	Arabia Mountain National Heritage Area	National Park Service
Henry	Panola Mountain State Park	GDNR – State Parks & Historic Sites
Henry	Davidson-Arabia Mountain Nature Preserve	DeKalb County
Jasper	Cedar Creek WMA (Mostly in Jones / Putnam Counties)	GDNR – WRD
Jasper	Charlie Elliott Wildlife Center, Clybel WMA, Marben Public Fishing Area	GDNR – WRD
Jasper	Oconee Ranger District of the Oconee National Forest	FS
Jasper	Piedmont National Wildlife Refuge (Mostly in Jones County)	FWS
Newton	Charlie Elliott Wildlife Center	GDNR
Newton	Lake Varner Park	Newton County Water Resources
Newton	Turner Lake Park	Newton County
Newton	Alcovy River Greenway	Georgia Wildlife Foundation and Others
Newton	Alcovy Conservation Center	Georgia Wildlife Foundation
Newton	Georgia FFA-FCCLA Center	Georgia FFA & Agriculture Education
ADJACENT COUNTIES:		
Putnam/Morgan	B.F. Grant WMA	GDNR – WRD
Walton/Morgan	Hard Labor Creek SP	GDNR – State Parks & Historic Sites
Walton	Public Dove Field and Hatchery	GDNR – WRD
Rockdale	Black Shoals Park	Rockdale County
Monroe	Rum Creek WMA	GDNR – WRD
Monroe	Jarrell Plantation Historic Site	GDNR – State Parks & Historic Sites

TABLE 24
Land Use in the Lloyd Shoals Project Area

Type	Project Boundary		Additional Zone Extending to 2,000 ft beyond Project Boundary	
	Area (Acres)	Percent of Total	Area (Acres)	Percent of Total
Open Water	3,616	70	321	2
Developed, Open Space	111	2	2,006	10
Developed, Low Intensity	20	0.4	105	1
Developed, Medium Intensity	-	0	9	0.04
Barren Land	4	0.1	124	1
Deciduous Forest	473	9	6,708	32
Evergreen Forest	326	6	5,217	25
Mixed Forest	37	1	458	2
Shrub/Scrub	58	1	1,484	7
Herbaceous	145	3	2,565	12
Hay/Pasture	10	0.2	995	5
Woody Wetlands	385	7	783	4
Emergent Herbaceous Wetlands	11	0.2	6	0.03
Total	5,195		20,782	

Source: 2011 National Land Use Data Set

Note: Areas are based on the project boundary prior to the May 22, 2018 license order amending the project boundary (Section 3.2). The 2000-ft zone does not include area within project boundary.

TABLE 25
Cultural Resources Monitoring Sites for Lloyd Shoals

Site	Description	NR Status	Land Use	Current Condition	Recommendation
9BS17	Lloyd Shoals Village	Recommended eligible	Unimproved forest	Razed	Continue monitoring
9BS18	Lloyd Shoals Village	Recommended eligible	Recreational	Undisturbed	Continue monitoring
9BS19	Dam Construction Area	Recommended eligible	Parking area/forest	Stable	Continue monitoring
9BS20	House or Structure	Recommended eligible	Landscaped/office	Undisturbed	Continue monitoring
9BS23	Hentdricks Mill	Recommended eligible	Partially inundated	Stable	Continue monitoring
9JA223	Historic Artifact Scatter	Recommended eligible	Partially inundated	Stable	Continue monitoring

TABLE 26
Population Trends in the Lloyd Shoals Project Vicinity

	Major Cities and Towns	2000 Population	2010 Population	2013 Population	Percent change from 2010 to 2013
Jasper County	Monticello	11,426	13,900	13,654	-1.8
Henry County	Hampton, Locust Grove, McDonough, Stockbridge	119,341	203,922	221,768	8.8
Newton County	Covington, Mansfield, Newborn	62,001	99,958	106,999	7.0
Butts County	Flovilla, Jackson, Jenkinsburg	19,522	23,655	23,817	0.7

Source: U.S. Census Bureau (2017).

TABLE 27

Federal or State Comprehensive Plans Potentially Applicable to the Project (FERC, 2018)

Comprehensive Plan	Potentially Applicable (Yes or No)
Atlantic States Marine Fisheries Commission. 1998. Amendment 1 to the Interstate Fishery Management Plan for Atlantic sturgeon (<i>Acipenser oxyrinchus oxyrinchus</i>). (Report No. 31). July 1998.	Yes
Atlantic States Marine Fisheries Commission. 1998. Interstate fishery management plan for Atlantic striped bass. (Report No. 34). January 1998.	Yes
Atlantic States Marine Fisheries Commission. 1999. Amendment 1 to the Interstate Fishery Management Plan for shad and river herring. (Report No. 35). April 1999.	Yes
Atlantic States Marine Fisheries Commission. 2000. Technical Addendum 1 to Amendment 1 of the Interstate Fishery Management Plan for shad and river herring. February 9, 2000.	Yes
Atlantic States Marine Fisheries Commission. 2009. Amendment 2 to the Interstate Fishery Management Plan for shad and river herring, Arlington, Virginia. May 2009.	Yes
Atlantic States Marine Fisheries Commission. 2010. Amendment 3 to the Interstate Fishery Management Plan for shad and river herring, Arlington, Virginia. February 2010.	Yes
Atlantic States Marine Fisheries Commission. 2000. Interstate Fishery Management Plan for American eel (<i>Anguilla rostrata</i>). (Report No. 36). April 2000.	Yes
Atlantic States Marine Fisheries Commission. 2008. Amendment 2 to the Interstate Fishery Management Plan for American eel. Arlington, Virginia. October 2008.	Yes
Atlantic States Marine Fisheries Commission. 2013. Amendment 3 to the Interstate Fishery Management Plan for American eel. Arlington, Virginia. August 2013.	Yes
Atlantic States Marine Fisheries Commission. 2014. Amendment 4 to the Interstate Fishery Management Plan for American eel. Arlington, Virginia. October 2014.	Yes
Department of the Army, Corps of Engineers. Savannah District. 1985. South metropolitan Atlanta region: Georgia water resources management study. Savannah, Georgia. January 1985.	Yes
Department of the Army, Corps of Engineers. Savannah District. 1985. Water resources development by the U.S. Army Corps of Engineers in Georgia. Savannah, Georgia. January 1985.	Yes
Georgia Department of Natural Resources. 1985. Water availability and use - Ocmulgee River Basin. Atlanta, Georgia.	Yes
Georgia Department of Natural Resources. Georgia Statewide Comprehensive Outdoor Recreation Plan (SCORP): 2008-2013. Atlanta	Yes
Georgia Department of Natural Resources. 1986. Water availability and use report - Altamaha River Basin. Atlanta	Yes
Metropolitan North Georgia Water Planning District. 2003. Water supply and water conservation management plan. Atlanta, Georgia. September 2003.	Yes
Metropolitan North Georgia Water Planning District. 2003. Long-term wastewater management plan. Atlanta, Georgia. September 2003.	Yes
Metropolitan North Georgia Water Planning District. 2003. District-wide watershed management plan. Atlanta, Georgia. September 2003.	Yes

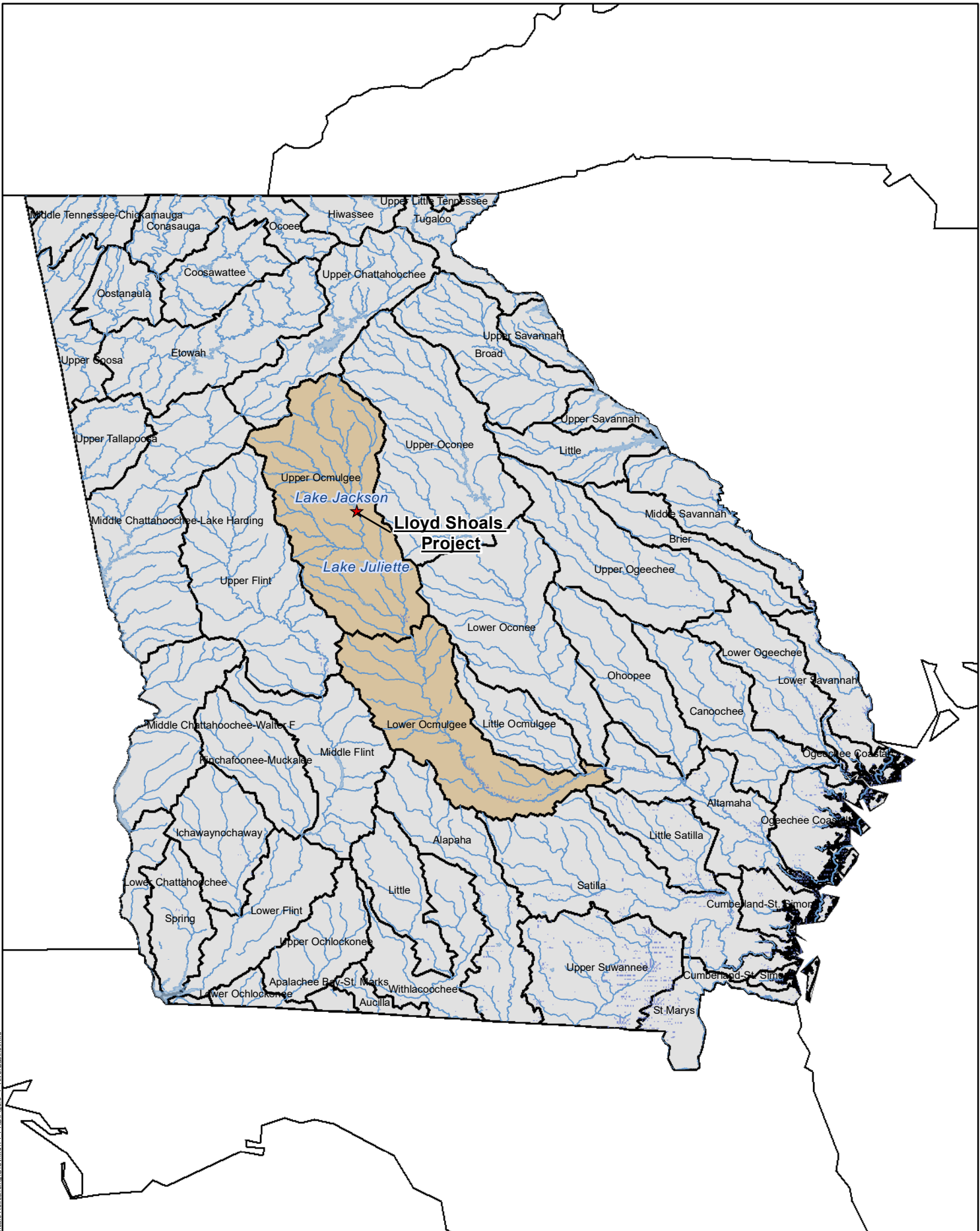
TABLE 27

Federal or State Comprehensive Plans Potentially Applicable to the Project (FERC, 2018)

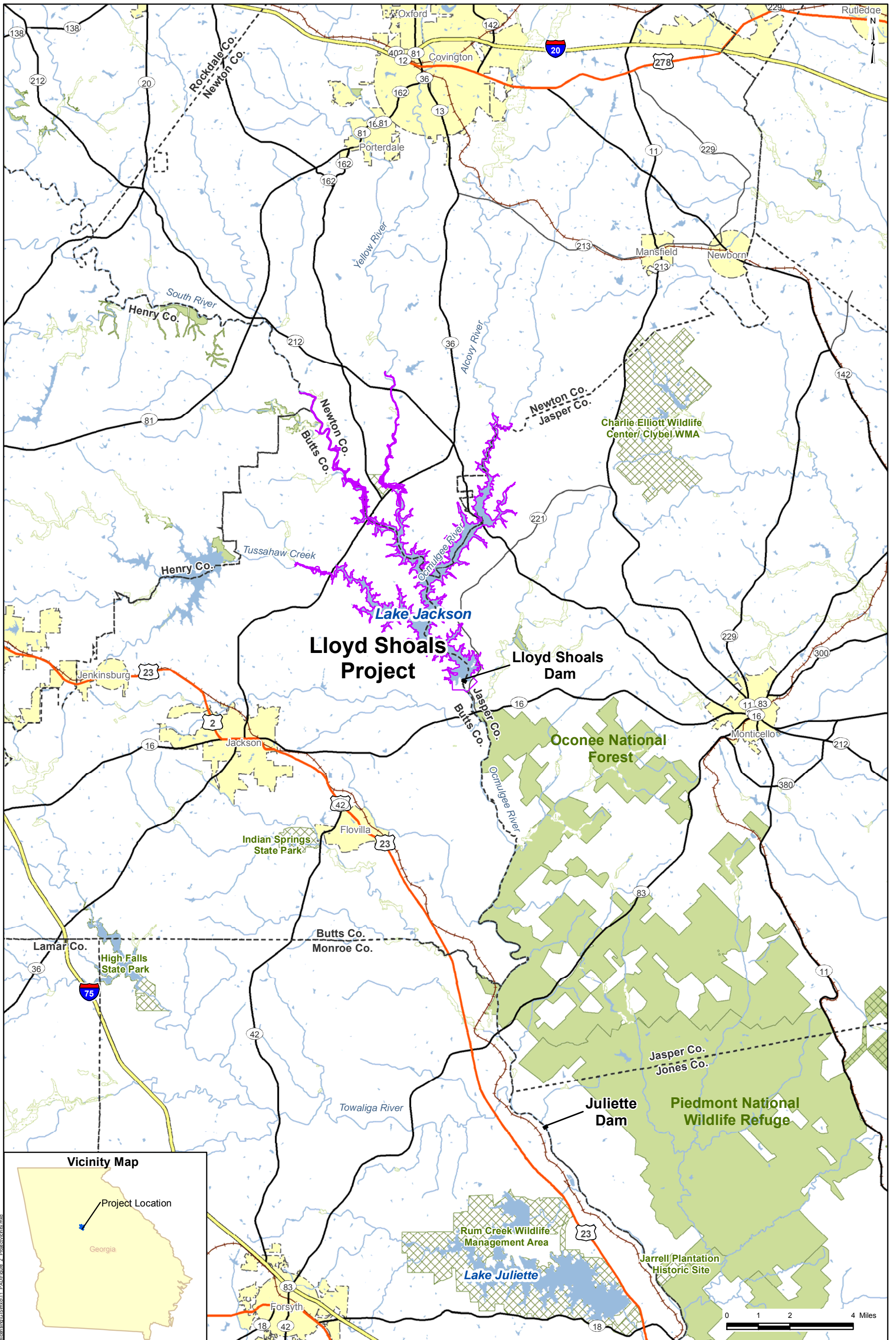
Comprehensive Plan	Potentially Applicable (Yes or No)
National Marine Fisheries Service. 1998. Final Recovery Plan for the shortnose sturgeon (<i>Acipenser brevirostrum</i>). Prepared by the Shortnose Sturgeon Recovery Team for the National Marine Fisheries Service, Silver Spring, Maryland. December 1998.	Yes
National Park Service. The Nationwide Rivers Inventory. Department of the Interior, Washington, D.C. 1993.	Yes
State of Georgia. Office of the Governor. 1987. Water resources management strategy-summary document. Atlanta, Georgia. January 12, 1987.	Yes
U.S. Fish and Wildlife Service. National Marine Fisheries Service. Georgia Department of Natural Resources. 2013. Priority restoration and management actions for the American Shad in the Altamaha River Basin, Georgia. Athens, Georgia. 2013.	Yes
U.S. Fish and Wildlife Service. No date. Fisheries USA: the recreational fisheries policy of the U.S. Fish and Wildlife Service. Washington, D.C.	Yes

Source: FERC (2018)

FIGURES



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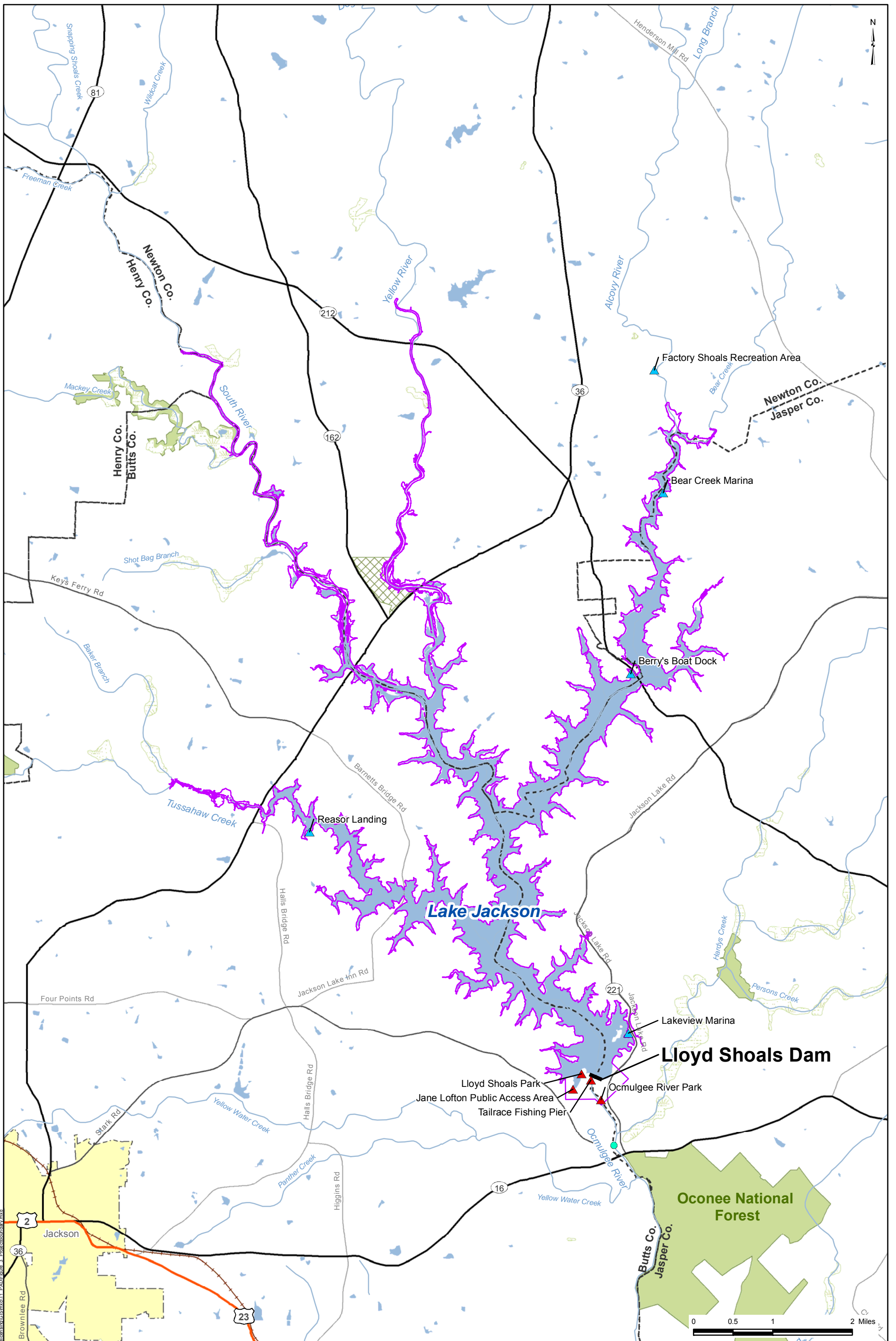


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- | | | |
|--------------------|------------------|--------------------------|
| Interstate Highway | Railroad | Towns/Cities |
| U.S. Highway | Dam | State Managed Lands |
| State Highway | Project Boundary | National Parks or Forest |
| County Road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



Figure 2
Project Vicinity
 Lloyd Shoals Project
 (FERC No. 2336)



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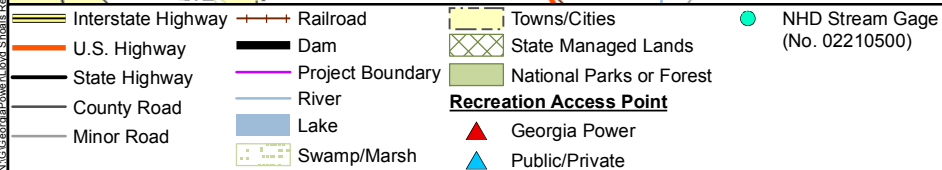


Figure 3
Lloyd Shoals Project Boundary
 Lloyd Shoals Project
 (FERC No. 2336)



Lake Jackson

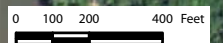
Power House

Substation

Spillway

Auxiliary
Spillway

Ocmulgee River



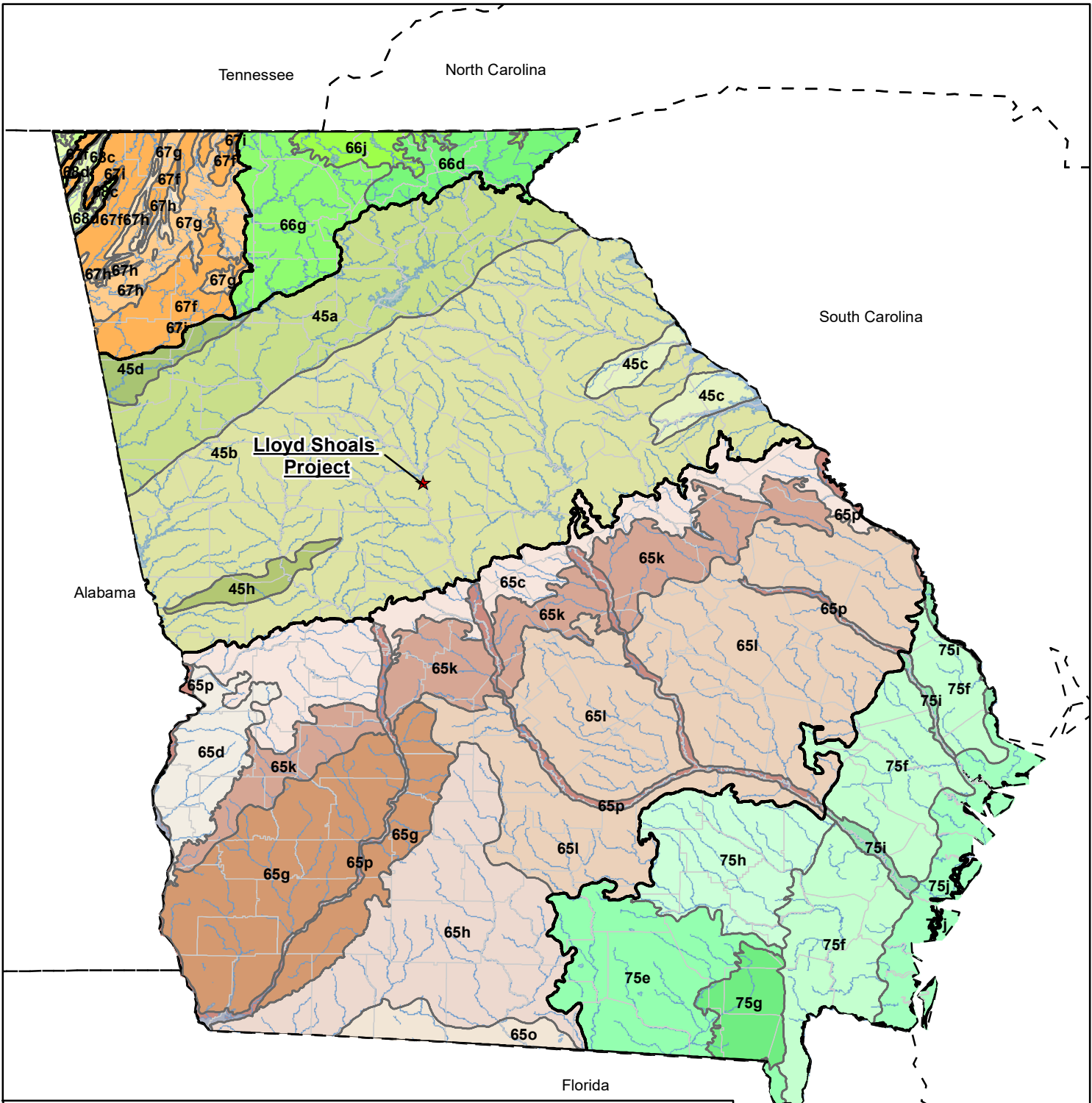
— Project Boundary



Figure 4
Project Facilities

Lloyd Shoals Project
(FERC No. 2336)

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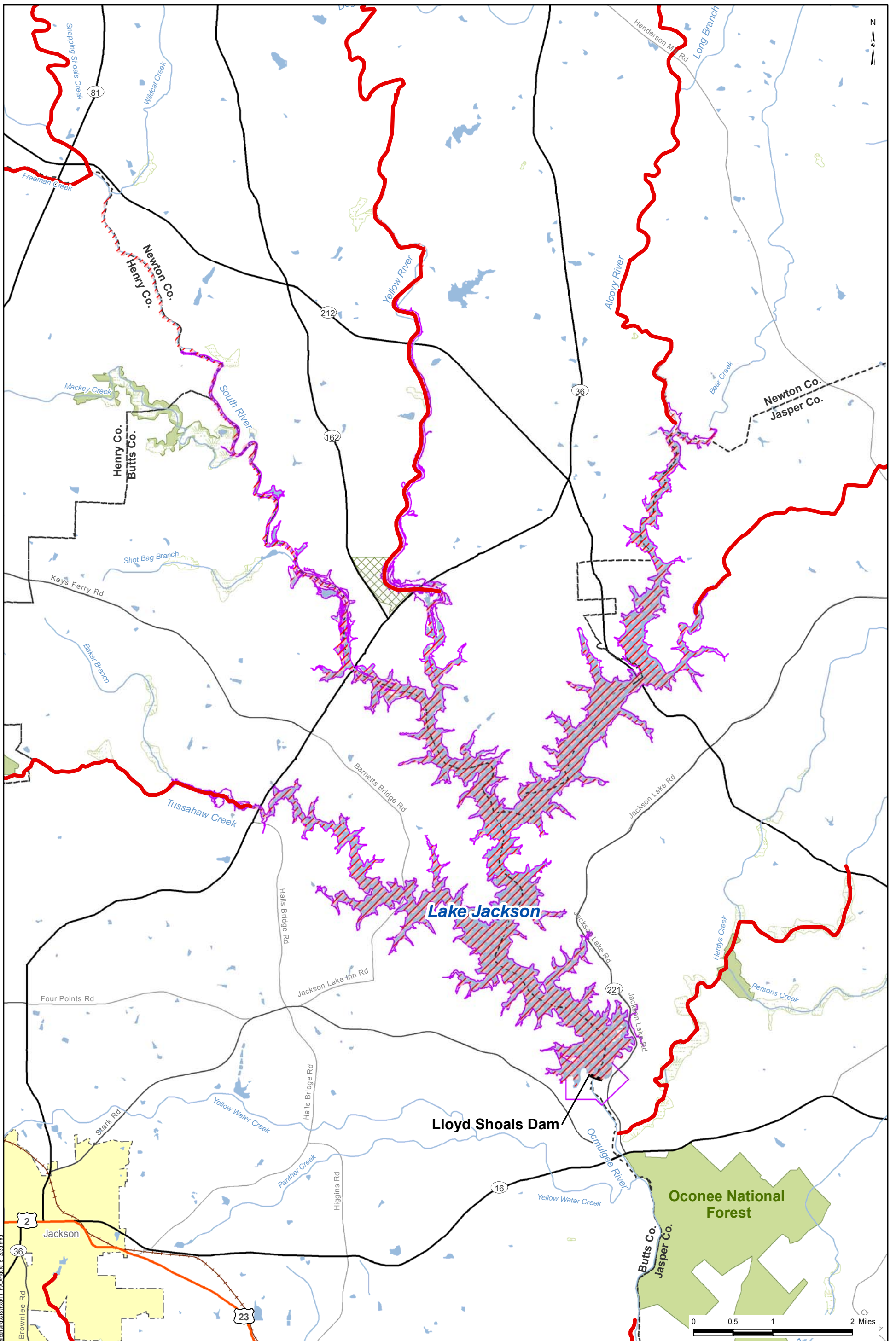
<p>45 Piedmont</p> <ul style="list-style-type: none"> 45a Southern Inner Piedmont 45b Southern Outer Piedmont 45c Carolina Slate Belt 45d Talladega Upland 45h Pine Mountain Ridges <p>65 Southeastern Plains</p> <ul style="list-style-type: none"> 65c Sand Hills 65d Southern Hilly Gulf Coastal Plain 65g Dougherty Plain 65h Tifton Upland 65k Coastal Plain Red Uplands 65l Atlantic Southern Loam Plains 65o Tallahasee Hills/Valdosta Limesink 65p Southeastern Floodplains and Low Terraces 	<p>66 Blue Ridge</p> <ul style="list-style-type: none"> 66d Southern Crystalline Ridges and Mountains 66g Southern Metasedimentary Mountains 66j Broad Basins <p>67 Ridge and Valley</p> <ul style="list-style-type: none"> 67f Southern Limestone/Dolomite Valleys and Low Rolling Hills 67g Southern Shale Valleys 67h Southern Sandstone Ridges 67i Southern Dissected Ridges and Knobs <p>68 Southwestern Appalachians</p> <ul style="list-style-type: none"> 68c Plateau Escarpment 68d Southern Table Plateaus 	<p>75 Southern Coastal Plain</p> <ul style="list-style-type: none"> 75e Okefenokee Plains 75f Sea Island Flatwoods 75g Okefenokee Swamp 75h Bacon Terraces 75i Floodplains and Low Terraces 75j Sea Islands/Coastal Marsh <p> Level III Ecoregion Level IV Ecoregion County Boundary State Boundary </p>
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Source: <https://www.epa.gov/eco-research/ecoregion-download-files-state-region-4>



Figure 5
Level III and IV Ecoregions of Georgia
Lloyd Shoals Project
(FERC No. 2336)

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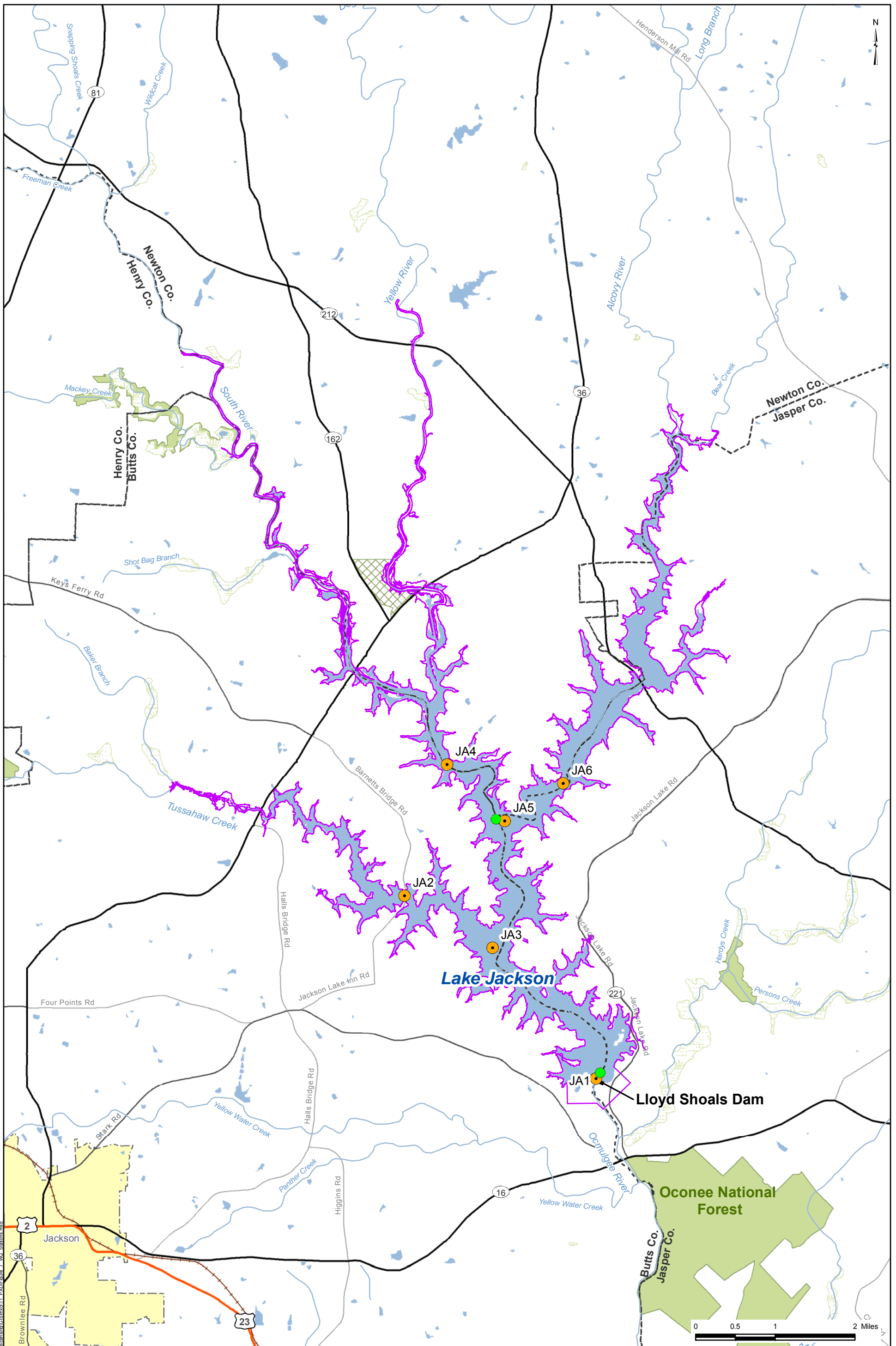
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- | | | |
|--------------------|------------------|--------------------------|
| Interstate Highway | Railroad | Towns/Cities |
| U.S. Highway | Dam | State Managed Lands |
| State Highway | Project Boundary | National Parks or Forest |
| County Road | River | 303(d) Listed Lake |
| Minor Road | Lake | 303(d) Listed Stream |
| | Swamp/Marsh | |



Figure 6
Clean Water Act Section 303(d) - Listed Streams Segments
 Lloyd Shoals Project
 (FERC No. 2336)





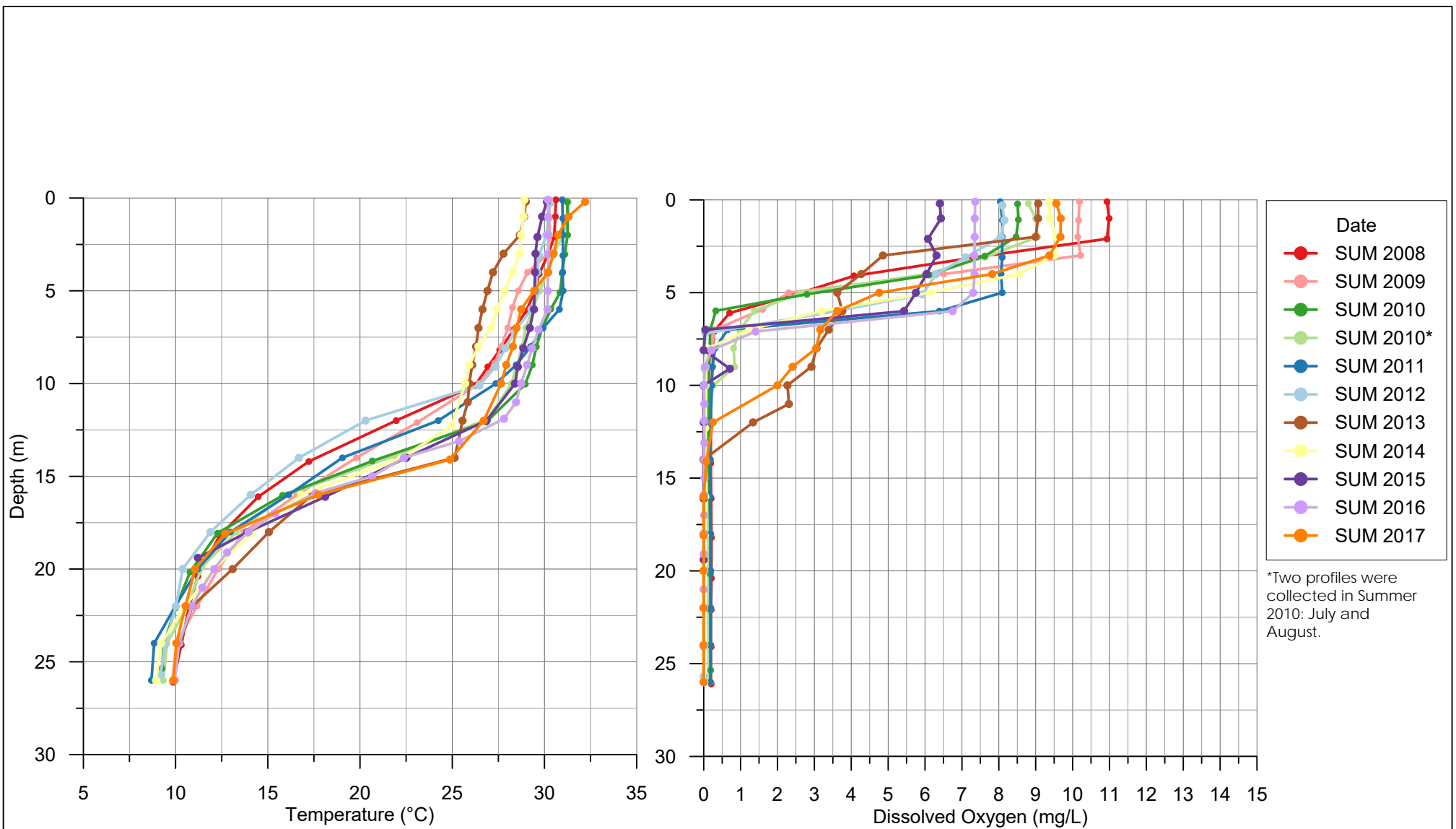
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- Interstate Highway
- U.S. Highway
- State Highway
- County Road
- Minor Road
- Railroad
- Dam
- Project Boundary
- River
- Lake
- Swamp/Marsh
- Towns/Cities
- State Managed Lands
- National Parks or Forest

- Water Quality Stations**
- Georgia Power sta
 - EPD



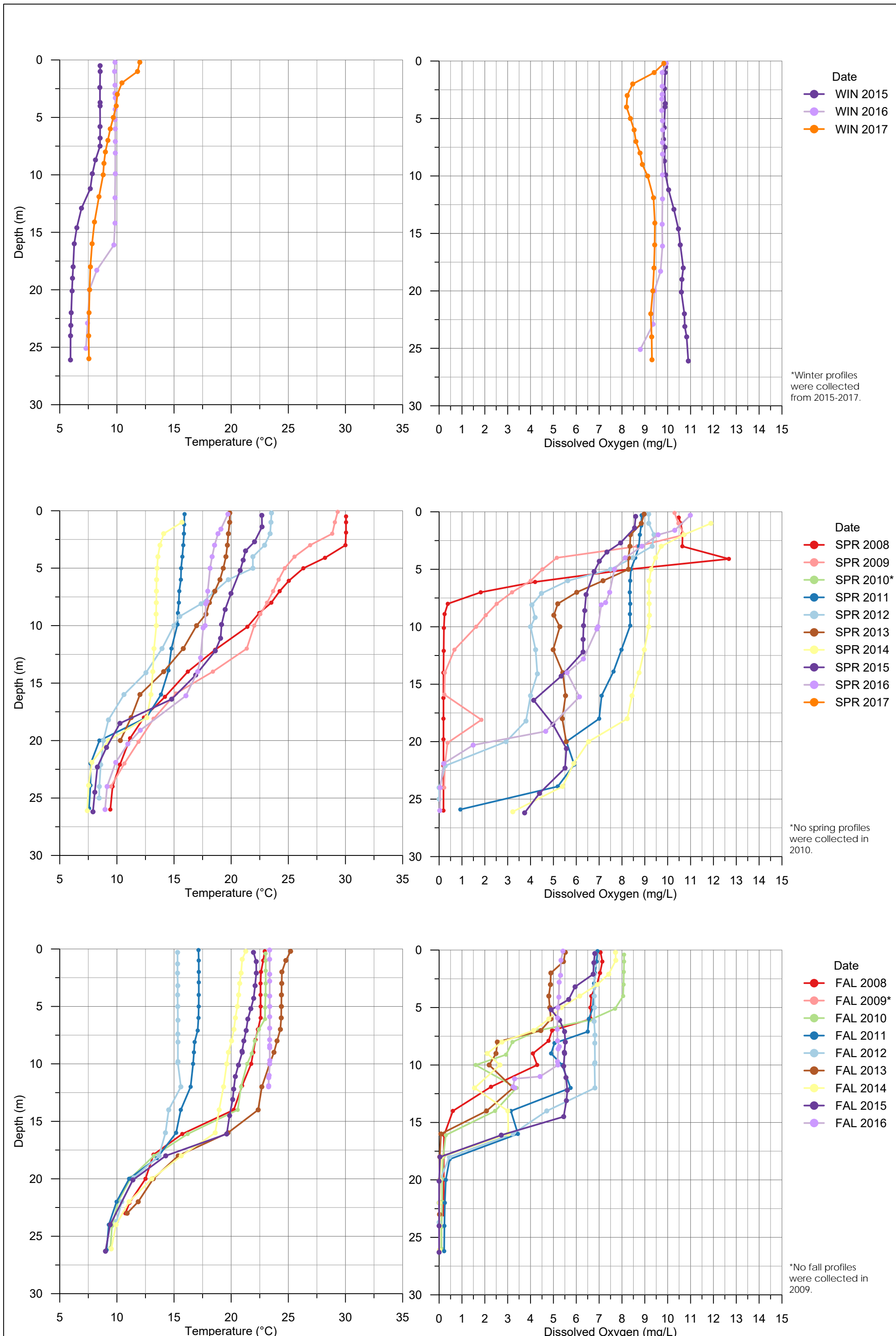
Figure 7
Georgia Power Water Quality Stations
 Lloyd Shoals Project
 (FERC No. 2336)



*Two profiles were collected in Summer 2010: July and August.



Figure 8
Summertime Temperature and DO Profiles at Lake Jackson Station JA01
 Lloyd Shoals Hydroelectric Project
 (FERC No. 2336)



Lloyd Shoals Dissolved Oxygen Levels July 2006

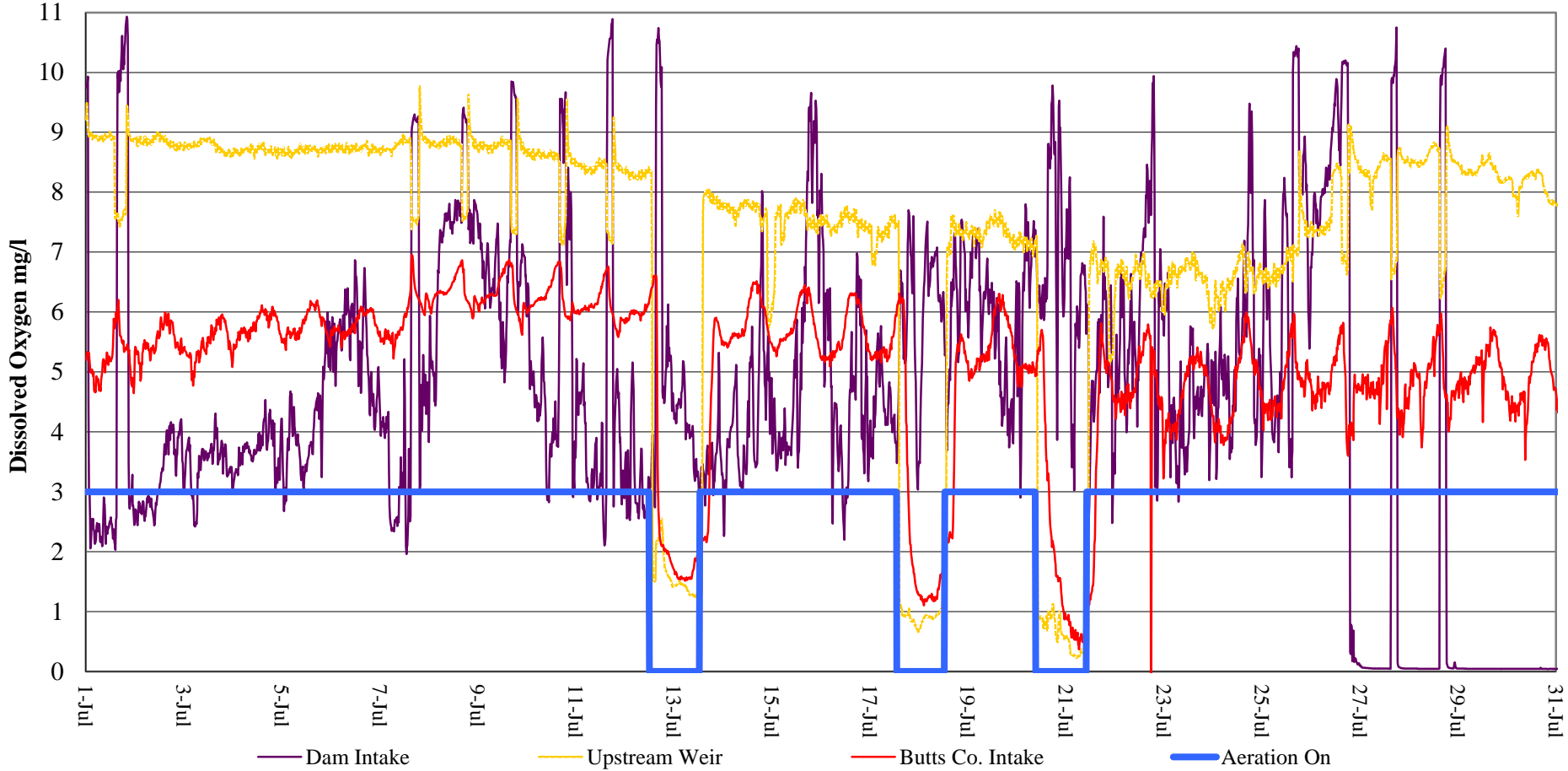
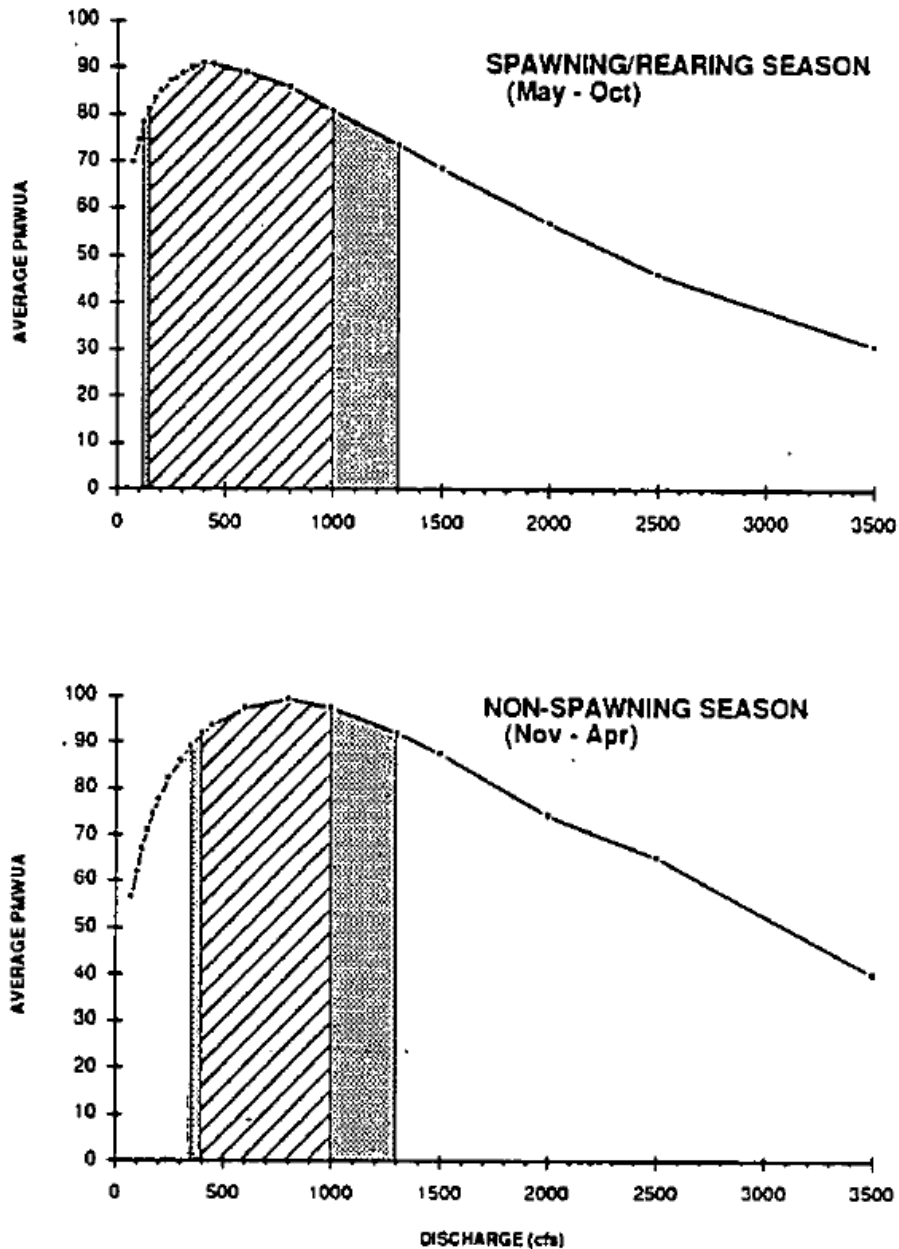


Figure 10
Lloyd Shoals Tailrace Dissolved Oxygen – July 2006
Lloyd Shoals Project (FERC No. 2336)



Discharges corresponding with the cross-hatched region produce average habitat values (PMWUA) not significantly different (Fisher's protected least significant difference, $p = 0.10$) than the maximum average PMWUA. Stippling on either side of the cross-hatched region indicates where discharges begin to produce average habitat values significantly less than the maximum average PMWUA. Unshaded regions indicate discharges producing average habitat values significantly lower than the maximum average PMWUA.

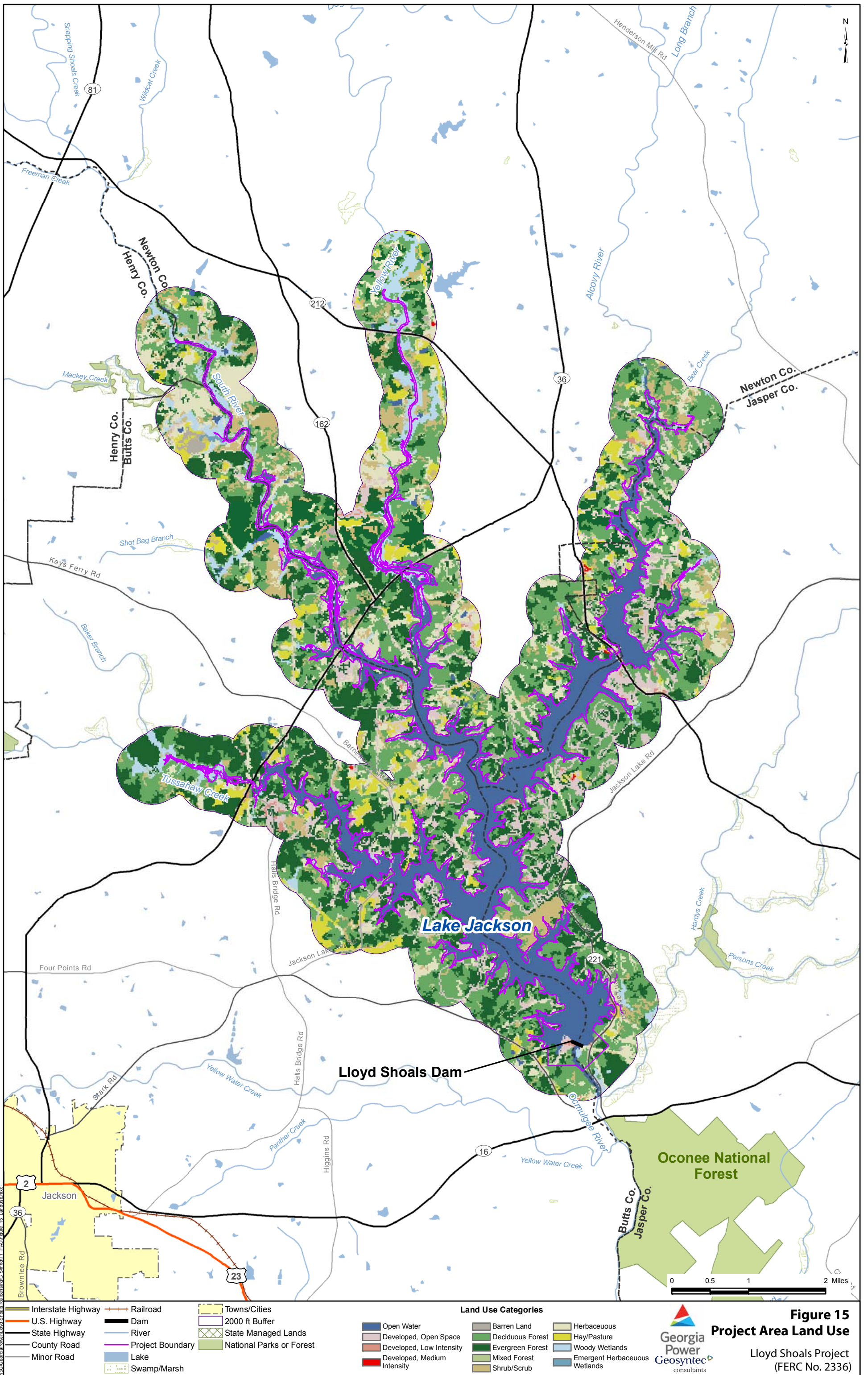
Source: EA (1990c).

Figure 11
 Discharge versus Average Percent Maximum Weighted Usable Area (PMWUA) for All Species and Life Stages within Spawning and Non-spawning Seasons in the Ocmulgee River Lloyd Shoals Project (FERC No. 2336)



Source: Google Earth, 2018

Figure 14
Ocmulgee River Park
Lloyd Shoals Project (FERC No. 2336)



M:\GIS\Projects\Lloyd Shoals\GIS\Map\TI_PADI\Figure 15_LandUse.mxd

- | | | |
|--------------------|------------------|--------------------------|
| Interstate Highway | Railroad | Towns/Cities |
| U.S. Highway | Dam | 2000 ft Buffer |
| State Highway | River | State Managed Lands |
| County Road | Project Boundary | National Parks or Forest |
| Minor Road | Lake | Swamp/Marsh |

- | | | |
|-----------------------------|------------------|------------------------------|
| Open Water | Barren Land | Herbaceous |
| Developed, Open Space | Deciduous Forest | Hay/Pasture |
| Developed, Low Intensity | Evergreen Forest | Woody Wetlands |
| Developed, Medium Intensity | Mixed Forest | Emergent Herbaceous Wetlands |
| Shrub/Scrub | Wetlands | |



Figure 15
Project Area Land Use
 Lloyd Shoals Project
 (FERC No. 2336)



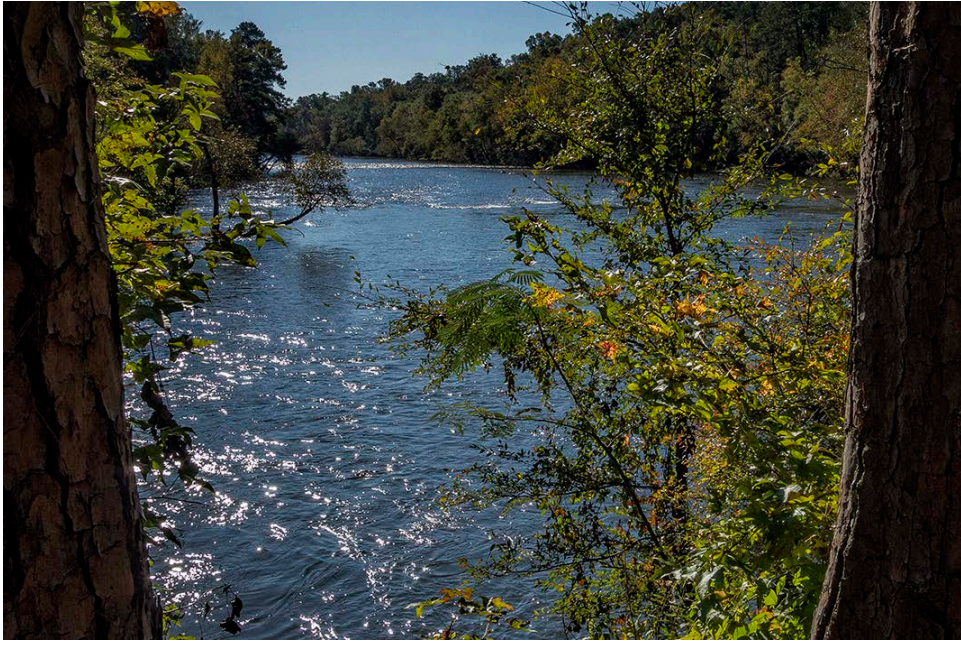
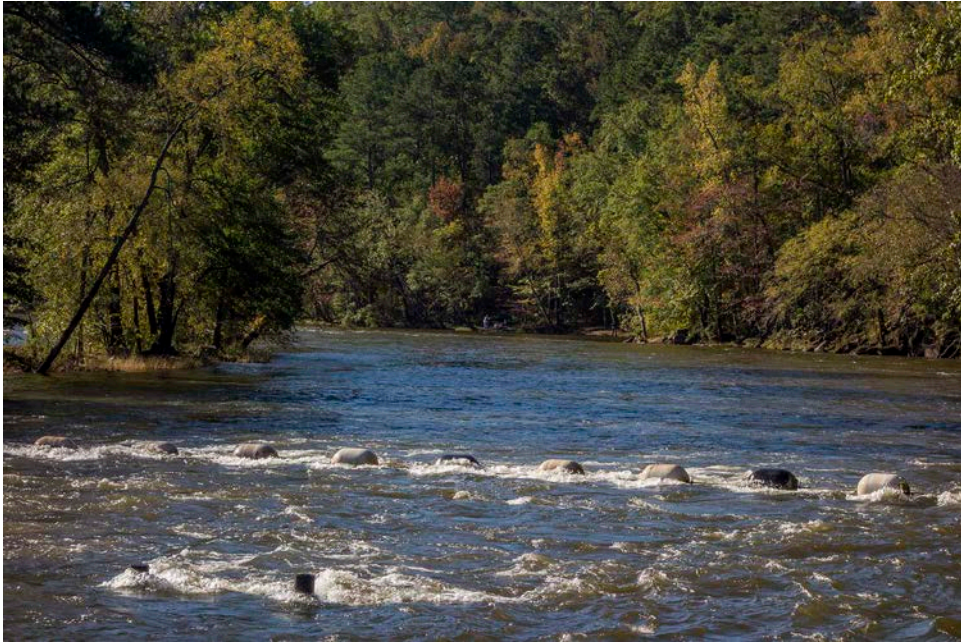
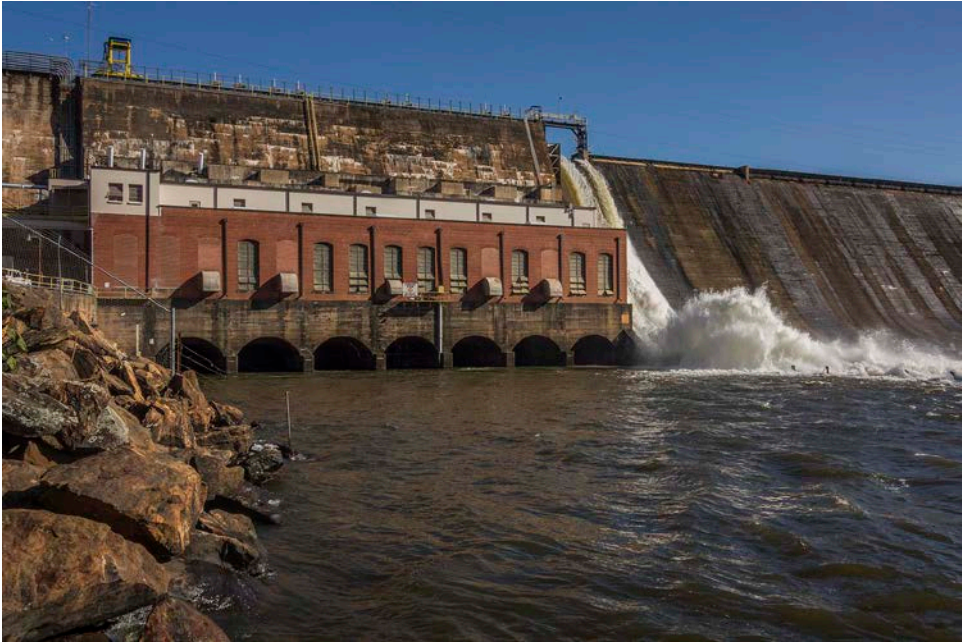


Figure 16
Lloyd Shoals Tailrace Area Public Access Viewsheds
Lloyd Shoals Project (FERC No. 2336)



Figure 17
Ocmulgee River Park Public Access Viewsheds
Lloyd Shoals Project (FERC No. 2336)



Figure 18
Lloyd Shoals Park Public Access Viewsheds
Lloyd Shoals Project (FERC No. 2336)

APPENDIX A

Summary of Contacts

**Pre-Consultation
Summary of Contacts
18 CFR § 5.6(d)(5)**

18 CFR § 5.6(d)(5): An appendix summarizing contacts with Federal, state, and interstate resource agencies, Indian tribes, non-governmental organizations, or other members of the public made in connection with preparing the Pre-Application Document sufficient to enable the Commission to determine if due diligence has been exercised in obtaining relevant information.

In accordance with 18 CFR § 5.6(d)(5), the following is a summary of Georgia Power contacts with Federal, state, and interstate resource agencies, Indian tribes, non-governmental organizations and others in preparing the Pre-Application Document (PAD). As demonstrated by the summary, Georgia Power has exercised due diligence in obtaining the required information.

I. EMAIL COMMUNICATION

Georgia Power made initial contact by email with lake residents and local property owners on November 6, 2017 and other potential stakeholders, including federal and state agencies on November 7, 2017. The purpose of the email was to announce that Georgia Power was beginning the relicensing process and to confirm contact information and determine stakeholder interest in the proceeding. The email also stated that Georgia Power was going to use the Federal Energy Regulatory Commission's (FERC) Integrated Licensing Process (ILP), and that the PAD would be filed in February 2018. Georgia Power subsequently delayed filing of the Notification of Intent and PAD to July 2018.

The email contacts included the following stakeholders:

- American Rivers
- Altamaha Riverkeeper
- Butts County
- Butts County Water and Sewer Authority
- City of Covington
- City of Jackson
- City of Locust Grove
- City of McDonough

- Georgia Bass Federation
- Georgia Department of Natural Resources – Environmental Protection Division
- Georgia Department of Natural Resources – Wildlife Resources Division
- Georgia Department of Natural Resources – Historic Preservation Division
- Henry County
- Homeowners – 1,756 individual homeowners
- Jackson Lake Homeowners Association
- Jasper County
- Macon Water Authority
- National Oceanic and Atmospheric Administration – National Marine Fisheries Service
- Newton County
- South River Water Alliance
- U.S. Department of Agriculture, Forest Service – Chattahoochee-Oconee National Forests
- U.S. Environmental Protection Agency, Region 4
- U.S. Fish and Wildlife Service

II. RELICENSING INFORMATION SESSIONS

The email described above announced two relicensing information sessions. The purpose of the meetings was to provide stakeholders with the opportunity to learn about the Project and the Project's resource areas. The information sessions were advertised in several local newspapers (Newton Newspapers, Inc., Monticello News, Jackson Progress Argus).

The information sessions were held in both an afternoon and evening session in order to accommodate the schedules of as many stakeholders as possible. Information sessions were held November 16, 2017 at the Butts County Administration Building in Jackson, Georgia from 3-5 p.m. and 6-8 p.m. At these information sessions, Georgia Power resource subject matter experts were available for one-on-one discussions with stakeholders in areas such as

Land Management, Recreation, Fisheries, Water Resources, Project Operations, Cultural Resources, and Tribal Issues.

In addition to numerous lake residents and property owners, attendees to the meetings included a representative from the following the Georgia Department of Natural Resources (GDNR) – Wildlife Resources Division (WRD).

III. STAKEHOLDER MEETINGS & PAD QUESTIONNAIRES

Georgia Power set up individual meetings with stakeholders and made additional specific contacts as described below.

Federal Resource Agencies

U.S. Fish and Wildlife Service

On January 9, 2018, Georgia Power met with the U.S. Fish and Wildlife Service (FWS). The purpose of the meeting was to introduce FWS to the Lloyd Shoals Project, to identify reasonably available resource information for the PAD, and to learn more about FWS's interests and resource management goals relative to the project.

Discussion topics included Georgia Power's Discussion topics included Georgia Power's project briefing information, general project description and overview of the FERC schedule, minimum flow from the project, dissolved oxygen and water quality improvements in the reservoir. Topics include the presence of unique habitats and rare plants that might occur near the project boundary. Georgia Power and FWS expressed mutual interest in wanting to support a citizen science-based water quality monitoring program on Jackson and other lakes if/as feasible in the future. The Ocmulgee Robust Redhorse CCAA with FWS and GDNR as a partnering agreement to provide critically important research and actions to conserve robust redhorse in its historic range was discussed. FWS looks forward to participating in the process.

FWS completed the PAD Questionnaire and returned it to Georgia Power (Appendix B).

State Resource Agencies

Georgia Department of Natural Resources – Wildlife Resources Division

On January 30, 2018, Georgia Power met with WRD to discuss the Lloyd Shoals relicensing. Among the topics discussed included delaying the relicensing schedule to begin in July 2018, fisheries resource interests, including efforts to complete a new conservation agreement for robust redhorse, and recreational access and facilities. WRD completed the PAD Questionnaire and returned it to Georgia Power (Appendix B).

Georgia Department of Natural Resources – Historic Preservation Division

Georgia Power met with GDNR’s Historic Preservation Division (HPD) on January 16, 2018 to discuss the Lloyd Shoals relicensing. Topics discussed including the relicensing schedule, the cultural resources studies previously conducted at the Project, and the sites currently being monitored. HPD completed the PAD Questionnaire and returned it to Georgia Power (Appendix B).

Georgia Department of Natural Resources – Environmental Protection Division – Watershed Protection Branch

On January 11, 2018, Georgia Power had a telephone conversation with the Georgia Department of Natural Resources – Environmental Protection Division (GEPD) – Watershed Protection Branch. The purpose of the meeting was to introduce GEPD to the Lloyd Shoals Project and Process, Plan and Schedule, to identify reasonably available resource information for the PAD, and to learn more about GEPD’s interests and resource management goals relative to the project.

Discussion topics included Georgia Power’s project briefing information which was shared electronically after the conversation. GEPD representative indicated there were schedule conflicts, but would consider an in-person meeting date with Georgia Power.

Georgia Power remains in communication with GEPD about scheduling an in-person meeting to discuss Lloyd Shoals relicensing. GEPD completed the PAD Questionnaire and returned it to Georgia Power (Appendix B).

IV. INDIAN TRIBES

In accordance with 18 CFR § 5.7, a meeting will be held no later than 30 days following filing of the notification of intent between potentially affected Indian tribes and Commission staff, if the Indian tribes agree to such meeting. As stipulated by the regulation, FERC staff is making initial contact with potentially affected Indian tribes, including the following:

Muscogee (Creek) Nation of Oklahoma

Cherokee Nation of Oklahoma

Eastern Band of Cherokee Indians

United Keetoowah Band of Cherokee

APPENDIX B

PAD Questionnaires



Pre-Application Document Questionnaire
Lloyd Shoals Hydroelectric Project
(FERC No. 2336)

Georgia Power Company (Georgia Power) is preparing to relicense its Lloyd Shoals Hydroelectric Project (Project), FERC No. 2336. The Lloyd Shoals Project, which includes Lake Jackson, is located on the upper Ocmulgee River in Butts, Henry, Jasper, and Newton Counties, Georgia. The current license expires December 31, 2023. Beginning in 2018 Georgia Power will use the Federal Energy Regulatory Commission’s (FERC’s) Integrated Licensing Process (ILP), 18 CFR Part 5, to develop the license application. In 2018 Georgia Power will distribute a Pre-application Document (PAD) to Federal and state resource agencies, Indian tribes, local governments, and members of the public likely to be interested in the proceeding. The PAD will compile existing, relevant, and reasonably available information pertaining to the Project. This information will be used throughout the proceeding to help identify resource issues and related information needs, develop study plans, and analyze any project impacts.

Through this PAD Questionnaire, Georgia Power is seeking the input of interested stakeholders to help identify sources of existing, relevant, and reasonably available resource information pertaining to the Project. Your responses will provide Georgia Power with valuable information for preparing a comprehensive PAD.

This questionnaire can be filled out and sent to Georgia Power via email, mail, or fax. If emailed, please send to cromara@southernco.com. If mailed, please send to Courtenay O’Mara, 241 Ralph McGill Blvd., NE, BIN 10193, Atlanta, GA 30308. If sent via fax, please send to (404) 506-2626.

1. Information about the person completing the questionnaire:

Name & Title:	Keith Weaver – Fisheries Biologist
Organization:	Department of Natural Resources – WRD - Fisheries
Address:	2065 Hwy 278 SE Social Circle, GA 30025
Phones:	706-557-3340
Email Address:	Keith.Weaver@dnr.ga.gov

2. Do you or your organization know of or possess existing, relevant, and reasonably available information that pertains to the Project: for example, information that describes the existing environment or potential impacts of project operation?

Yes (*Please complete 2a through 2d*) No (*Please go to 3*)

a. If yes, please check the box(es) to indicate the specific resource area(s) the information relates to:

<input type="checkbox"/> Geology and soils	<input checked="" type="checkbox"/> Recreation and land use
<input checked="" type="checkbox"/> Water resources	<input type="checkbox"/> Aesthetic resources

Thank you for your participation.

Not responding within 30 days will indicate that you are unaware at this time of any existing, relevant and reasonably available information pertaining to the Project and are not interested in participating in the Lloyd Shoals relicensing proceeding at this time.



Pre-Application Document Questionnaire
Lloyd Shoals Hydroelectric Project
(FERC No. 2336)

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1. Information about the person completing the questionnaire:

Name & Title:	Elizabeth Booth
Organization:	Georgia EPD
Address:	2 Martin Luther King Jr. Drive S.E. , Suite 1152 East Tower, Atlanta GA, 30334
Phones:	404-463-4929
Email Address:	Elizabeth.Booth@dnr.ga.gov

2. Do you or your organization know of or possess existing, relevant, and reasonably available information that pertains to the Project: for example, information that describes the existing environment or potential impacts of project operation?

Yes (**Please complete 2a through 2d**) No (**Please go to 3**)

a. If yes, please check the box(es) to indicate the specific resource area(s) the information relates to:

Geology and soils Recreation and land use

- | | | | |
|-------------------------------------|--|--------------------------|----------------------------|
| <input checked="" type="checkbox"/> | Water resources | <input type="checkbox"/> | Aesthetic resources |
| <input checked="" type="checkbox"/> | Fish and aquatic resources | <input type="checkbox"/> | Cultural resources |
| <input type="checkbox"/> | Wildlife and botanical resources | <input type="checkbox"/> | Socio-economic resources |
| <input checked="" type="checkbox"/> | Wetlands, riparian, and littoral habitat | <input type="checkbox"/> | Tribal resources |
| <input type="checkbox"/> | Rare, threatened, and endangered species | <input type="checkbox"/> | Other resource information |

b. Please briefly describe the information or list available documents and references. If listing references, please provide author(s), date, title, publication, volume, and page numbers where applicable. (Additional information may be provided on separate sheets).

Monthly water quality data for Lake Jackson collected during the growing season

(1997 - present)

Monitoring reports/data

Fish tissue data

Water quality models for Lake Jackson and its watershed

391-3-6-.03(14) – Designated Use classifications (Lake Jackson is Recreation)

391-3-6-.03(17) – Site specific water quality criteria for Lake Jackson

TMDL documents for fecal coliform, mercury, chlordane, and PCBs

305b/303d assessment documents

NPDES documents for Lake Jackson watershed

Groundwater data in the area

Middle Ocmulgee Water Planning Council's Regional Water Plan

Construction and stormwater permits

c. Where can Georgia Power obtain this information?

Georgia EPD Watershed Protection Branch

d. Please provide the name(s) of any specific representative(s) of your organization other than yourself you wish to designate for a potential follow-up contact by Georgia Power or Georgia Power's representative for the resource area(s) checked above.

Representative Contact Information

Name and Title: Jeremy Smith

Address: 7 Martin Luther King Jr. Drive S.E. , Suite 450,

Atlanta GA, 30334

Phones: 404-651-8454

Thank you for your participation.

Not responding within 30 days will indicate that you are unaware at this time of any existing, relevant and reasonably available information pertaining to the Project and are not interested in participating in the Lloyd Shoals relicensing proceeding at this time.



Pre-Application Document Questionnaire
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1. Information about the person completing the questionnaire:

Name & Title: Meg Richardson, Environmental Review Historian
Organization: DNR, Historic Preservation Division (GA-SHPD)
Address: 2610 GA Hwy 155, SW, Stockbridge, GA 30281
Phones: 770-389-7844
Email Address: meg.richardson@dnr.ga.gov

2. Do you or your organization know of or possess existing, relevant, and reasonably available information that pertains to the Project: for example, information that describes the existing environment or potential impacts of project operation?

Yes (Please complete 2a through 2d) No (Please go to 3)

- a. If yes, please check the box(es) to indicate the specific resource area(s) the information relates to:

Geology and soils Recreation and land use

- | | |
|---|--|
| <input type="checkbox"/> Water resources | <input type="checkbox"/> Aesthetic resources |
| <input type="checkbox"/> Fish and aquatic resources | <input checked="" type="checkbox"/> Cultural resources |
| <input type="checkbox"/> Wildlife and botanical resources | <input type="checkbox"/> Socio-economic resources |
| <input type="checkbox"/> Wetlands, riparian, and littoral habitat | <input type="checkbox"/> Tribal resources |
| <input type="checkbox"/> Rare, threatened, and endangered species | <input type="checkbox"/> Other resource information |

b. Please briefly describe the information or list available documents and references. If listing references, please provide author(s), date, title, publication, volume, and page numbers where applicable. (Additional information may be provided on separate sheets).

The Research Room at HPD holds an Environmental Review file pertaining to Lloyd Shoals (HP-921112-007) along with other files that may contain pertinent information. Files at HPD that may be of use are County & ~~State~~ City Surveys, National Register, Centennial Farm, Topical, & Environmental Review files. HPD also recommends reviewing our online database GNAHRGIS for additional resources & the Georgia Archaeological Site Files (GASF) which are housed at UGA.

c. Where can Georgia Power obtain this information?

- d. Please provide the name(s) of any specific representative(s) of your organization other than yourself you wish to designate for a potential follow-up contact by Georgia Power or Georgia Power's representative for the resource area(s) checked above.

Representative Contact Information

Name and Title: _____

Address: _____

Phones: _____

Email Address: _____

Name and Title: _____

Address: _____

Phone: _____

Email Address: _____

3. Are you aware of any specific Project-related issues pertaining to the resource area(s) listed in 2a above?

Yes (Please list specific issues by resource area below) No (Please go to 4)

Resource Area	Specific Issue
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

4. Do you or your organization plan to participate in the Lloyd Shoals Project relicensing proceeding?

- Yes No

5. We are interested in your comments. Please provide below any comments or additional information you may have regarding the Lloyd Shoals Project relicensing.

Comments or Additional Information

Thank you for your participation.

Not responding within 30 days will indicate that you are unaware at this time of any existing, relevant and reasonably available information pertaining to the Project and are not interested in participating in the Lloyd Shoals relicensing proceeding at this time.



**Pre-Application Document Questionnaire
Lloyd Shoals Hydroelectric Project
(FERC No. 2336)**

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Through this PAD Questionnaire, Georgia Power is seeking the input of interested stakeholders to help identify sources of existing, relevant, and reasonably available resource information pertaining to the Project. Your responses will provide Georgia Power with valuable information for preparing a comprehensive PAD.

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1. Information about the person completing the questionnaire:

Name & Title:	Tamara Johnson
Organization:	U.S. Fish and Wildlife Service (Department of the Interior)
Address:	105 Westpark Drive, Suite D
Phones:	(706) 613-9493 x.229
Email Address:	Tamara_Johnson@FWS.gov

2. Do you or your organization know of or possess existing, relevant, and reasonably available information that pertains to the Project: for example, information that describes the existing environment or potential impacts of project operation?

X Yes **(Please complete 2a through 2d)** No **(Please go to 3)**

a. If yes, please check the box(es) to indicate the specific resource area(s) the information relates to:

- | | |
|--|--|
| <input type="checkbox"/> Geology and soils | <input type="checkbox"/> Recreation and land use |
| X Water resources | <input type="checkbox"/> Aesthetic resources |

4. Do you or your organization plan to participate in the Lloyd Shoals Project relicensing proceeding?
X Yes No

5. We are interested in your comments. Please provide below any comments or additional information you may have regarding the Lloyd Shoals Project relicensing.

Comments or Additional Information

GPC and FWS had a meeting on January 9, 2018 to discuss the upcoming FERC relicensing process. The discussion included water quality monitoring methods, and potential resource issues. The FWS agreed to participate as a stakeholder in their best capacity.

Thank you for your participation.

Not responding within 30 days will indicate that you are unaware at this time of any existing, relevant and reasonably available information pertaining to the Project and are not interested in participating in the Lloyd Shoals relicensing proceeding at this time.

APPENDIX C

Transfer of Electricity from Project to Transmission Grid (Critical Energy Infrastructure Information) Lloyd Shoals Project (FERC No. 2336)

Appendix C contains critical energy infrastructure information (CEII), including a diagram showing the transfer of electricity derived from engineering documents. This CEII contains details which could be useful to a person planning an attack on critical infrastructure, and the incapacity of the facility would negatively affect security, economic security, and public health and safety.

APPENDIX D

Lloyd Shoals Operations Primer

**Lloyd Shoals
Operations Primer
June 2018**



How Does a Hydro Plant Generate Power?

Hydropower is one of the oldest methods of generating power. A hydro plant uses the stored kinetic energy in water as it moves from the higher reservoir elevation to the lower tailwater elevation to produce clean, renewable power.

Water flows from the reservoir into the intake, through passageways called penstocks, to the turbine blades. There the water turns the turbine, which turns an electric generator to make electricity. Figure 1 shows how this works.

The amount of power generated is directly proportional to the head (difference between reservoir headwater elevation and discharge tailwater elevation) and flow. In any hydroelectric power plant scenario, more power can be generated if there is more head, i.e. a higher dam, or more flow in the river.

The amount of flow available upstream of a dam depends on rainfall and the size and geography of the drainage basin, and is affected by water uses and other factors. The drainage basin, also called a watershed, is all of the land upon which rainfall flows to a particular stream, river, or other water body. In general, the larger the drainage basin area, and the more abundant the rainfall, the higher the flow in the river. Flows vary daily, seasonally, and annually. Typically, flows in Georgia are highest in March or April and lowest in August, September or October.

How is Hydroelectric Power Used?

Only certain sites have sufficient flow and are otherwise suitable for riverine hydro plants, so the amount of energy produced by hydro plants in Georgia is limited. In 2015, hydro represented 7-percent of Georgia Power's generation capacity (megawatts [MW]) and provided about 2-percent of actual generation (MW-hours). Yet, despite these relatively low numbers, hydropower is an important component of the generation mix.

Because hydro plants can be loaded quickly, they are often used to supply power during peak power demand periods. Hydro plants can also be used in system emergencies, such as when a large fossil or nuclear plant trips, or when the system transmission grid requires balancing. Generally, peak power demands in Georgia occur most weekday afternoons during warm seasons of the year and also on most weekday mornings in the winter months. Peak power demands can change rapidly and hydro plants can come on-line quickly to meet that demand.

How Does Storage Affect Hydro Plant Operations?

Over time, inflow and outflow at a hydro plant are generally equivalent. The amount of time over which inflow and outflow are equivalent depends on the amount of usable storage at the hydro plant.

A very small reservoir cannot store water, so inflow and outflow are always equal. This type of plant is called a “run of river” plant. It is rarely economical to build turbines large enough to pass the highest of inflows at run of river plants, so during higher flow periods some of the water often must be spilled, bypassing the generation turbines. For these reasons, plants with very small reservoirs generally do not produce much power. Most hydro plants of this type found in Georgia are old mill sites, where steady power throughout the day was traditionally more important than peaking power and spillage was not a concern.

A larger reservoir can store water for hours or days, and may generate during peak power periods when generation from other sources is costly or not readily available. For these “modified run-of-river” hydro plants, the reservoir is drawn down when generating, and then refilled when not generating. The average discharge over a matter of day(s), or week(s), is equal to inflow over the same period. Lloyd Shoals is a dam that operates in this manner.

A very large reservoir can store water for months, or even years. These reservoirs can capture water for generation during high flow periods of the year for use in lower flow periods of the year. Without this capability to store water, the high inflows at these reservoirs would have to be spilled and not used to generate power. These very large reservoirs are called “storage” reservoirs. Examples in Georgia are the Army Corps of Engineers dams on the Chattahoochee and Savannah Rivers.

What Determines the Size of a Hydro Plant?

Deciding what size dam and reservoir to build is a matter of economics and the physical features of the geographic area. A taller dam has more head, and a greater ability to use more water through storage, but at some point, the economic gains from building a larger reservoir solely for power generation will not offset the costs of construction, maintenance, and operation, which can be substantial. Other important benefits such as navigation, flood control, water supply, and recreation often help justify the cost of these large storage reservoirs.

A large storage reservoir can reregulate inflows and provide benefits on-site, as well as to smaller reservoirs downstream. Downstream reservoirs benefit because the large storage reservoir captures high inflows in wet months, which might otherwise be spilled at a smaller downstream plant, and release the water in dry months when it can be used to generate power. Downstream power customers and reservoir users benefit from this reregulation as well.

How is the Lloyd Shoals Project Operated?

General Project Description

Lloyd Shoals is located at river mile 250.2 of the Ocmulgee River, near the confluence of the Alcovy, Yellow and South Rivers in Central Georgia, approximately 35 miles northwest of Macon, Georgia, and 40 miles southeast of Atlanta, Georgia. Project waters lie within parts of Butts, Jasper, Henry, and Newton Counties. The project consists of a reservoir (Lake Jackson), an earth and concrete gravity dam, a powerhouse, a spillway, a tailrace, a substation, recreation facilities, and appurtenant facilities.

The drainage area upstream of the dam is about 1,400 square miles. The area of the reservoir at normal pool (elevation 530 feet plant datum (PD)) is about 4,750 acres with a shoreline length of 135 miles. The full reservoir storage is approximately 107,200 acre-feet.

Current Operation at Lloyd Shoals Dam during Normal Conditions

Lloyd Shoals began operation in 1911. It operates as a modified run-of-river project, where flows are modified over a couple of hours during the peak power period. The powerhouse is integral with and immediately downstream of the intake. The powerhouse contains six horizontal Francis type double-runner turbine units, with a total nameplate generating capacity of 18 MW at a head of 96.8 feet. Table 1 below presents pertinent data on the turbines:

Table 1
Data on Lloyd Shoals Turbines

UNIT	Nameplate Capacity MW	Maximum Hydraulic Capacity CFS	Commercial Operation Date
1	3	620	1911
2	3	620	1911
3	3	620	1911
4	3	620	1911
5	3	620	1916
6	3	620	1917

Lloyd Shoals discharges directly into the Ocmulgee River. When the plant is not operating to generate peaking energy, it releases a continuous minimum flow through the turbines of 400 cubic feet per second (cfs), or inflow, whichever is less. This is required by Article 402 of the project's current Federal Energy Regulatory Commission (FERC) license, which states, "The Licensee shall release from the Lloyd Shoals Dam into the

Ocmulgee River a continuous minimum flow of 400 cubic feet per second, or inflow to the project reservoir, whichever is less, as measured at the project's tailrace, for the protection and enhancement of fish and wildlife resources in the Ocmulgee River.” Compliance with this flow is based on flows measured at the US Geological Survey Ocmulgee at Jackson gage (USGS 02210500), which is located approximately 1 mile downstream of Lloyd Shoals Dam.

Water for generation at Lloyd Shoals is sourced from precipitation in the Ocmulgee River basin upstream of Lloyd Shoals Dam. There is no reregulation of water upstream of Lloyd Shoals, so inflows are solely dependent on timing, duration and quantity of rainfall. Inflows are stored for a short period of time and then released through the generating turbines during peak power demand periods.

Typically, during normal operations, Lloyd Shoals is operated to maintain reservoir elevations between approximately 530 and 527 feet PD, excluding planned drawdowns and drought. The reservoir rises slightly as inflow is temporarily stored during hours when the region is not in its peak power demand period (“off-peak” hours). As Georgia Power’s service territory enters a peak power demand period, Lloyd Shoals is operated to release water through the powerhouse turbines and produce energy from the plant generators. This cycle repeats daily depending on peak power demand periods, which vary from season to season.

Operations during High Flow Events at the Lloyd Shoals Project

During high flow events at Lloyd Shoals Dam, all flow is first run through turbine/generator units where electricity is generated. As inflow to the powerhouse exceeds the maximum hydraulic capacity of the turbines, spillway gates are opened incrementally to approximate inflow. Water is not released in advance of a storm because oftentimes predicted storms in the southeast do not materialize and then the reservoir could remain low for an undetermined amount of time. Water is only released as inflows increase and justify the release.

Prior to 2012, Georgia Power operated Lake Jackson largely between reservoir guide curves, a lower rule curve and an upper full pool limit. During this time, Georgia Power operated Lake Jackson between about 527 and 530 feet PD from May through October and between 522 and 530 feet PD from January through February, with a refill period from March through April and a drawdown period from November through December. The annual winter drawdown created storage volume from elevations 522 to 530 feet PD, which allowed Georgia Power to manage expected large rainfall events during the winter and spring without tripping the flashboards. The flashboard spillway was designed such that the inherent force of the water would open or “trip” the 2- and 5-foot-high boards when the reservoir reached elevation 530 feet PD. Flashboards could only be reset when the reservoir receded below the crest of the spillway, at elevation 525 feet PD. By implementing the reservoir rule curves and creating additional storage volume, Georgia Power greatly reduced the frequency of fluctuations between elevations 525 and 530 feet PD.

In 2012, Georgia Power replaced the spillway flashboards with Obermeyer spillway gates. These gates provide better control of the reservoir level during the course of high flow operations by allowing the plant discharges to be more closely matched with inflows into the project. Since 2012, Georgia Power has discontinued the implementation of the reservoir guide curves and manages Lake Jackson between approximately 527 and 530 feet PD year-round during normal inflows, excluding prolonged drought periods and lake drawdowns for homeowner and shoreline maintenance.

Operations during Drought and Low Flow Periods at the Lloyd Shoals Project

During low-flow periods or extended drought at Lloyd Shoals Dam, calculated inflows often drop below the 400 cfs, or inflow, minimum flow requirement. During the most recent drought during the summer/fall of 2016, the lowest recorded elevation of Lake Jackson was 525 feet PD (by comparison the target low level elevation during the last homeowner drawdown in 2015 was 523 feet PD). In 2016, Lloyd Shoals Dam supplemented the river downstream of the project with a 250 cfs absolute minimum release to ensure adequate stream flows for aquatic life and downstream uses such as the Butts County and Macon Water Authority water intakes. These supplemental flows were provided for approximately 64 days causing the lake elevations to decline as shown in Figure 35 below. During the refill period after the drought, Georgia Power continued to release the 250-cfs minimum flow to raise lake elevations at Lake Jackson prior to increasing discharges from the project. In 2016 calculated daily inflows were less than 400 cfs 28.1% of the days and less than 250 cfs 20.5% of the days.

Lloyd Shoals Operations are Shown in the Following Figures:

Figure 1 shows a typical cross-sectional depiction of a hydroelectric generating plant with horizontal generating units.

Figure 2 demonstrates the historical average monthly inflows to Lloyd Shoals for the period of January 1997 through December 2016.

Figures 3 through 7 show the average calculated inflows to Lloyd Shoals and the hourly reservoir elevations and discharges for five periods. These graphs illustrate how Lake Jackson is operated to maintain elevation 527 through 530 feet PD most of the time, but may vary in times of extremely wet or dry conditions. Average annual inflow for Lake Jackson is approximately 1,747 cfs. The actual amount available for generation is less due to withdrawals by local users and evaporation from the reservoir

Figure 3 shows a medium-range inflow week from Sunday to Sunday with a rainfall event.

Figure 4 shows a medium-range week from Sunday to Sunday with steady inflows.

Figure 5 shows a 21-week low-inflow period due to drought conditions.

Figure 6 shows a two-week period in winter 2015-2016 with high inflow conditions. This high inflow event shows the impact of high inflow on Lake Jackson water levels with Obermeyer spillway gates.

Figure 7 shows a three-week period in winter 1997-1998 with high inflow conditions. This figure illustrates the impact of high inflow on Lake Jackson elevation levels with the flashboard spillway

Figures 8 through 27 show the daily maximum and minimum Lake Jackson reservoir elevation for each of the years from 1997 through 2016. Some things to note about these graphs are:

- The typical operating range for the reservoir is between elevations 527 feet and 530 feet PD, with 530 feet PD being full pool.
- Installation of Obermeyer spillway gates in 2012 provided the following benefits:
 - better control of high inflow events
 - decreased reservoir fluctuation during high inflow events
 - elimination of the need for a guide curve drawdown
- The drought durations noted on the graphs are as classified by the United States Drought Monitor and do not necessarily indicate the range of dates supplemental flows were released from storage at Lloyd Shoals.

Figure 28 shows daily lake fluctuation statistics for the period 1997-2016. Daily fluctuations were less than 1.5 feet 98-percent of the time and less than 1.0 foot 95-percent of the time.

Figure 29 shows daily lake fluctuation statistics for the period 2013-2015. This time period reflects a short period of normal operations since the installation of the Obermeyer spillway gates. Daily fluctuations have been reduced since the installation of the Obermeyer spillway gates.

Figure 30 shows statistics on hourly lake elevations for the period 1997-2016. Lake Jackson was below elevation 528 feet PD 32% of the time, below elevation 527 feet PD 20% of the time, and less than 522 feet PD only 0.1% of the time.

Figure 31 shows statistics on hourly lake elevations for the period 2013-2015. This time period reflects an extended period of normal operations since the installation of the Obermeyer spillway gates. Lake Jackson was below elevation 529 feet PD 73% of the time, below elevation 528 feet PD 0.1% of the time, and less than 527 feet PD only 0.0% of the time.

Figure 32 shows a comparison of hourly lake elevation statistics for the period of 1997-2016, and for the period from July 2012 through December 2016 after the spillway flashboards were replaced with Obermeyer spillway gates. Comparison of these data sets shows the elevation range of Lake Jackson was reduced by 2.3 feet, from a 11.1-foot range to a 8.8-foot range, after the installation of the Obermeyer spillway gates.

Figure 33 shows statistics on weekly inflow and outflow for the period 1997-2016. From this graph, it can be seen on a weekly basis, inflow and outflow are approximately equal, i.e. there is negligible storage change on a weekly time step.

Figure 34 shows statistics on daily river flows for the period 1997-2016 based on the USGS Jackson gage. For the period 1997-2016, daily average flow in the river exceeded 250 cfs 98% of the days, 400 cfs 84% of the days, and 1000 cfs 50% of the days.

Figure 35 shows the decline in reservoir elevation during the most recent drought that occurred from July 26 through November 28, 2016 as classified by the United States Drought Monitor.

FIGURES

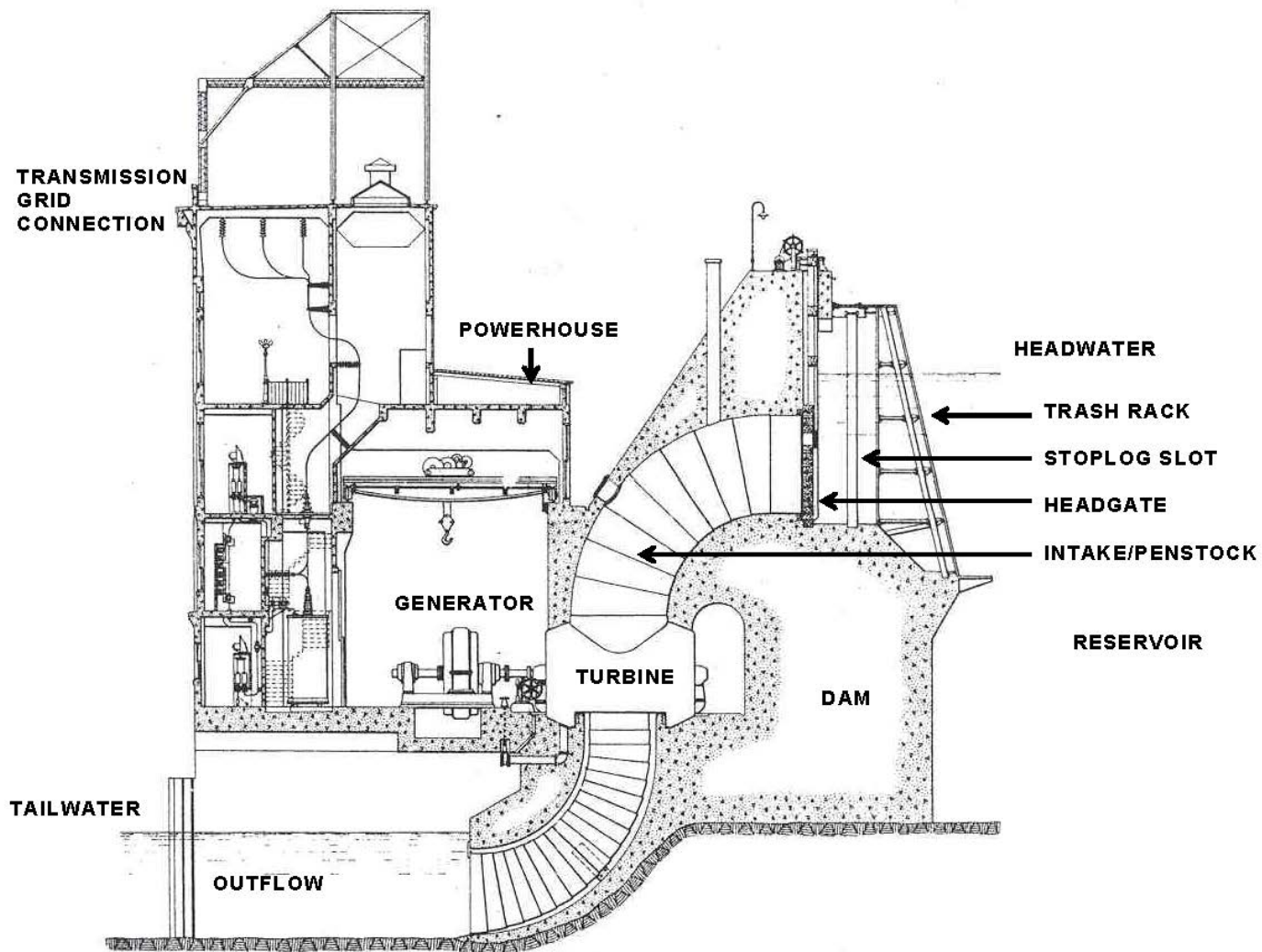


FIGURE 1

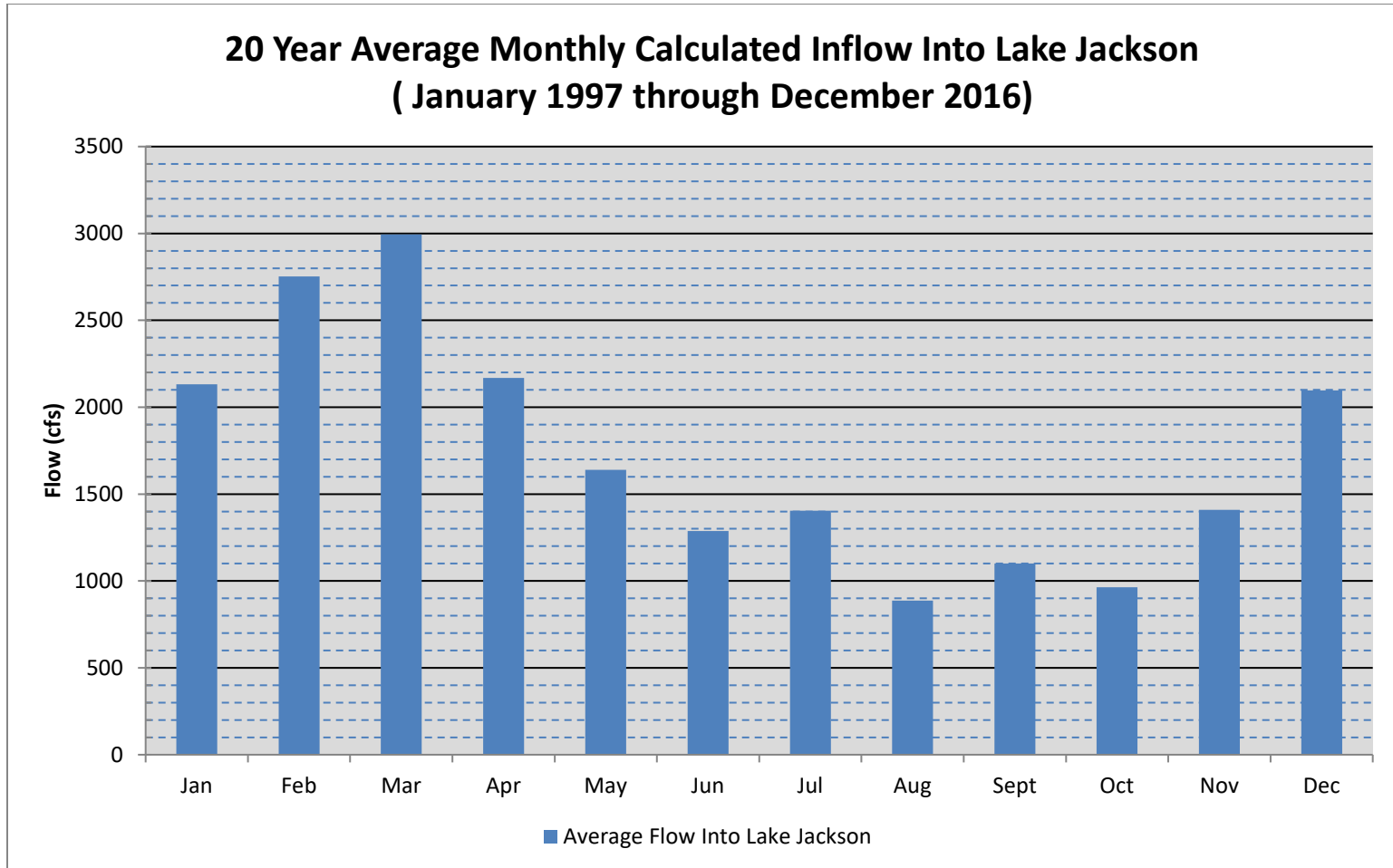


FIGURE 2

**Lloyd Shoals Operations:
Example of One Week of Operation, Sunday to Sunday
During An Average Inflow Week (1,747 cfs Average Inflow)**

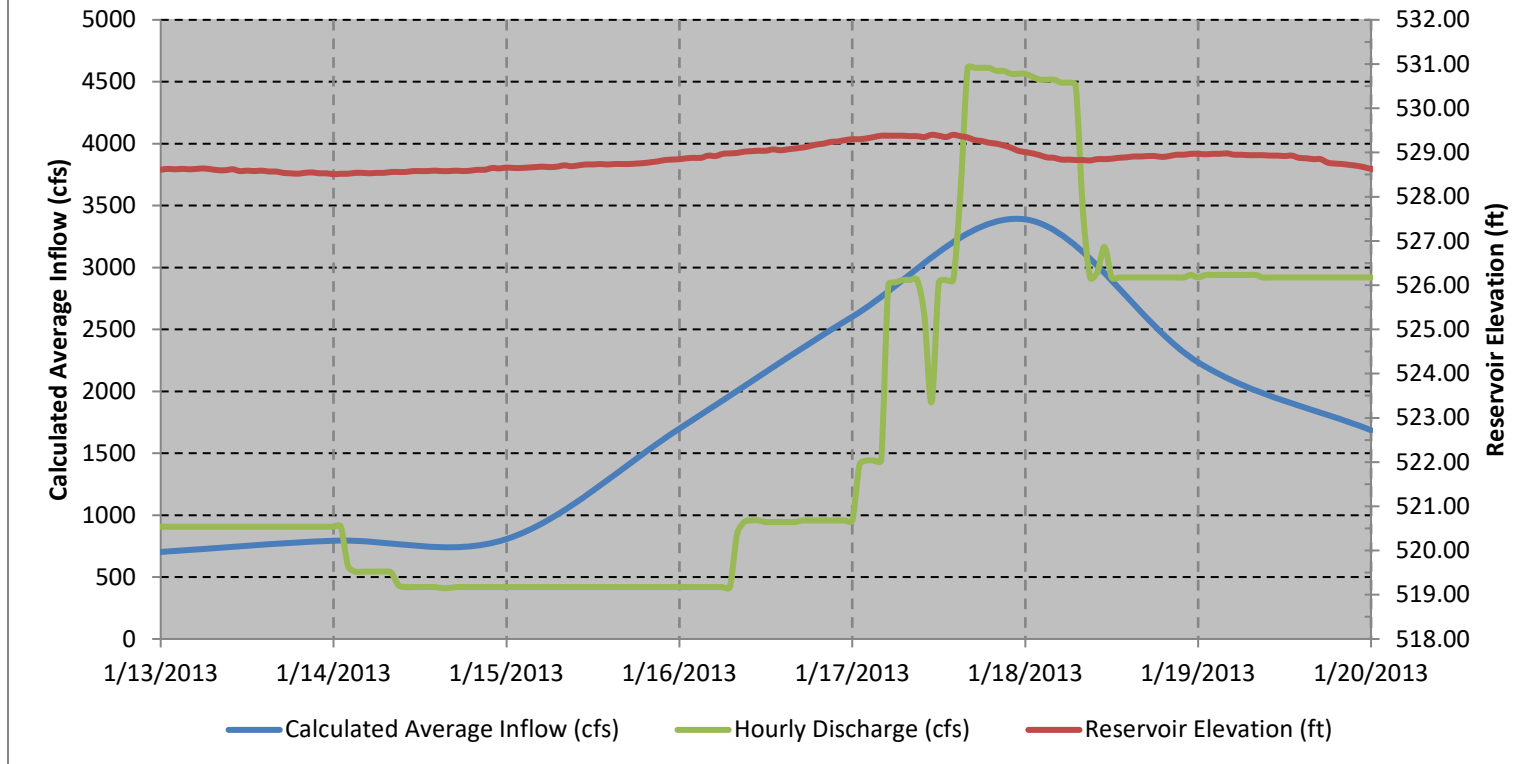


FIGURE 3

**Lloyd Shoals Operations:
Example of One Week of Operation, Sunday to Sunday
During An Average Inflow Week (1,547 cfs Average Inflow)**

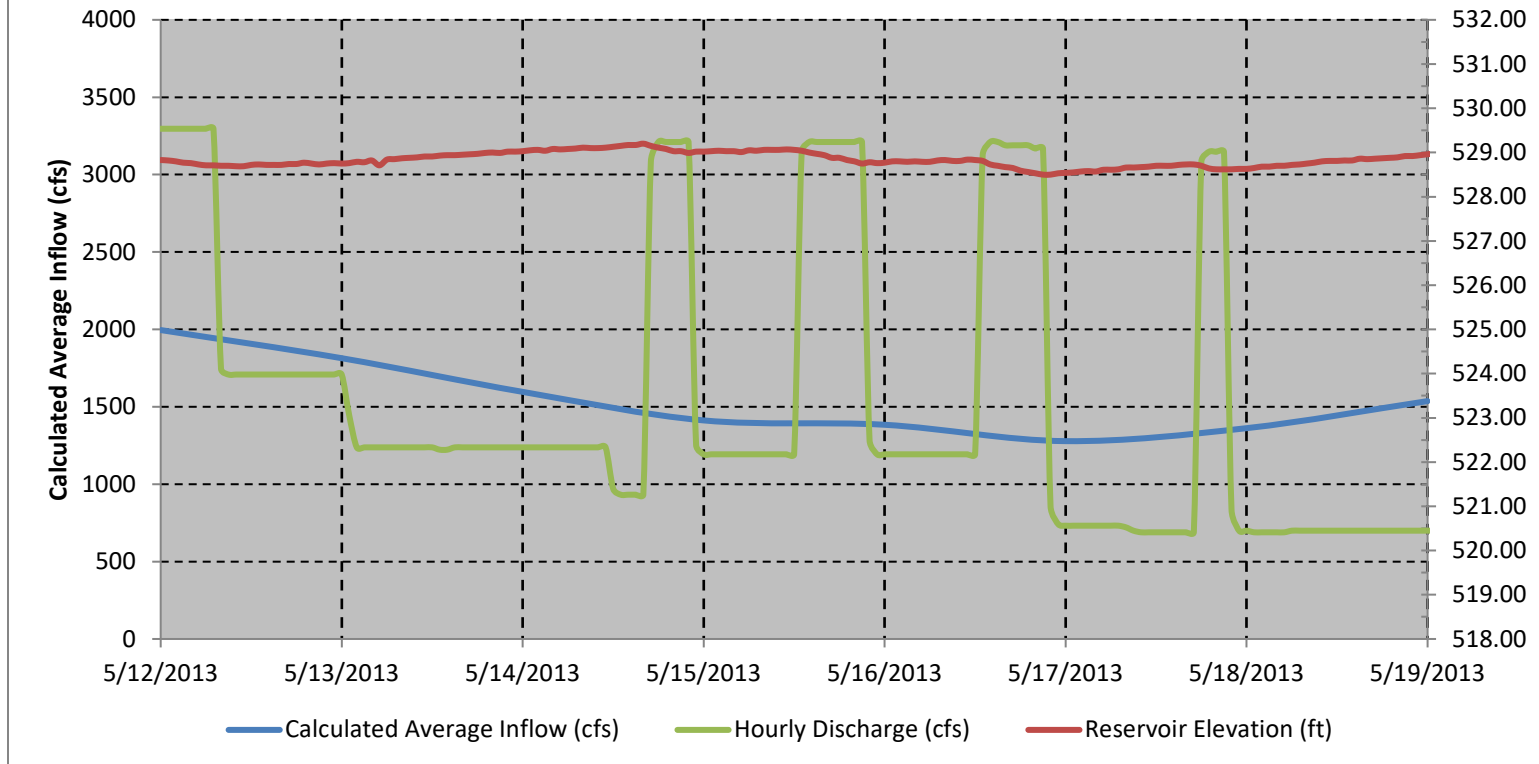


FIGURE 4

Lloyd Shoals Operations: Example of a 21 Week Drought Period (313 cfs Average Inflow)

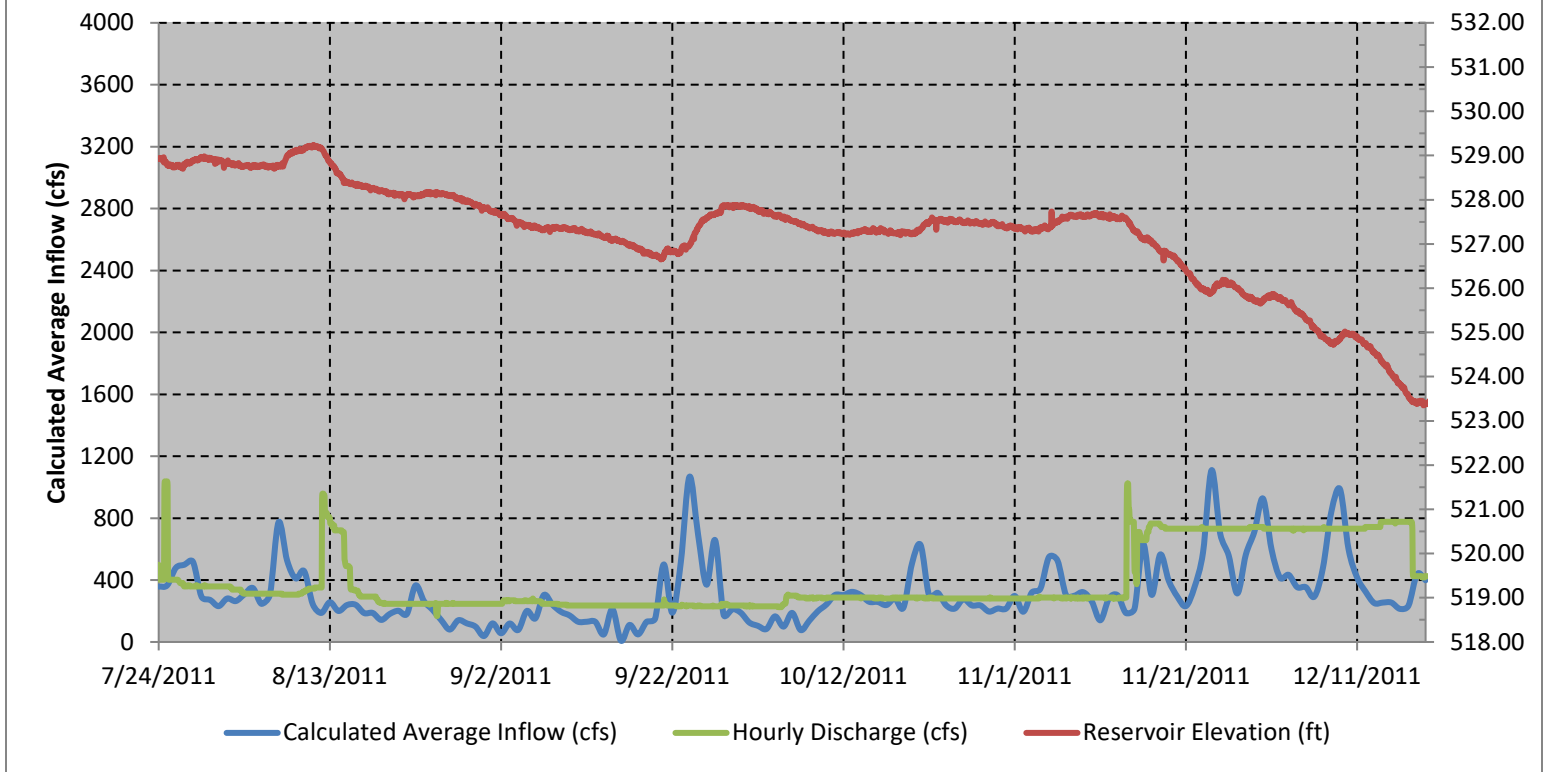


FIGURE 5

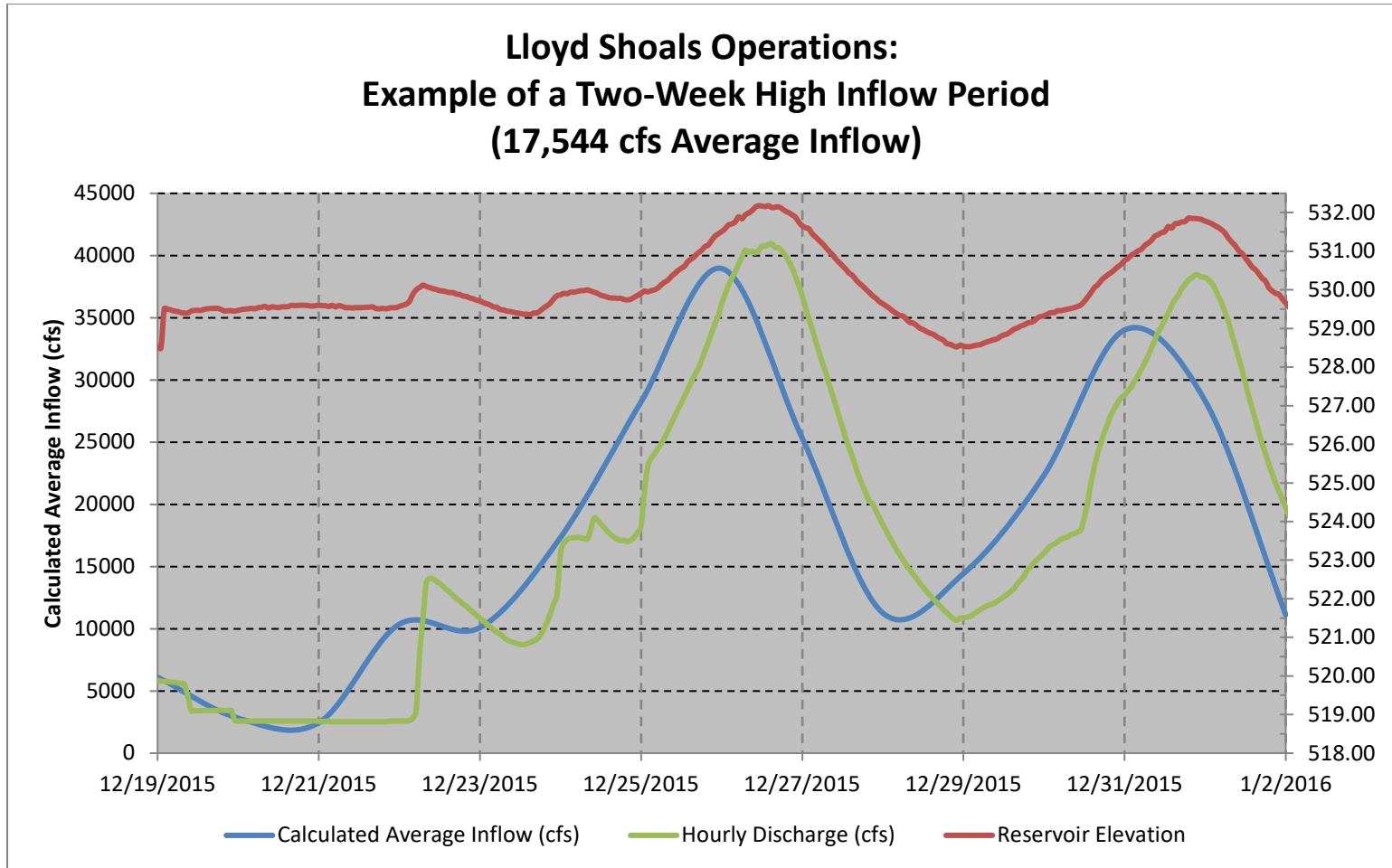


FIGURE 6

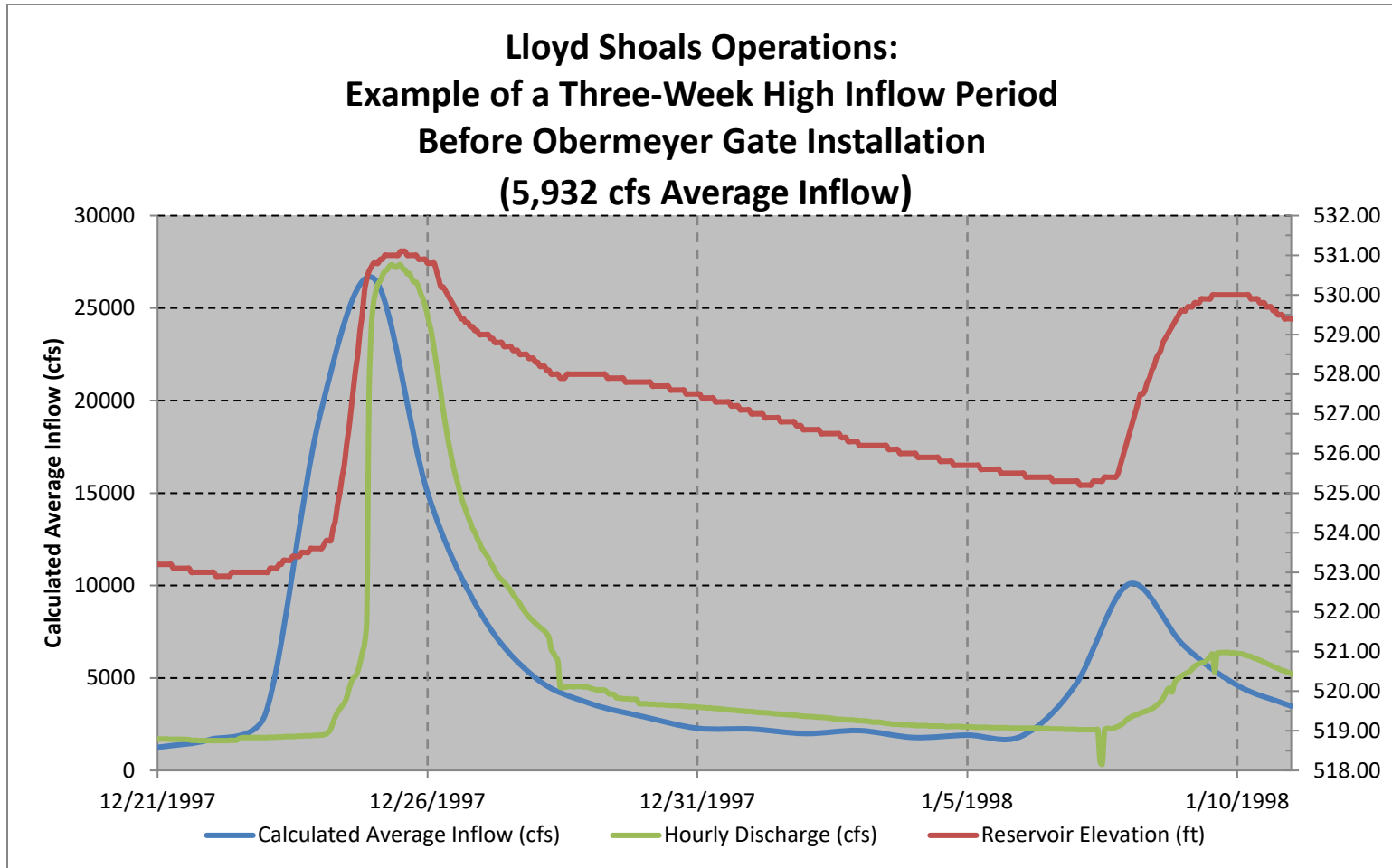


FIGURE 7

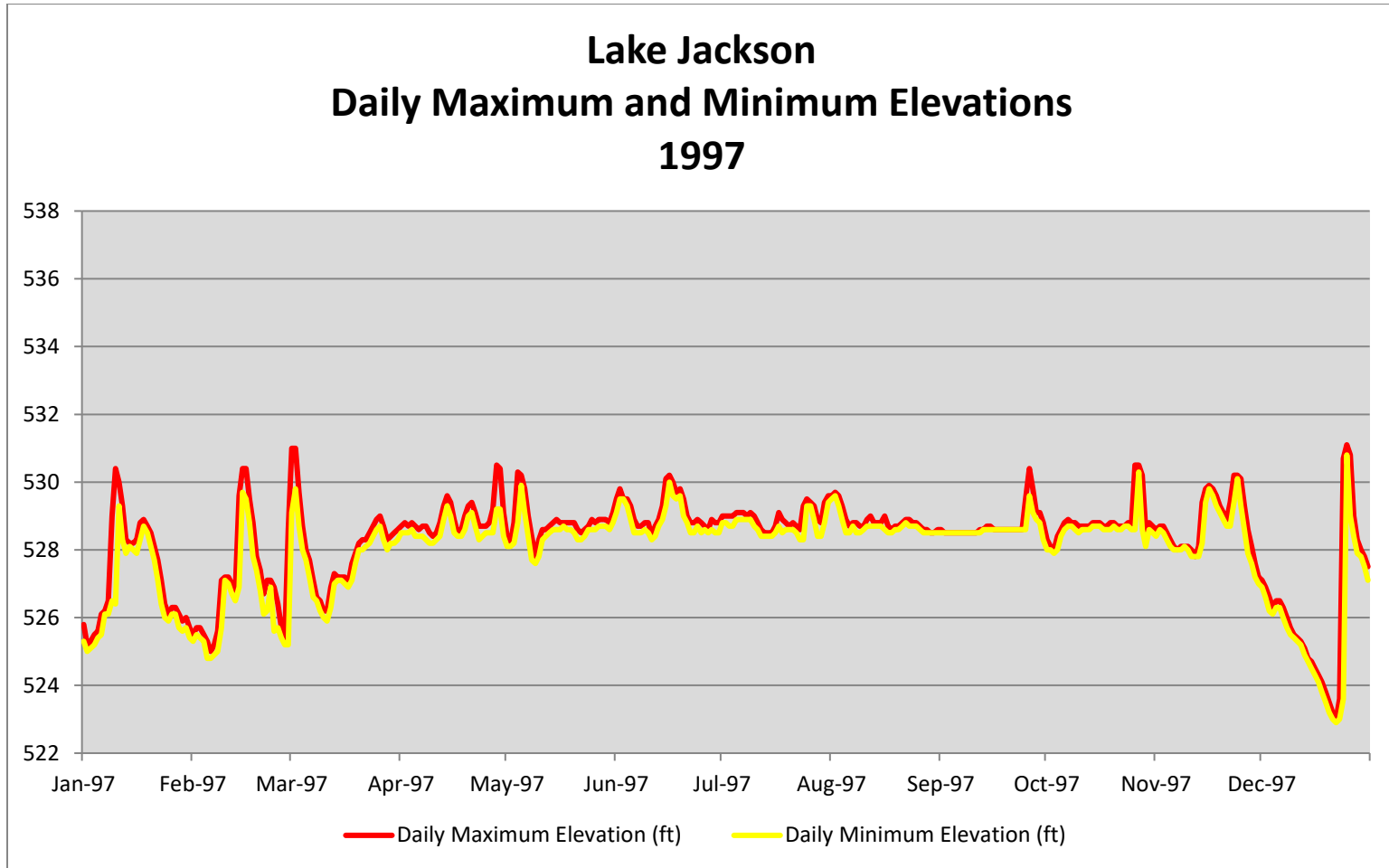


FIGURE 8

Lake Jackson Daily Maximum and Minimum Elevations 1998

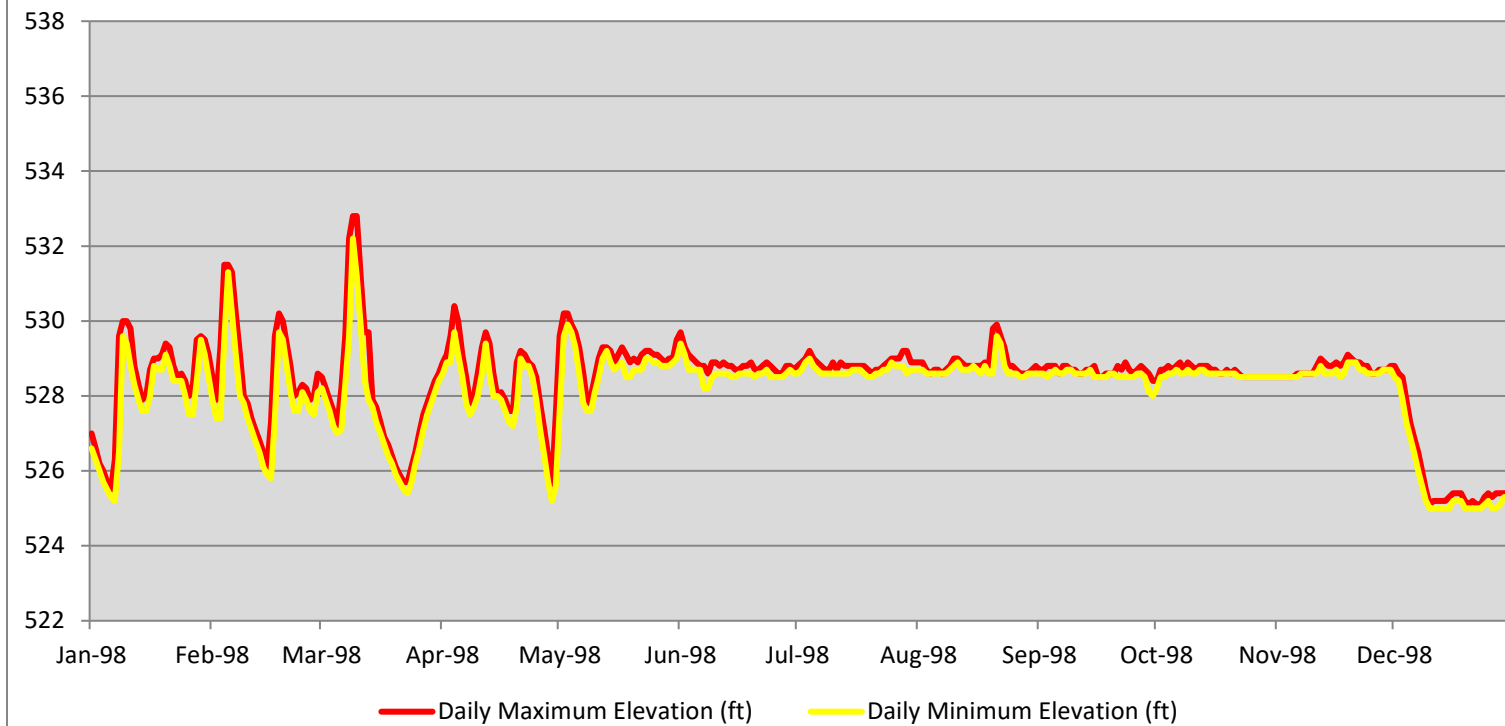


FIGURE 9

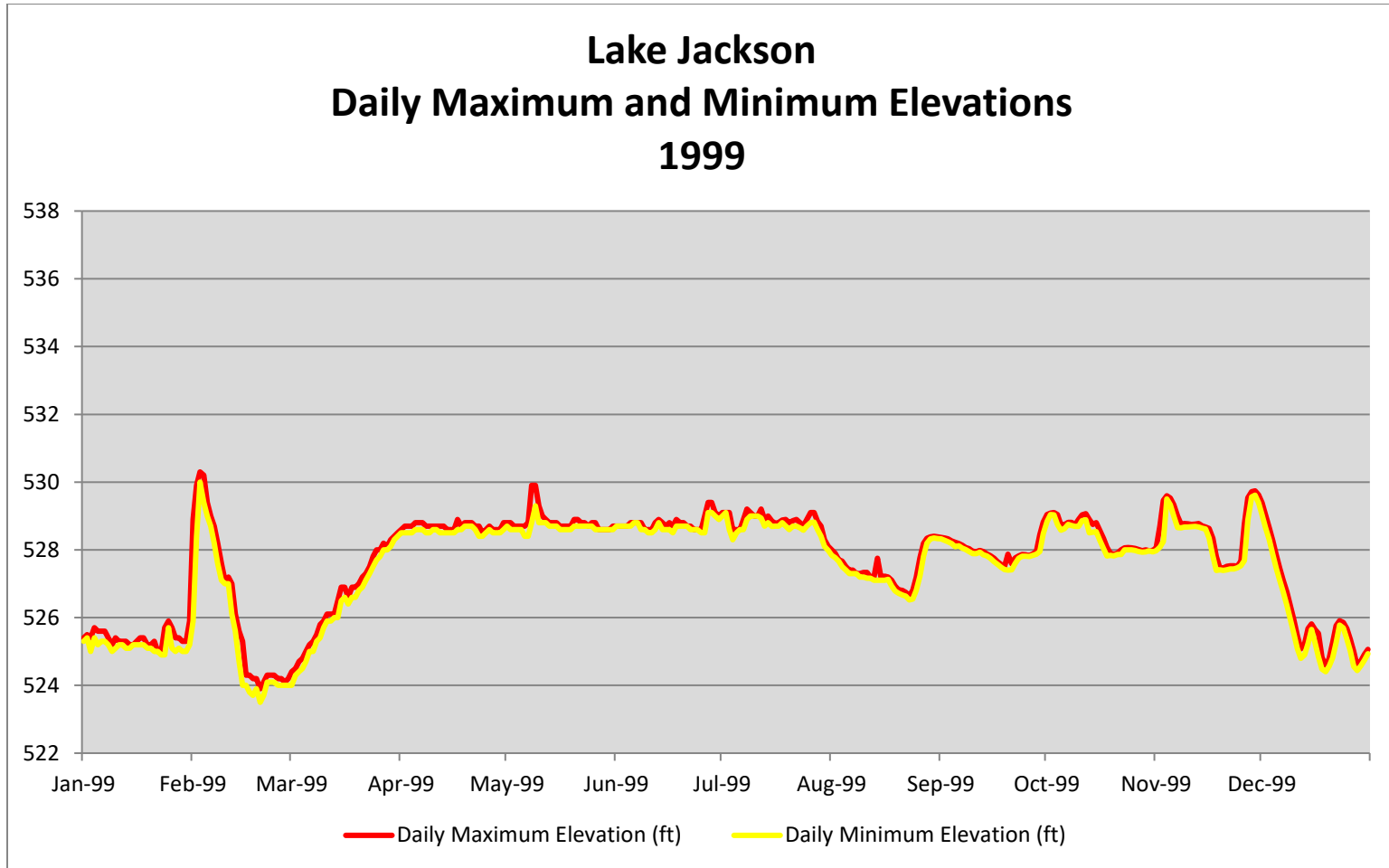


FIGURE 10

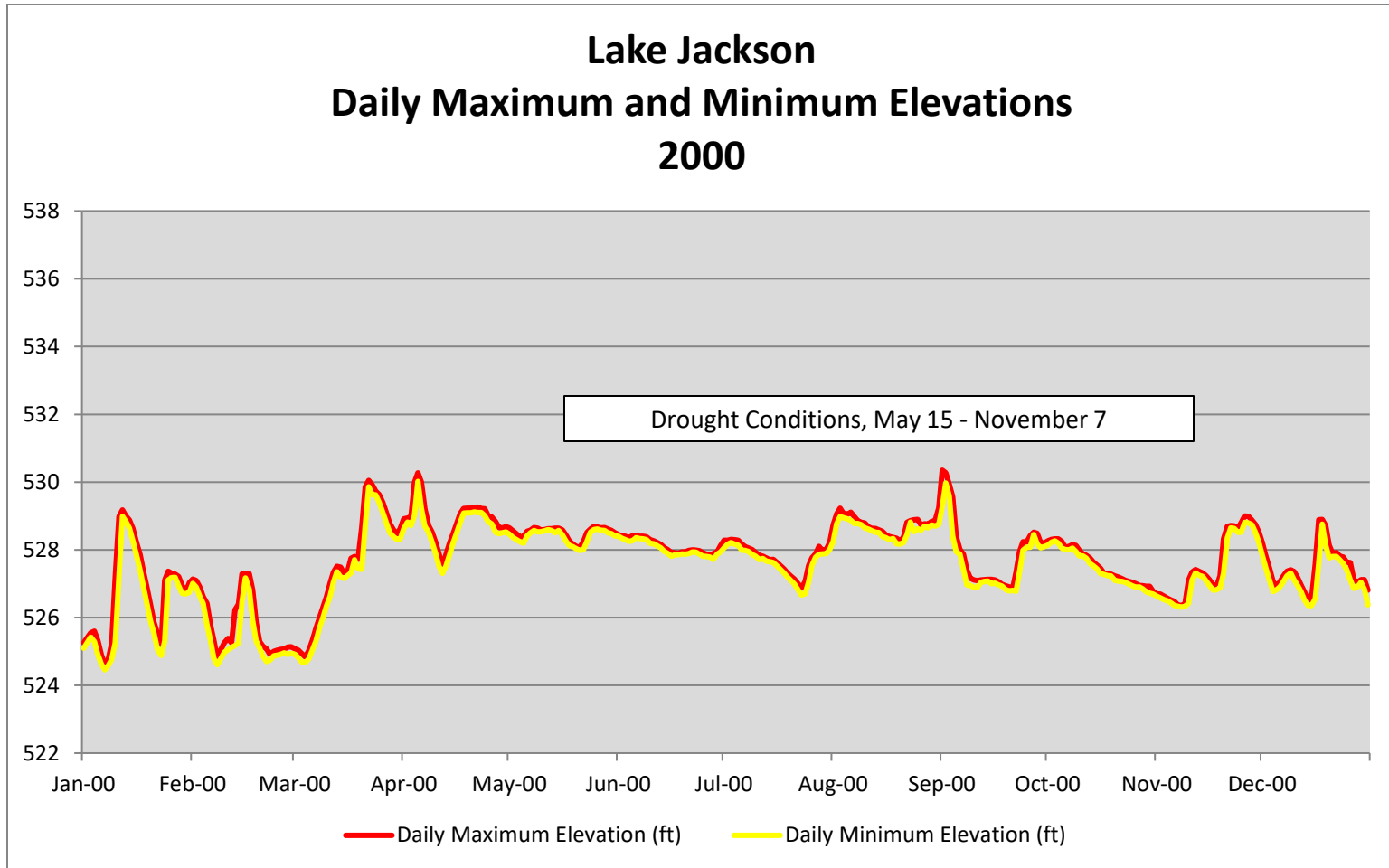


FIGURE 11

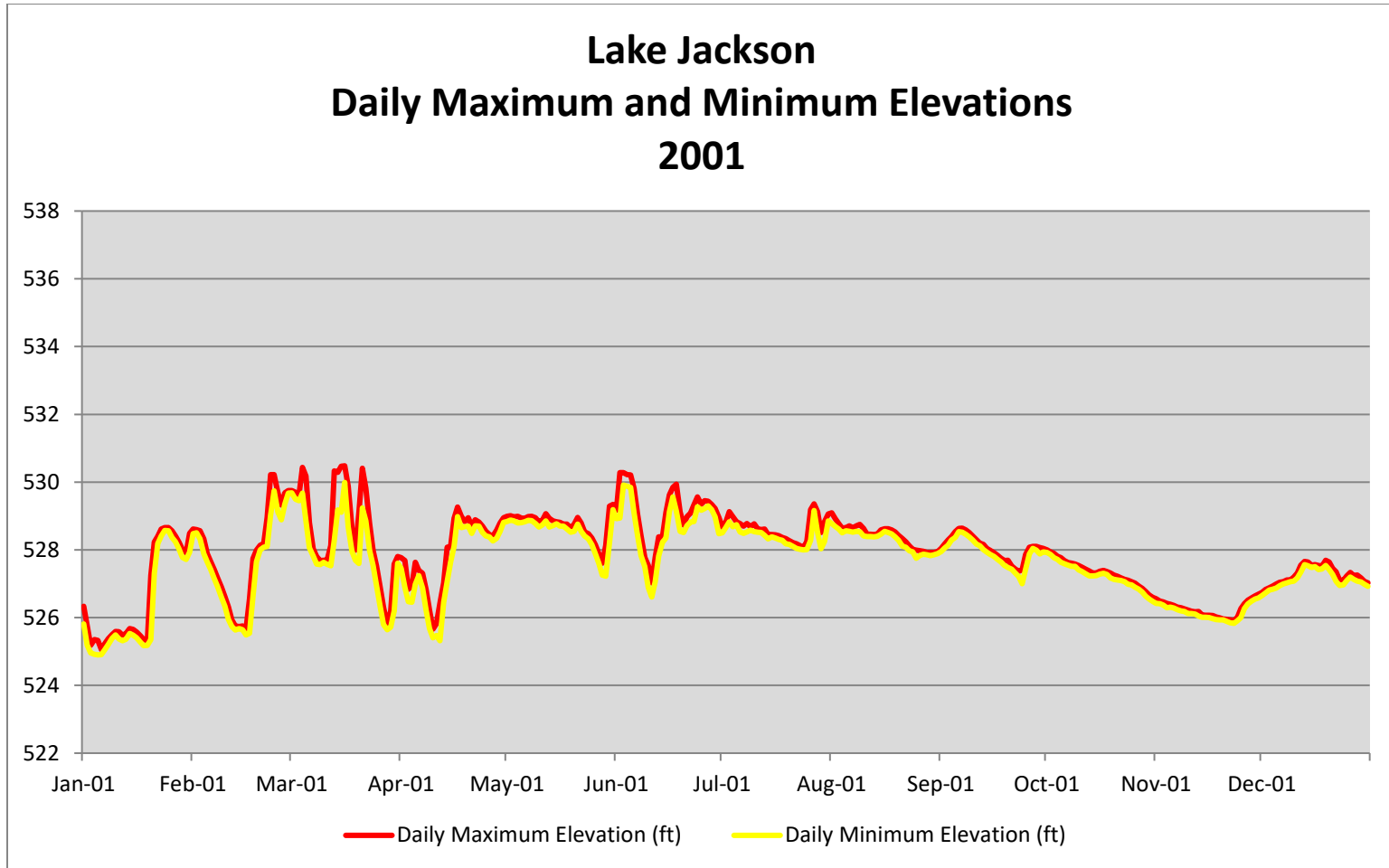


FIGURE 12

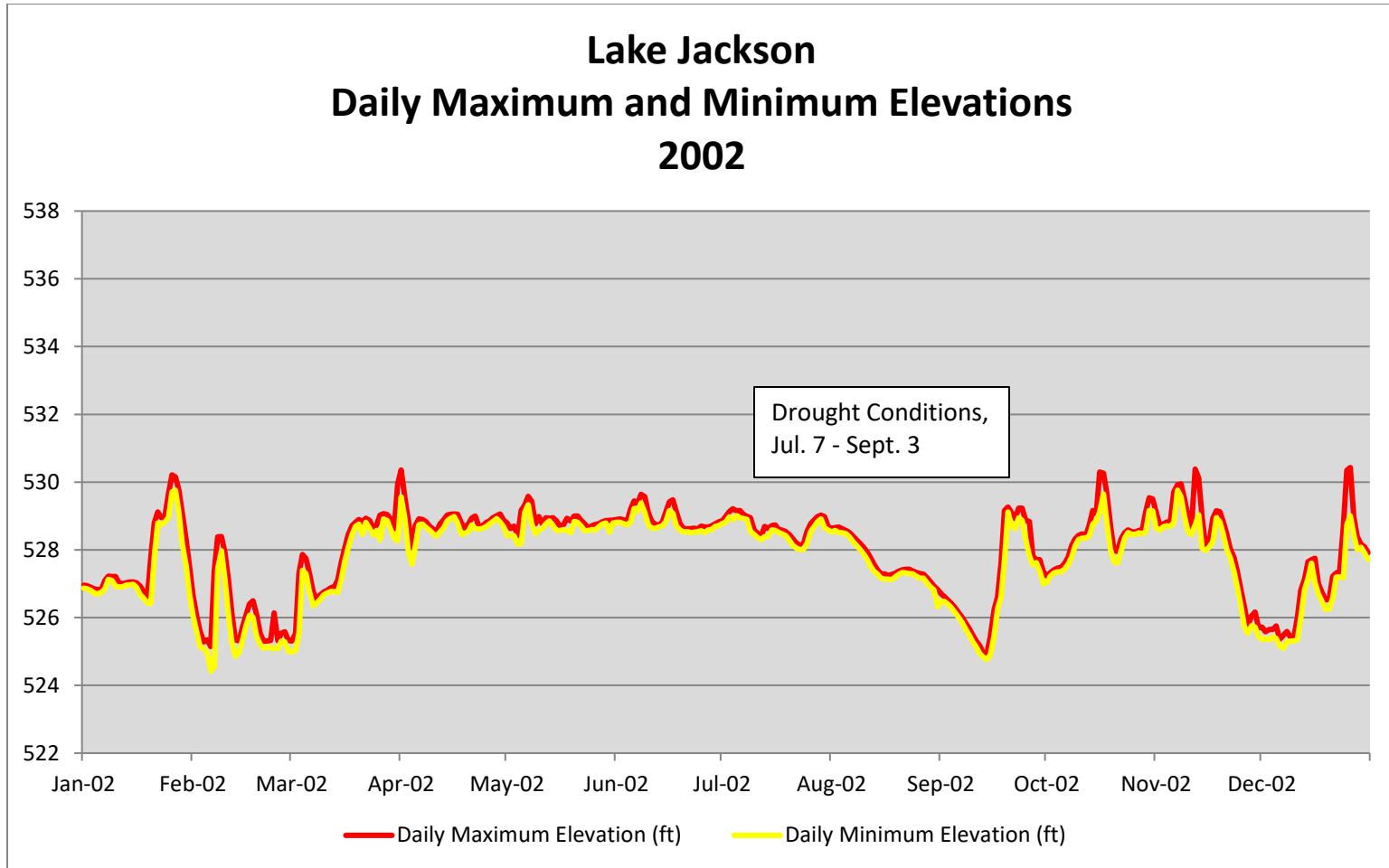


FIGURE 13

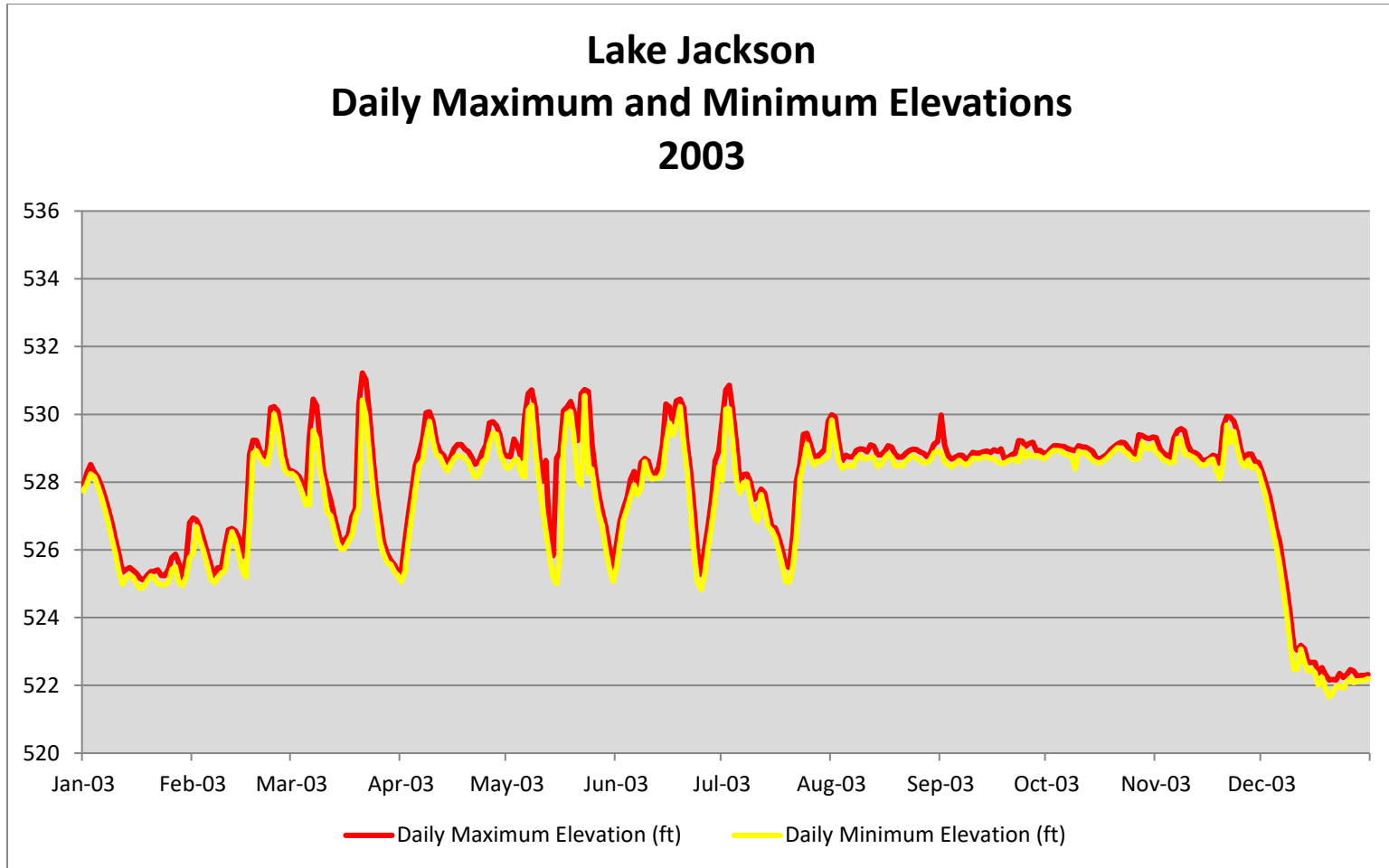


FIGURE 14

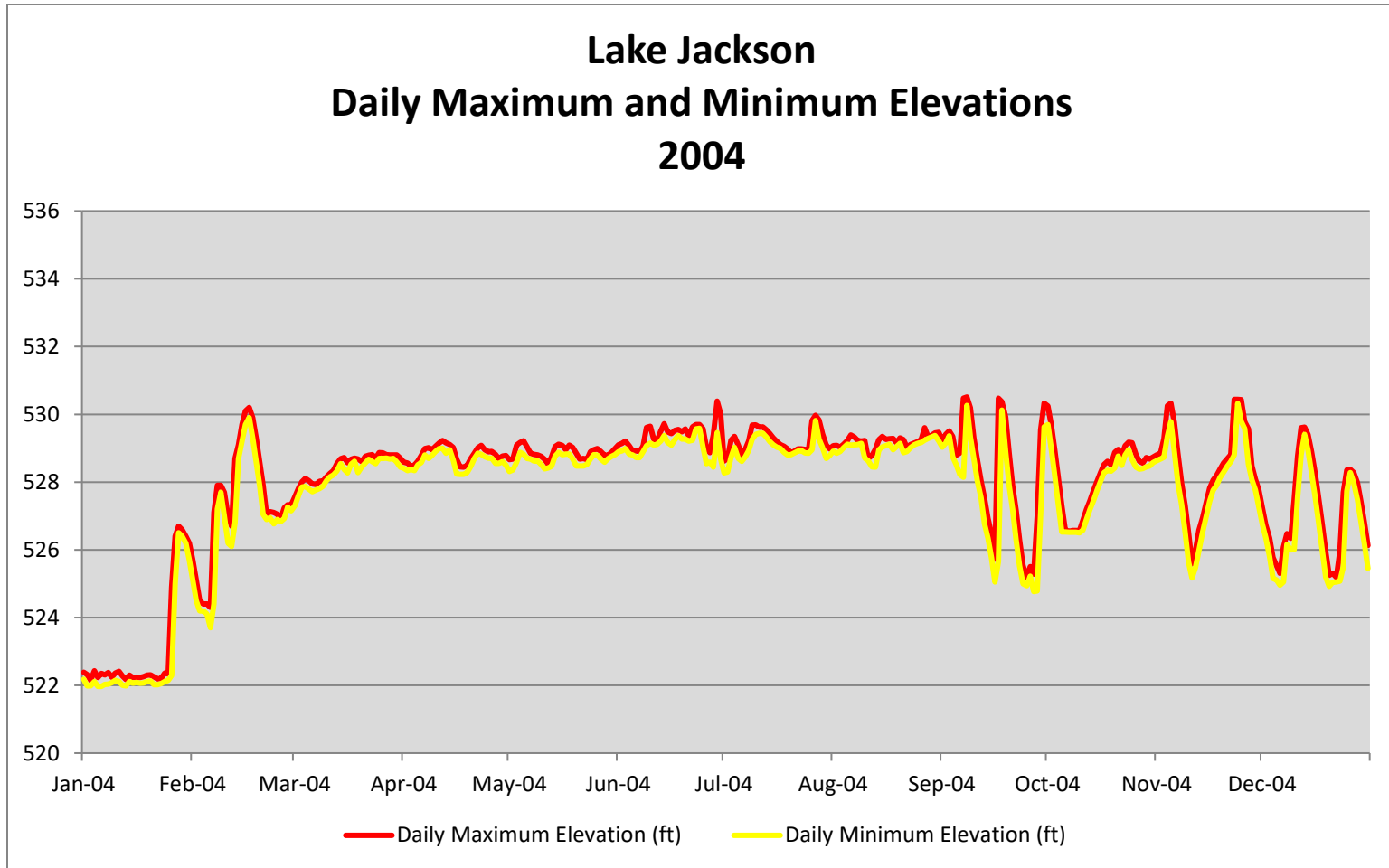


FIGURE 15

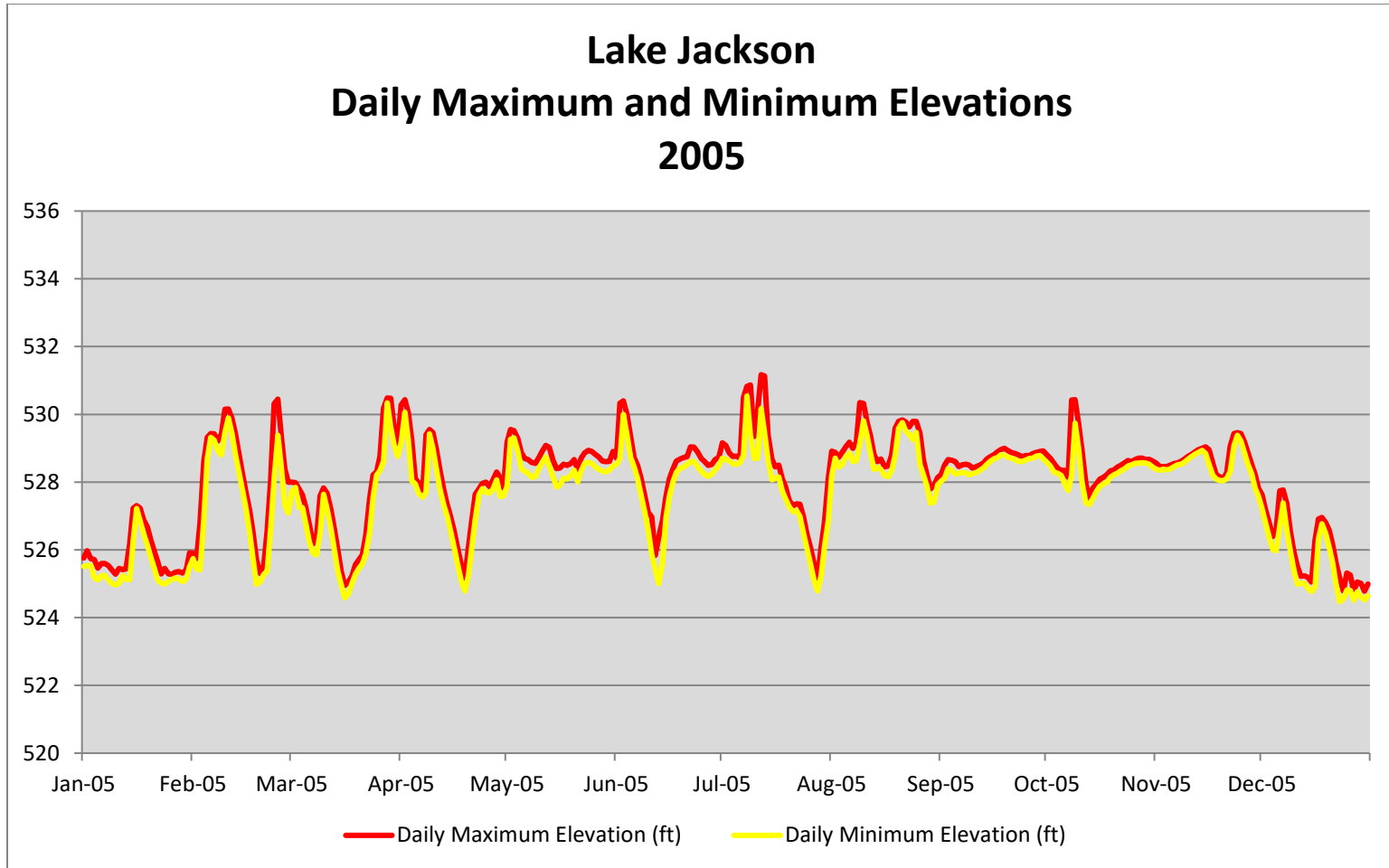


FIGURE 16

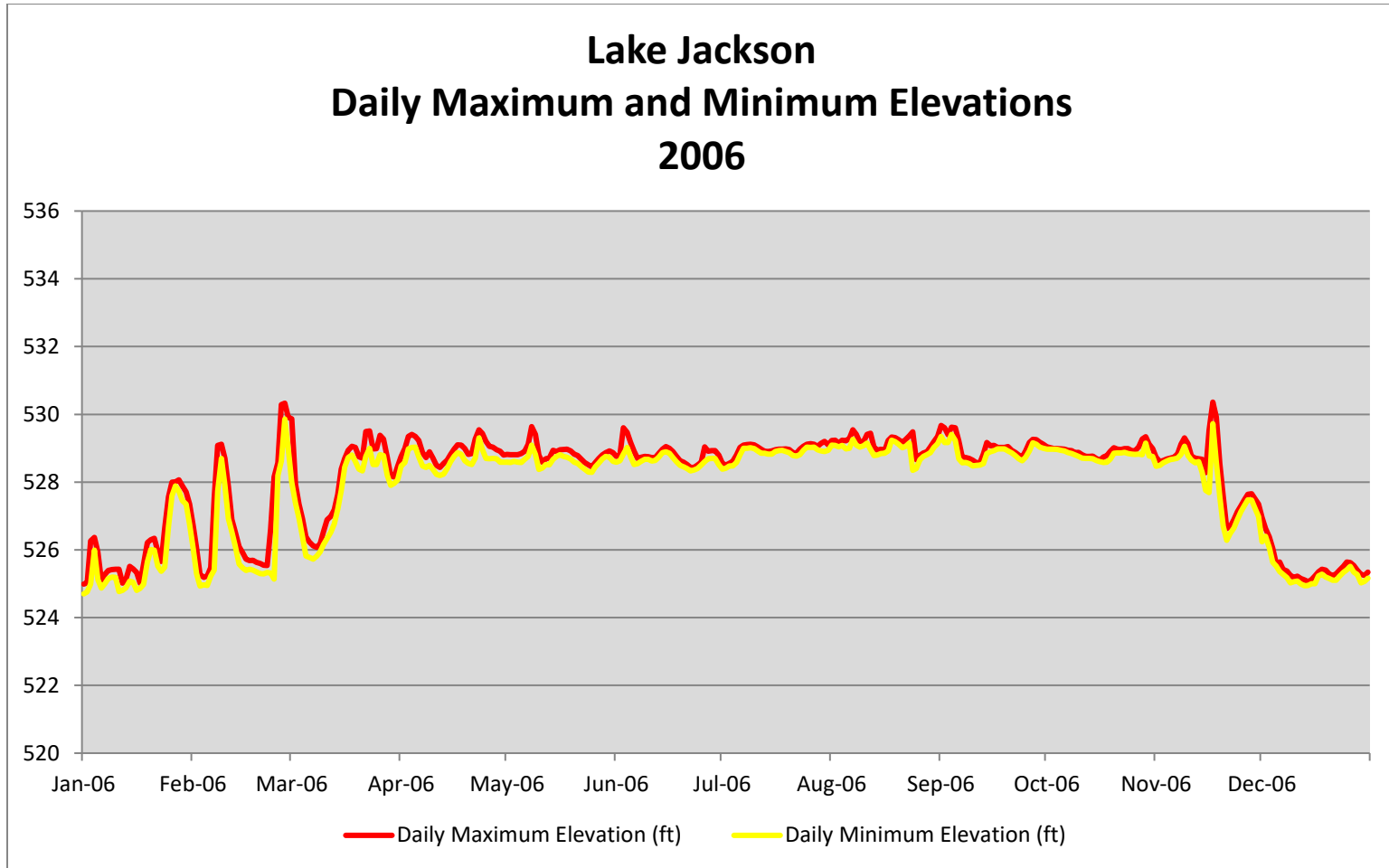


FIGURE 17

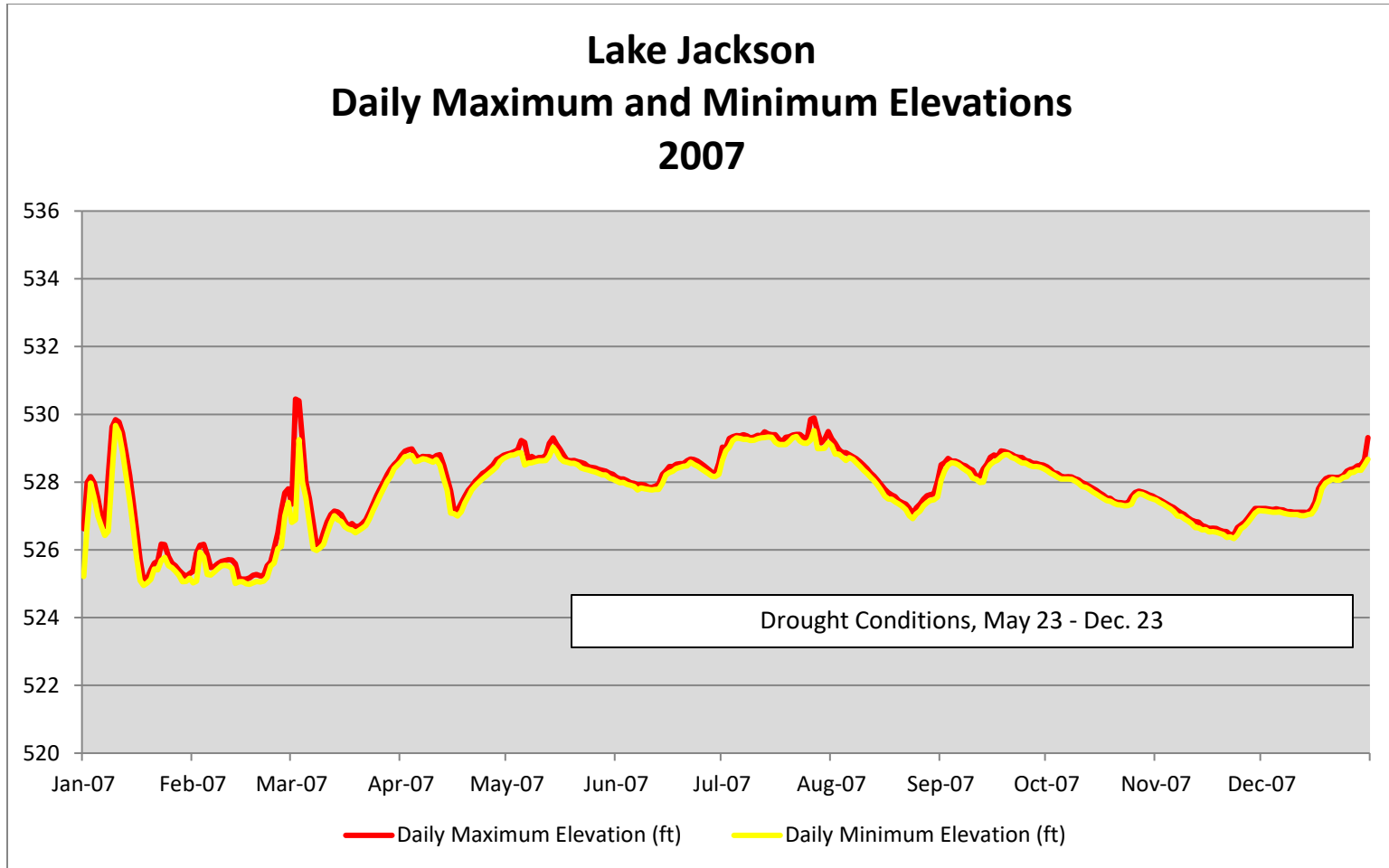


FIGURE 18

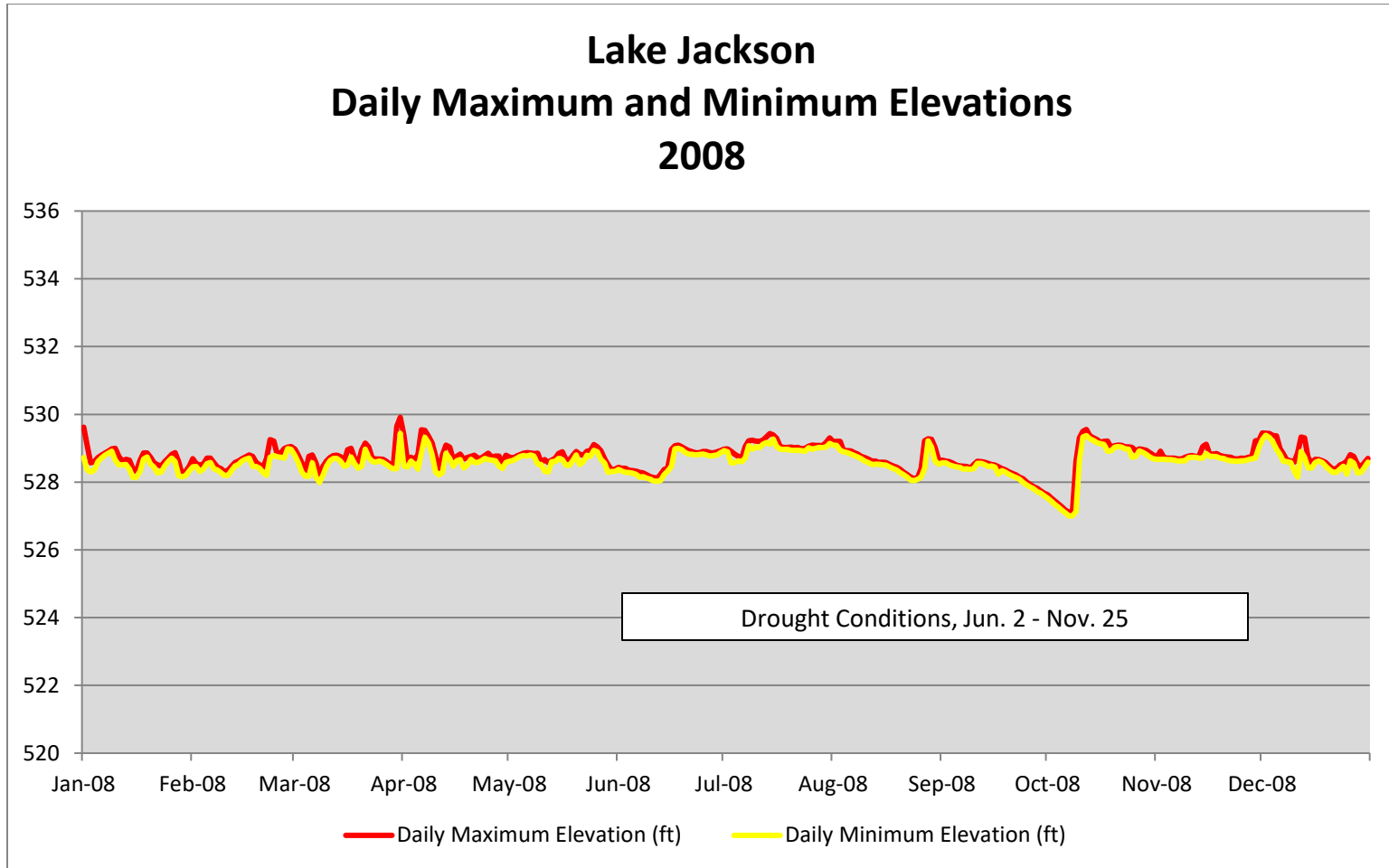


FIGURE 19

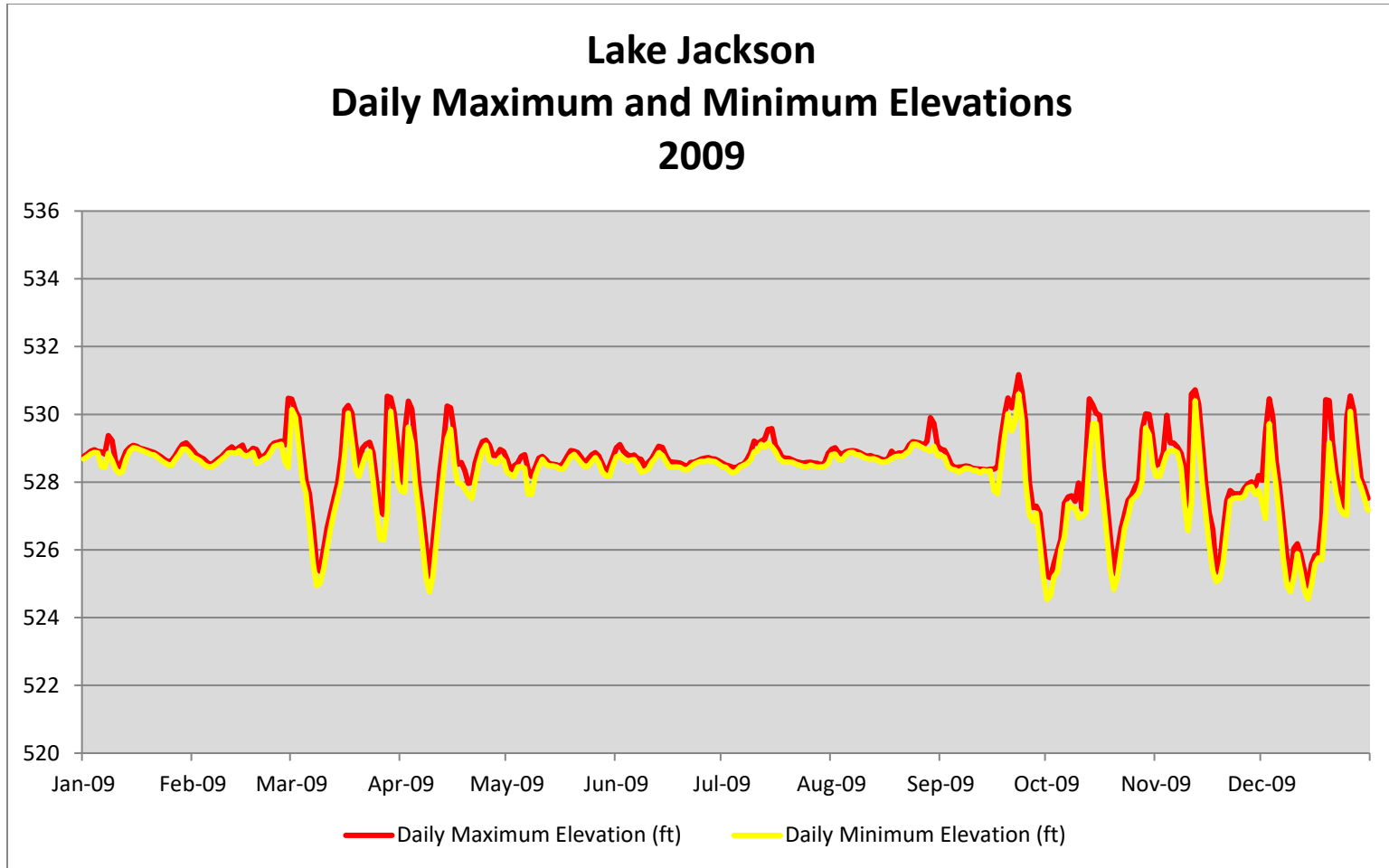


FIGURE 20

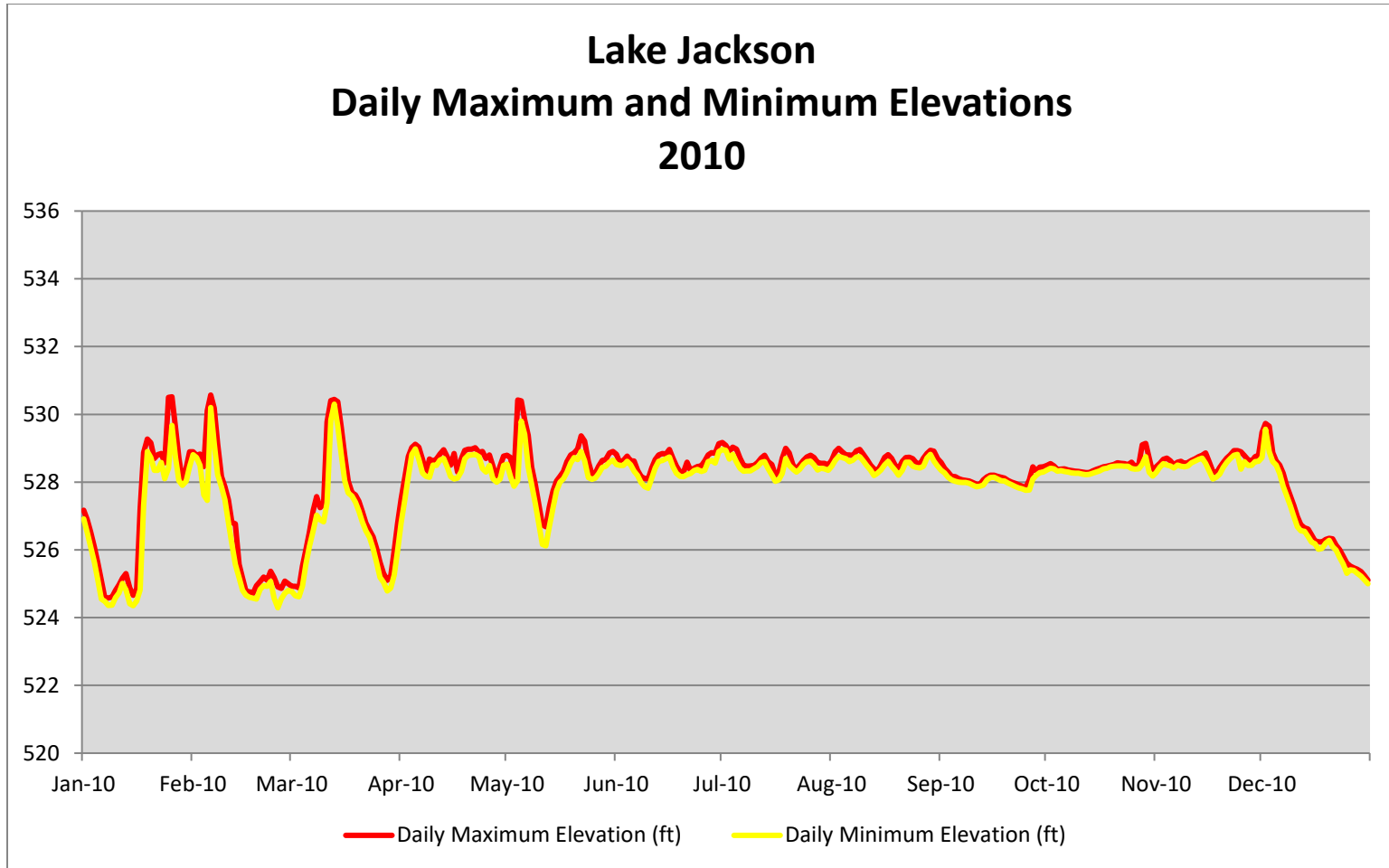


FIGURE 21

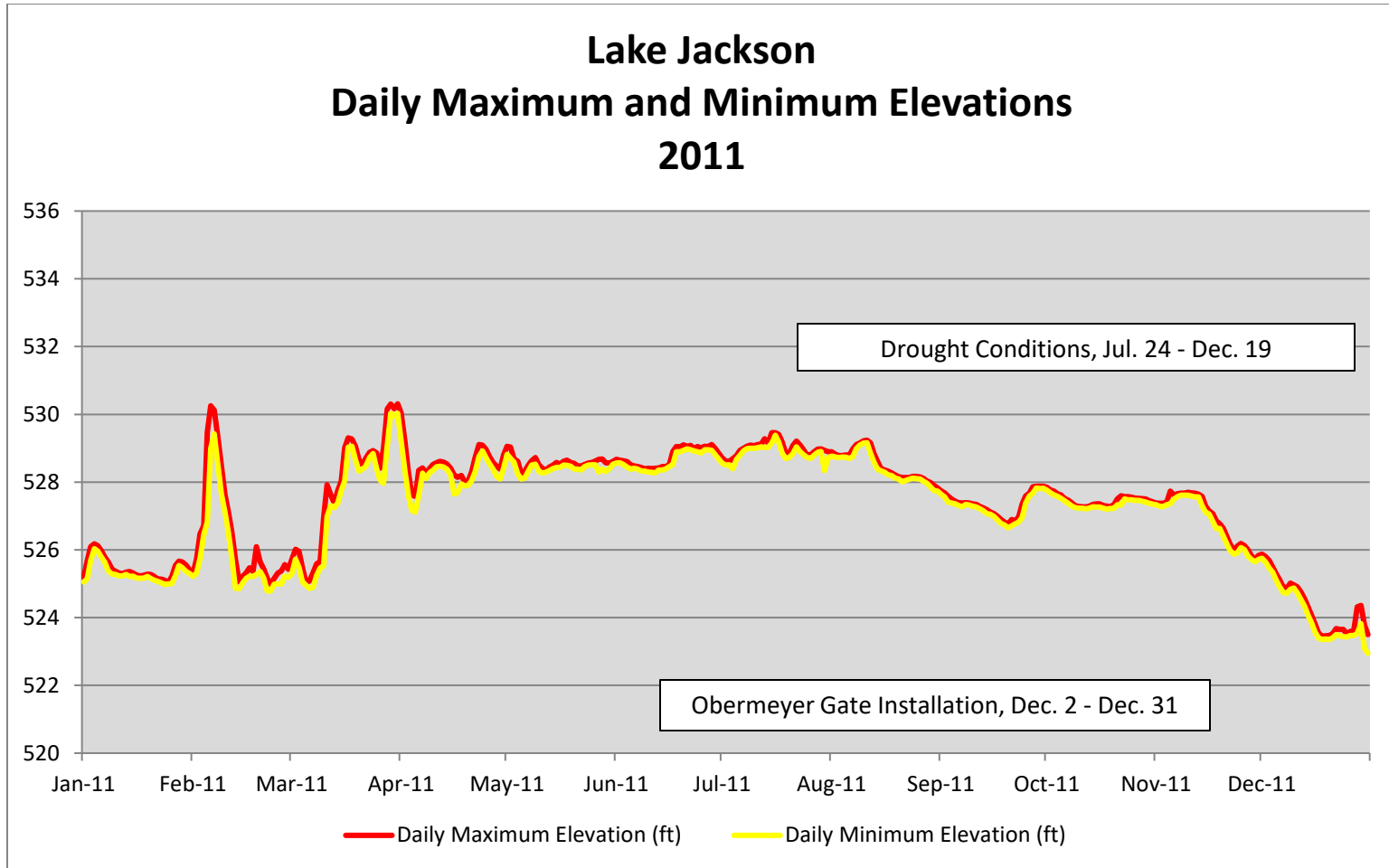


FIGURE 22

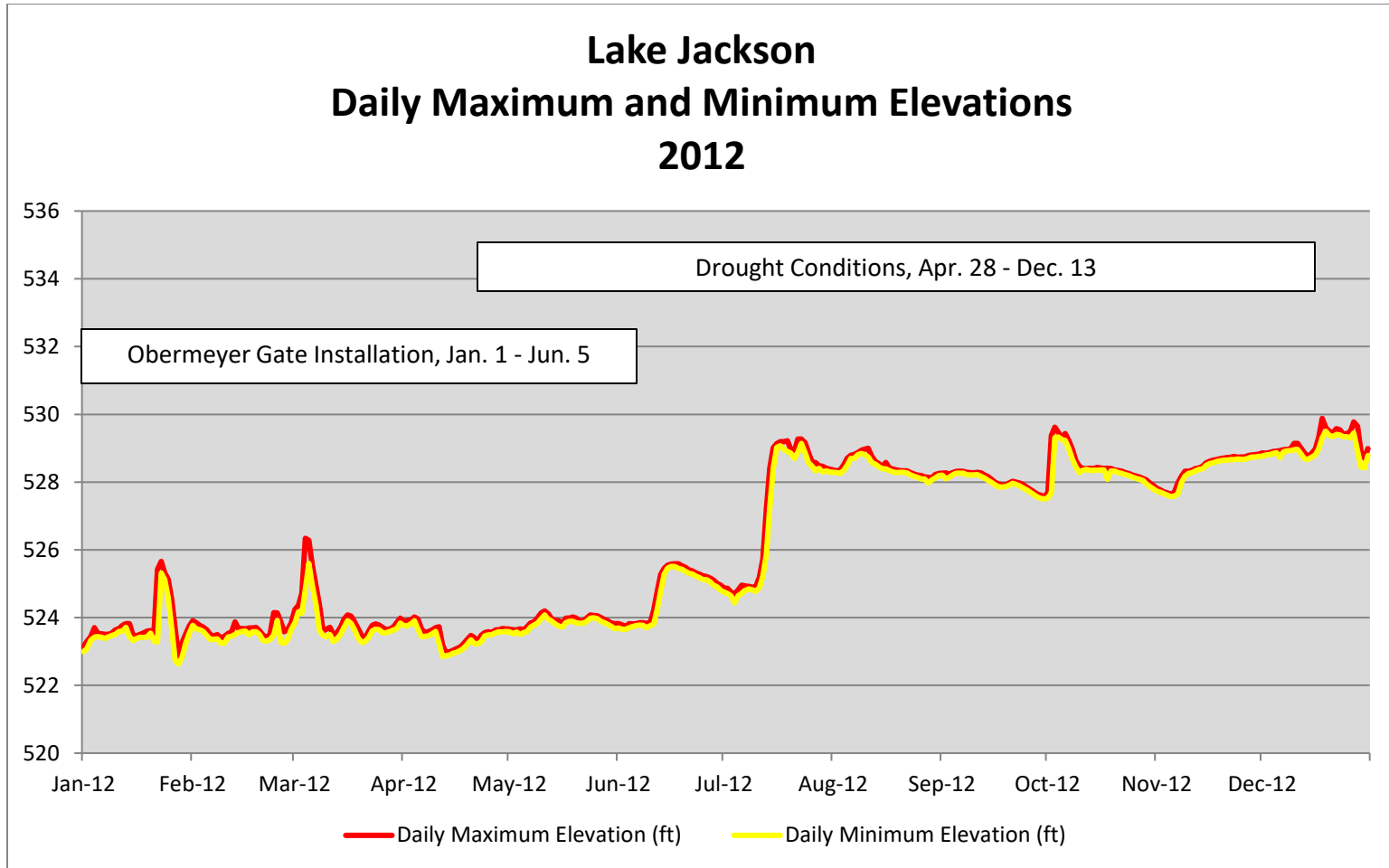


FIGURE 23

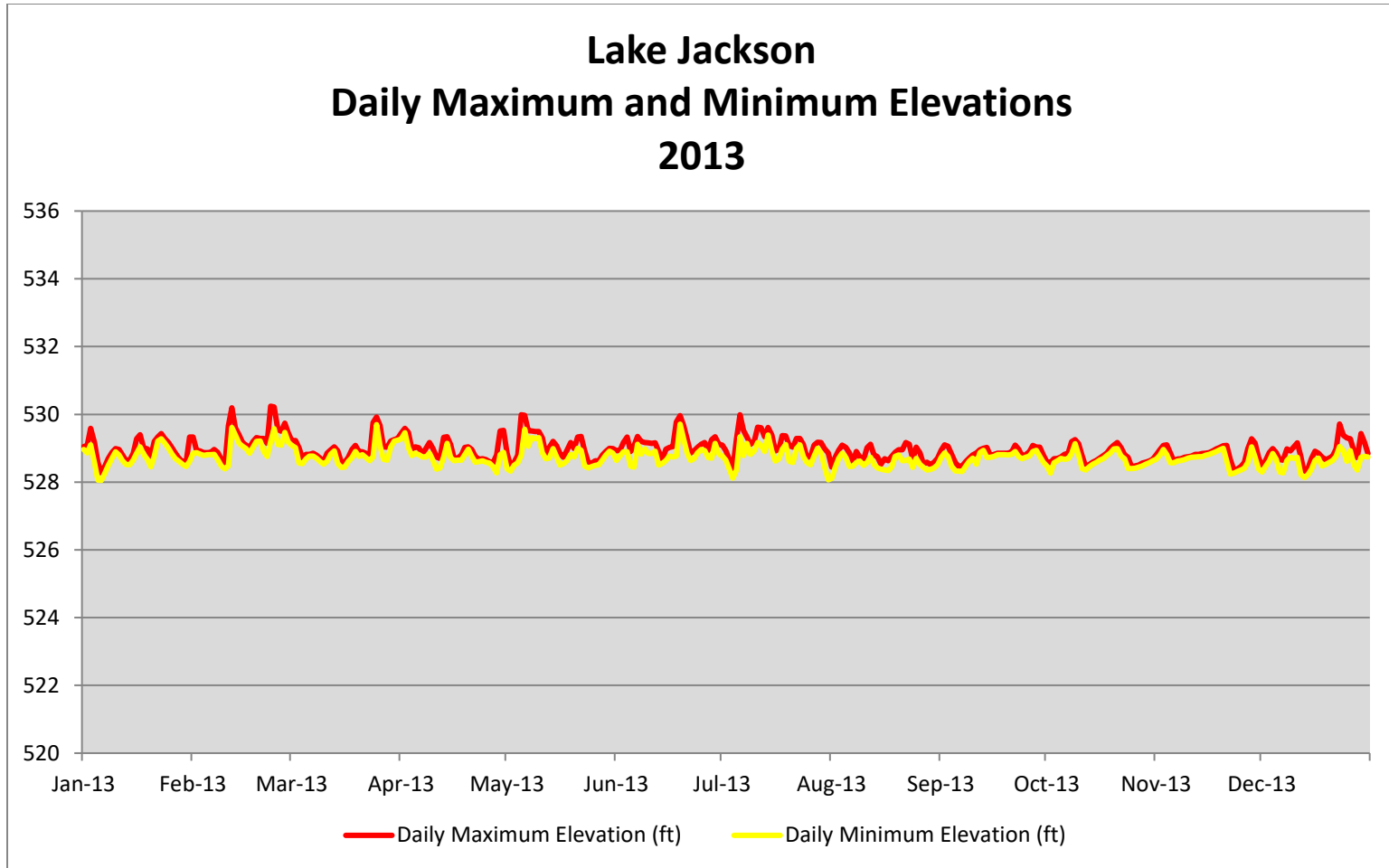


FIGURE 24

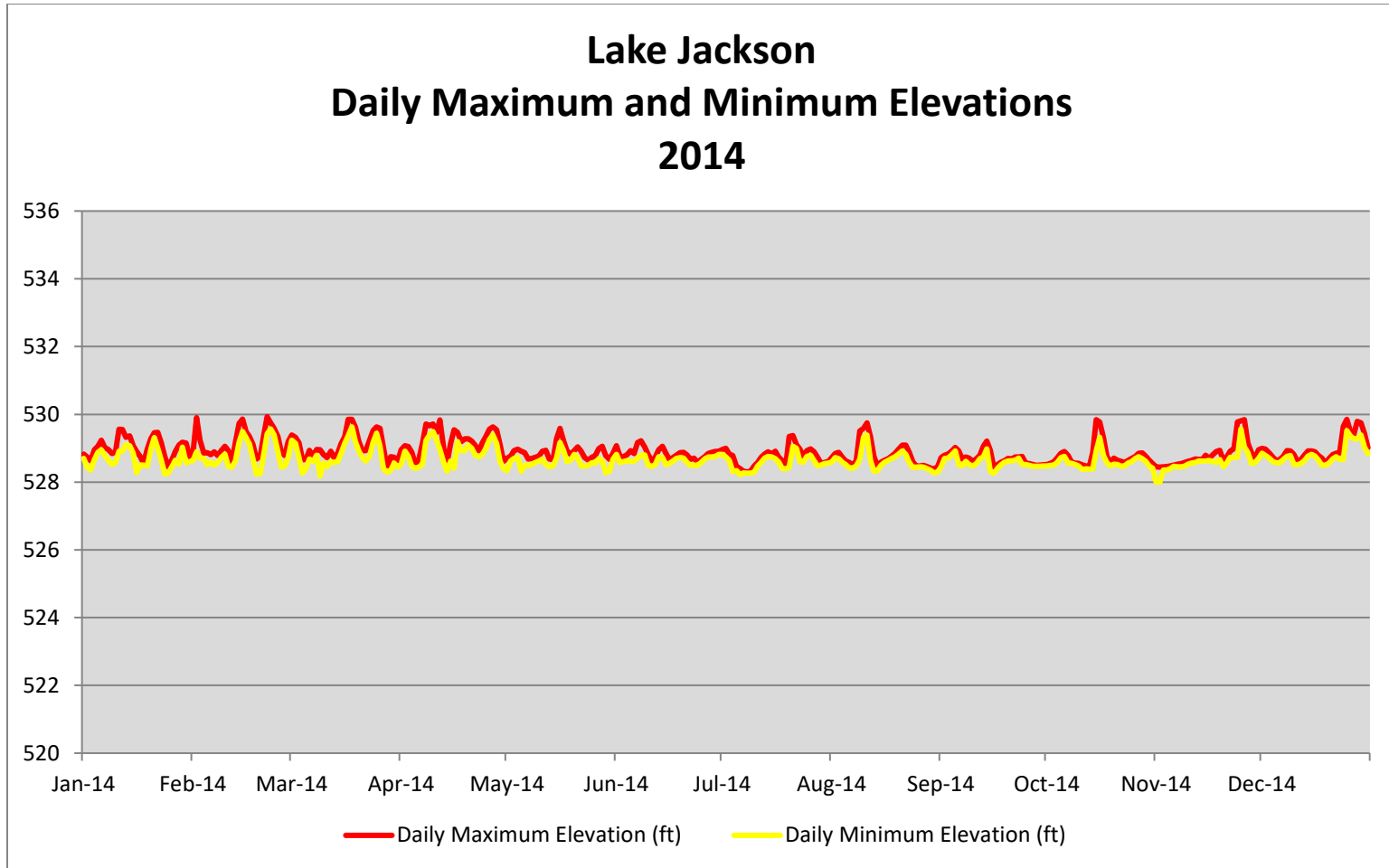


FIGURE 25

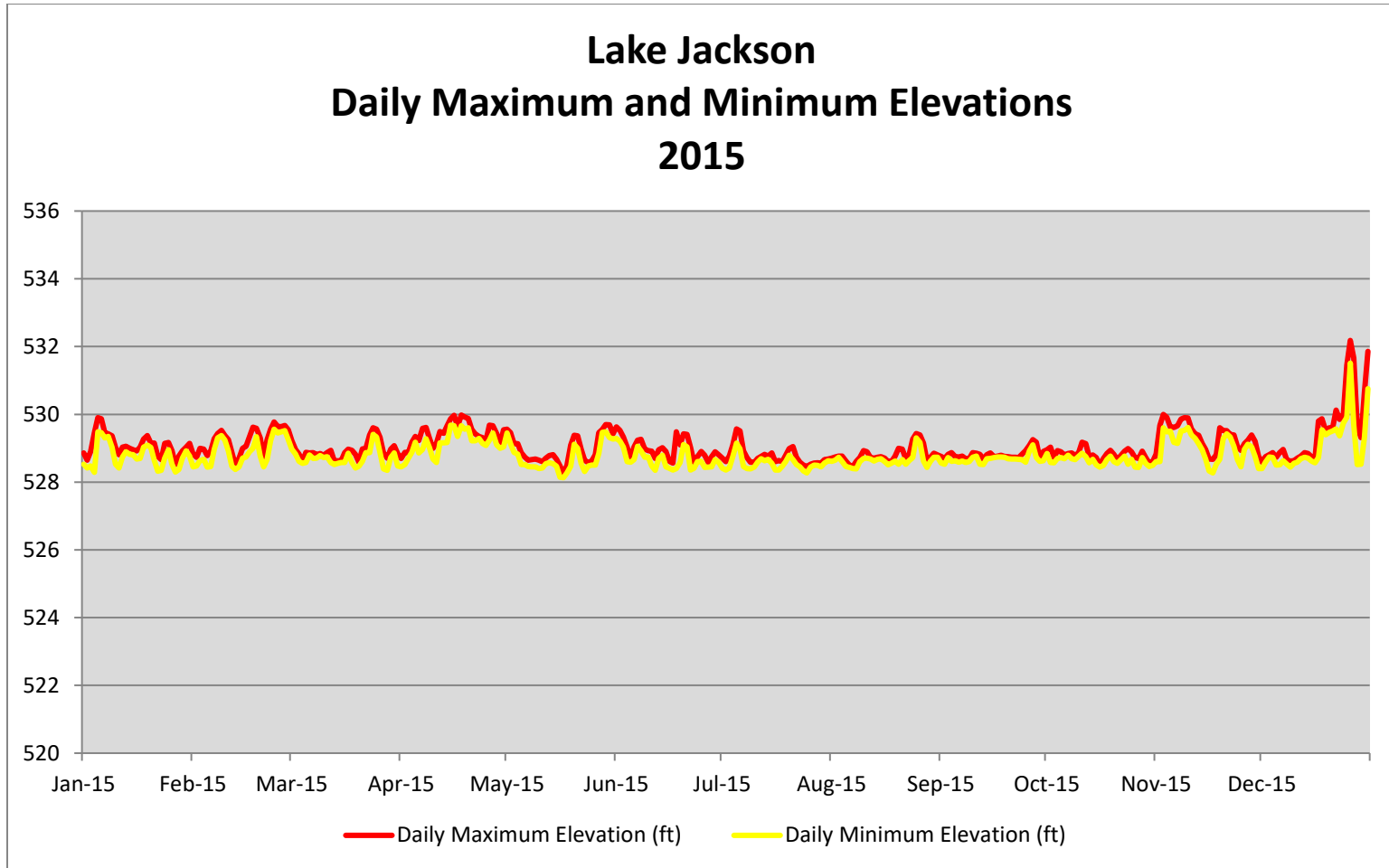


FIGURE 26

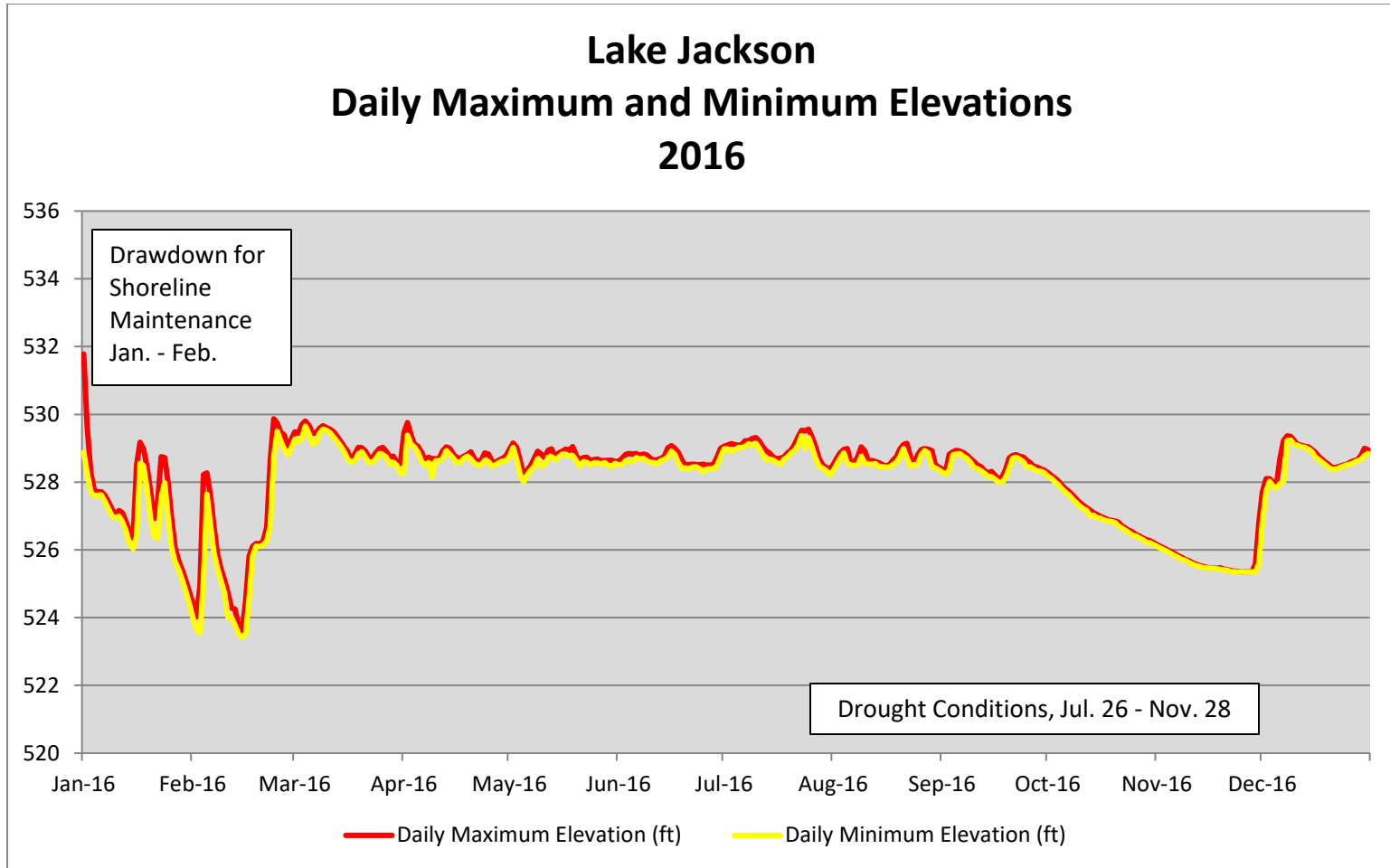


FIGURE 27

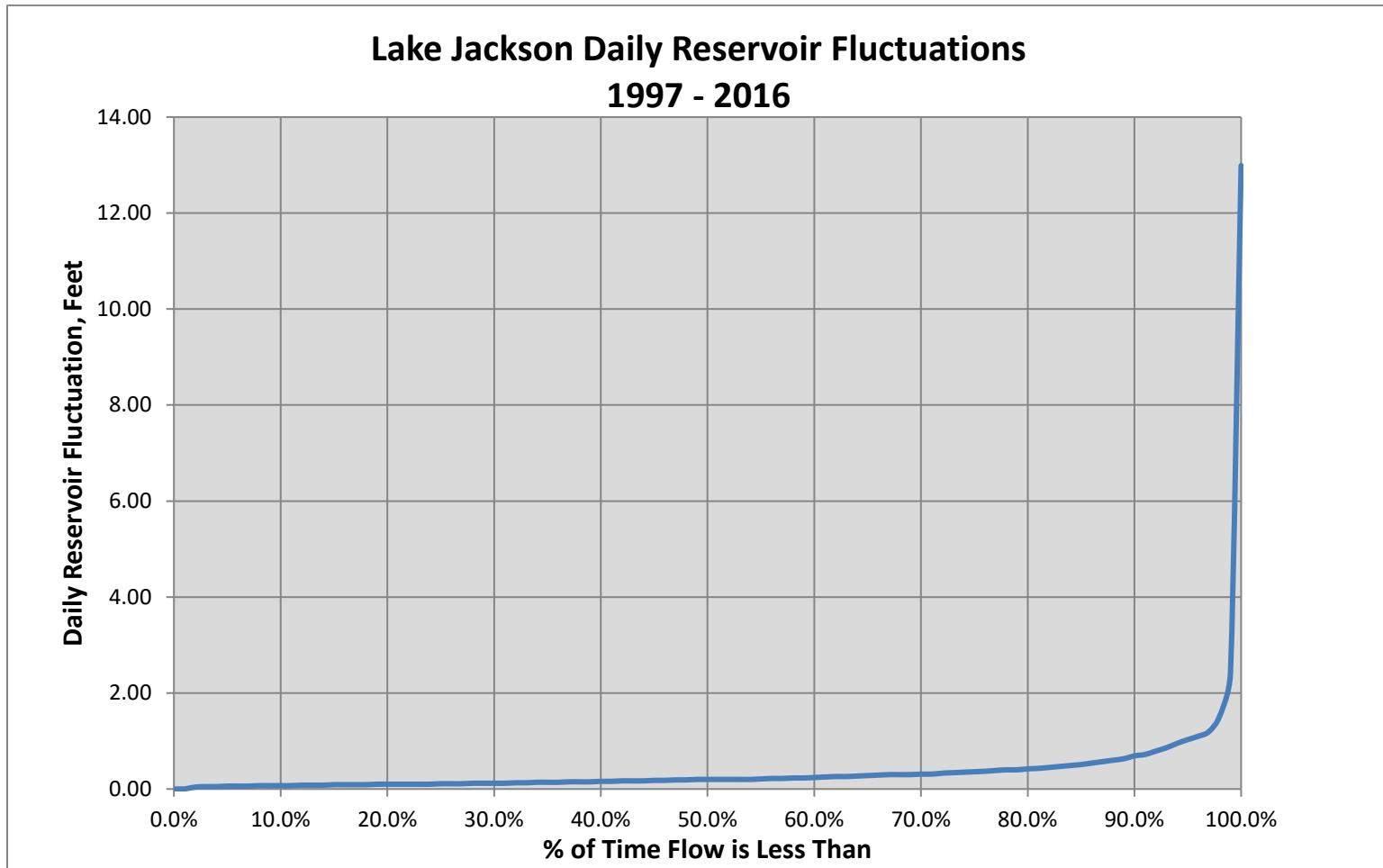


FIGURE 28

**Lake Jackson Daily Reservoir Fluctuations
(During Normal Operations Since the Installation of the Obermeyer Gates)
2013 - 2015**

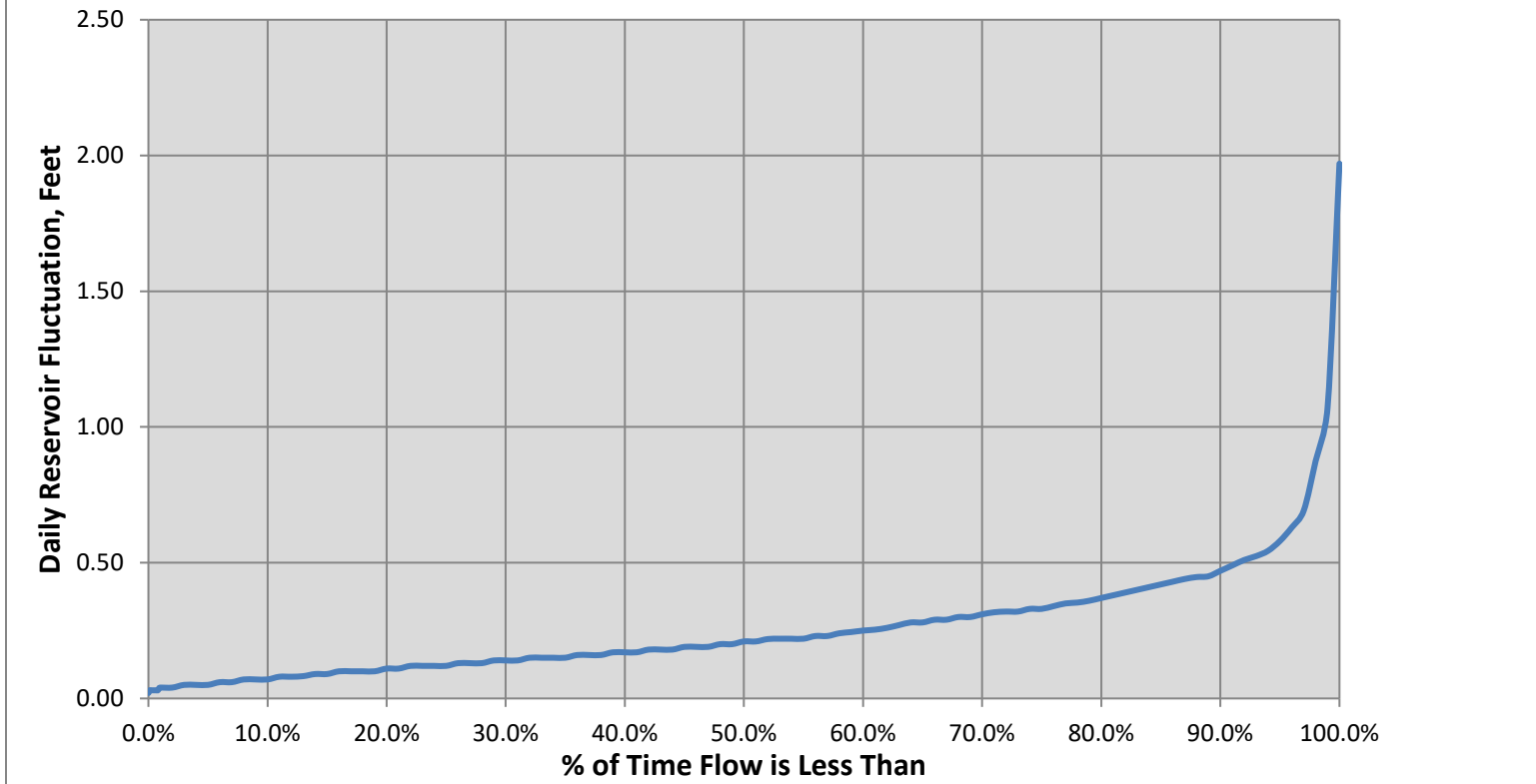


Figure 29

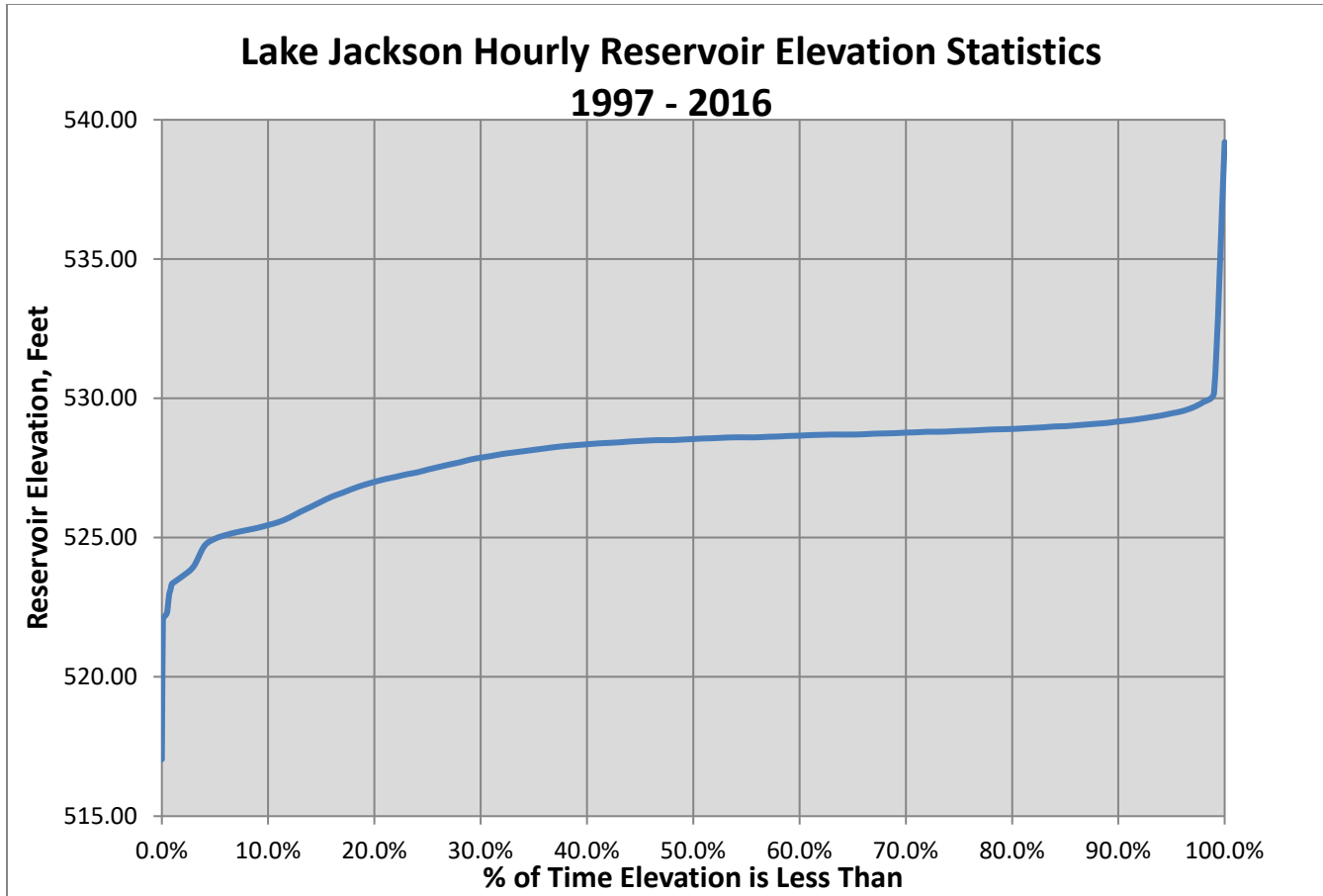


FIGURE 30

**Lake Jackson Hourly Reservoir Elevation Statistics
(During Normal Operations Since the Installation of Obermeyer Gates)
2013-2015**

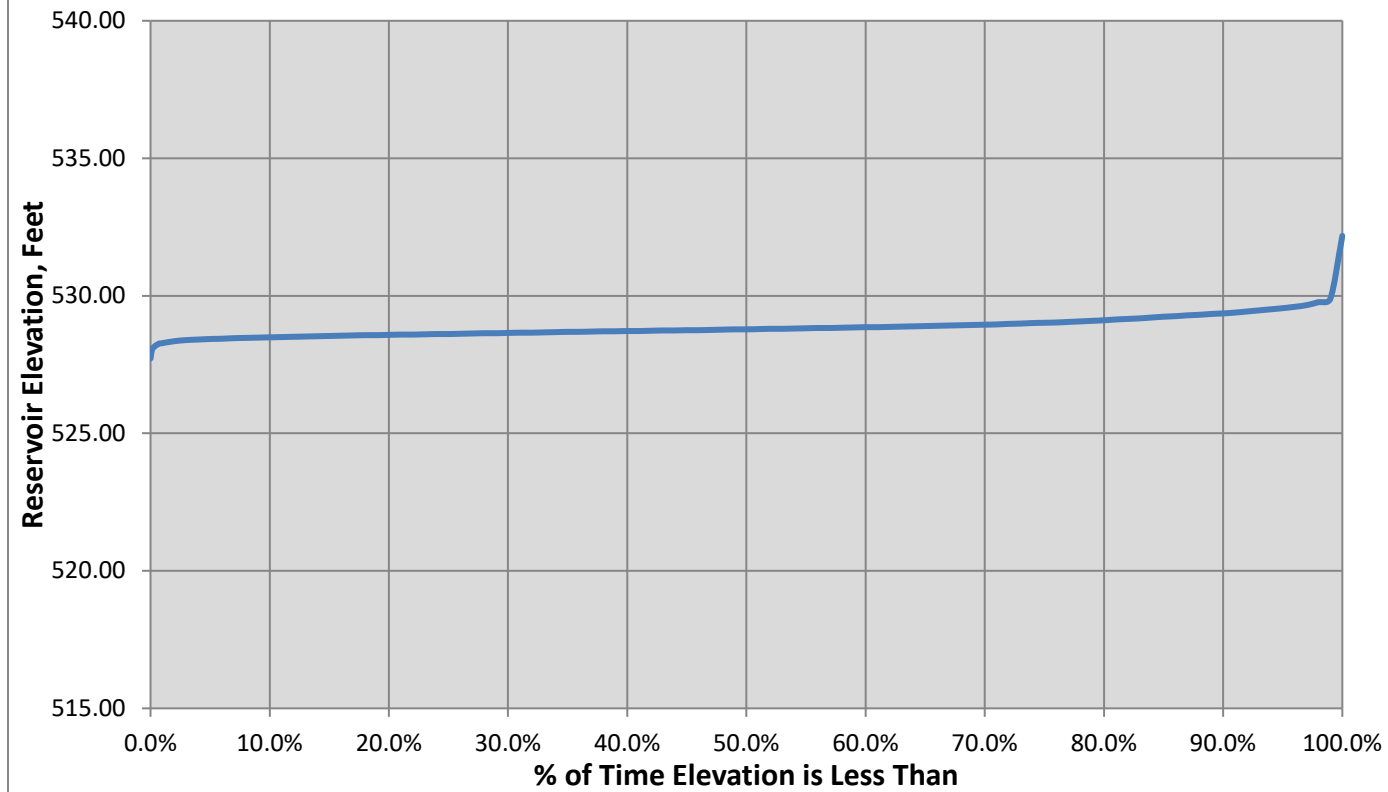


Figure 31

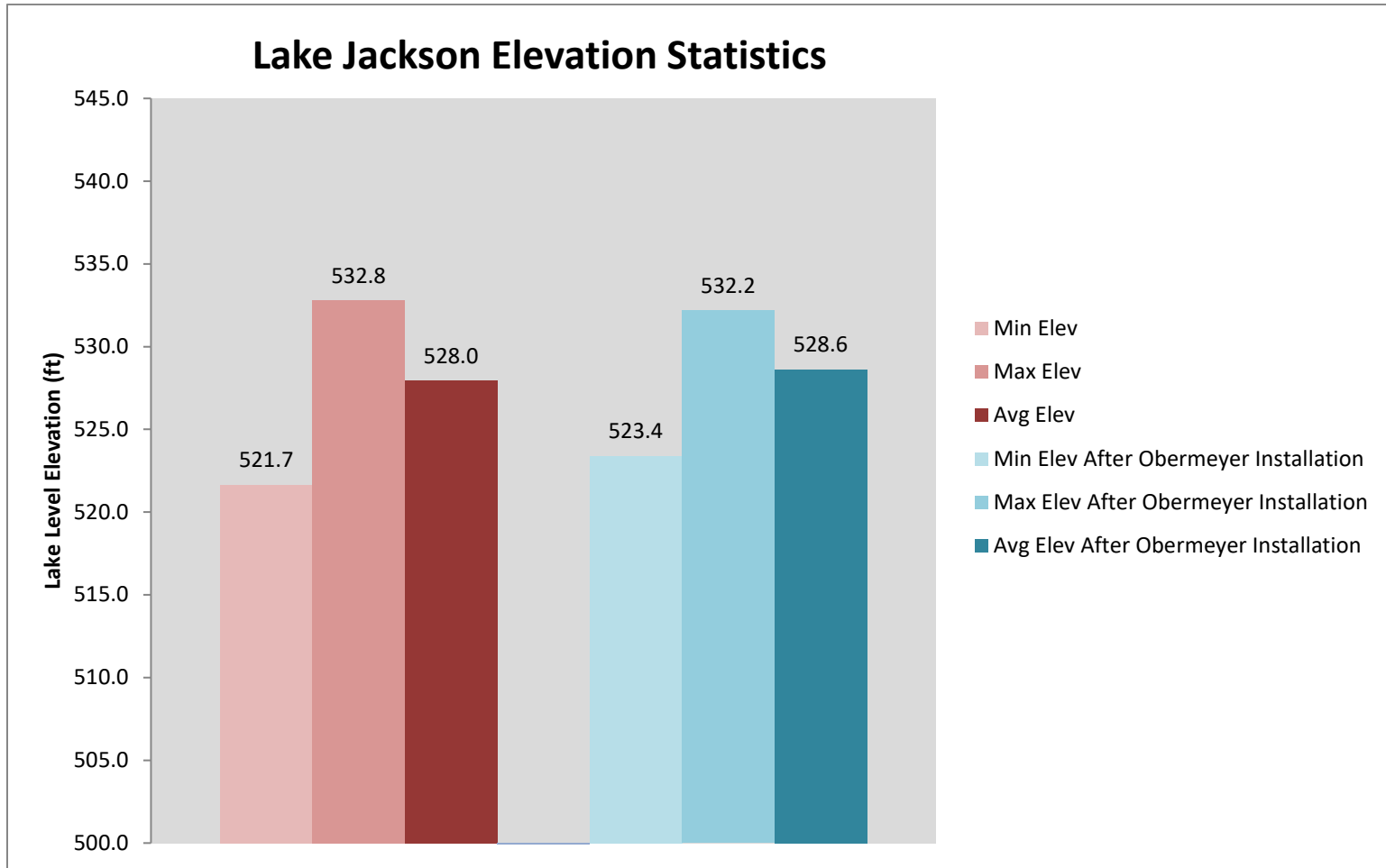


FIGURE 32

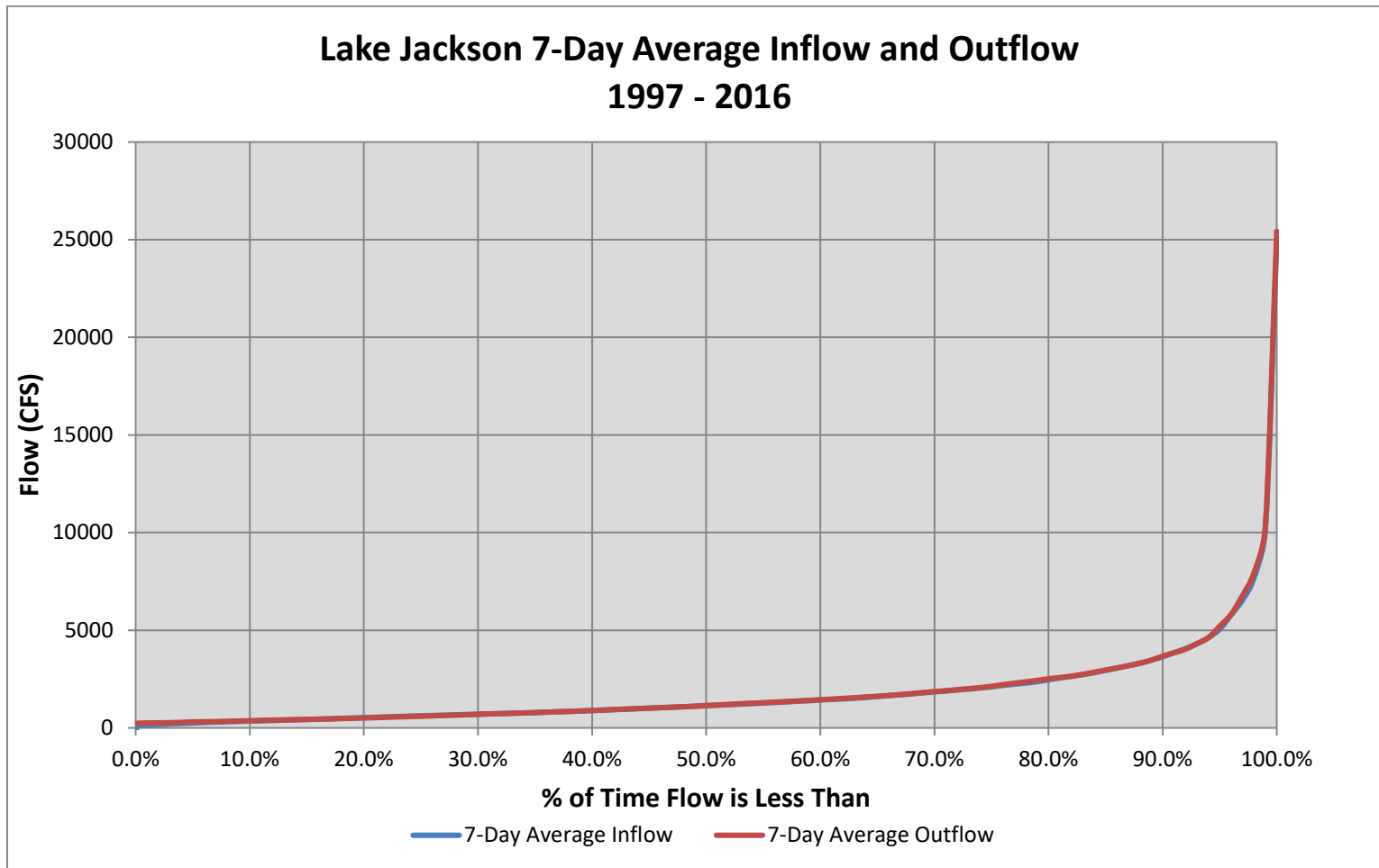


FIGURE 33

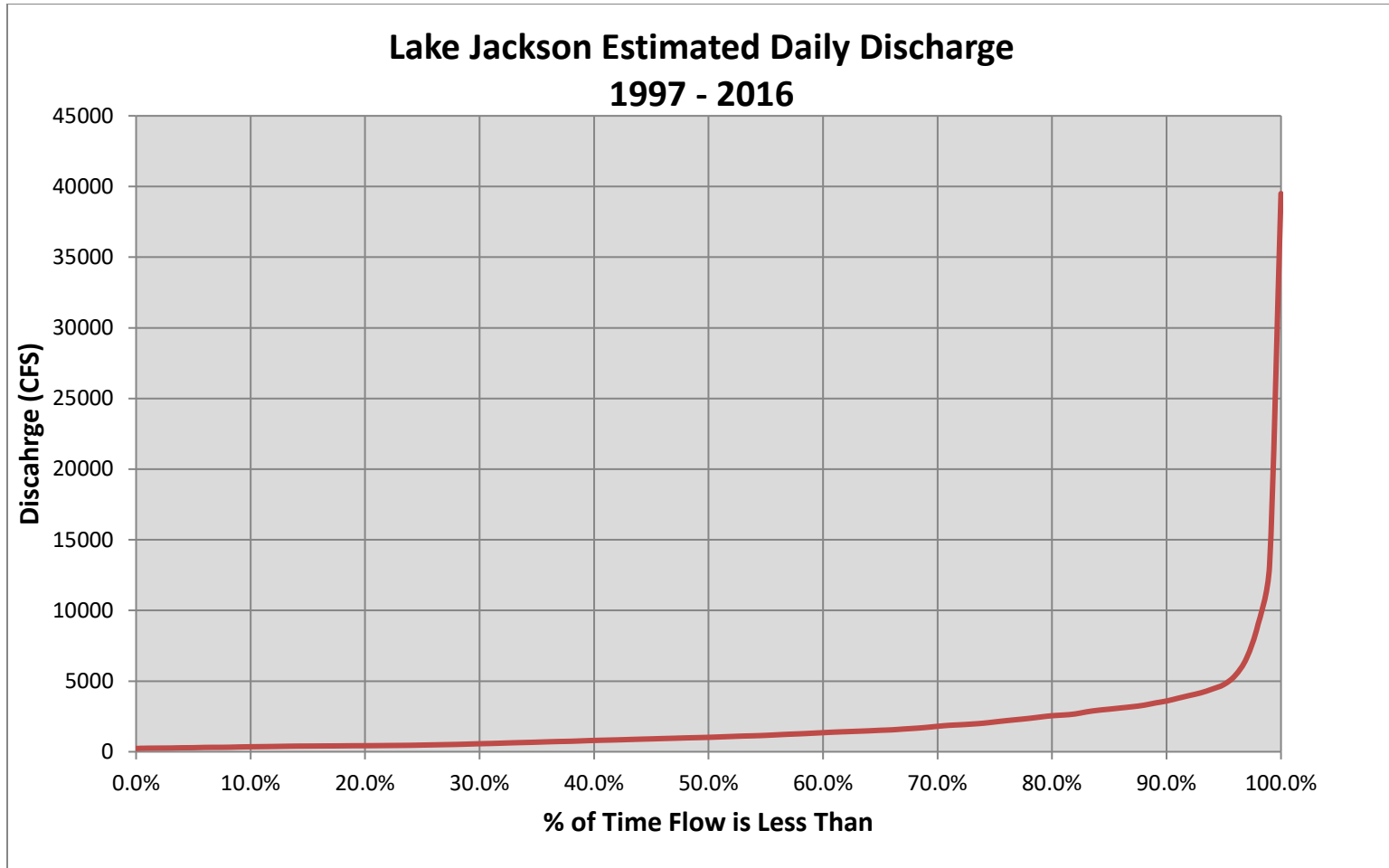


FIGURE 34

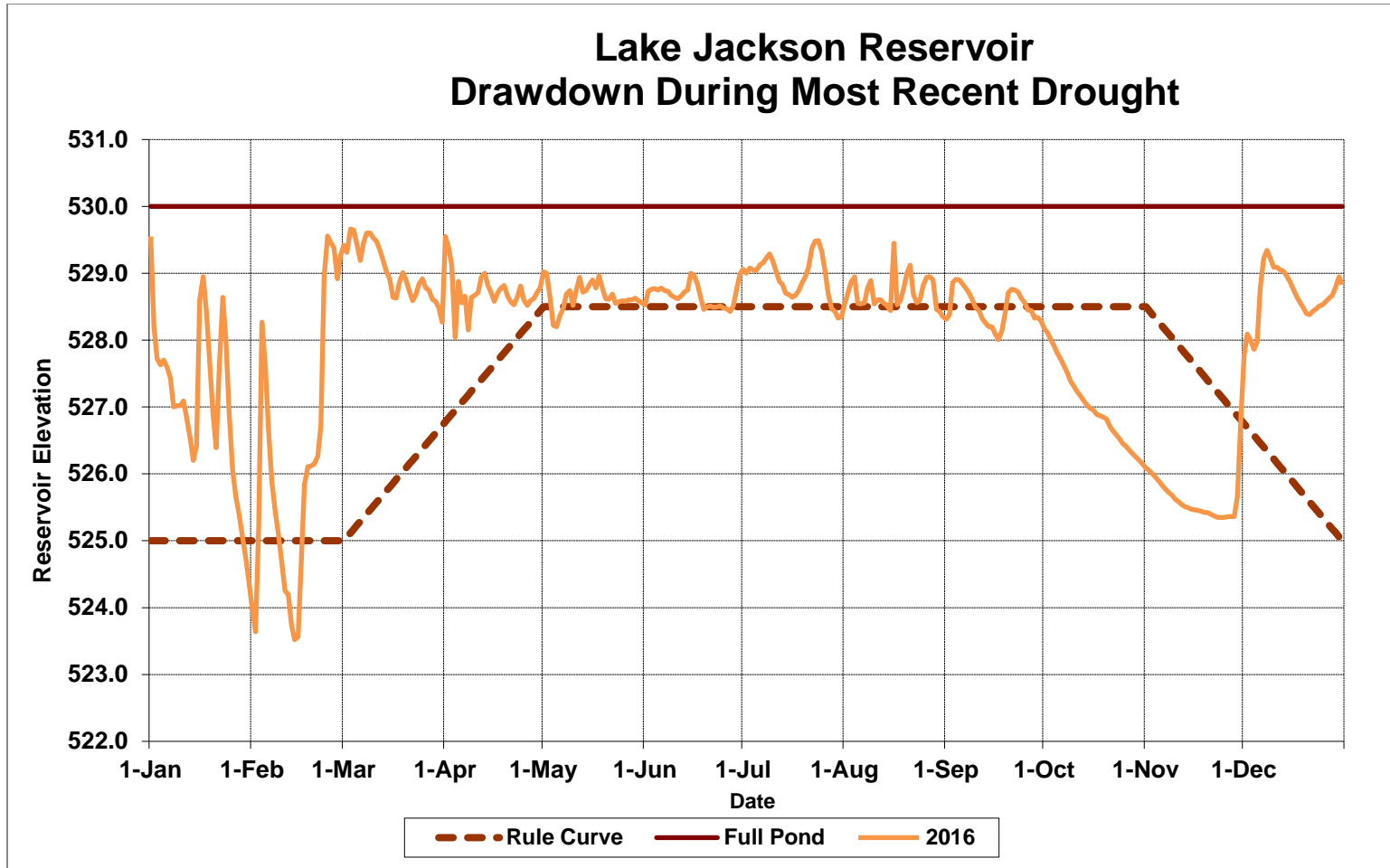


FIGURE 35

APPENDIX E

Current License Requirements

Lloyd Shoals
FERC Project Number P-2336
Current License Articles

Article 1. The entire project, as described in this order of the Commission, shall be subject to all of the provisions, terms, and conditions of the license.

Article 2. No substantial change shall be made in the maps, plans, specifications, and statements described and designated as exhibits and approved by the Commission in its order as a part of the license until such change shall have been approved by the Commission provided, however, that if the Licensee or the Commission deems it necessary or desirable that said approved exhibits, or any of them, be changed, there shall be submitted to the Commission for approval a revised, or additional exhibit or exhibits covering the proposed changes which, upon approval by the Commission, shall become a part of the license and shall supersede, in whole or in part, such exhibit or exhibits theretofore made a part of the license as may be specified by the Commission.

Article 3. The project area and project works shall be in substantial conformity with the approved exhibits referred to in Article 2 herein or as changed in accordance with the provisions of said article. Except when emergency shall require for the protection of navigation, life, health, or property, there shall not be made without prior approval of the Commission any substantial alteration or addition not in conformity with the approved plans to any dam or other project works under the license or any substantial use of project lands and waters not authorized herein; and any emergency alteration, addition, or use so made shall thereafter be subject to such modification and change as the Commission may direct. Minor changes in project works, or in uses of project lands and waters, or divergence from such approved exhibits may be made if such changes will not result in a decrease in efficiency, in a material increase in cost, in an adverse environmental impact, or in impairment of the general scheme of development; but any of such minor changes made without the prior approval of the Commission, which in its judgment have produced or will produce any of such results, shall be subject to such alteration as the Commission may direct.

Article 4. The project, including its operation and maintenance and any work incidental to additions or alterations authorized by the Commission, whether or not conducted upon lands of the United States, shall be subject to the inspection and supervision of the Regional Engineer, Federal Energy Regulatory Commission, in the region wherein the project is located, or of such other officer or agent as the Commission may designate, who shall be the authorized representative of the Commission for such purposes. The Licensee shall cooperate fully with said representative and shall furnish him such information as he may require concerning the operation and maintenance of the project, and any such alterations thereto, and shall notify him of the date upon which work with respect to any alteration will begin, as far in advance thereof as said representative may reasonably specify, and shall notify him promptly in writing of any suspension of work for a period of more than one week, and of its resumption and completion. The Licensee shall submit to said representative a detailed program of inspection by the

Licensee that will provide for an adequate and qualified inspection force for construction of any such alterations to the project. Construction of said alterations or any feature thereof shall not be initiated until the program of inspection for the alterations or any feature thereof has been approved by said representative. The Licensee shall allow said representative and other officers or employees of the United States, showing proper credentials, free and unrestricted access to, through, and across the project lands and project works in the performance of their official duties. The Licensee shall comply with such rules and regulations of general or special applicability as the Commission may prescribe from time to time for the protection of life, health, or property.

Article 5. The Licensee, within five years from the date of issuance of the license, shall acquire title in fee or the right to use in perpetuity all lands, other than lands of the United States, necessary or appropriate for the construction maintenance, and operation of the project. The Licensee or its successors and assigns shall, during the period of the license, retain the possession of all project property covered by the license as issued or as later amended, including the project area, the project works, and all franchises, easements, water rights, and rights or occupancy and use; and none of such properties shall be voluntarily sold, leased, transferred, abandoned, or otherwise disposed of without the prior written approval of the Commission, except that the Licensee may lease or otherwise dispose of interests in project lands or property without specific written approval of the Commission pursuant to the then current regulations of the Commission. The provisions of this article are not intended to prevent the abandonment or the retirement from service of structures, equipment, or other project works in connection with replacements thereof when they become obsolete, inadequate, or inefficient for further service due to wear and tear; and mortgage or trust deeds or judicial sales made thereunder, or tax sales, shall not be deemed voluntary transfers within the meaning of this article.

Article 6. In the event the project is taken over by the United States upon the termination of the license as provided in Section 14 of the Federal Power Act, or is transferred to a new licensee or to a nonpower licensee under the provisions of Section 15 of said Act, the Licensee, its successors and assigns shall be responsible for, and shall make good any defect of title to, or of right of occupancy and use in, any of such project property that is necessary or appropriate or valuable and serviceable in the maintenance and operation of the project, and shall pay and discharge, or shall assume responsibility for payment and discharge of, all liens or encumbrances upon the project or project property created by the Licensee or created or incurred after the issuance of the license, provided that the provisions of this article are not intended to require the Licensee, for the purpose of transferring the project to the United States or to a new licensee, to acquire any different title to, or right of occupancy and use in, any of such project property than was necessary to acquire for its own purposes as the Licensee.

Article 7. The actual legitimate original cost of the project, and of any addition thereto or betterment thereof, shall be determined by the Commission in accordance with the Federal Power Act and the Commission's Rules and Regulations thereunder.

Article 8. The Licensee shall install and thereafter maintain gages and stream-gaging stations for the purpose of determining the stage and flow of the stream or streams on which the project is located, the amount of water held in and withdrawn from storage, and the effective head on the turbines; shall provide for the required reading of such gages and for the adequate rating of such stations; and shall install and maintain standard meters adequate for the determination of the amount of electric energy generated by the project works. The number, character, and location of gages, meters, or other measuring devices, and the method of operation thereof, shall at all times be satisfactory to the Commission or its authorized representative. The Commission reserves the right, after notice and opportunity for hearing, to require such alterations in the number, character, and location of gages, meters, or other measuring devices, and the method of operation thereof, as are necessary to secure adequate determinations. The installation of gages, the rating of said stream or streams, and the determination of the flow thereof, shall be under the supervision of, or in cooperation with, the District Engineer of the United States Geological Survey having charge of stream-gaging operations in the region of the project, and the Licensee shall advance to the United States Geological Survey the amount of funds estimated to be necessary for such supervision, or cooperation for such periods as may mutually agreed upon. The Licensee shall keep accurate and sufficient records of the foregoing determinations to the satisfaction of the Commission, and shall make return of such records annually at such time and in such form as the Commission may prescribe

Article 9. The Licensee shall, after notice and opportunity for hearing, install additional capacity or make other changes in the project as directed by the Commission, to the extent that it is economically sound and in the public interest to do so.

Article 10. The Licensee shall, after notice and opportunity for hearing, coordinate the operation of the project, electrically and hydraulically, with such other projects or power systems and in such manner as the Commission may direct in the interest of power and other beneficial public uses of water resources, and on such conditions concerning the equitable sharing of benefits by the Licensee as the Commission may order.

Article 11. Whenever the Licensee is directly benefited by the construction work of another licensee, a permittee, or the United States on a storage reservoir or other headwater improvement, the Licensee shall reimburse the owner of the headwater improvement for such part of the annual charges for interest, maintenance, and depreciation thereof as the Commission shall determine to be equitable, and shall pay to the United States the cost of making such determination as fixed by the Commission. For benefits provided by a storage reservoir or other headwater improvement of the United States, the Licensee shall pay to the Commission the amounts for which it is billed from time to time for such headwater benefits and for the cost of making the determinations pursuant to the then current regulations of the Commission under the Federal Power Act.

Article 12. The operations of the Licensee, so far as they affect the use, storage and discharge from storage of waters affected by the license, shall at all times be controlled by such reasonable

rules and regulations as the Commission may prescribe for the protection of life, health, and property, and in the interest of the fullest practicable conservation and utilization of such waters for power purposes and for other beneficial public uses, including recreational purposes, and the Licensee shall release water from the project reservoir at such rate in cubic feet per second, or such volume in acre-feet per specified period of time, as the Commission may prescribe for the purposes hereinbefore mentioned.

Article 13. On the application of any person, association, corporation, Federal agency, State or municipality, the Licensee shall permit such reasonable use of its reservoir or other project properties, including works, lands and water rights, or parts thereof, as may be ordered by the Commission, after notice and opportunity for hearing, in the interests of comprehensive development of the waterway or waterways involved and the conservation and utilization of the water resources of the region for water supply or for the purposes of steam-electric, irrigation, industrial, municipal or similar uses. The Licensee shall receive reasonable compensation for use of its reservoir or other project properties or parts thereof for such purposes, to include at least full reimbursement for any damages or expenses which the joint use causes the Licensee to incur. Any such compensation shall be fixed by the Commission either by approval of an agreement between the Licensee and the party or parties benefiting or after notice and opportunity for hearing. Applications shall contain information in sufficient detail to afford a full understanding of the proposed use, including satisfactory evidence that the applicant possesses necessary water rights pursuant to applicable State law, or a showing of cause why such evidence cannot concurrently be submitted, and a statement as to the relationship of the proposed use to any State or municipal plans or orders which may have been adopted with respect to the use of such waters.

Article 14. In the construction or maintenance of the project works, the Licensee shall place and maintain suitable structures and devices to reduce to a reasonable degree the liability of contact between its transmission lines and telegraph, telephone and other signal wires or power transmission lines constructed prior to its transmission lines and not owned by the Licensee, and shall also place and maintain suitable structures and devices to reduce to a reasonable degree the liability of any structures or wires falling or obstructing traffic or endangering life. None of the provisions of this article are intended to relieve the Licensee from any responsibility or requirement which may be imposed by any other lawful authority for avoiding or eliminating inductive interference.

Article 15. The Licensee shall, for the conservation and development of fish and wildlife resources, construct, maintain, and operate, or arrange for the construction, maintenance, and operation of such reasonable facilities, and comply with such reasonable modifications of the project structures and operation, as may be ordered by the Commission upon its own motion or upon the recommendation of the Secretary of the Interior or the fish and wildlife agency or agencies of any State in which the project or a part thereof is located, after notice and opportunity for hearing.

Article 16. Whenever the United States shall desire, in connection with the project, to construct fish and wildlife facilities or to improve the existing fish and wildlife facilities at its own expense, the Licensee shall permit the United States or its designated agency to use, free of cost, such of the Licensee's lands and interests in lands, reservoirs, waterways and project works as may be reasonably required to complete such facilities or such improvements thereof. In addition, after notice and opportunity for hearing, the Licensee shall modify the project operation as may be reasonably prescribed by the Commission in order to permit the maintenance and operation of the fish and wildlife facilities constructed or improved by the United States under the provisions of this article. This article shall not be interpreted to place any obligation on the United States to construct or improve fish and wildlife facilities or to relieve the Licensee of any obligation under this license.

Article 17. The Licensee shall construct, maintain, and operate, or shall arrange for the construction, maintenance, and operation of such reasonable recreational facilities, including modifications thereto, such as access roads, wharves, launching ramps, beaches, picnic and camping areas, sanitary facilities, and utilities, giving consideration to the needs of the physically handicapped, and shall comply with such reasonable modifications of the project, as may be prescribed hereafter by the Commission during the term of this license upon its own motion or upon the recommendation of the Secretary of the Interior or other interested Federal or State agencies, after notice and opportunity for hearing.

Article 18. So far as is consistent with proper operation of the project, the Licensee shall allow the public free access, to a reasonable extent, to project waters and adjacent project lands owned by the Licensee for the purpose of full public utilization of such lands and waters for navigation and for outdoor recreational purposes, including fishing and hunting provided that the Licensee may reserve from public access such portions of the project waters, adjacent lands, and project facilities as may be necessary for the protection of life, health, and property.

Article 19. In the construction, maintenance, or operation of the project, the Licensee shall be responsible for, and shall take reasonable measures to prevent, soil erosion on lands adjacent to streams or other waters, stream sedimentation, and any form of water or air pollution. The Commission, upon request or upon its own motion, may order the Licensee to take such measures as the Commission finds to be necessary for these purposes, after notice and opportunity for hearing.

Article 20. The Licensee shall clear and keep clear to an adequate width lands along open conduits and shall dispose of all temporary structures, unused timber, brush, refuse, or other material unnecessary for the purposes of the project which results from the clearing of lands or from the maintenance or alteration of the project works. In addition, all trees along the periphery of project reservoirs which may die during operations of the project shall be removed. All clearing of the lands and disposal of the unnecessary material shall be done with due diligence and to the satisfaction of the authorized representative of the Commission and in accordance with appropriate Federal, State, and local statutes and regulations.

Article 21. If the Licensee shall cause or suffer essential project property to be removed or destroyed or to become unfit for use, without adequate replacement, or shall abandon or discontinue good faith operation of the project or refuse or neglect to comply with the terms of the license and the lawful orders of the Commission mailed to the record address of the Licensee or its agent, the Commission will deem it to be the intent of the Licensee to surrender the license. The Commission, after notice and opportunity for hearing, may require the Licensee to remove any or all structures, equipment and power lines within the project boundary and to take any such other action necessary to restore the project waters, lands, and facilities remaining within the project boundary to a condition satisfactory to the United States agency having jurisdiction over its lands or the Commission's authorized representative, as appropriate, or to provide for the continued operation and maintenance of nonpower facilities and fulfill such other obligations under the license as the Commission may prescribe. In addition, the Commission in its discretion, after notice and opportunity for hearing, may also agree to the surrender of the license when the Commission, for the reasons recited herein, deems it to be the intent of the Licensee to surrender the license.

Article 22. The right of the Licensee and of its successors and assigns to use or occupy waters over which the United States has jurisdiction, or lands of the United States under the license, for the purpose of maintaining the project works or otherwise, shall absolutely cease at the end of the license period, unless the Licensee has obtained a new license pursuant to the then existing laws and regulations, or an annual license under the terms and conditions of this license.

Article 23. The terms and conditions expressly set forth in the license shall not be construed as impairing any terms and conditions of the Federal Power Act which are not expressly set forth herein.

Article 201. The Licensee shall pay the United States an annual charge, effective January 1, 1994, for the purpose of reimbursing the United States for the cost of administration of Part I of the Act, as determined by the Commission. The authorized installed capacity for that purpose is 24,000 horsepower.

Article 202. Pursuant to Section 10(d) of the Act, a specified reasonable rate of return upon the net investment in the project shall be used for determining surplus earnings of the project for the establishment and maintenance of amortization reserves. The Licensee shall set aside in a project amortization reserve account at the end of each fiscal year one half of the project surplus earnings, if any, in excess of the specified rate of return per annum on the net investment. To the extent that there is a deficiency of project earnings below the specified rate of return per annum for any fiscal year, the Licensee shall deduct the amount of that deficiency from the amount of any surplus earnings subsequently accumulated, until absorbed. The Licensee shall set aside one-half of the remaining surplus earnings, if any, cumulatively computed, in the project amortization reserve account. The Licensee shall maintain the amounts established in the project amortization reserve account until further order of the Commission.

The specified reasonable rate of return used in computing amortization reserves shall be calculated annually based on current capital ratios developed from an average of 13 monthly balances of amounts properly includible in the Licensee's long-term debt and proprietary capital accounts as listed in the Commission's Uniform System of Accounts. The cost rate for such ratios shall be the weighted average cost of long-term debt and preferred stock for the year, and the cost of common equity shall be the interest rate on 10-year government bonds (reported as the Treasury Department's 10-year constant maturity series) computed on the monthly average for the year in question plus four percentage points (400 basis points).

Article 203.

- (A) In accordance with the provisions of this article, the Licensee shall have the authority to grant permission for certain types of use and occupancy of project lands and waters and to convey certain interests in project lands and waters for certain types of use and occupancy, without prior Commission approval. The Licensee may exercise the authority only if the proposed use and occupancy is consistent with the purposes of protecting and enhancing the scenic, recreational, and other environmental values of the project. For those purposes, the Licensee shall also have continuing responsibility to supervise and control the use and occupancies for which it grants permission, and to monitor the use of, and ensure compliance with the covenants of the instrument of conveyance for, any interests that it has conveyed under this article. If a permitted use and occupancy violates any condition of this article or any other condition imposed by the Licensee for protection and enhancement of the project's scenic, recreational, or other environmental values, or if a covenant of a conveyance made under the authority of this article is violated, the Licensee shall take any lawful action necessary to correct the violation. For a permitted use or occupancy, that action includes, if necessary, canceling the permission to use and occupy the project lands and waters and requiring the removal of any non-complying structures and facilities.
- (B) The types of use and occupancy of project lands and waters for which the Licensee may grant permission without prior Commission approval are: (1) landscape plantings; (2) non-commercial piers, landings, boat docks, or similar structures and facilities that can accommodate no more than 10 watercraft at a time and where said facility is intended to serve single-family type dwellings; (3) embankments, bulkheads, retaining walls, or similar structures for erosion control to protect the existing shoreline; and (4) food plots and other wildlife enhancement. To the extent feasible and desirable to protect and enhance the project's scenic, recreational, and other environmental values, the Licensee shall require multiple use and occupancy of facilities for access to project lands or waters. The Licensee shall also ensure, to the satisfaction of the Commission's authorized representative, that the use and occupancies for which it grants permission are maintained in good repair and comply with applicable state and local health and safety requirements. Before granting permission for construction of bulkheads or retaining walls, the Licensee shall: (1)

inspect the site of the proposed construction, (2) consider whether the planting of vegetation or the use of riprap would be adequate to control erosion at the site, and (3) determine that the proposed construction is needed and would not change the basic contour of the reservoir shoreline. To implement this paragraph (b), the Licensee may, among other things, establish a program for issuing permits for the specified types of use and occupancy of project lands and waters, which may be subject to the payment of a reasonable fee to cover the Licensee's costs of administering the permit program. The Commission reserves the right to require the Licensee to file a description of its standards, guidelines, and procedures for implementing this paragraph (b) and to require modification of those standards, guidelines, or procedures.

- (C) The Licensee may convey easements or rights-of-way across, or leases of, project lands for: (1) replacement, expansion, realignment, or maintenance of bridges or roads where all necessary state and federal approvals have been obtained; (2) storm drains and water mains; (3) sewers that do not discharge into project waters; (4) minor access roads; (5) telephone, gas, and electric utility distribution lines; (6) non-project overhead electric transmission lines that do not require erection of support structures within the project boundary; (7) submarine, overhead, or underground major telephone distribution cables or major electric distribution lines (69-kV or less); and (8) water intake or pumping facilities that do not extract more than one million gallons per day from a project reservoir. No later than January 31 of each year, the licensee shall file three copies of a report briefly describing for each conveyance made under this paragraph (c) during the prior calendar year, the type of interest conveyed, the location of the lands subject to the conveyance, and the nature of the use for which the interest was conveyed.
- (D) The Licensee may convey fee title to, easements or rights-of-way across, or leases of project lands for: (1) construction of new bridges or roads for which all necessary state and federal approvals have been obtained; (2) sewer or effluent lines that discharge into project waters, for which all necessary federal and state water quality certification or permits have been obtained; (3) other pipelines that cross project lands or waters but do not discharge into project waters; (4) non-project overhead electric transmission lines that require erection of support structures within the project boundary, for which all necessary federal and state approvals have been obtained; (5) private or public marinas that can accommodate no more than 10 watercraft at a time and are located at least one-half mile (measured over project waters) from any other private or public marina; (6) recreational development consistent with an approved Exhibit R or approved report on recreational resources of an Exhibit E; and (7) other uses, if: (i) the amount of land conveyed for a particular use is five acres or less; (ii) all of the land conveyed is located at least 75 feet, measured horizontally, from project waters at normal surface elevation; and (iii) no more than 50 total acres of project lands for each project development are conveyed under this clause (d)(7) in any

calendar year. At least 60 days before conveying any interest in project lands under this paragraph (d), the Licensee must submit a letter to the Director, Office of Hydropower Licensing, stating its intent to convey the interest and briefly describing the type of interest and location of the lands to be conveyed (a marked exhibit G or K map may be used), the nature of the proposed use, the identity of any federal or state agency official consulted, and any federal or state approvals required for the proposed use. Unless the Director, within 45 days from the filing date, requires the Licensee to file an application for prior approval, the Licensee may convey the intended interest at the end of that period.

(E) The following additional conditions apply to any intended conveyance under paragraph (c) or (d) of this article:

- (1) Before conveying the interest, the Licensee shall consult with federal and state fish and wildlife or recreation agencies, as appropriate, and the State Historic Preservation Officer.
- (2) Before conveying the interest, the Licensee shall determine that the proposed use of the lands to be conveyed is not inconsistent with any approved exhibit R or approved report on recreational resources of an exhibit E; or, if the project does not have an approved exhibit R or approved report on recreational resources, that the lands to be conveyed do not have recreational value.
- (3) The instrument of conveyance must include the following covenants running with the land: (i) the use of the lands conveyed shall not endanger health, create a nuisance, or otherwise be incompatible with overall project recreational use; (ii) the grantee shall take all reasonable precautions to insure that the construction, operation, and maintenance of structures or facilities on the conveyed lands will occur in a manner that will protect the scenic, recreational, and environmental values of the project; and (iii) the grantee shall not unduly restrict public access to project waters.
- (4) The Commission reserves the right to require the Licensee to take reasonable remedial action to correct any violation of the terms and conditions of this article, for the protection and enhancement of the project's scenic, recreational, and other environmental values.

(F) The conveyance of an interest in project lands under this article does not in itself change the project boundaries. The project boundaries may be changed to exclude land conveyed under this article only upon approval of revised exhibit G or K drawings (project boundary maps) reflecting exclusion of that land. Lands conveyed under this article will be excluded from the project only upon a determination that the lands are not necessary for project purposes, such as operation and maintenance, flowage, recreation, public access, protection of environmental resources, and

shoreline control, including shoreline aesthetic values. Absent extraordinary circumstances, proposals to exclude lands conveyed under this article from the project shall be consolidated for consideration when revised exhibit G or K drawings would be filed for approval for other purposes.

- (G) The authority granted to the Licensee under this article shall not apply to any part of the public lands and reservations of the United States included within the project boundary.

20000511 – FERC issues an Order Amending Licenses to incorporate a small dredging permit program.

The Director Orders:

- (A) The licenses for the Flint River Project, the Sinclari Dam Project, the Lloyd Shoals Project, the Langdale Project, the Riverview Project, and the North Georgia Project are amended to include the Small Dredging Permit Program, filed February 26, 1993 and approved with modifications on June 28, 1993.
- (B) This order constitutes final Commission action. Requests for rehearing by the Commission may be filed within 30 days of the date of issuance of this order, pursuant to 18 C.F.R. § 385.713.

20010829 – Georgia Power proposed a programmatic agreement between FERC and Georgia Power for managing the construction of additions and/or improvements to existing residential structures on project lands within 75 feet of the reservoir. The goal of the PA is to permit additions and/or improvements that will be consistent with the use of project lands for recreational purposes, will not interfere with the use of the project by the general public, and will protect the project's scenic and environmental values.

20020107 – FERC issued to Georgia Power an order approving the Shoreline Management Programmatic Agreement filed on August 29, 2001.

The Director orders:

- (A) The programmatic agreement for shoreline management, filed on August 29, 2001, for the Barletts Ferry Project (P-485), the Sinclair Project (P-1951), the Middle Chattahoochee Project (P-2177), the Lloyd Shoals Project (P-2336), and the North Georgia Project (P-2354) is approved and made part of the licenses.
- (B) This order constitutes final Commission action. Requests for rehearing by the Commission may be filed within 30 days of the date of issuance of this order, pursuant to 18 C.F.R. § 385.713.

Article 401. Within 90 days from the effective date of this license, the Licensee shall file with the Commission for approval a plan to monitor dissolved oxygen (DO) in the Ocmulgee River downstream of the project. The plan shall include a schedule for submitting the monitoring results to the Commission and the Georgia Department of Natural Resources (GDNR) and recommendations on measures needed to ensure maintenance of the state DO standard as measured downstream of the project.

The Licensee shall prepare the plan after consultation with the GDNR. The Licensee shall include with the plan documentation of consultation and copies of comments and recommendations made on the completed plan after it has been prepared and provided to the GDNR and specific descriptions of how the GDNR's comments are accommodated by the plan. The Licensee shall allow a minimum of 30 days for the GDNR to comment and to make recommendations prior to filing the plan with the Commission. If the Licensee does not adopt a recommendation, the filing shall include the Licensee's reasons, based on project-specific information.

The Commission reserves the right to require changes to the plan. Upon Commission approval, the Licensee shall implement the plan, including any changes required by the Commission.

If the results of monitoring indicate that changes in project structures or operations are necessary to ensure maintenance of the state DO standard downstream, the Commission may direct the Licensee to modify project structures or operations.

Article 402. The Licensee shall release from the Lloyd Shoals Dam into the Ocmulgee River a continuous minimum flow of 400 cubic feet per second, or inflow to the project reservoir, whichever is less, as measured at the project's tailrace, for the protection and enhancement of fish and wildlife resources in the Ocmulgee River.

This flow may be temporarily modified if required by operating emergencies beyond the control of the Licensee, and for short periods upon agreement between the Licensee and the Georgia Department of Natural Resources. If the flow is so modified, the Licensee shall notify the Commission as soon as possible, but not later than 10 days after each such incident.

Article 403. The Licensee, after consultation with the Georgia State Historic Preservation Officer (SHPO), shall implement its cultural resources management plan contained its application for license filed December 17, 1991, to avoid or mitigate impacts to archeological and historic sites at the Lloyd Shoals Project eligible for inclusion in the National Register of Historic Places.

The Licensee shall file for Commission approval reports on any cultural resources investigations and any revisions to its cultural resources management plan found necessary in the future to avoid or mitigate impacts to eligible sites at the project, along with copies of the SHPO's written comments on the investigations, reports, and revisions. Any investigations, reports, and revisions to the plan must be based on the recommendations of the SHPO and

adhere to the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservations.

The Licensee shall not implement any revisions to the cultural resources management plan or begin any land-clearing or land-disturbing activities that may have an effect on National Register eligible sites until informed by the Commission that the requirements discussed above have been fulfilled. The Commission reserves the right to require additional investigations and revisions to the reports or to the plan based on these filings.

19930420 – Georgia Power requested assistance from Commission staff in determining how to incorporate the programmatic agreement (PA) into the license.

19960214 – FERC issued an Order Amending Article 403 to incorporate an executed Programmatic Agreement for managing historic properties in the project.

- (A) Article 403 of the license for Lloyd Shoals Project is amended to state: The licensee shall implement the Programmatic Agreement (PA) among the Federal Regulatory Commission, the Advisory Council on Historic Preservation and the Georgia State Historic Preservation Officer (SHPO) For Managing Historic Properties that May Be Affected By An Amended License Issued to Georgia Power Company for the Continued Operation of the Lloyd Shoals Project executed on January 18, 1996. The licensee shall file, with the Commission and the SHPO, on ever anniversary of the license issuance date, annual reports of activities undertaken pursuant to the PA.
- (B) In the event the PA is terminated pursuant to Stipulation III B. of the document, the licensee shall continue to implement the cultural resource management plant (CRMP). In addition, the licensee must file, for Commission approval, revisions to the CRMP along with comments from SHPO if available.
- (C) This order constitutes final Commission action. Requests for rehearing by the Commission may be filed within 30 days of the date of issuance of this order, pursuant to 18 C.F.R. 385.713.

Article 404. The Licensee shall implement the recreation and land use enhancement measures filed on December 17, 1991 (exhibit E sections 4.51.f.5 and 6) and July 31, 1992 (additional information response to item number 1, pages 1-4).

The recreation and land use enhancements consist of: (1) a new boat ramp, parking lot, and associated facilities downstream of the dam and upstream of Highway 16, on the east bank of the river; (2) a barrier free access area for bank fishing downstream of the oxygenation weir on the west bank of the river; (3) monitoring the proposed fishing area downstream of the dam for three years to determine whether or not the proposed facilities meet current demand or whether changes need to be made; (4) developing the existing boat launching facilities at Lloyd Shoals Park, as well as the proposed boat ramp upstream of Highway 16, to accommodate

disabled users; (5) extending one of the two boat ramps at Lloyd Shoals Park to allow access during low-water periods; (6) developing a litter control plan for the Lloyd Shoals Project; and (7) developing policies for the removal of stumps and deadfalls and the re-introduction of native vegetation along Lake Jackson's shoreline.

The Licensee shall complete construction of the recreational facilities described above within two years from the effective date of the license. Within 90 days after finishing construction, the Licensee shall file for Commission approval revised exhibits A, F, and G to describe the recreational facilities as-built.

20161115 – FERC issued an order amending recreation plan to relocate the existing accessible ramp to the fishing pier from the upstream end to the downstream end to help avoid concerns over public safety and security around the powerhouse while also improving accessibility along the entire tailrace pier.

The Director's orders:

- (A) Georgia Power Company's amendment to the recreation plan for the Lloyd Shoals Hydroelectric Project (FERC No. 2336), filed October 14, 2016, is approved.
- (B) Georgia Power Company must file, for Commission approval, as-built site plan drawings within 6 months of completing construction at the Lloyd Shoals Tailrace Fishing Pier. An overall site plan drawing that includes the location of all Commission approved recreation sites in relation to the project boundary and a three-column table is required. In addition to the overall site plan drawing, the licensee must file as-built site plan drawings for each recreation site showing the location of all recreation facilities in relation to the project boundary. The first column of the three-column table on the overall site plan drawing must be titled "Identification" and must key each recreation site to the location on the drawing. The second column must be titled "Exhibit No." and must include the Commission assigned Exhibit Numbers for any previously approved as-built site plan drawings and left blank for the current filing until provided in an approval order. The third column must be titled "Recreation Site Name." Each drawing must include a north arrow, scale (graphic and numeric), and Title Block. The Title Block must include the Project Name, Project Number, a space for Exhibit Number (Commission assigned upon approval), a space for Drawing Number (Commission assigned upon approval) and drawing name. All drawings must be legible when reduced to or printed on 11"x17" paper size. For additional guidance, please see: <https://www.ferc.gov/industries/hydropower/gen-info/guidelines/as-built-site-plan.pdf>.
- (C) Within 45 days of the issuance of this order, the licensee shall review the attribute table in Appendix A of this order. If the licensee concurs with the information shown in the table, the licensee must file the completed table with the Commission, including location information. If the licensee does not concur with the information

provided in the table, the licensee must file a revised table, including location information. The table must be filed in one of the following file formats: .xls, .csv, or .dbf.

- (D) This order constitutes final agency action. Any party may file a request for rehearing of this order within 30 days from the date of its issuance, as provided in section 313(a) of the FPA, 16 U.S.C. § 8251 (2012), and the Commission's regulations at 18 C.F.R. § 385.713 (2016). The filing of a request for rehearing does not operate as a stay of the effective date of this order, or of any other date specified in this order. The licensee's failure to file a request for rehearing shall constitute acceptance of this order.

20161118 – FERC issued an errata notice to correct the cited Project Number and Location in the November 15, 2016 order.

20170307 – FERC issued an order amending recreation plan approving the closing of Riverside Park to public access and improvements to bank fishing access to an area at the south end of the emergency spillway.

The Director orders:

- (A) Georgia Power Company's November 11, 2016 request to amend the recreation plan for the Lloyd Shoals Hydroelectric Project (FERC No. 2336) is approved.
- (B) Georgia Power Company must file, for Commission approval, as-built site plan drawings within 6 months of completing construction of the Lloyd Shoals Tailrace Fishing Pier. An overall site plan drawing that includes the location of all Commission approved recreation sites in relation to the project boundary and a three-column table is required. In addition to the overall site plan drawing, the licensee must file as-built site plan drawings for each recreation site (except Ocmulgee River Park, Exhibit R-3, FERC Drawing No. 2336-52) showing the location of all recreation facilities in relation to the project boundary. The first column of the three-column table on the overall site plan drawing must be titled "Identification" and must key each recreation site to the location on the drawing. The second column must be titled "Exhibit No." and must include the Commission assigned Exhibit Numbers for any previously approved as-built site plan drawings and left blank for the current filing until provided in an approval order. The third column must be titled "Recreation Site Name." Each drawing must include a north arrow, scale (graphic and numeric), and Title Block. The Title Block must include the Project Name, Project Number, a space for Exhibit Number (Commission assigned upon approval), a space for Drawing Number (Commission assigned upon approval) and drawing name. All drawings must be legible when reduced to or printed on 11"x17" paper size. For additional guidance, please see: <https://www.ferc.gov/industries/hydropower/gen-info/guidelines/as-built-site-plan.pdf>.

- (C) Within 45 days of the issuance of this order, the licensee shall review the attribute table in Appendix A of this order. If the licensee concurs with the information shown in the table, the licensee must file the completed table with the Commission, including location information. If the licensee does not concur with the information provided in the table, the licensee must file a revised table, including location information. The table must be filed in one of the following file formats: .xls, .csv, or .dbf.

Article 405. The Licensee, after consultation with the National Park Service and the Georgia Department of Natural Resources, shall monitor recreation use at the project to determine whether existing recreation facilities are meeting recreation needs. Monitoring studies shall begin within 3 years from the effective date of this license. Monitoring studies, at a minimum, shall consist of collection of annual recreation use data, by activity, including bank fishing, for a one-calendar-year period.

Once every 5 years during the term of the license, the Licensee shall collect data and file a report with the Commission on the monitoring results. This report shall include: (1) the annual recreation use figures, by activity; (2) a discussion of the adequacy of the Licensee's recreation facilities at the project site to meet recreation demand; (3) a description of the methodology used to collect all study data; and (4) if there is a need for additional facilities, a recreation plan proposed by the Licensee to accommodate recreation needs in the project area.

The Licensee shall include with the report documentation of consultation, copies of comments and recommendations on the report after it has been prepared and provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the report. The Licensee shall allow a minimum of 30 days for the agencies to comment and make recommendations before filing the report, and any recreation plan under item (4), with the Commission.

The Commission reserves the right to require changes to any recreation plan. No modification or enhancement activities proposed in the recreation plan shall begin until the Licensee is notified by the Commission that the plan is approved. Upon Commission approval, the Licensee shall implement the recreation plan, including any changes required by the Commission.

19930422 – FERC issued an errata notice affecting Article 405 language.

20130517 – FERC issued an Order Amending Article 405.

The Director orders:

- (A) Georgia Power Company's application, filed on March 8, 2013, to modify the requirements of Article 405 of the license for the Lloyd Shoals Hydroelectric Project (FERC No. 2633), as modified by ordering paragraph (B) below, is approved.

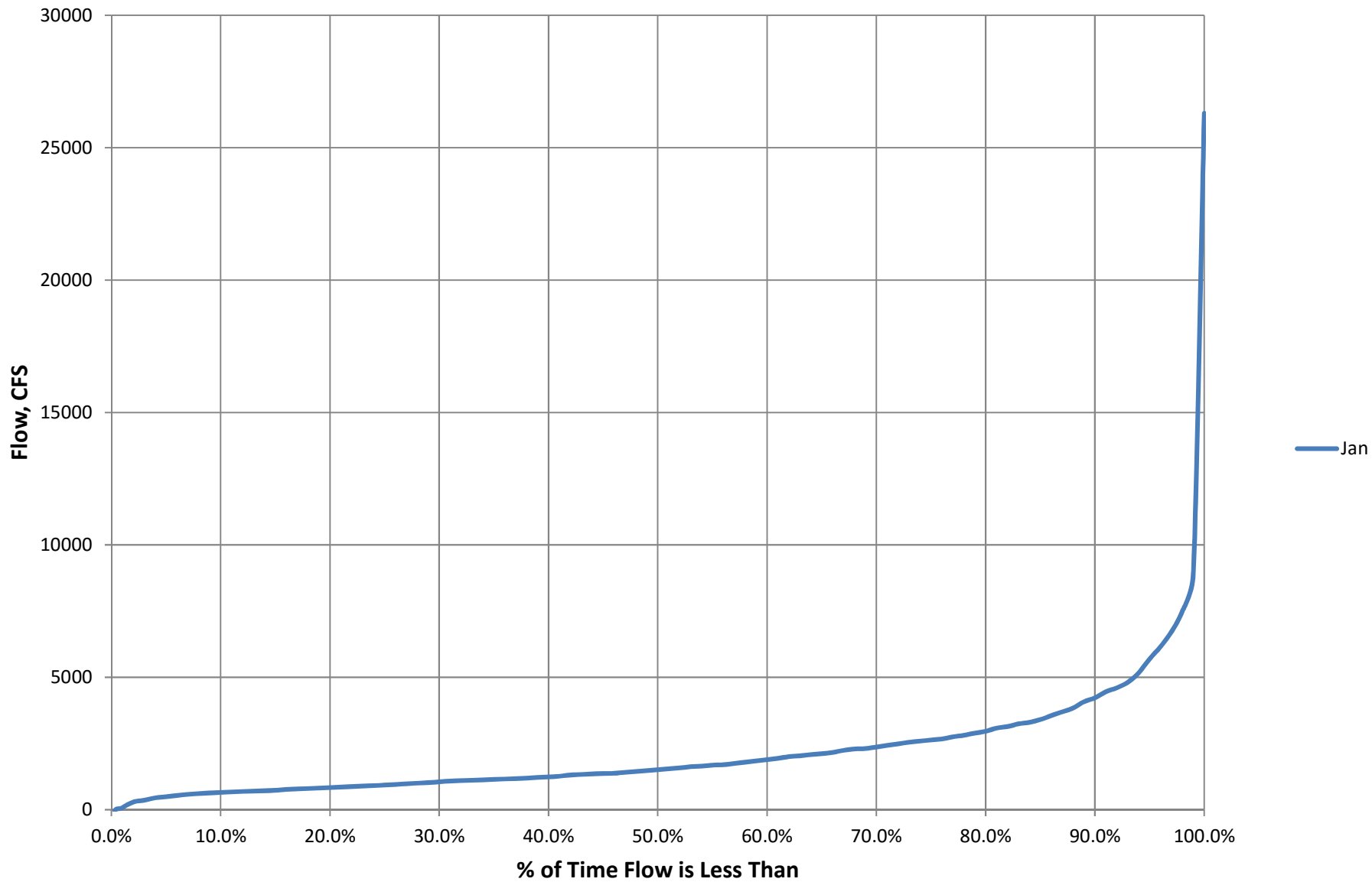
- (B) The licensee shall file with the Commission the recreation monitoring report, as required by article 405, every six years in conjunction with the FERC Form 80, beginning in 2015. The recreation monitoring report shall include: (1) annual recreation use figures by activity; (2) a discussion of the adequacy of the licensee's recreation facilities at the project site to meet recreation demand; (3) a description of the methods used to collect study data; and (4) if there is a need for additional facilities, a recreation plan proposed by the licensee to accommodate the recreation needs in the project area. The licensee shall prepare the summary report after consultation with the Georgia Department of Natural Resources and the National Park Service. The licensee shall include with the report documentation of consultation, copies of comments and recommendations on the report and specific descriptions of how the agencies' comments are accommodated in the report. The licensee shall allow a minimum of thirty days for the agencies to comment and to make recommendations prior to filing the report and any recreation plan with the Commission. The next recreation monitoring report shall be due April 1, 2015.
- (C) This order constitutes final agency action. Any party may file a request for rehearing of this order within 30 days from the date of its issuance, as provided in section 313(a) of the FPA, 16 U.S.C. § 8251 (2006), and the Commission's regulations at 18 C.F.R. § 385.713 (2012). The filing of a request for rehearing does not operate as a stay of the effective date of this order, or of any other date specified in this order. The licensee's failure to file a request for rehearing shall constitute acceptance of this order.

Article 501. If the Licensee's project was directly benefited by the construction work of another Licensee, a permittee, or the United States on a storage reservoir or other headwater improvement during the term of the original license (including extensions of that term by annual licenses), and if those headwater benefits were not previously assessed and reimbursed to the owner of the headwater improvement, the Licensee shall reimburse the owner of the headwater improvement for those benefits, at such time as they are assessed, in the same manner as for benefits received during the term of this new license.

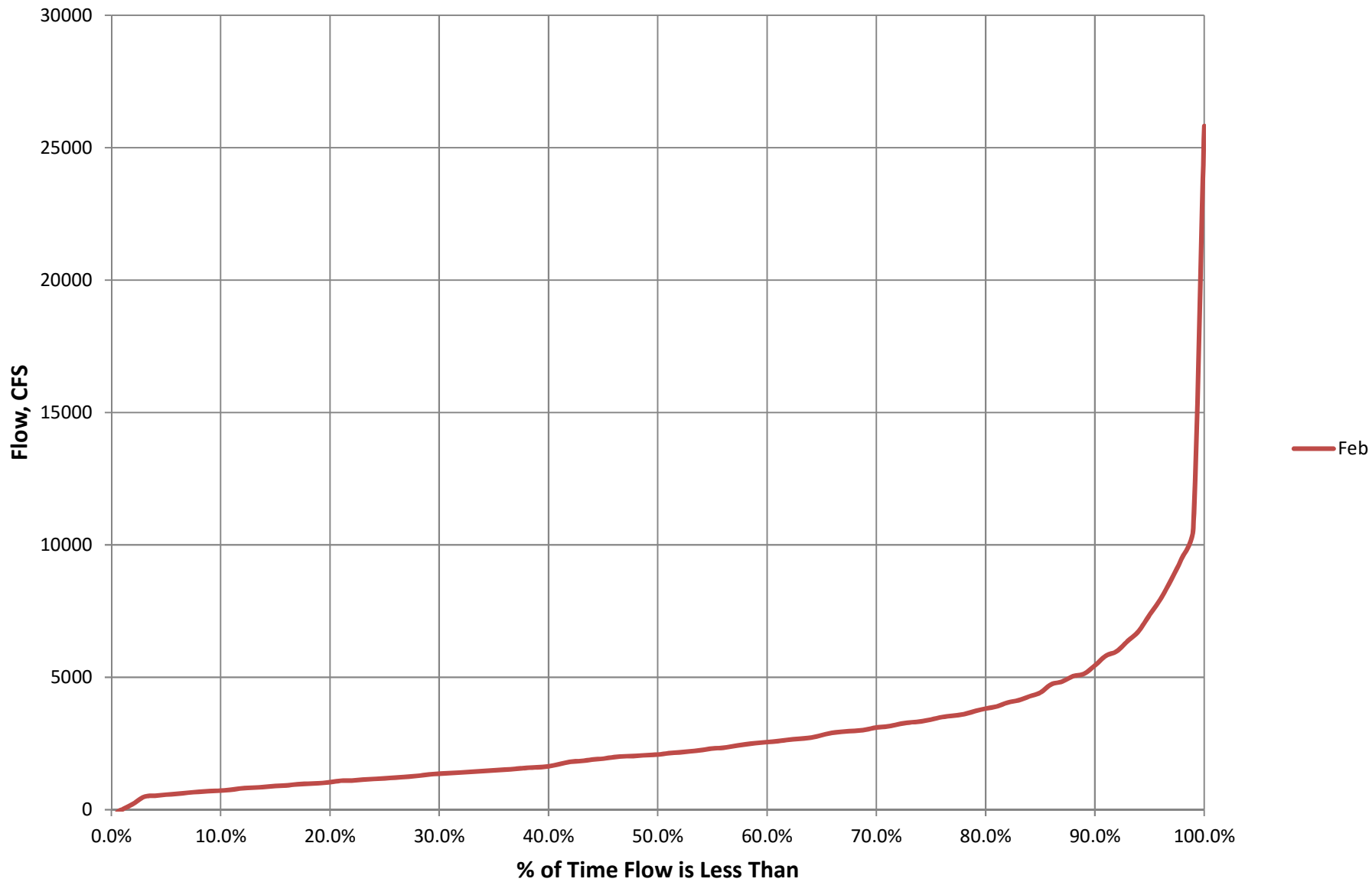
APPENDIX F

Monthly and Annual Daily Inflow Duration Curves

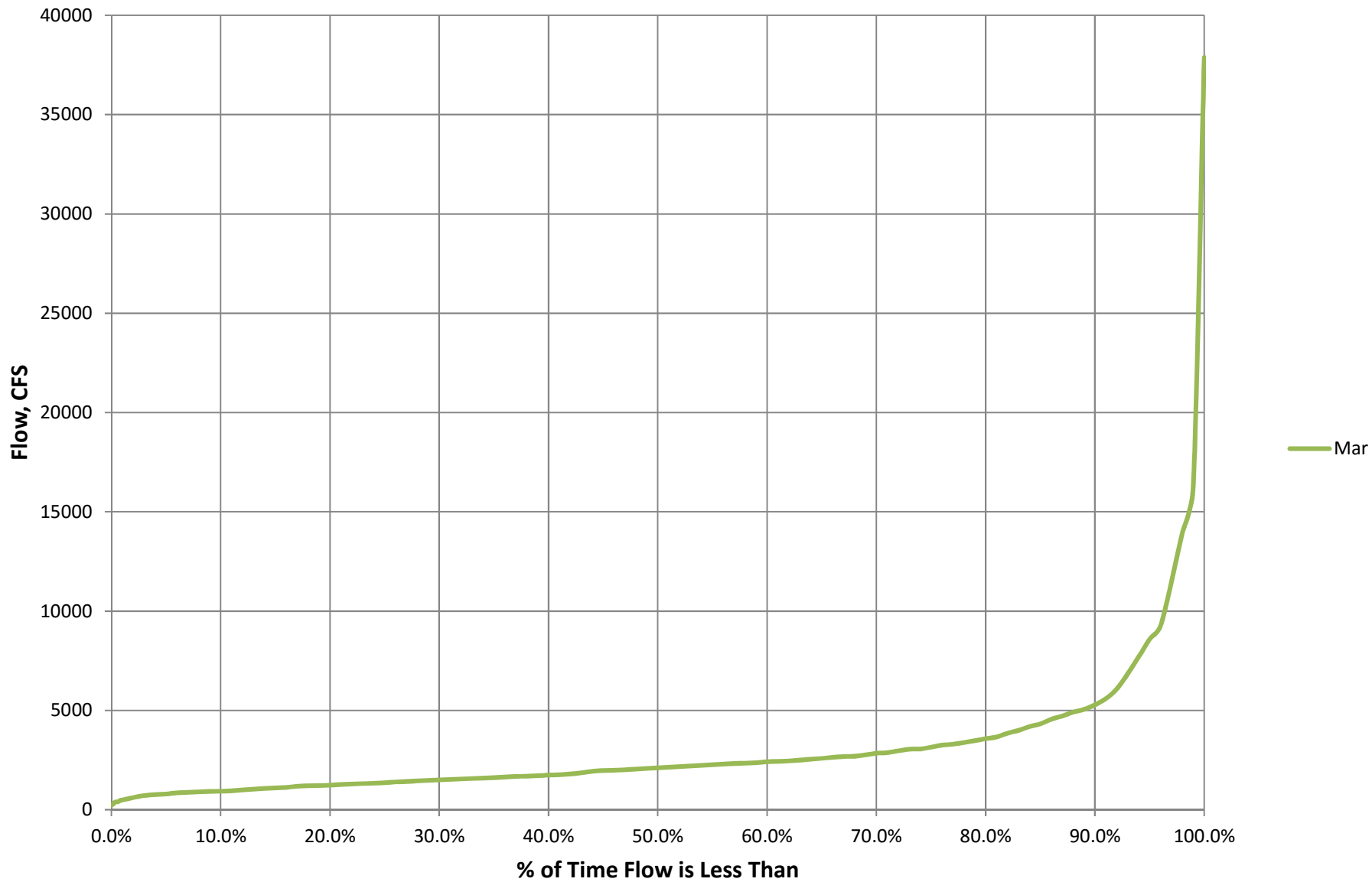
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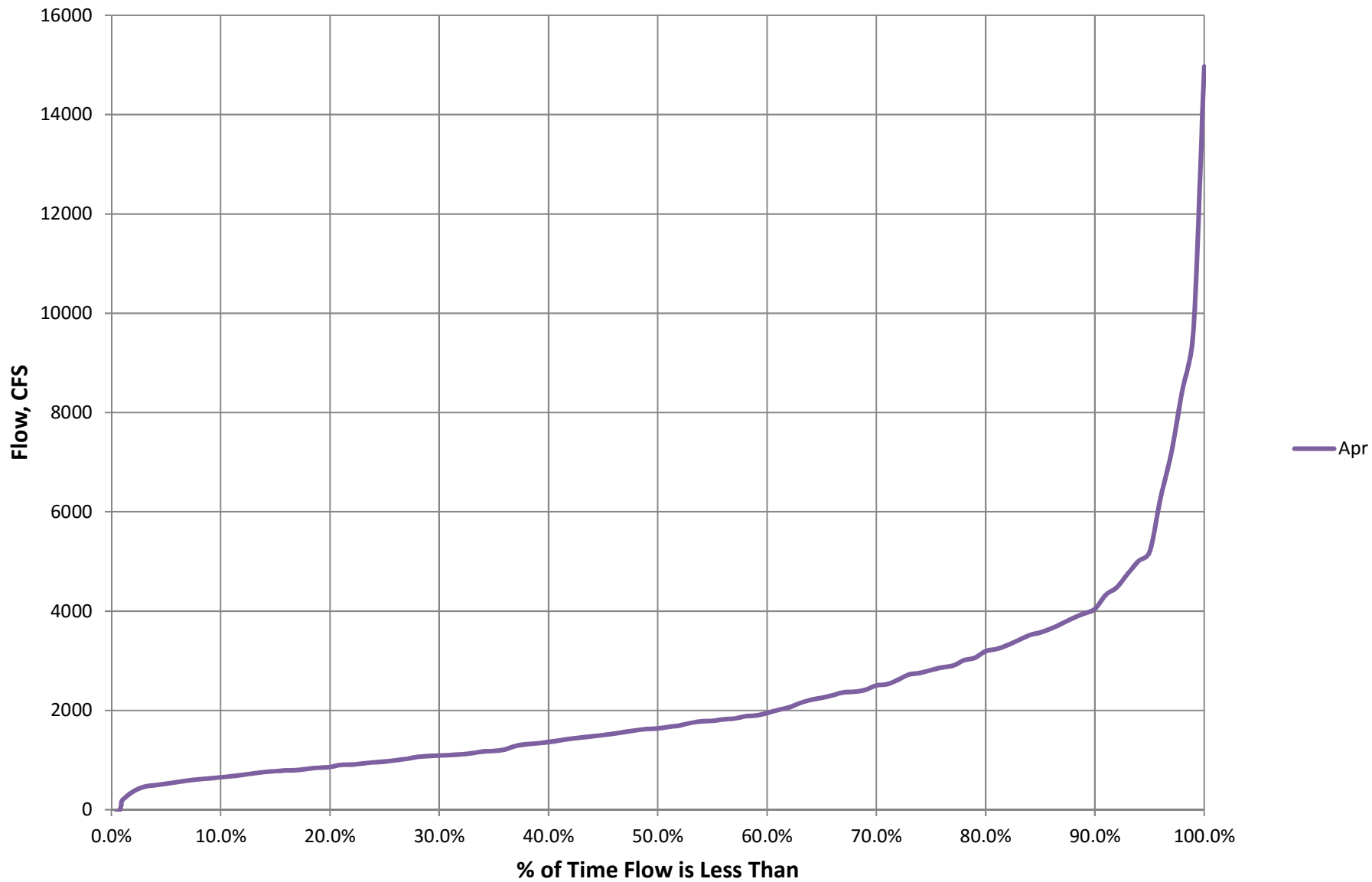
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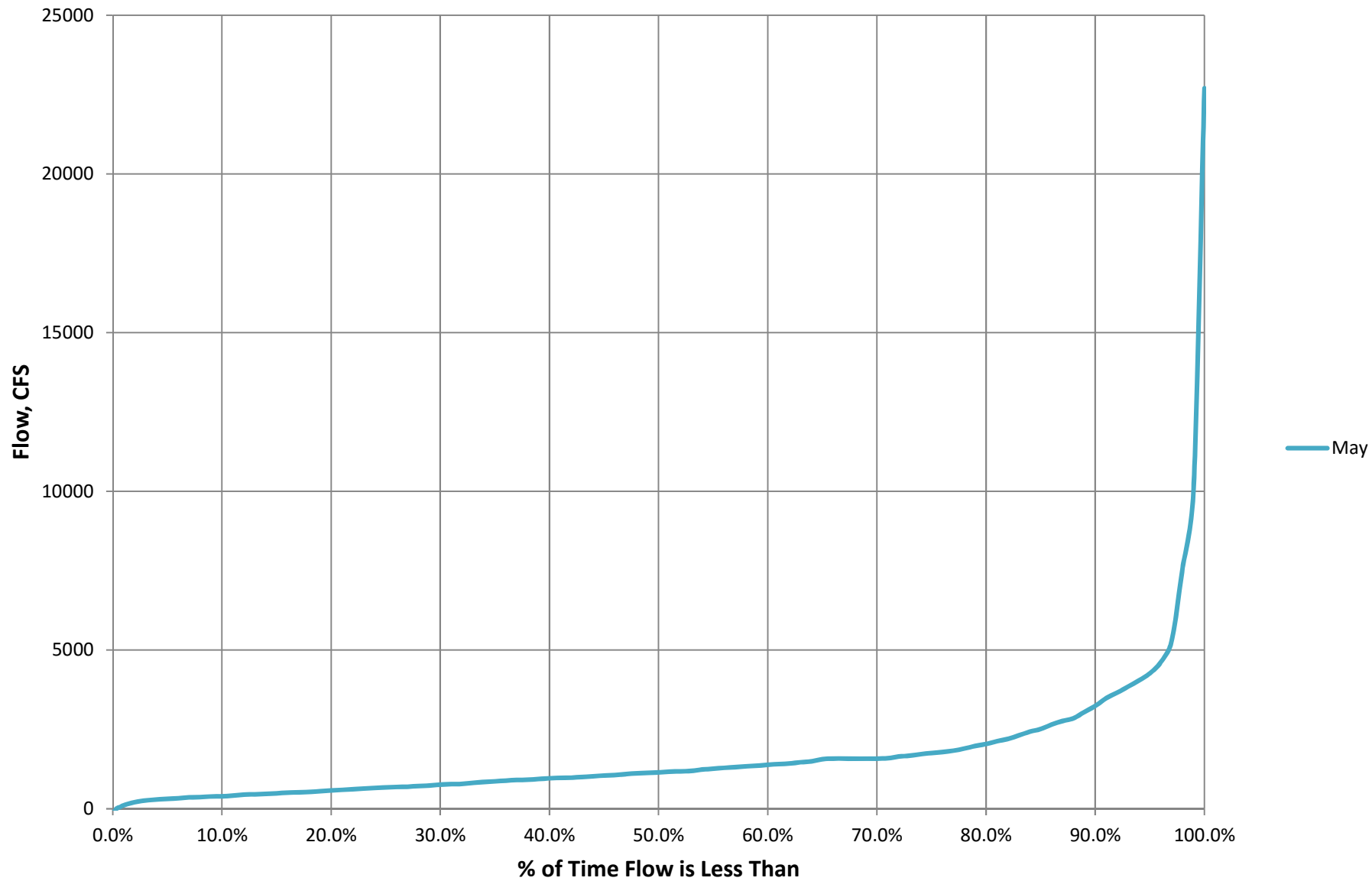
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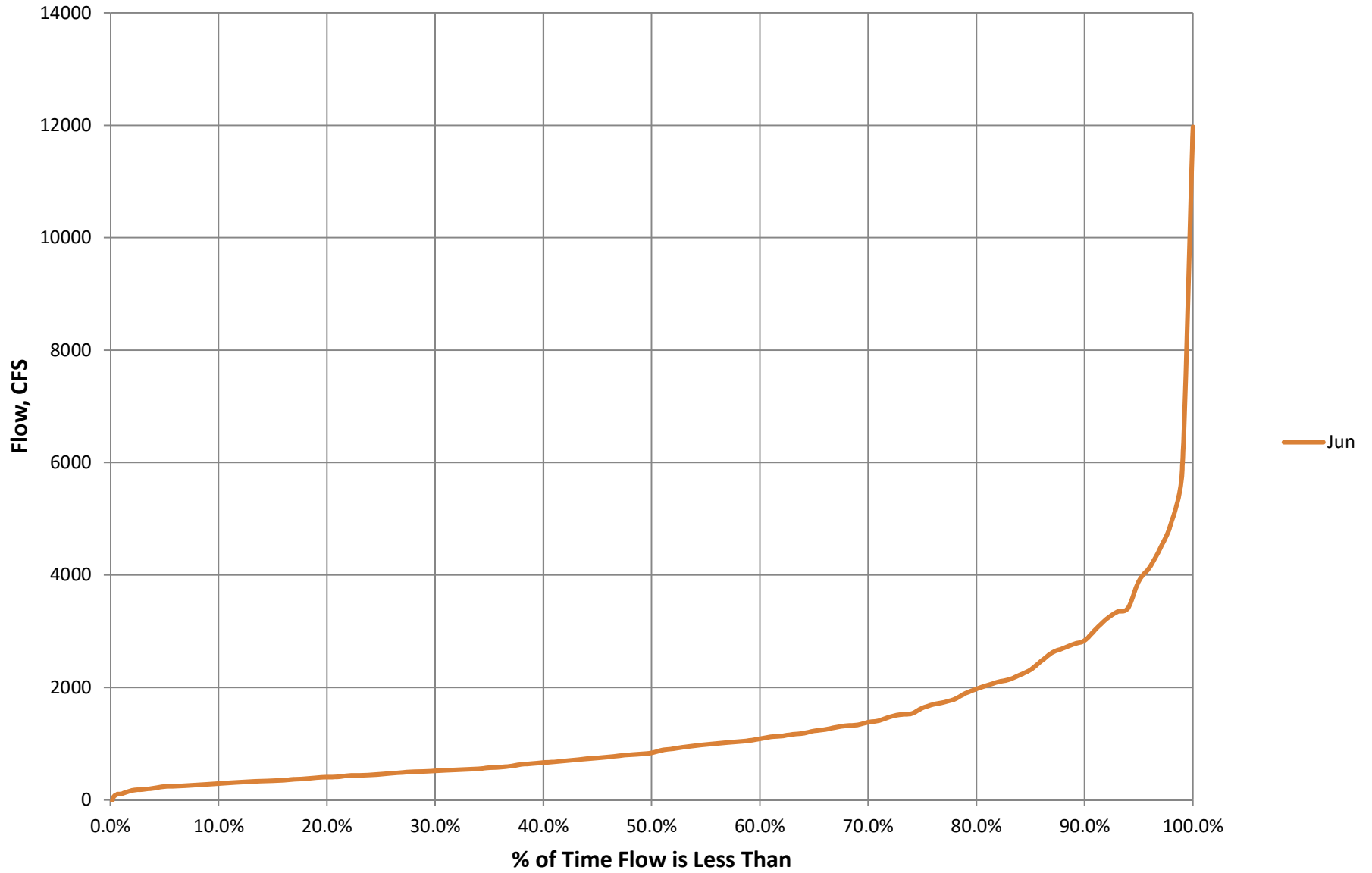
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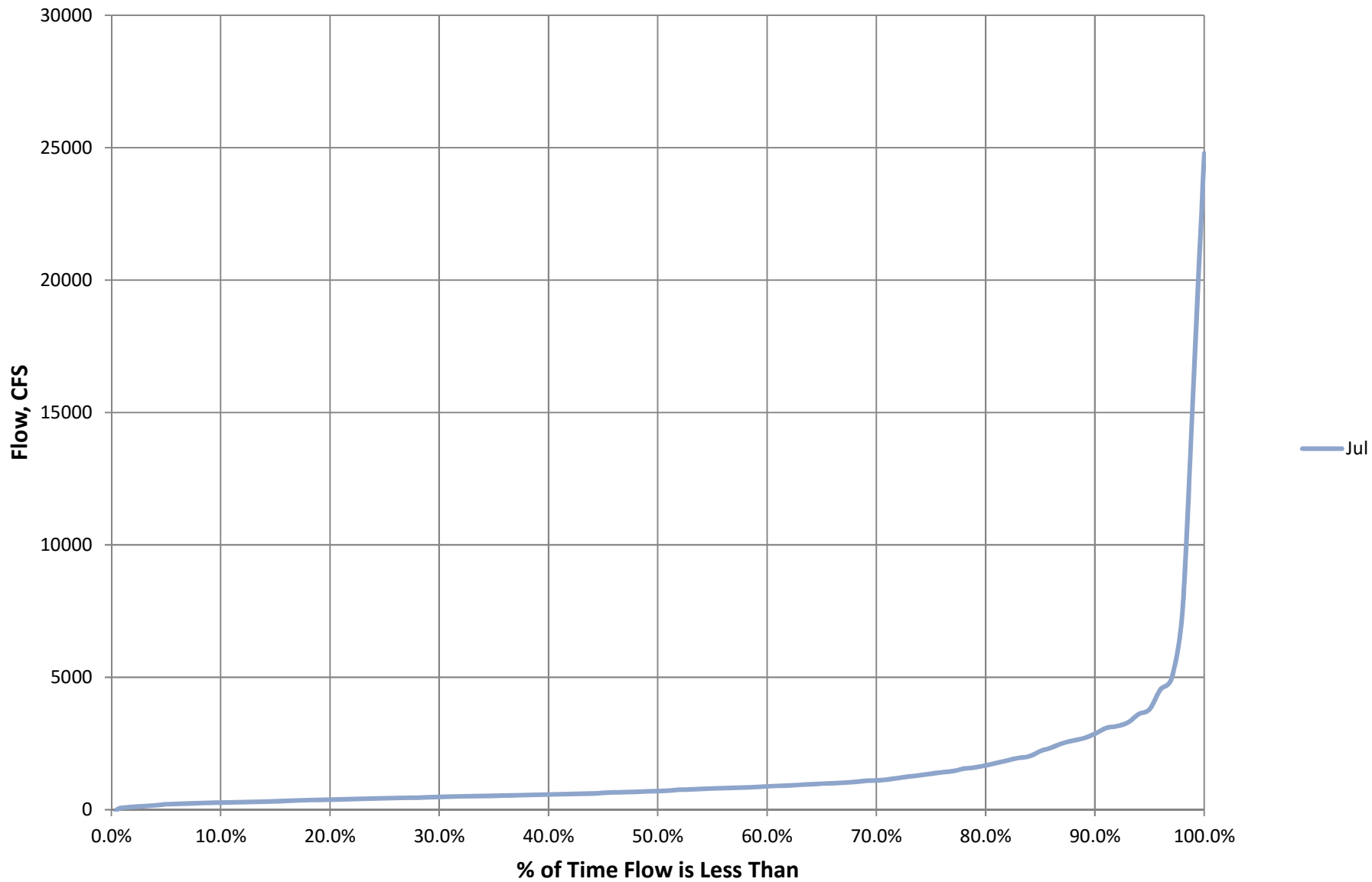
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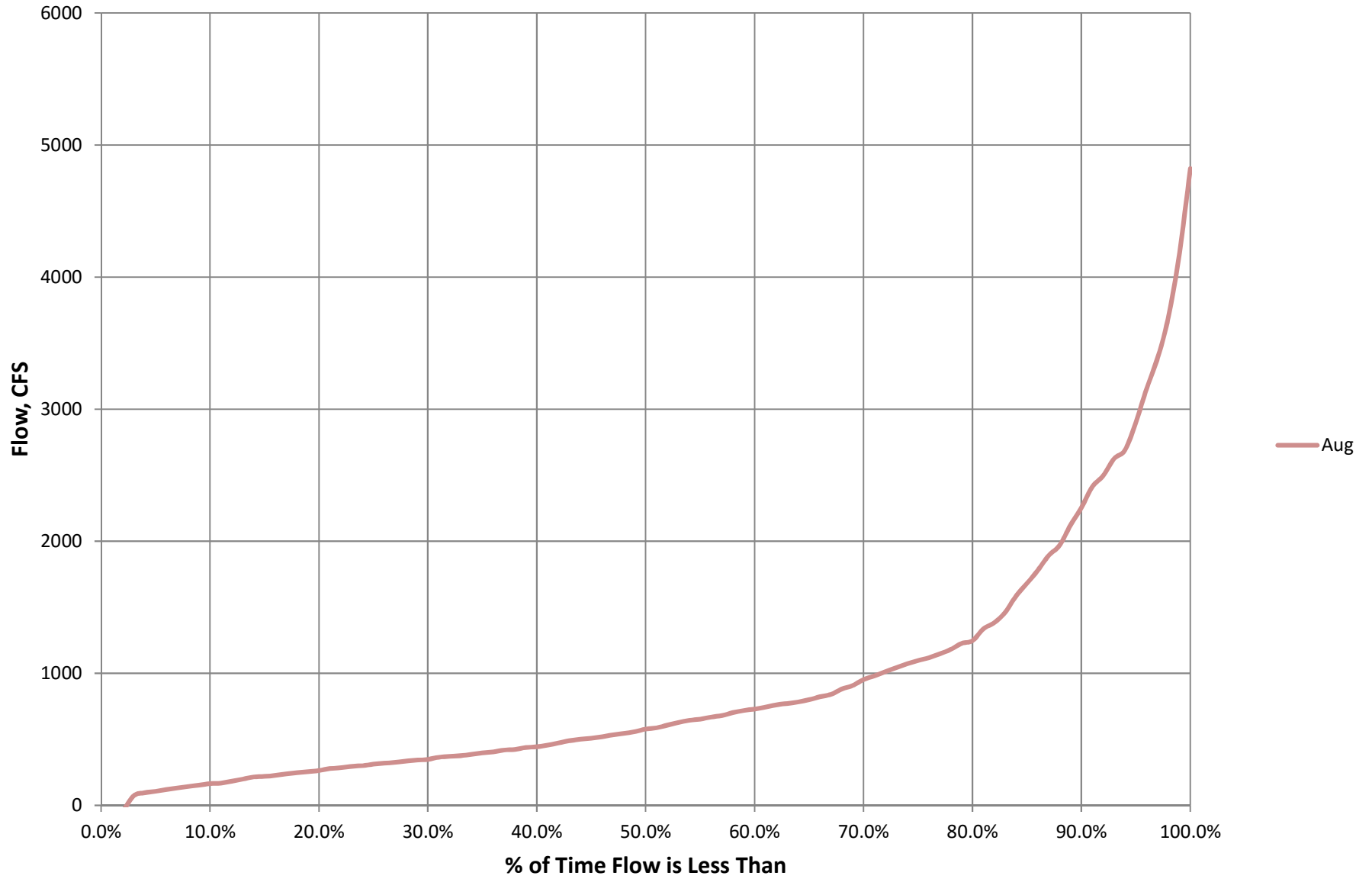
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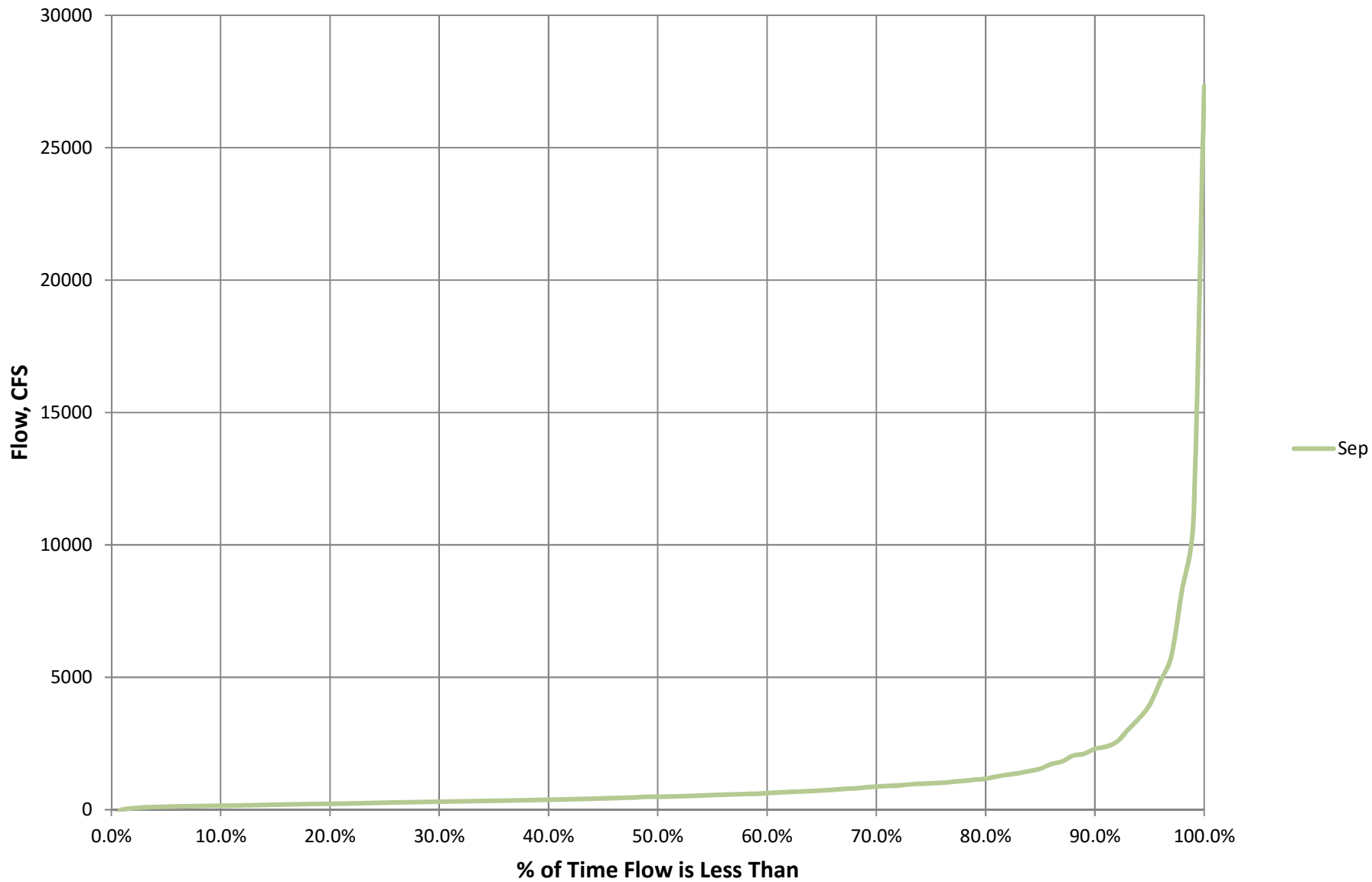
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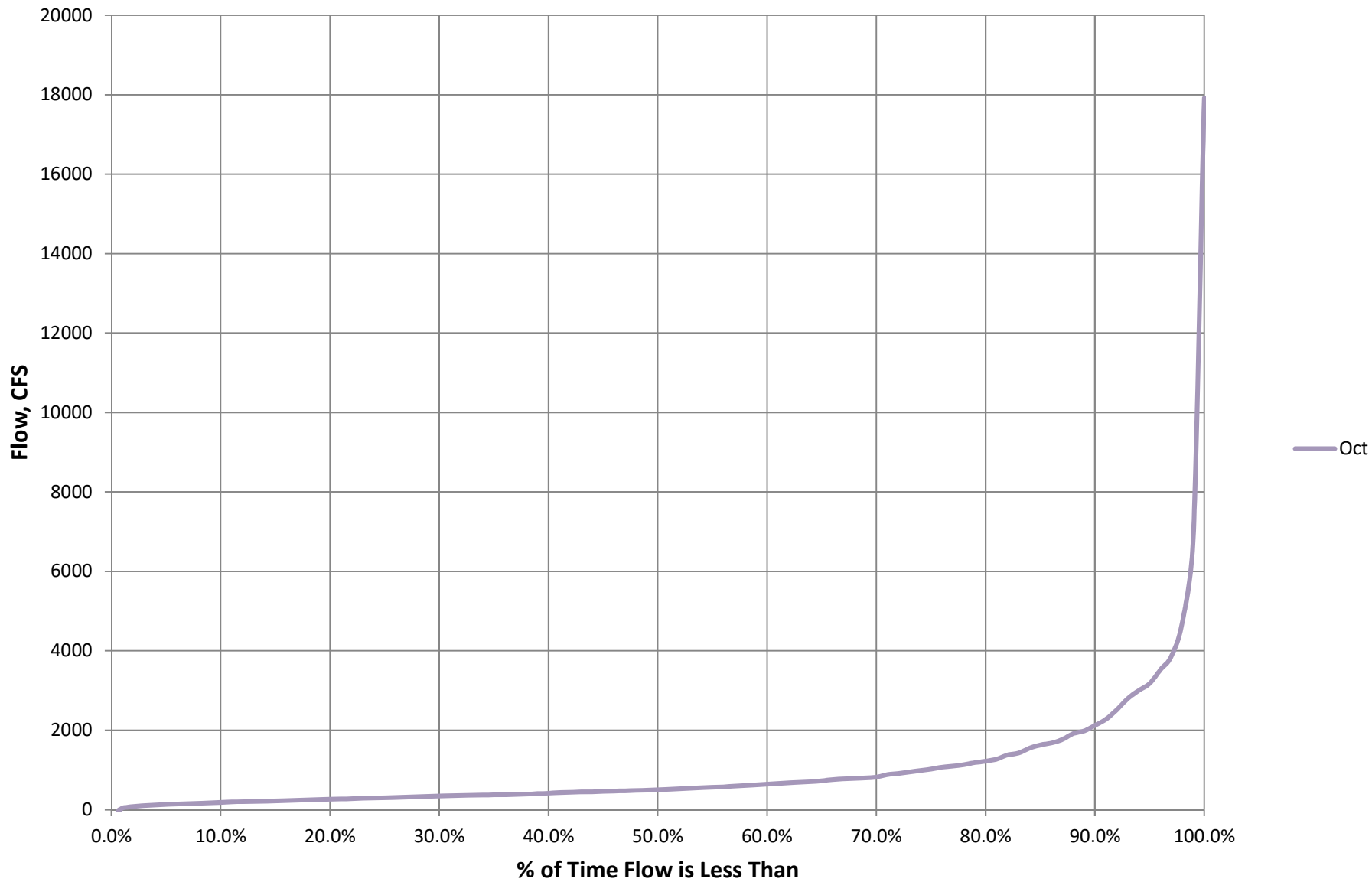
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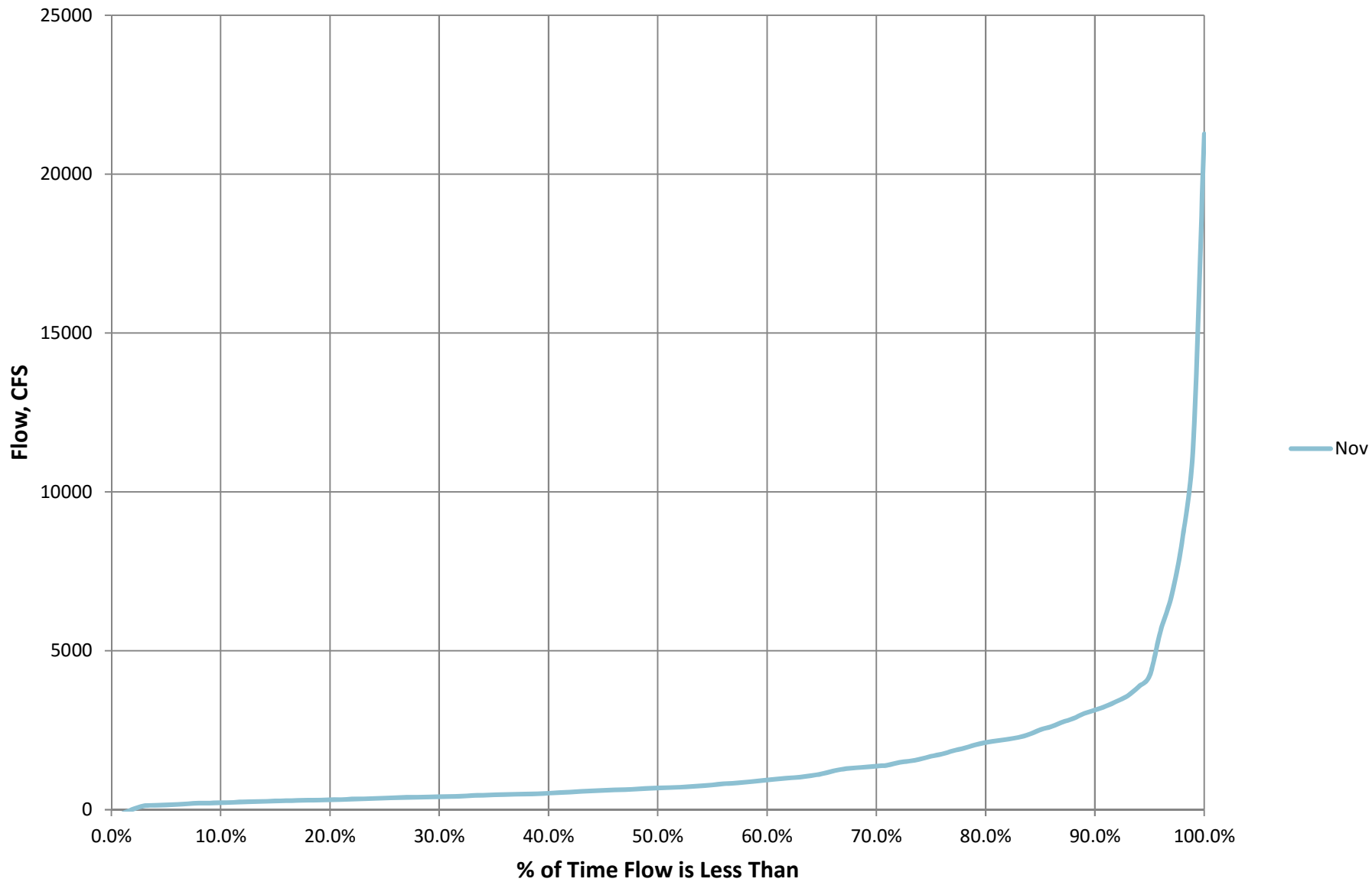
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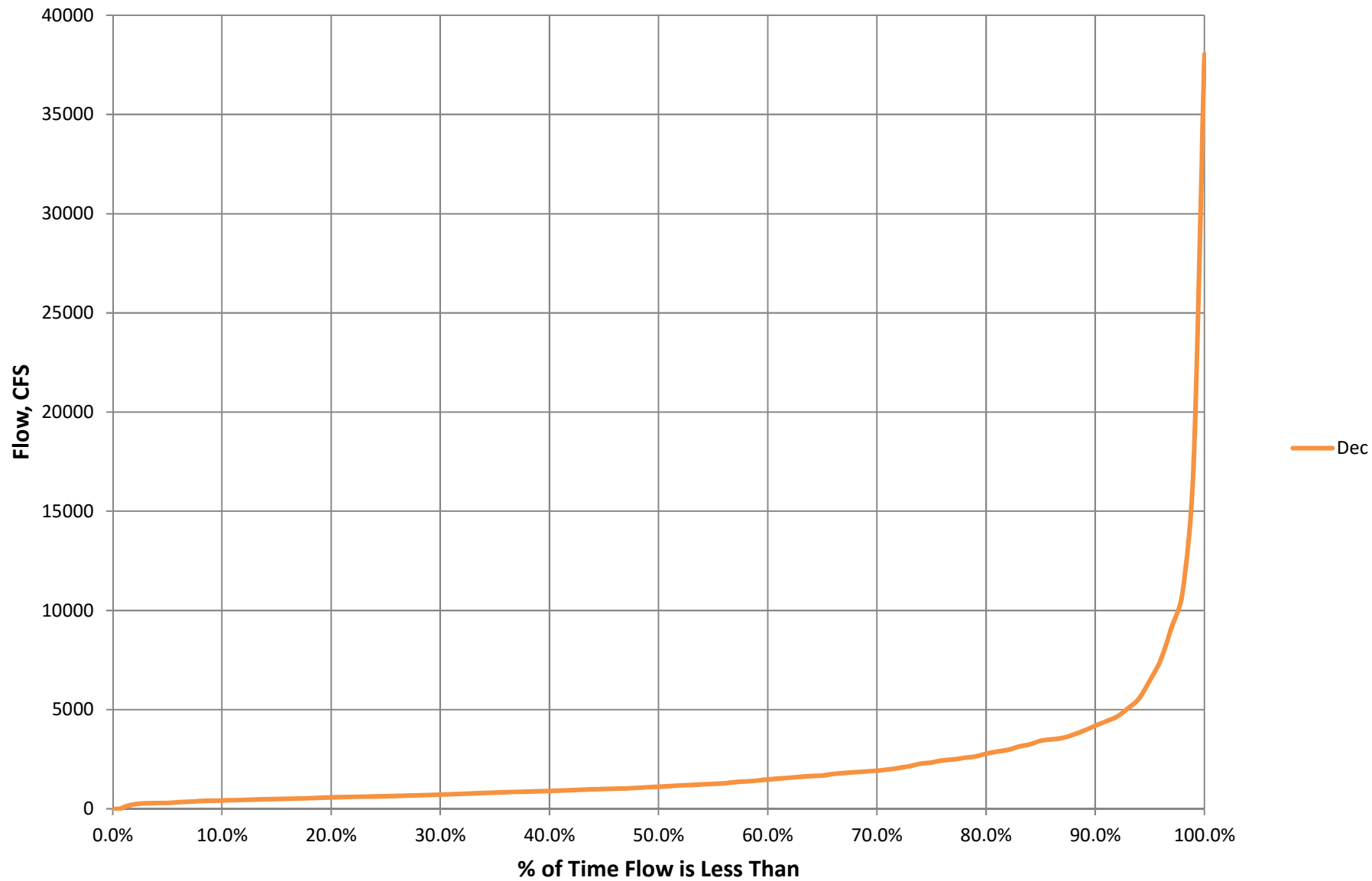
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