

June 17, 2021

Lloyd Shoals Hydroelectric Project (FERC No. 2336-094)
Relicensing Updated Study Results Meeting Summary

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

Dear Secretary Bose:

On behalf of Georgia Power Company, Southern Company is filing with the Federal Energy Regulatory Commission (Commission) the Lloyd Shoals relicensing Updated Study Results Meeting Summary in compliance with the Commission's Integrated Licensing Process regulations at 18 CFR § 5.15(f). Along with this cover letter, this filing consists of the following parts:

Attachment A – Updated Study Results Meeting Summary
Attachment B – Updated Study Results Meeting Agenda
Attachment C – Updated Study Results Meeting Attendees
Attachment D – Updated Study Results Meeting Presentations
Attachment E – Revised Updated Water Resources Study Report Figure 5

Responses to comments made during the meeting are included in the Updated Study Results Meeting Summary.

If you require further information, please contact me at 404.506.7219 or cromara@southernco.com.

Sincerely,



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

Enclosure

cc: FERC – Navreet Deo, Allan Creamer
Kleinschmidt – Steve Layman, Ph.D.
Troutman Pepper – Hallie Meushaw

ATTACHMENT A
LLOYD SHOALS PROJECT
UPDATED STUDY RESULTS MEETING SUMMARY



Lloyd Shoals Relicensing
FERC No. 2236-094
Updated Study Results Meeting – June 3, 2021
Meeting Summary

Background and Introduction

On June 3, 2021, Southern Company and Georgia Power hosted the Lloyd Shoals Project (FERC No. 2336-094) (Project) Updated Study Results Meeting via TEAMS. An agenda for the meeting is provided in Attachment B. Courtenay O'Mara (Southern Company) opened the meeting with an overview of the meeting format, a safety topic, and a roll call. A list of participants is included in Attachment C.

Southern Company and Georgia Power presented a Project Operations Review as well as updated results of the following three studies: American Eel Abundance and Upstream Movements; Water Resources; and Recreation and Land Use. The three studies involved efforts conducted during the second year of the FERC Integrated Licensing Process (ILP) study period in accordance with the Commission-approved study plan. At the meeting's conclusion, Courtenay O'Mara provided an overview of FERC's ILP schedule for the Lloyd Shoals relicensing, including a reminder of the upcoming July 18, 2021, Updated Study Results Meeting comment period deadline.

The Updated Study Results Meeting presentations were made available to stakeholders on the Lloyd Shoals Project FERC Relicensing website (<https://www.georgiapower.com/company/energy-industry/generating-plants/lloyd-shoals-dam-project.html>) prior to the meeting and were shown during the meeting via TEAMS. The presentations are included in this report as Attachment D. The TEAMS meeting was recorded and is in the process of being uploaded to Georgia Power's Lloyd Shoals Project FERC Relicensing website.

In this Updated Study Results Meeting Summary, Southern Company presents the questions asked and comments made during the Updated Study Results Meeting. Each question or comment is followed by the Southern Company/Georgia Power response in *italicized* text.

Meeting Summary by Resource Area

Project Operations Review

Q1 Fletcher Sams (Altamaha Riverkeeper): Does Georgia Power plan to publish the Lloyd Shoals generation schedule on its website?

R1: Georgia Power is currently working on creating a Lloyd Shoals Real Time Operations webpage, which will include a schedule for turbine operations. Upon completion, the webpage will be accessible through the Georgia Power website located here:

<https://www.georgiapower.com/community/environment/lakes-rivers.html>

Water Resources

Q1 Allan Creamer (FERC): Figure 5 of Georgia Power's May 2021 Updated Water Resources Study Report, "Line Plot of Daily Average DO and Water Temperature From Tailrace Monitor", is very similar to the graph that is included in the Updated Water Resources Study presentation on slide 12, titled "Results – Tailrace Continuous Monitoring". Figure 5 of the report did not have a legend defining dissolved oxygen (DO) and temperature plots. In addition, the dataset of the report version may be a shorter timeframe compared to what is in the presentation slides.

R1 Figure 5 of the Updated Water Resources Study Report has been revised to accurately reflect the full monitoring period and to include a legend. The revised Figure 5 is included with this filing as Attachment E and will also be included in the Water Resources section of the Lloyd Shoals Preliminary Licensing Proposal (PLP).

Q2 Maria Clark (EPA): Do you have any idea what caused the periods of low DO summarized in the Updated Water Resources Study presentation on slide 12, titled "Results – Tailrace Continuous Monitoring", and discussed in Section 3.2.1 of the May 2021 Updated Study Water Resources Report? For the final report, could you add data regarding the cause of the event?

R2 The periods of low DO occurred during the critical conditions period following precipitation events in the Project basin. Based on our review of the events, it appears that naturally occurring run-off and the associated oxygen demanding constituents result in temporary DO depressions as those constituents assimilate in the lake. Those passing depressions are measurable in the tailrace water as the water moves through the system. One example in particular showed temporary decline and recovery of DO concentrations above 4.0 mg/L during a brief time window without any change in the dam unit operations.

The Lloyd Shoals PLP will incorporate an analysis of these events, including graphs of the events and associated conditions.

American Eel Abundance and Upstream Movements

Q1 Allan Creamer (FERC): The Updated American Eel Abundance and Upstream Movement Study presentation slide 9, titled "American Eel Capture Data by Sampling Event", shows two eels captured by traps, compared to 46, 126, and 24 eels reported by boat electrofishing, backpack electrofishing, and flashlight surveys, respectively. Why do you think the eel traps were not that effective?

R1 Georgia Power's American Eel Abundance and Upstream Movements Study Plan indicated that eel traps would be placed in up to five locations near the base of the Lloyd Shoals Dam, including shorelines within or approaching the tailrace channel and spillway area, and shallow pools along the base of the spillway.

During the first five months of the study, from September 2019 through January 2020, traps were located in the areas identified in the study plan. As shown in Updated American Eel Abundance and Upstream Movements Study presentation slide 9, titled "American Eel Capture Data by Sampling Event", traps along the base of the spillway were vandalized during each effort of the first five months. Because retention of traps was problematic, some traps were relocated to the west side of the tailrace within the gated area of the powerhouse to reduce the risk of vandalism. However, these traps were not

very effective. Flashlight surveys indicated that eels were less attracted to the higher flow velocities of the powerhouse tailrace than to the spillway side of the dam.

Q2 Twyla Cheatwood (NMFS): Thank you for adding to the American Eel Abundance and Upstream Movement study and being proactive about getting the additional data needed to make this a worthwhile study for relicensing. NMFS really appreciates that effort.¹

R2 Communications between NMFS was helpful from our viewpoint as well. When we knew we were having sampling issues out of our control, we reached out to talk about what we needed to do to make the study work. Your input has been very helpful.

Q3 Fletcher Sams (Altamaha Riverkeeper): Do you plan on reporting any other data that was collected during the study? I know you collected at least one or two Robust Redhorse during the study's field work and I'd be interested to see if there was more than just the two that I'm aware of.

R3 The sampling crew initially reported collecting a Robust Redhorse, but after further review of photographs by Georgia DNR WRD, the collected fish was identified as a closely related species, Brassy Jumprock (Scartomyzon). There were morphological characteristics that distinguished it from Robust Redhorse, and in addition, the seasonal timing was a little early for Robust Redhorse.

Paula Marcinek (Georgia DNR WRD): The last documented Robust Redhorse between Lloyd Shoals and Juliette Dam was 2011 or 2014.

Recreation and Land Use

Q1 Dustin Wilson (FERC): Please keep in mind with previous Georgia Power relicensing projects, we have asked that Georgia Power provide a Shoreline Management Plan that tailors the Georgia Power Shoreline Guidelines to the specific project.

R1 Georgia Power will keep this in mind as we prepare the Lloyd Shoals PLP.

Q2 Maria Clark (EPA): Has Georgia Power agreed to add compost toilets to Project recreation areas?

R2 Georgia Power will include its proposal for recreation enhancements in the Lloyd Shoals PLP.

¹ A description of the study modifications made following the ILP first year of study is included in Section 2.2 of Georgia Power's Proposed Study Plan Amendment to the American Eel Abundance and Upstream Movements filed with FERC as Attachment C of Georgia Power's October 14, 2020 Response to Comments on Relicensing Study Results.

ATTACHMENT B
LLOYD SHOALS PROJECT
UPDATED STUDY RESULTS MEETING AGENDA



Lloyd Shoals Hydro Project FERC Relicensing

Updated Study Results Meeting

Agenda – June 3, 2021

Meeting Expected to Last Between 10:00 a.m. – 1:00 p.m. EDT

- ***Welcome, Safety, Overview of Meeting Format, Attendee Roll Call***
- Project Operations Review
- American Eel Abundance and Upstream Movements Updated Study Results
- ***Break 11:30 – 12:00***
- Water Resources Updated Study Results
- Recreation and Land Use Updated Study Results
- ***Questions and Next Steps***

ATTACHMENT C
LLOYD SHOALS PROJECT
UPDATED STUDY RESULTS MEETING ATTENDEES



Georgia Power
Lloyd Shoals Relicensing
Updated Study Results Meeting – June 3, 2021
Attendees

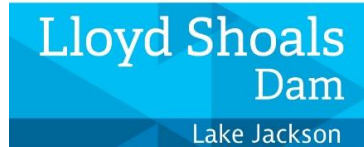
Neetu Deo, FERC
Allan Cremer, FERC
Kristine Sillett, FERC
Dustin Wilson, FERC
Eric Bower, USFWS
Twyla Cheatwood, National Marine Fisheries Services
Maria Clark, EPA
Paula Marcinek, Georgia DNR WRD
Scott Robinson, Georgia DNR WRD
Steve Schleiger, Georgia DNR WRD
Veronica Craw, Georgia DNR EPD
Jennifer Welte, Georgia DNR EPD
Wei Zeng, Georgia DNR EPD
Feng Jiang, Georgia DNR EPD
Gillian Wason, Georgia DNR EPD
Santiago Martinez, Georgia SHPO
Fletcher Sams, Altamaha Riverkeeper
Dawson Ingram, Georgia Power
Joey Charles, Georgia Power
Tony Dodd, Georgia Power
Patrick O'Rourke, Georgia Power
Jim Ozier, Georgia Power
Melissa Crabbe, Southern Company
Courtenay O'Mara, Southern Company
James Jones, Southern Company
Steve Layman, Kleinschmidt
Hallie Meushaw, Troutman Pepper
Blair, Unaffiliated

ATTACHMENT D
LLOYD SHOALS PROJECT
UPDATED STUDY RESULTS MEETING PRESENTATIONS



Updated Study Results Meeting

June 3, 2021
Virtual Format



Introduction

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



Lloyd Shoals Hydro Project FERC Relicensing

Updated Study Results Meeting

Agenda – June 3, 2021

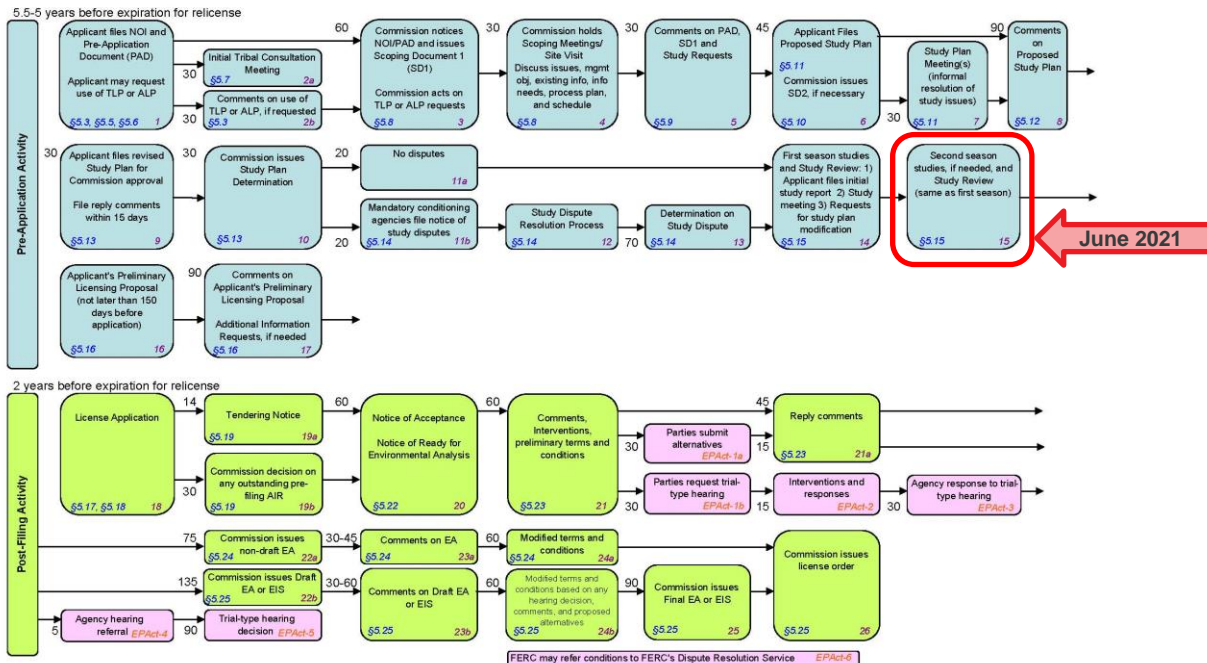
Meeting Expected to Last Between 10:00 a.m. – 1:00 p.m. EDT

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- Water Resources Updated Study Results
- Recreation and Land Use Updated Study Results
- *Questions and Next Steps*

FERC ILP Schedule



Integrated Licensing Process (Section 241 of the Energy Policy Act of 2005)



*Section 241 of the Energy Policy Act of 2005 in pink.

Field Studies Previously Completed and Filed



Activity	Completion Date or Deadline
<i>Geology and Soils</i>	May 19, 2020
<i>Water Resources</i>	Field Studies Continued into July 2020; Reported May 19, 2020 & Updated May 19, 2021
<i>Fish and Aquatic</i>	May 19, 2020
<i>American Eel Abundance and Upstream Movements</i>	Field Studies Continued into 2021; Reported May 19, 2020 & Updated May 19, 2021; Addendum Expected August 2021
<i>Terrestrial, Wetland, and Riparian</i>	May 19, 2020
<i>Rare, Threatened and Endangered Species</i>	May 19, 2020
<i>Recreation and Land Use</i>	Field Studies Continued in March and April 2021 Reported May 19, 2020 & Updated May 19, 2021
<i>Cultural Resources</i>	May 19, 2020
<i>Historic Hydro</i>	May 19, 2020

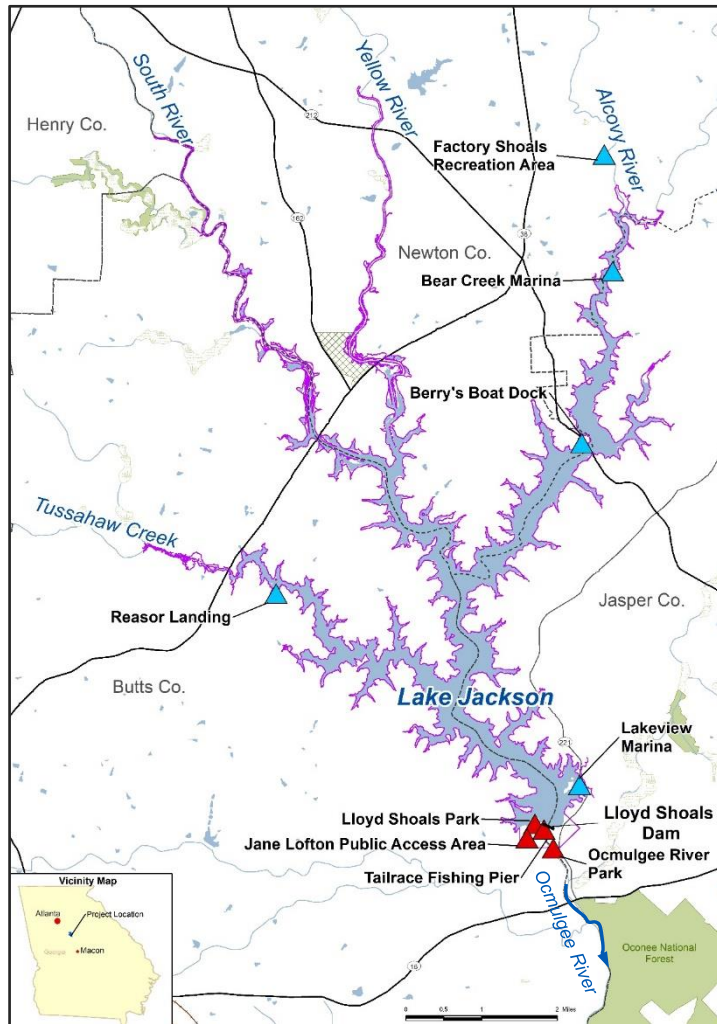
Remaining Schedule 2021



Activity	Completion Date or Deadline
File Progress Reports (2 nd Season)	January 2021
File Final Study Reports (2 nd Season)	May 2021
Hold Study Results Meetings (2 nd Season)	June 3, 2021
GPC Files Updated Study Results Meeting Summary	June 18, 2021
Stakeholders File Updated Study Results Meeting Summary Disagreements	July 18, 2021
GPC Files Response to Updated Study Results Meeting Summary Disagreements	August 17, 2021
FERC Resolves Meeting Summary Disagreements	September 16, 2021
GPC Files Preliminary Licensing Proposal (PLP)	August 3, 2021
Stakeholders File PLP Comments	November 1, 2021
GPC Files Final License Application	December 31, 2021

Project Boundary

- Project Boundary
- ▲ Georgia Power Project Recreation Facilities
- ▲ Public/Private Recreation Access

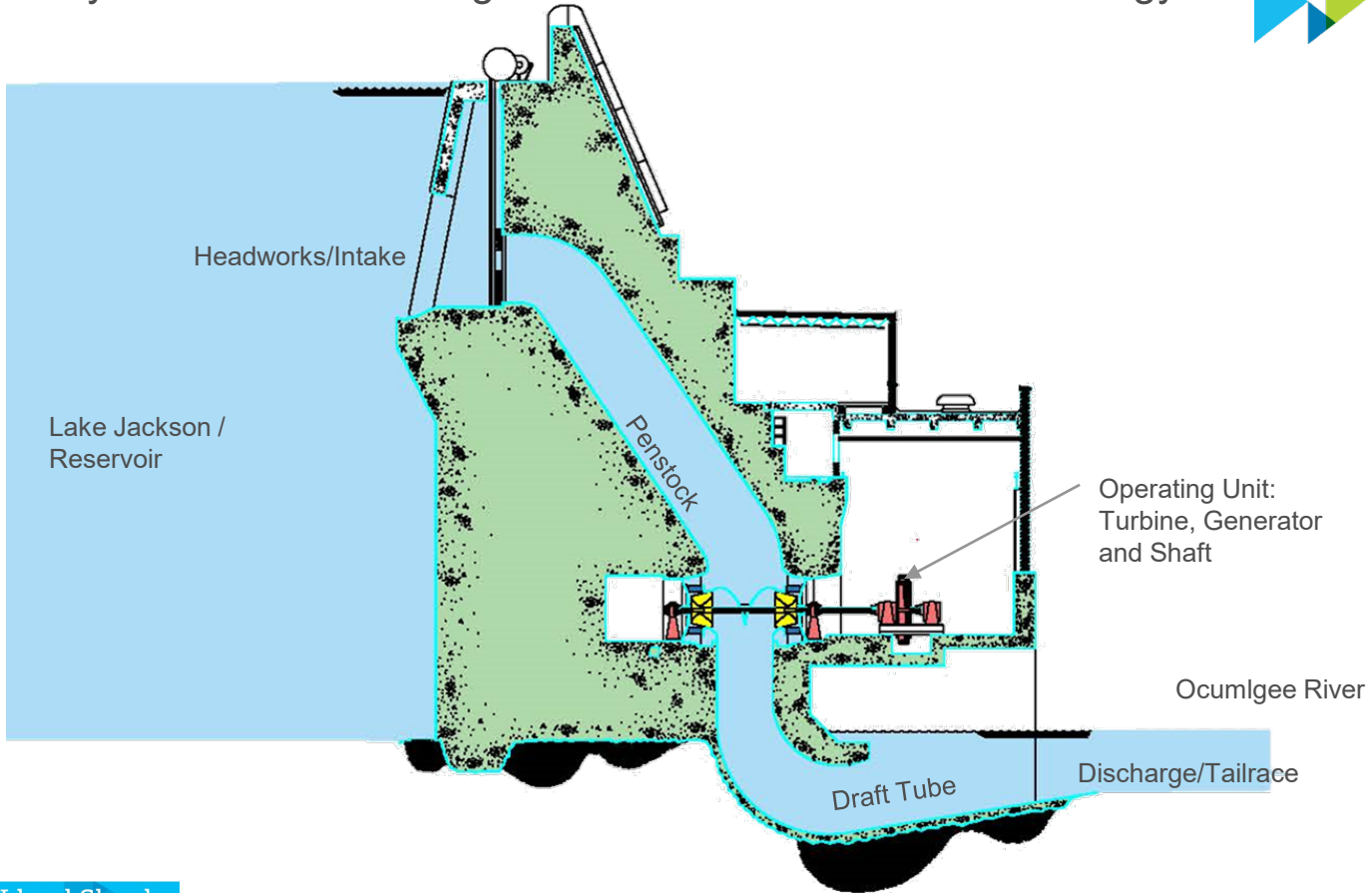




Project Operations

Melissa Crabbe, P.E.
Southern Company

Lloyd Shoals Generating Unit Cross-section and Terminology



Lloyd Shoals Project (FERC No. 2336)



Generating Capacity	18 MW
Number of units:	6 (horizontal, Francis-type)
Max. hydraulic capacity:	620 cfs/unit or 3,720 cfs total plant capacity
Full reservoir storage:	107,000 acre-feet
Normal operating range:	527 to 530 feet
Average annual inflow:	1,732 cfs
Operation mode:	Modified run-of-river
Minimum flow:	400 cfs or inflow, whichever is less
Spillway Capacity:	16,770 cfs



Lloyd Shoals Project Works Flow Release Sequence



Reservoir Storage and Effect on Operations

Small Reservoirs – Run-of-River Operation



- No storage
- Run-of-River
Inflow = outflow all the time
- Example: old mill sites where steady power was more important than peaking power
- Project purpose: steady power or no power



Reservoir Storage and Effect on Operations

Medium Reservoirs – Modified Run-of-River Operation



- Some storage
- Water is stored for hours or days
- Inflow \neq outflow hourly
- Water is released for the week
Inflow = outflow on a weekly basis
- Example:
Lake Jackson (useable storage = 74,750 acre-feet)
- Project purpose: power generation



Large Reservoirs – Storage Operation



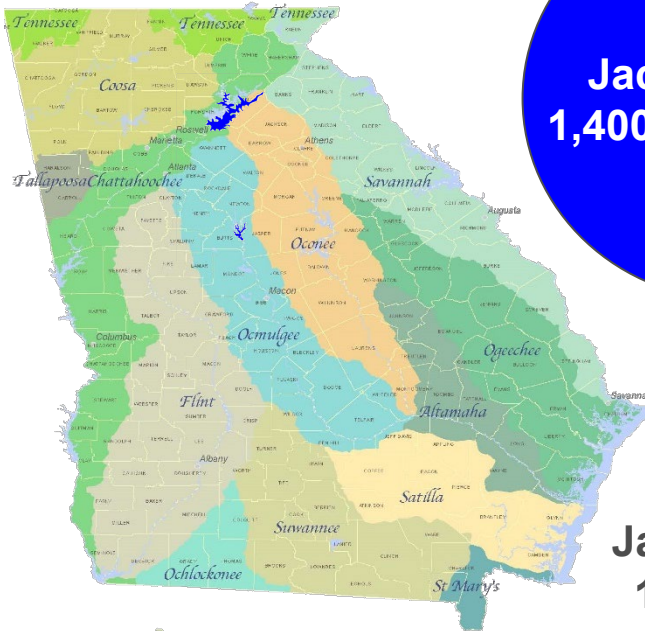
- Significant storage
- Water is stored for months or years
Inflow \neq outflow
- Capture flows during high flow periods for use in low flow periods



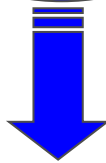
<https://media.defense.gov/2017/Nov/29/2001849723/-1/-1/0/171129-A-CE999-006.JPG>

- Example:
Lake Lanier (Useable Storage = 1,087,600 acre-feet)
- Project purposes: power generation, flood control, navigation, and recreation

Hydroelectric Project Purpose Comparison

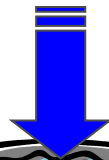


Jackson Basin
1,400 square miles



Jackson Storage
107,000 acre-ft

Lanier Basin
1,040 square miles



Lanier Storage
2,554,000 acre-ft



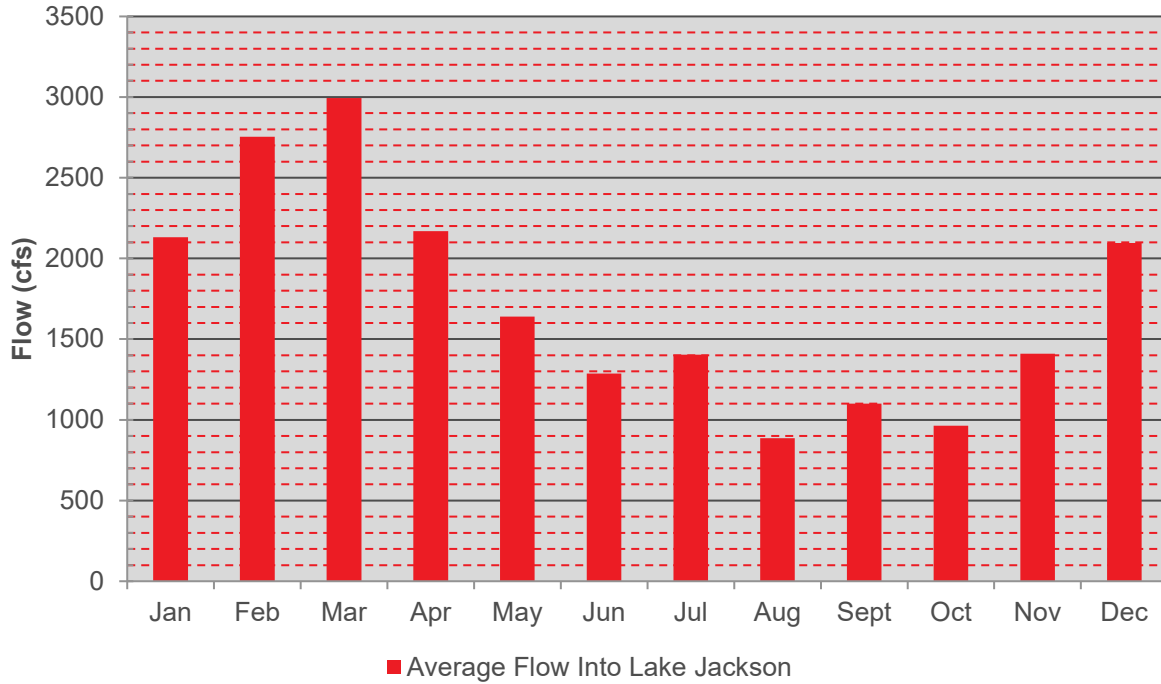
**Lloyd Shoals
Dam**

Lake Jackson

Large Drainage Basin – Small Amount of Storage



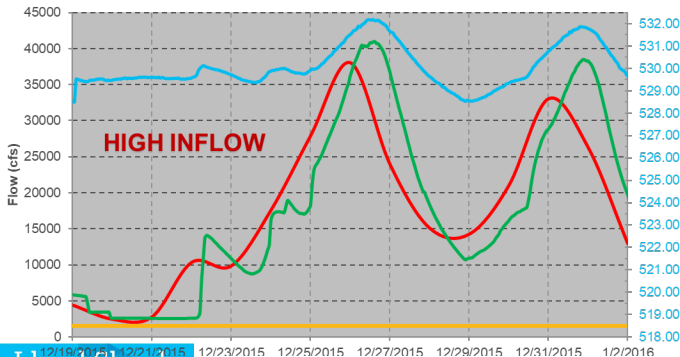
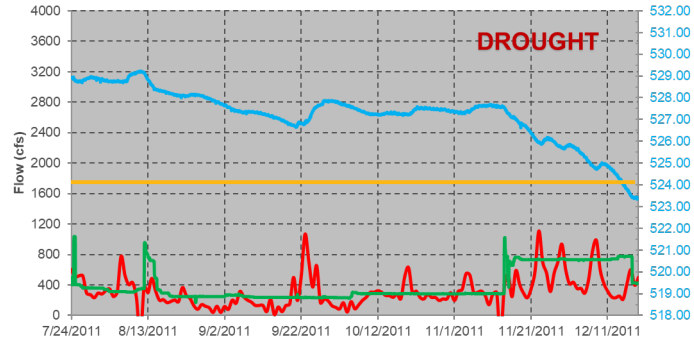
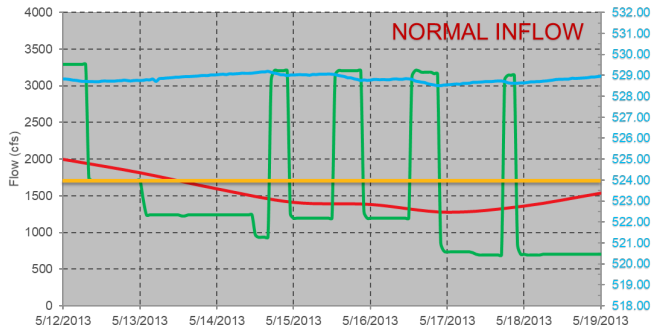
20-Year Average Monthly Calculated Inflow January 1997 through December 2016



Lloyd Shoals Operations Examples

NORMAL, DROUGHT AND HIGH INFLOW OPERATIONS

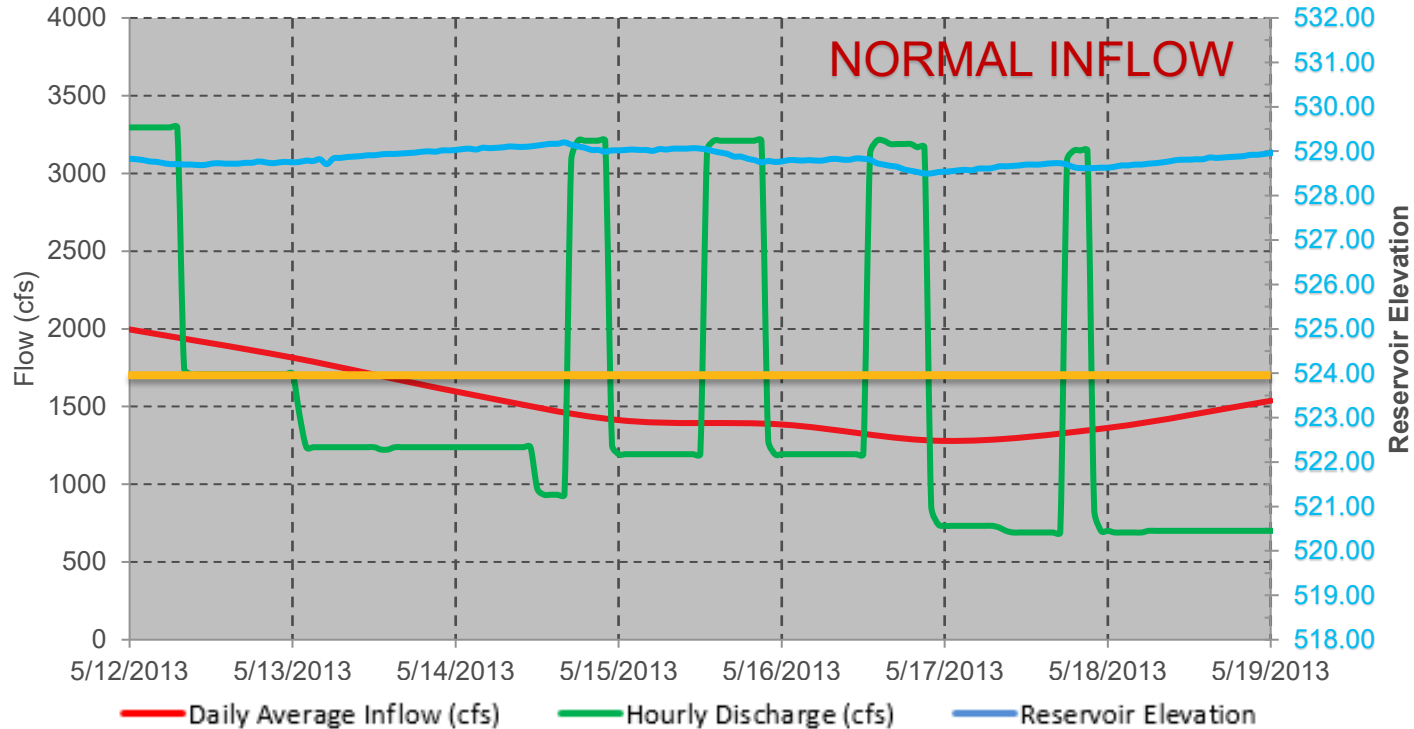
Average Annual Inflow = 1,732 cfs



- Daily Average Inflow (cfs)
- Hourly Discharge (cfs)
- Reservoir Elevation
- Average Annual Inflow (cfs)

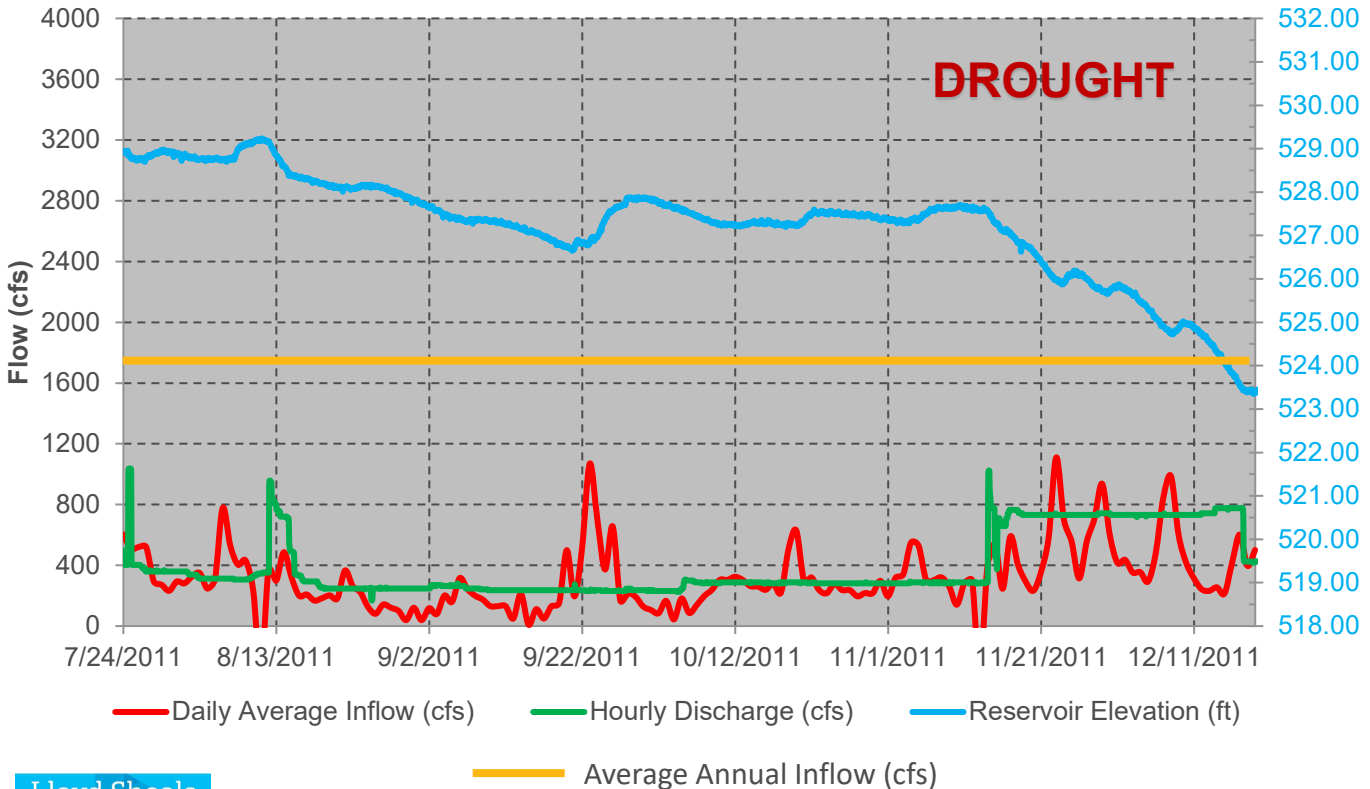
Lloyd Shoals Operations Example

NORMAL Inflow Week of 1,547 cfs, Average Annual Inflow = 1,732 cfs



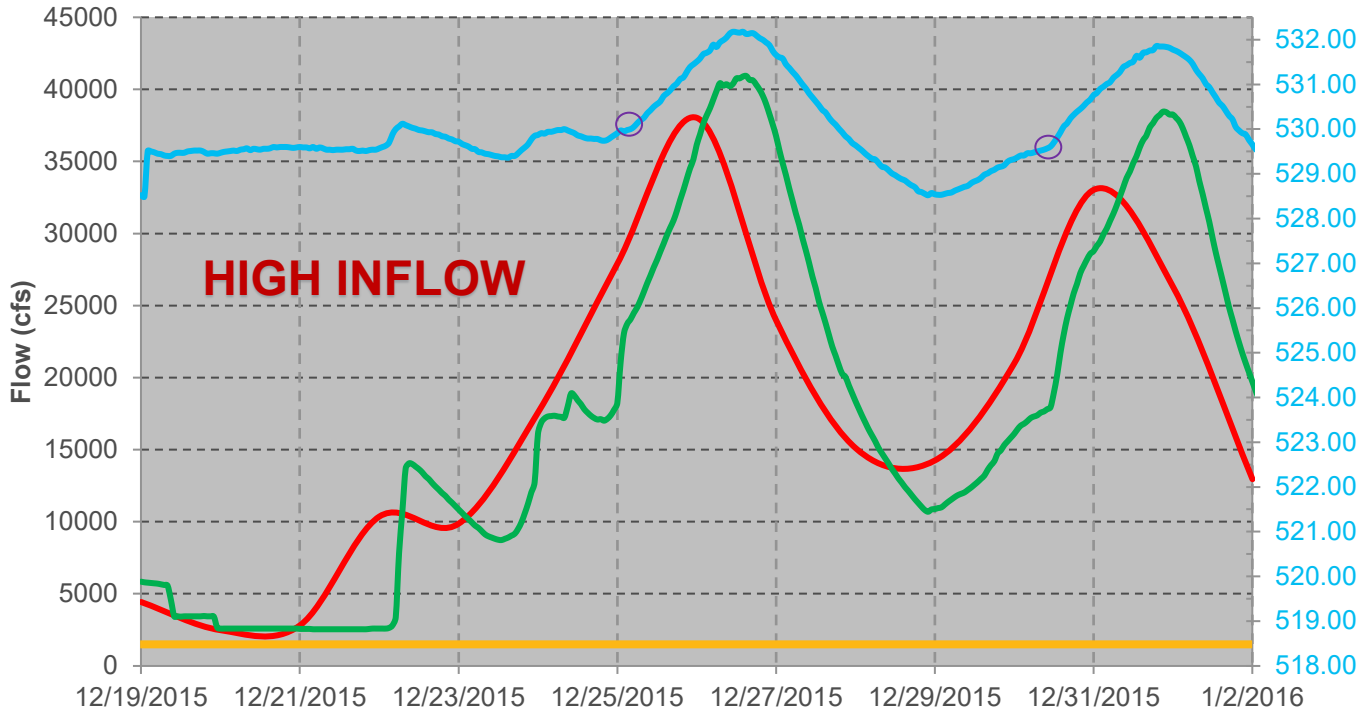
Lloyd Shoals Operations Example

DROUGHT Period of 313 cfs, Average Annual Inflow = 1,732 cfs



Lloyd Shoals Operations Example

HIGH Inflow Period of 17,544 cfs, Average Annual Inflow = 1,732 cfs

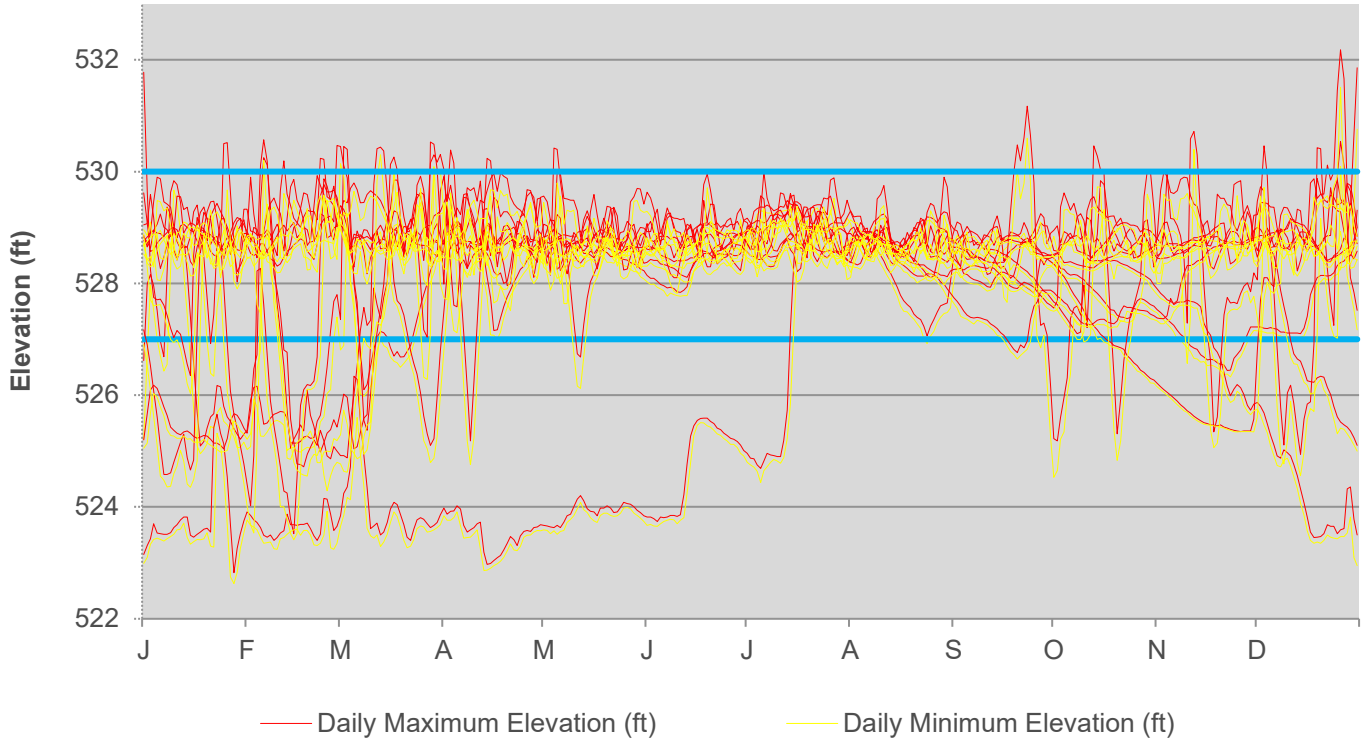


— Daily Average Inflow (cfs) — Hourly Discharge (cfs) — Reservoir Elevation

— Average Annual Inflow (cfs)

Lake Jackson Elevation 2007-2016

Typical Range Between 527 to 530 Feet

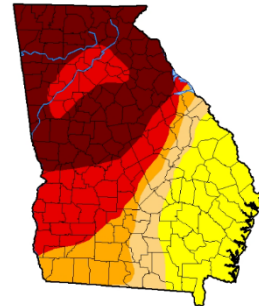


Operations Outside of Normal Pool Elevation Range



- Weather related events
 - High inflows
 - Drought
- Task/goal oriented
 - Emergency
 - Homeowner or dam maintenance

U.S. Drought Monitor
Georgia



November 22, 2016
(Released Wednesday, Nov. 23, 2016)
Valid 7 a.m. EST

	Drought Conditions (Percent Area)					
	None	D0	D1	D2	D3	D4
Current	93.0	103.00	76.64	67.76	56.65	33.78
Last Week in 24-Hrs	15.69	84.37	68.18	58.03	52.38	22.25
3 Months Ago in 24-Hrs	26.02	73.98	48.87	28.88	5.92	0.00
Start of Calendar Year in 24-Hrs	87.38	12.64	0.00	0.00	0.00	0.00
Start of Water Year in 24-Hrs	25.37	64.63	45.94	24.55	14.67	1.95
One Year Ago in 24-Hrs	90.41	11.59	0.00	0.00	0.00	0.00

Intensity:
■ D0 Abnormally Dry ■ D3 Extreme Drought
■ D1 Moderate Drought ■ D4 Exceptional Drought
■ D2 Severe Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for local statements.

USDA
Partners in
RISER/ARMA



<http://droughtmonitor.unl.edu/>

Next Homeowner Drawdown
Scheduled for Fall 2021



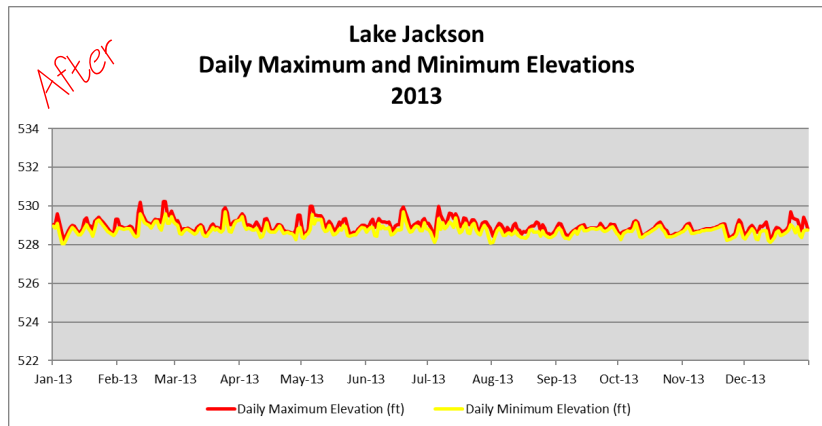
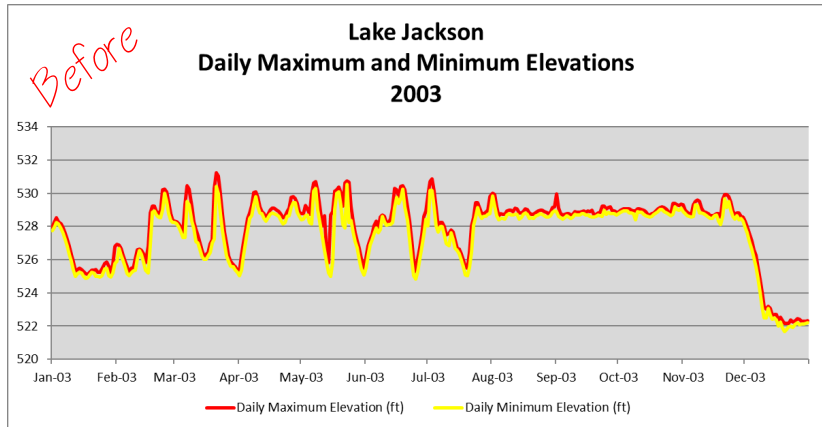
Spillway Gate Enhancement / Operational Improvements



Obermeyer Gates Significantly Reduce Frequency of Reservoir Fluctuations



- Installed in 2011/2012 to replace spillway flashboards
- Decrease frequency of Lake Jackson fluctuations outside of normal pool elevation range caused by high flow events
- Eliminate safety hazards for plant personnel
- Water saved provides more water for reliable, clean, and renewable generation



Total Generation 2012 – 2016



Year	Annual Generation (MWh)	Average Inflow (cfs)	Flow Category
2012	27,175	723	Low
2013	84,296	2,001	High
2014	65,245	1,484	Average
2015	79,413	2,425	High
2016	51,404	1,554	Average



American Eel Abundance and Upstream Movements

Presented by: Patrick O'Rourke

Updated Study Results Meeting
Lloyd Shoals Project
June 3, 2021

Study Objectives

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



Study Area

- Ocmulgee River from Lloyd Shoals Dam downstream to shoals below Georgia Hwy 16 bridge (1.4 miles)



Study Methods

American Eel Study Methods



- Sampling once per month when water temperatures are between 10-28°C
- Boat electrofishing
 - 2 hours effort
 - Daylight sampling (Sep 2019 – Oct 2020)
 - Nighttime sampling (February & May 2021)
- Backpack electrofishing
 - 1 hour effort (Sep 2019 – Oct 2020)
 - 2 hours effort (Nov 2020 – June 2021)
- Trapping – 2 consecutive nights
- Nighttime visual (flashlight) surveys – 2 consecutive nights

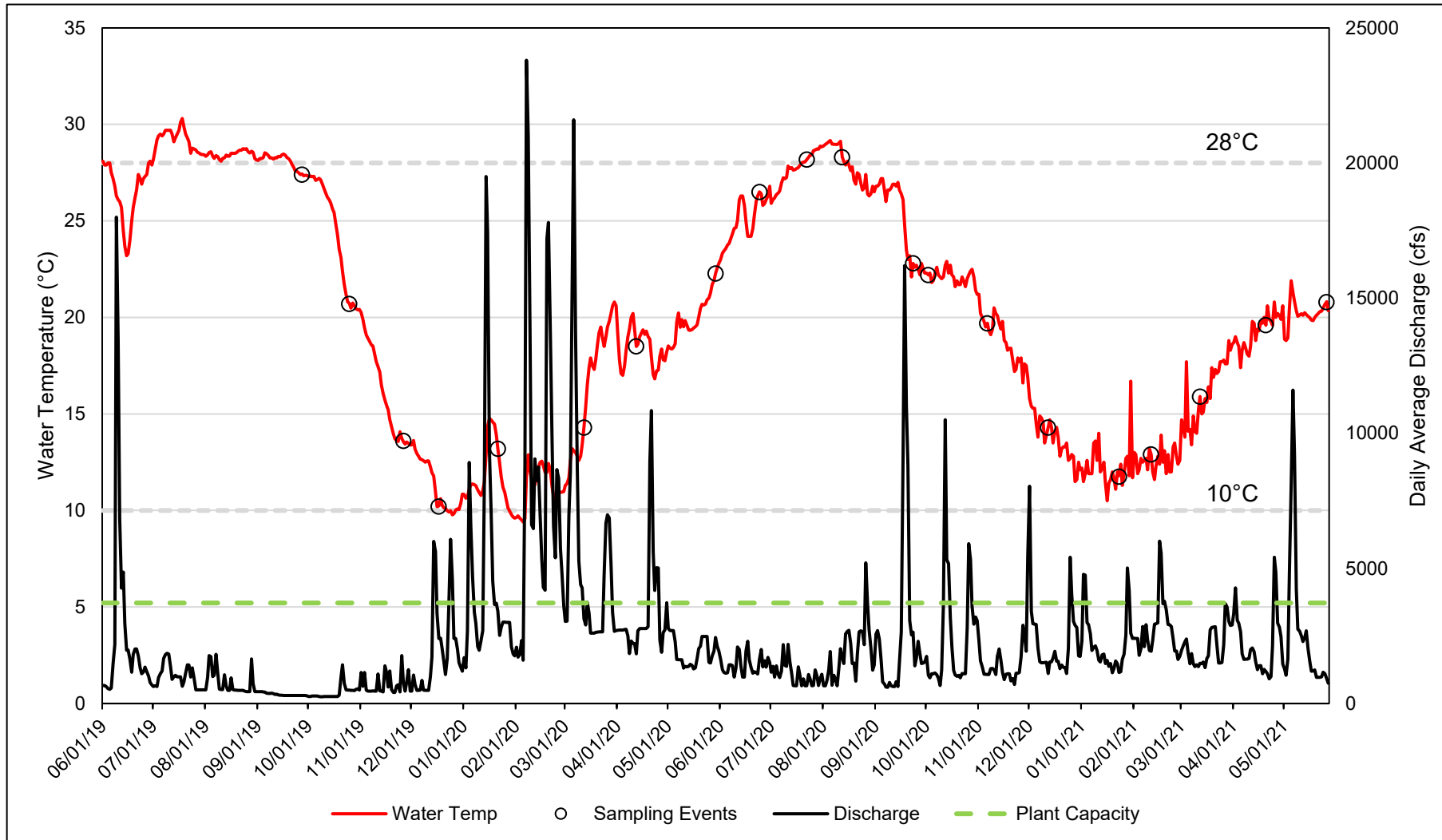


Study Plan Amendment for Second Year of Study

- Extend study period through June 2021
- Extend study area to shoal complex just downstream of Georgia Hwy 16 bridge for monthly backpack electrofishing
- Winter and spring nighttime boat electrofishing events in 2021
- Monthly nighttime flashlight surveys along the base of the spillway and tailrace shorelines to detect eels migrating to base of dam
- Monthly nighttime trapping along base of spillway and on west side of powerhouse tailrace
- If eels observed during nighttime flashlight surveys/trapping, increase frequency to two events per month

Study Results

River Discharge and Water Temperature



American Eel Capture Data by Sampling Event

DATE	DISCHARGE (CFS)	WATER TEMPERATURE (°C)	TOTAL EELS CAPTURED OR OBSERVED			
			BOAT	BACKPACK	TRAP	Flashlight Surveys
09/27/2019	299	27.4	0	0	0 ³	NA
10/25/2019	493	20.8	1	1	0 ³	NA
11/26/2019	1,288	13.7	1	0	0 ³	NA
12/17/2019	2,870	10.2	0	NSF ¹	0 ³	NA
01/21/2020	3,565	13.6	7	NSF	0 ³	NA
03/12/2020	3,020	14.3	1	NSF	0	NA
04/10/2020	2,230	18.5	NSC ²	NSC	0	NA
05/29/2020	2,440	22.3	10	NSF	0	NA
06/24/2020	1,640	26.5	3	NSF	0	3
07/22/2020	658	28.2	7	26	1	1
8/12/2020	1,710	28.3	2	NSF	0	0
9/23/2020	2,640	22.8	2	0	0	0
10/2/2020	1,040	22.2	NA	8	0	0
11/6/2020	1,070	19.7	3	6	0	0
12/12/2020	1,110	14.3	NA	1	0	1
1/23/2021	1,150	11.8	NA	3	0	0
2/11/2021	1,930	12.9	3	3	0	0
3/12/2021	1,490	15.9	NA	3	0	1
4/20/2021	1,190	19.6	NA	24	0	5
5/26/2021	917	20.8	6	51	1	13
TOTAL			46 (2 recaptures)	126 (2 recaptures)	2	24

¹ Not Sampled due to high flows

² Not Sampled due to COVID-19

³ Traps vandalized

American Eel Capture Data by Survey Method

Survey Method	Number of Eels Captured or Observed	Number Captured	Number Tagged	Number Recaptured
Backpack electrofishing	126	97	71	2
Boat electrofishing	46	22	18	2
Flashlight	24	0	0	0
Trap	2	2	0	0
TOTAL	198	121	89	4

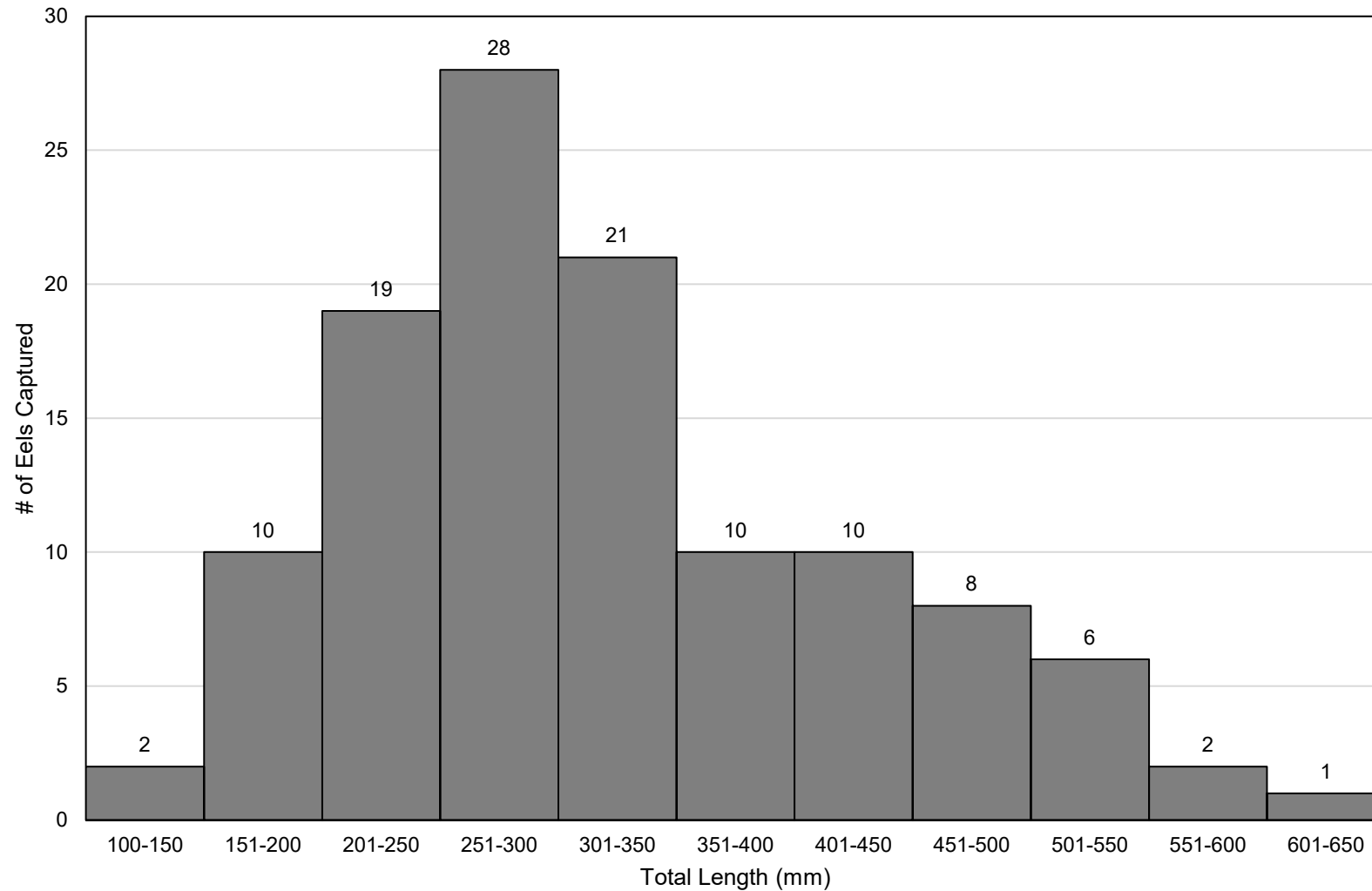
Flashlight Survey Eel Observations



Summary of Eel Catch Data Compared to Previous Study

	EA 1988	Georgia Power 2019 - 2021
Backpack Electrofishing CPUE (eel/hr)		
Spring	14.6	11.7
Summer	37.4	26.0
Fall	5.4	3.0
Winter	1.4	2.3
Boat Electrofishing CPUE (eel/hr)		
Spring	--	2.3
Summer	1.4	2.0
Fall	--	0.8
Winter	0.6	1.5
Lengths (mm) and Life Stages Present		
Minimum	168	127
Maximum	825	635
Mean	343	322
Standard Deviation	95	106
Life Stages	juveniles, adults	juveniles, adults

Size Distribution of Captured Eels, 2019-2021



Maximum = 635 mm
Minimum = 127 mm

Estimate of Eel Abundance

Estimate calculated using Schnabel method

$$N = \frac{\sum_{i=1}^m M_i C_i}{\sum_{i=1}^m R_i}$$

M_i = the total number of previously marked animals at time i

C_i = the number caught at time i

R_i = the number of marked animals caught at time i

Through April 2021 with 1 recapture:

Estimated abundance **3,145** with confidence limits of 591 – 61,667

Through May 2021 with 4 recaptures:

Estimated abundance **1,254** with confidence limits of 523 – 3,671

Summary

- The size range of eels captured (127 – 635 mm) indicates a range of year-classes are present (est. age 1 – 9+ years)
- Sampling effectiveness was impacted by high flows and COVID-19 in 2020 but was not affected as much in 2021
- Catch rates of American Eel were slightly lower compared to a previous study but seasonal trends in backpack electrofishing abundance were similar
- In both studies, the majority of eels were captured by backpack electrofishing
- Boat electrofishing catch rates were slightly higher during the current study
- Eels detected at night at the base of the dam were small and nearly all were encountered in the eastern-most pools along the base of the spillway



Georgia
Power



Water Resources

Presented by: Tony Dodd

Updated Study Results Meeting
Lloyd Shoals Project
June 3, 2021

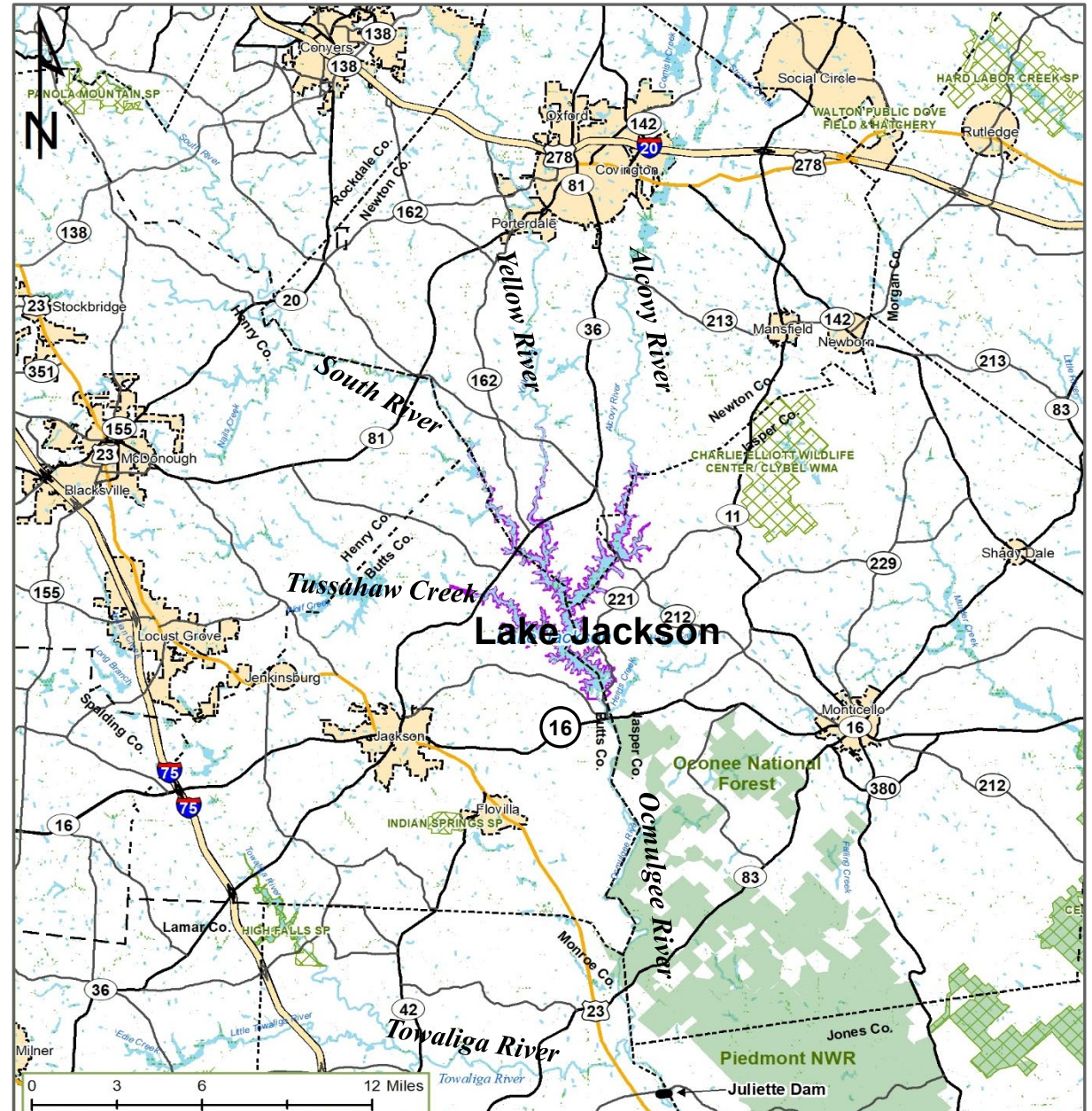
Study Objectives

- Review and analyze existing information and data and the findings of Georgia Power's water quality monitoring in project waters
- Characterize water use, availability, and water quality in the Lloyd Shoals Project study area
- Characterize the effects of continued project operation on water quality, including water temperature and DO concentrations, in Lake Jackson and the tailrace area

Study Area

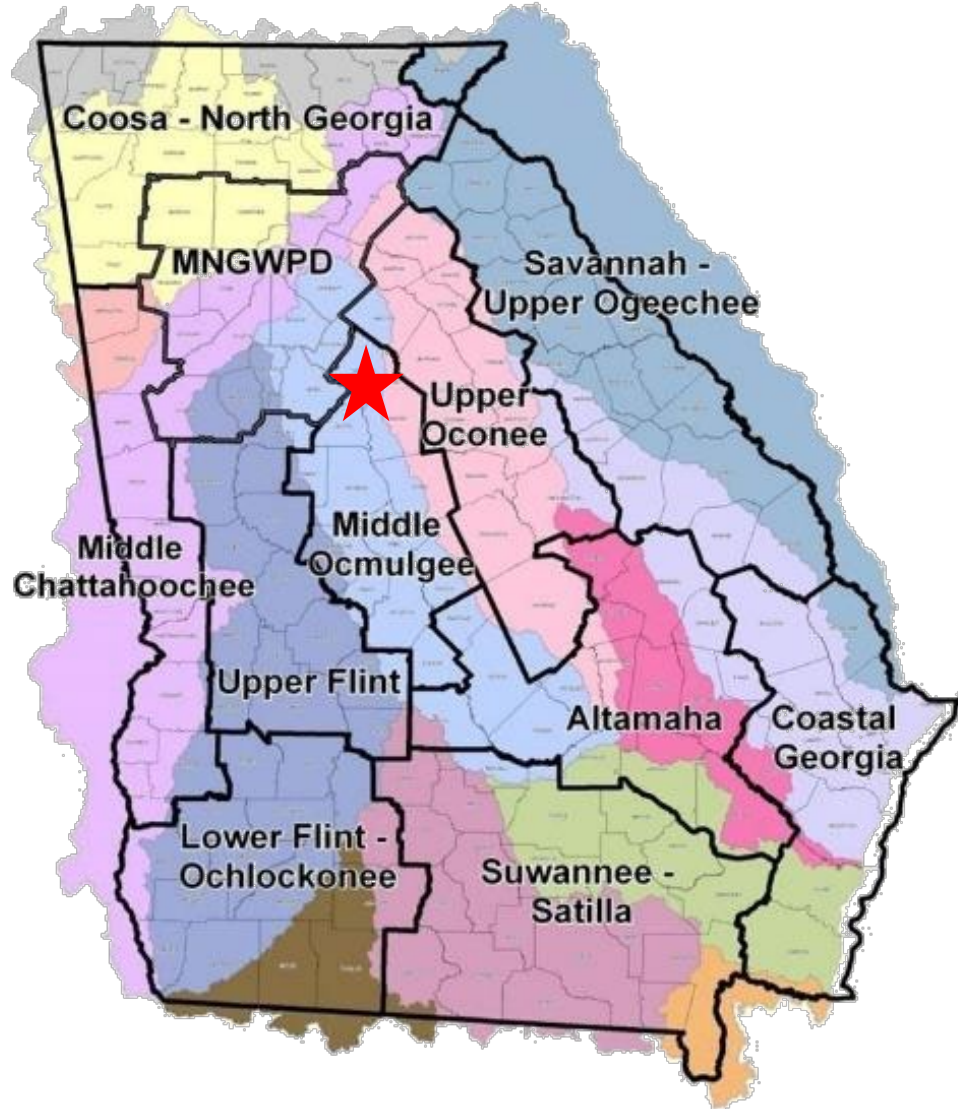
- Lake Jackson and the Lloyd Shoals tailrace area within the project boundary
- Tributary watersheds to Lake Jackson
- Tailrace area between the project boundary and the Georgia Hwy 16 bridge
- Ocmulgee River downstream

□ Project Boundary

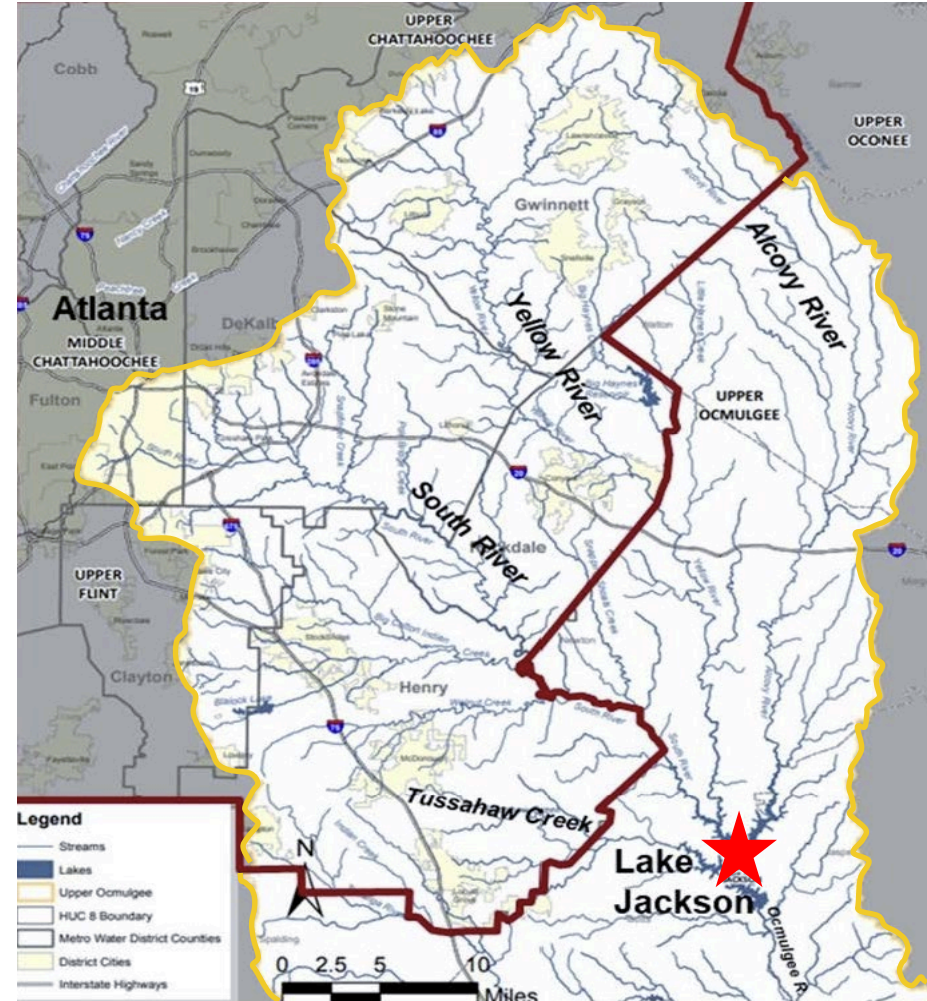


Project Location ★

Water Planning Regions



Upper Ocmulgee River Basin

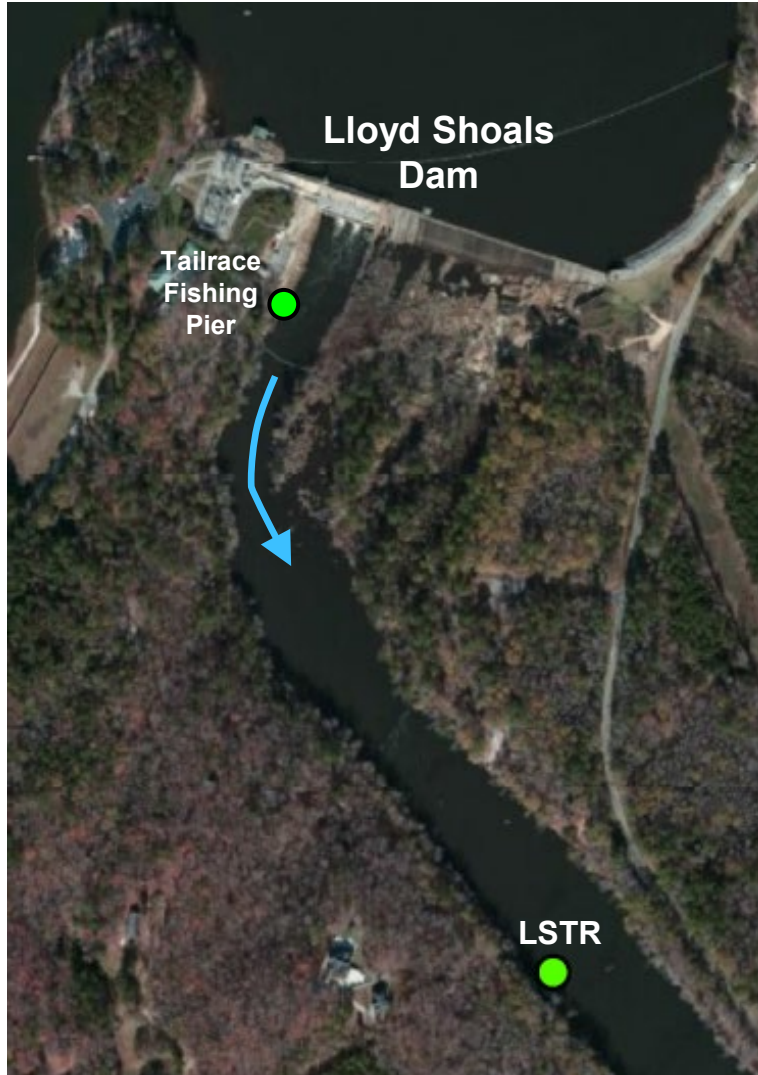


Upper Ocmulgee

Metro Water District

Study Methods

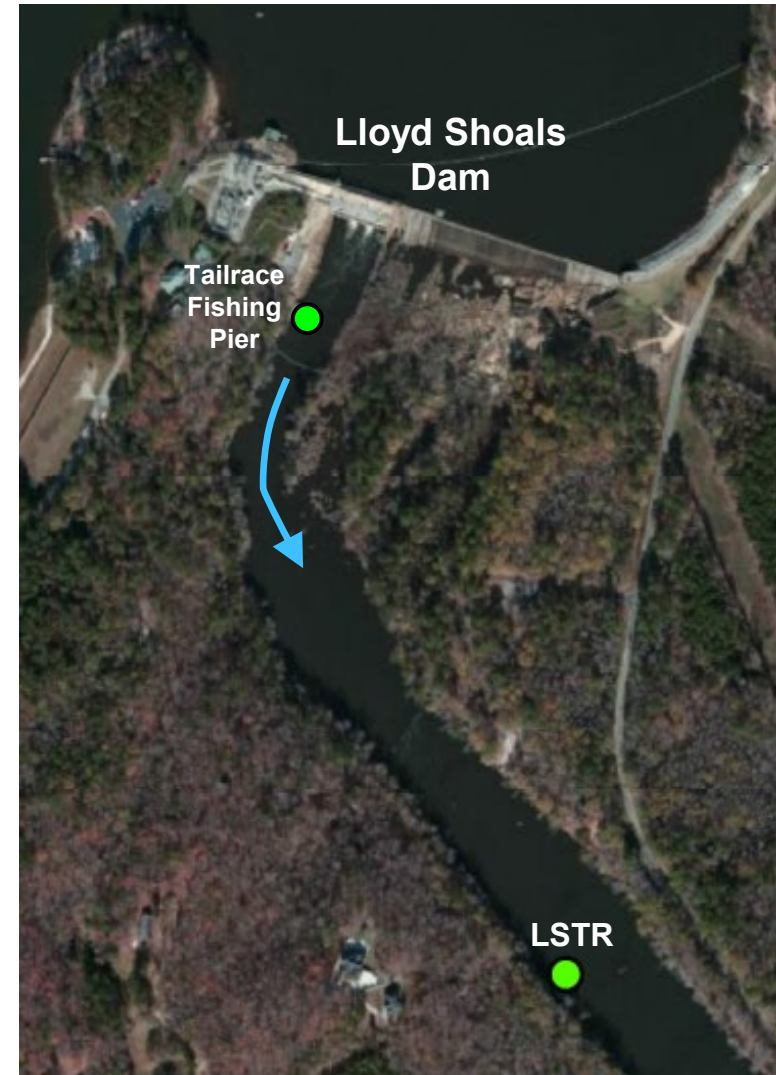
Methods – Tailrace Continuous Water Quality Monitoring



- Reconnaissance to choose monitoring station (LSTR)
- Buoy deployed July 24, 2019 – July 31, 2020
- Measurements at 1-m depth at hourly intervals:
 - Dissolved oxygen (DO), water temperature, pH, specific conductance, and turbidity
- *In-situ* measurements also taken at Tailrace Fishing Pier during sampling events

Methods – Tailrace Monthly Water Chemistry Samples

- Grab samples collected at 1-m depth
- Sampling locations:
 - Monitoring buoy (Station LSTR)
 - Tailrace Fishing Pier during very high flows and Covid-19 social-distancing restrictions
- Parameters analyzed:
 - 5-day biochemical oxygen demand (BOD)
 - Ammonia
 - Inorganic nitrogen (nitrate-nitrite)
 - Total Kjeldahl nitrogen (TKN)
 - Ortho-phosphate
 - Total phosphorus



Methods – Analysis of Existing Information

GEPD

- Georgia Environmental Monitoring and Assessment System (GOMAS) Lake and River Data

Georgia Power

- Monthly vertical lake profiles
- Algal reports and bloom investigations

Adopt-a-Lake

- Volunteer citizen monitoring data

Scientific Literature and Technical Reports

- Regional research publications
- Water use and availability reports

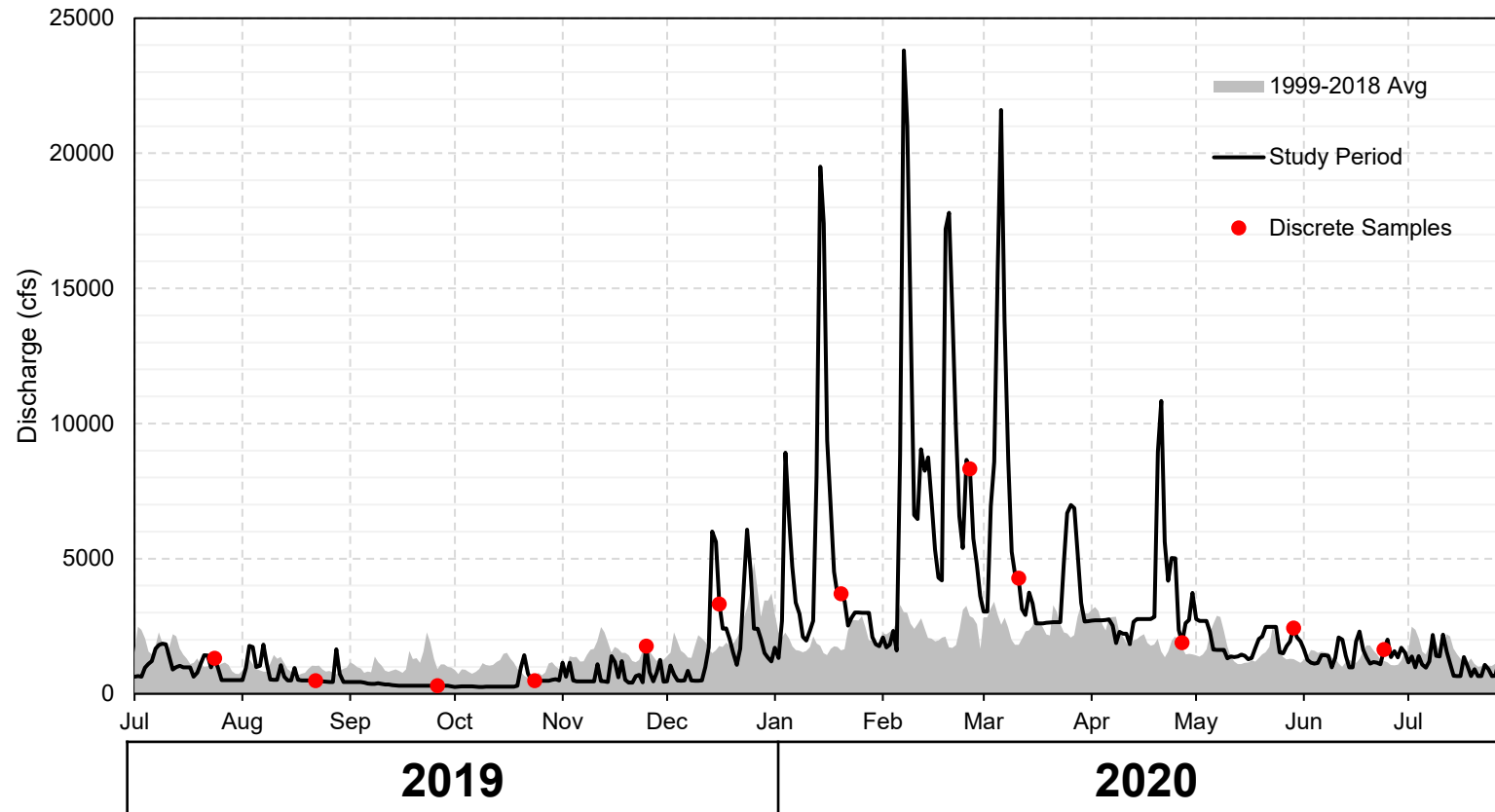
Study Results

Tailrace Water Quality Monitoring

Ocmulgee River Daily Average Discharge during Study Period

- Prolonged low-flow conditions in fall 2019
- Multiple high-flow events in winter and spring 2020

USGS 02210500 Ocmulgee River at Jackson, GA



Draft Tube Aeration System Operation

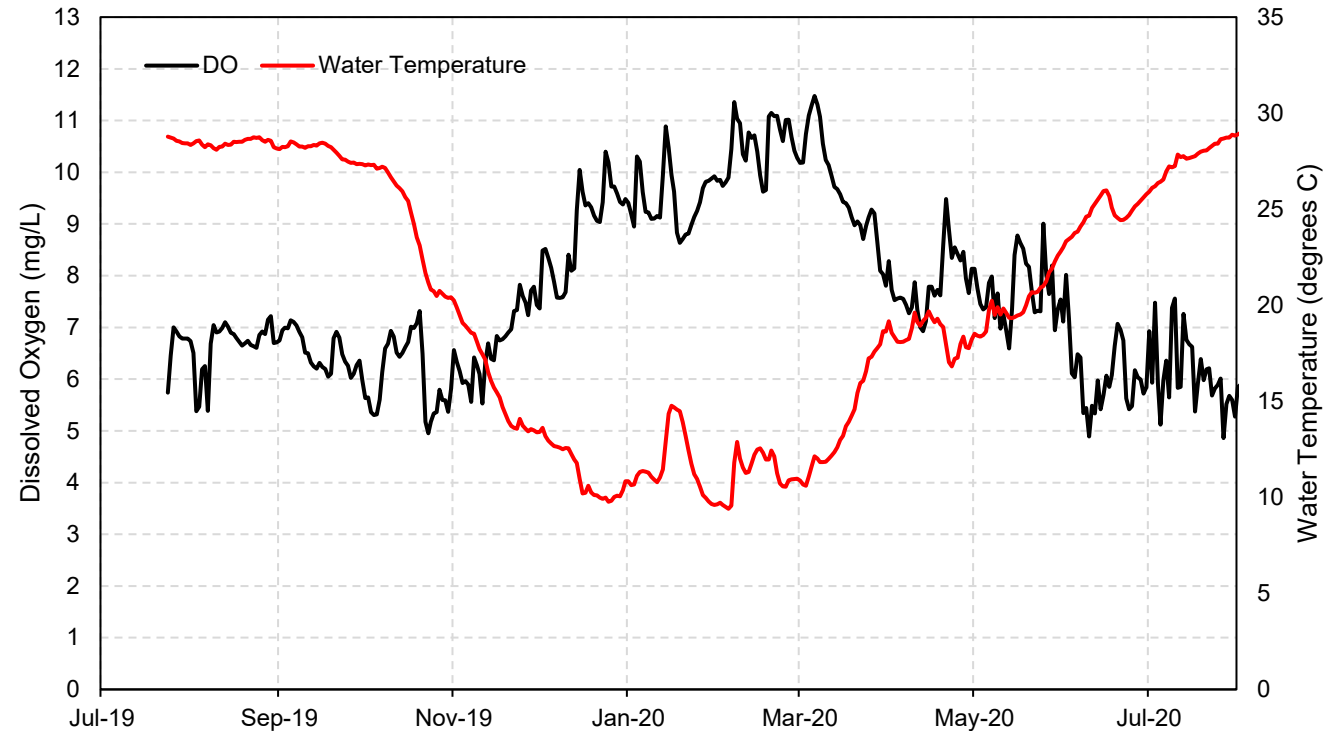


- Passive draft tube aeration system installed for Units 2, 3, and 4 in 2006
- Improves and stabilizes summer DO levels in downstream releases
- Operated from May 15 through September, extending into October when low-flow conditions persist
- In 2019, draft tube aeration extended through mid-October

Results – Tailrace Continuous Monitoring

- Summer-early fall DO levels indicate effective performance of draft tube aeration system
 - 99.2% of days - DO > 5.0 mg/L
 - 10/23/2019: 4.95 mg/L
 - 6/10/2020: 4.89 mg/L
 - 7/27/2020: 4.86 mg/L
 - 99.84% of time - DO > 4.0 mg/L
 - July 27, 2020: 13:00 – 15:00; Min 3.92 mg/L
 - July 27-28, 2020: 18:00 – 01:00; Min 3.65 mg/L
 - July 31, 2020: 18:00 – 20:00; Min 3.76 mg/L

Daily Average Dissolved Oxygen and Water Temperature



Results – Tailrace Water Chemistry Samples

- Levels of nitrate-nitrite and TKN similar to ecoregional* averages
- Levels of total phosphorus below ecoregional average

Sample Date	Ammonia (mg/L)	BOD (mg/L)	Nitrate-Nitrite (mg/L)	Ortho-phosphate (mg/L)	Total Phosphorus (mg/L)	TKN (mg/L)
7/24/2019	0.10	ND	0.71	ND	ND	0.29
8/22/2019	ND	ND	0.78	ND	ND	0.46
9/26/2019	0.33	ND	0.33	ND	ND	0.64
10/24/2019	0.22	ND	0.63	ND	ND	1.50
11/25/2019	0.21	ND	0.76	ND	ND	0.49
12/16/2019	0.12	ND	0.85	ND	ND	0.40
1/20/2020	ND	ND	0.43	ND	0.068	0.37
2/26/2020	ND	ND	0.48	ND	0.055	0.23
3/11/2020	ND	ND	0.45	ND	ND	0.31
4/27/2020	ND	ND	0.43	ND	0.073	0.33
5/29/2020	ND	ND	0.60	ND	ND	0.35
6/24/2020	0.11	ND	0.53	ND	ND	0.51
Region Avg	-	-	0.71 – 0.83	0.078 - 0.117	0.122 – 0.157	0.53 – 0.64

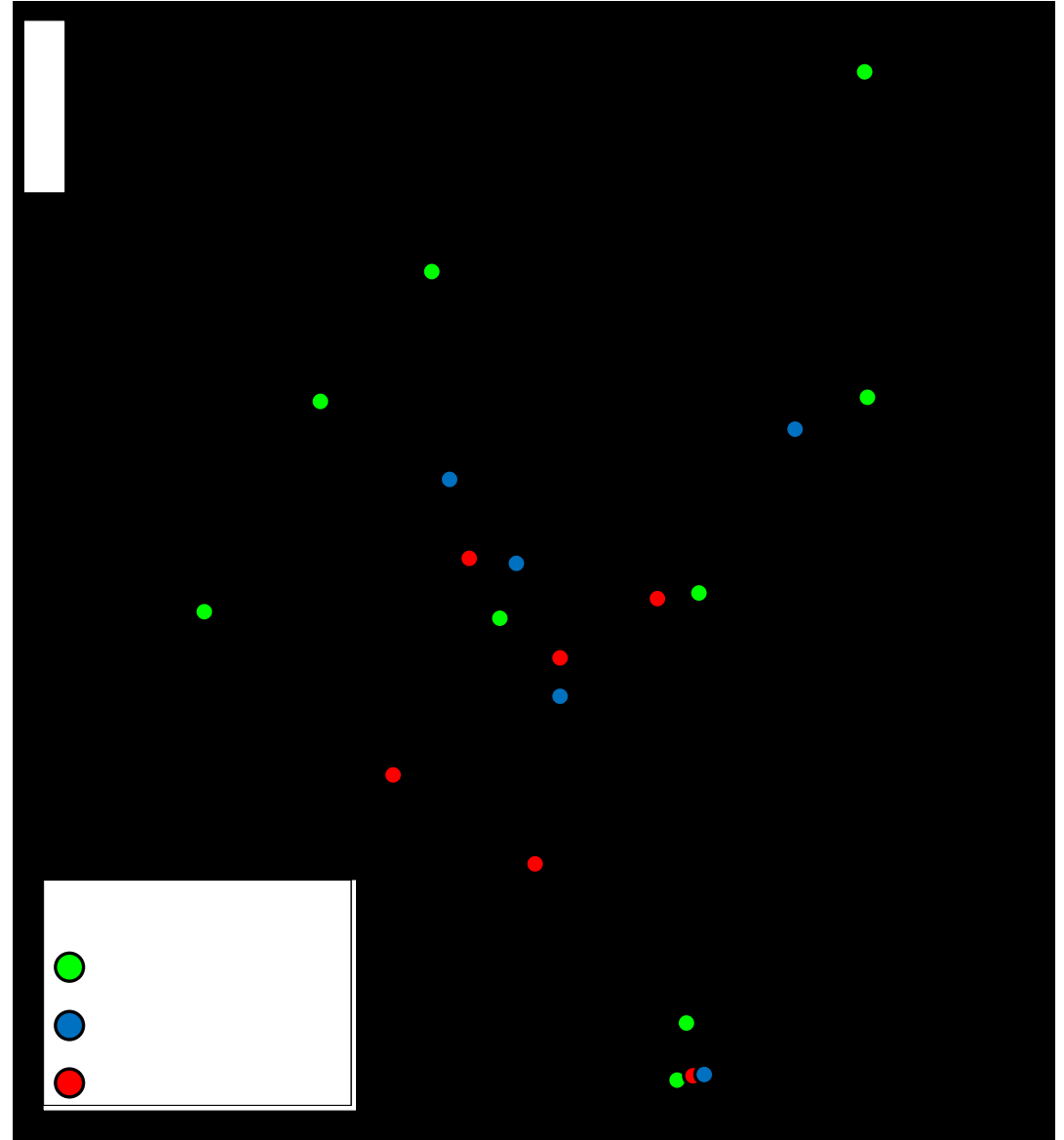
ND = not detected; *= USEPA 2000

Study Results

Water Quality in Lake Jackson

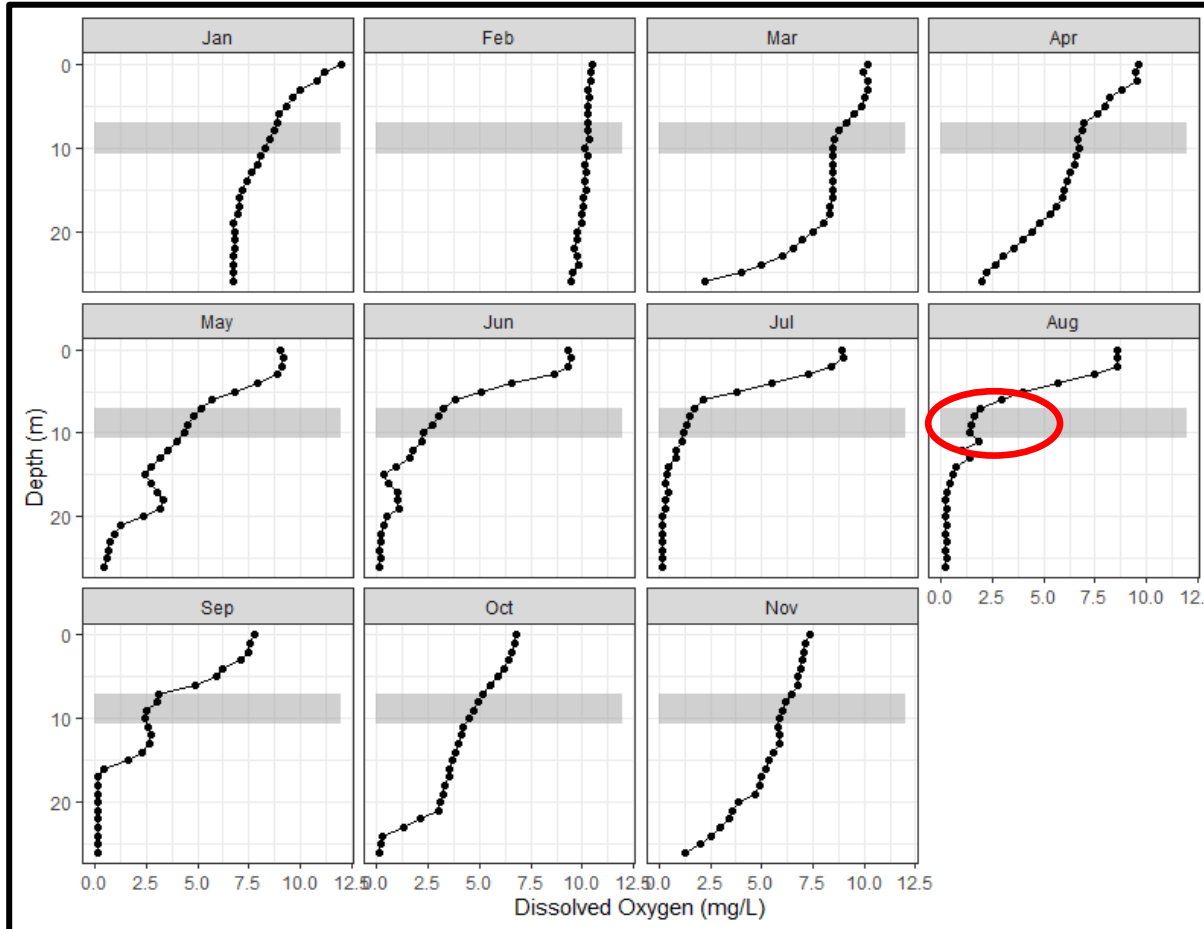
Existing Water Quality Data for Lake Jackson

- Georgia Power monthly forebay vertical profiles from 1986-2017
- GEPD monthly vertical profiles in forebay and mid-lake from 2011-2019
- Adopt-a-Lake citizen monitoring data from 2014-2021
- Algal bloom investigations from 2007-2015

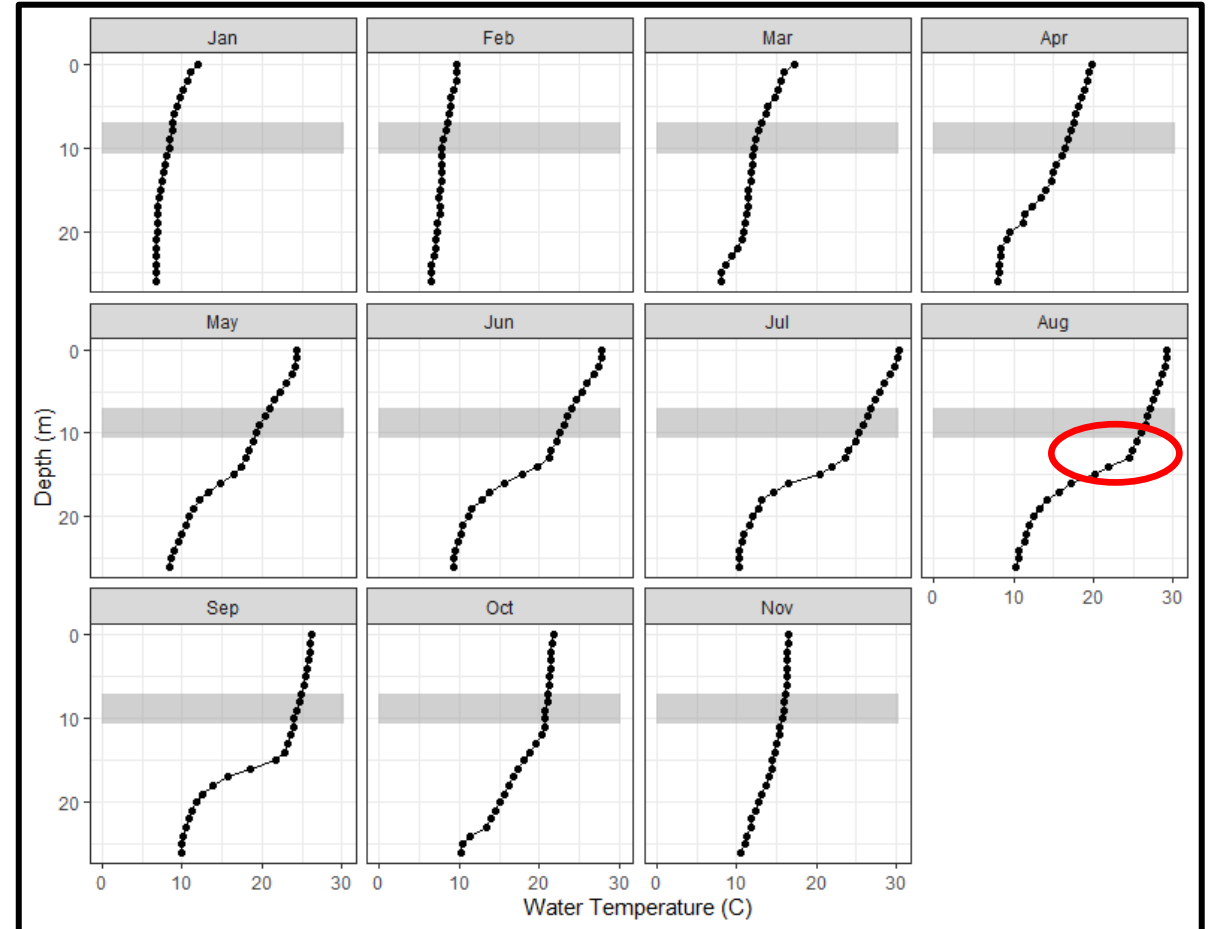


Georgia Power – Monthly Forebay Profiles, 1986-2017

DO



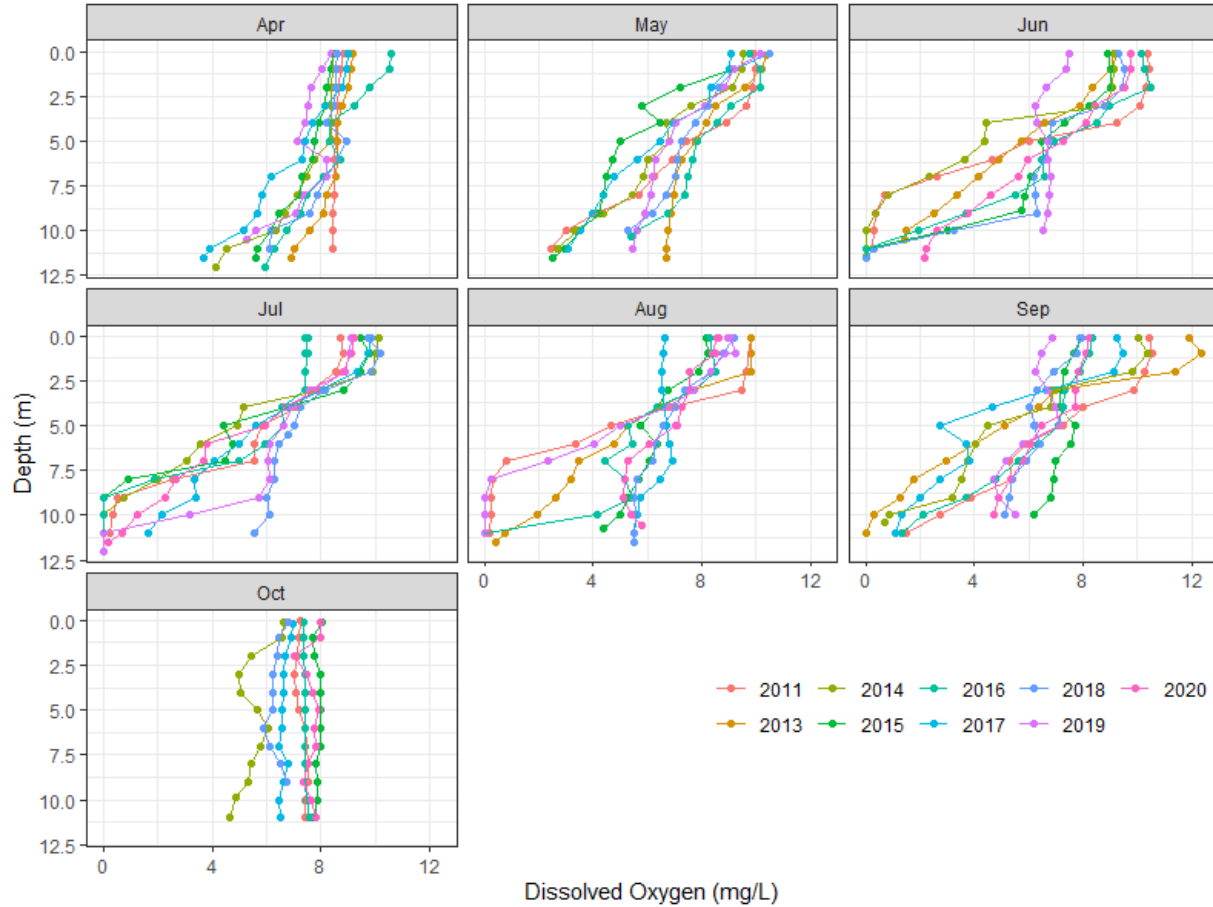
Water Temperature



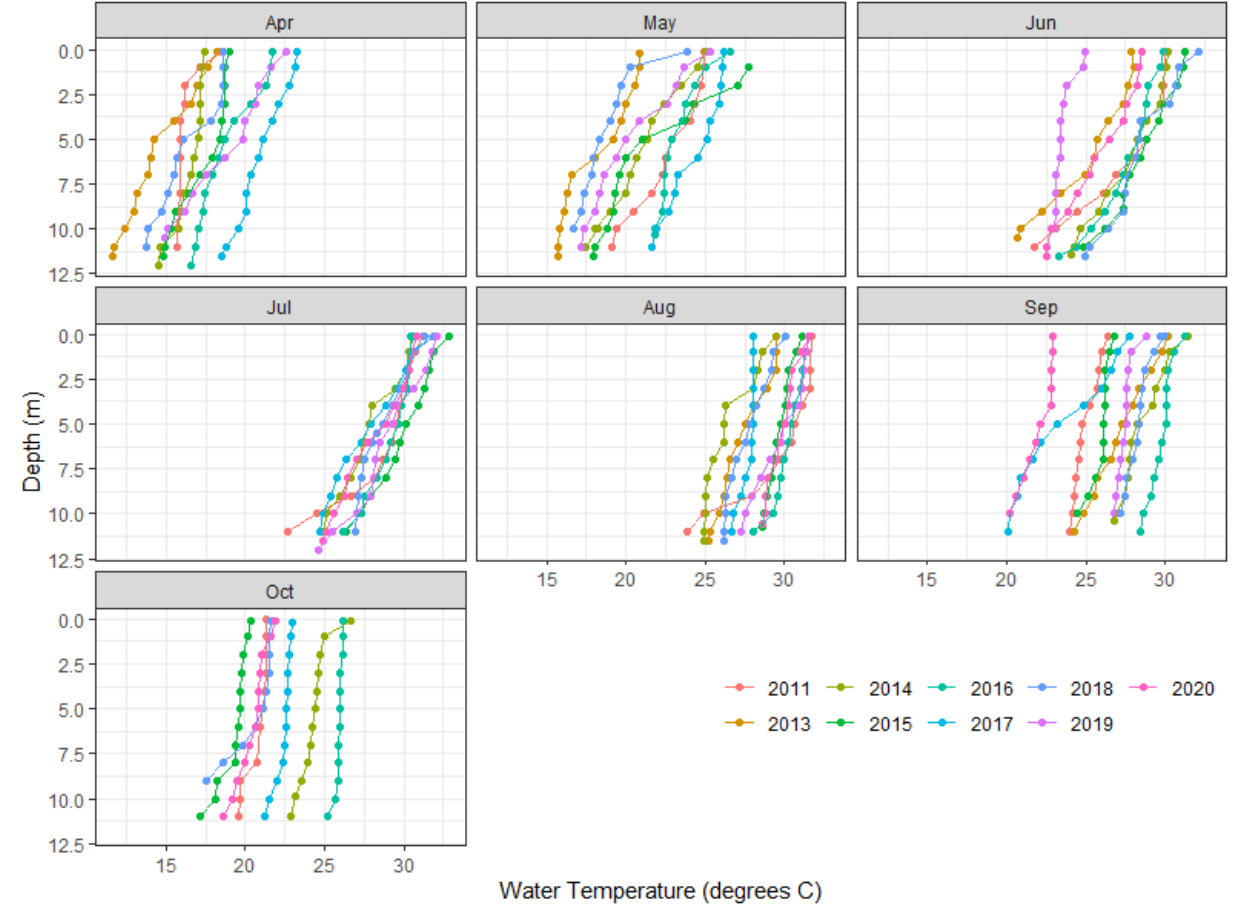
- Composite profiles based on Georgia Power data collected from 1986-2017
- Gray shading indicates the location of the intake in the water column

GEPD – Monthly Mid-Lake Profiles, 2011-2019

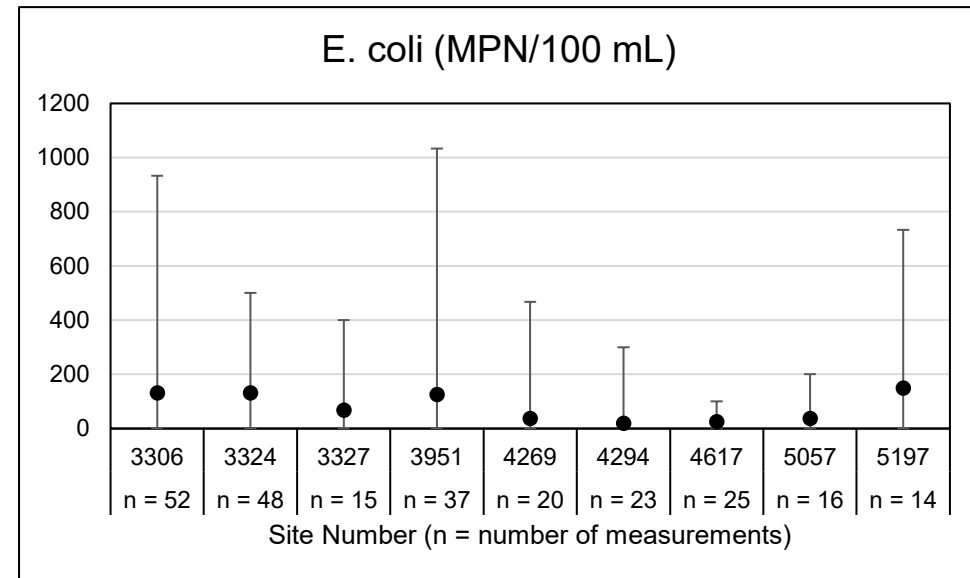
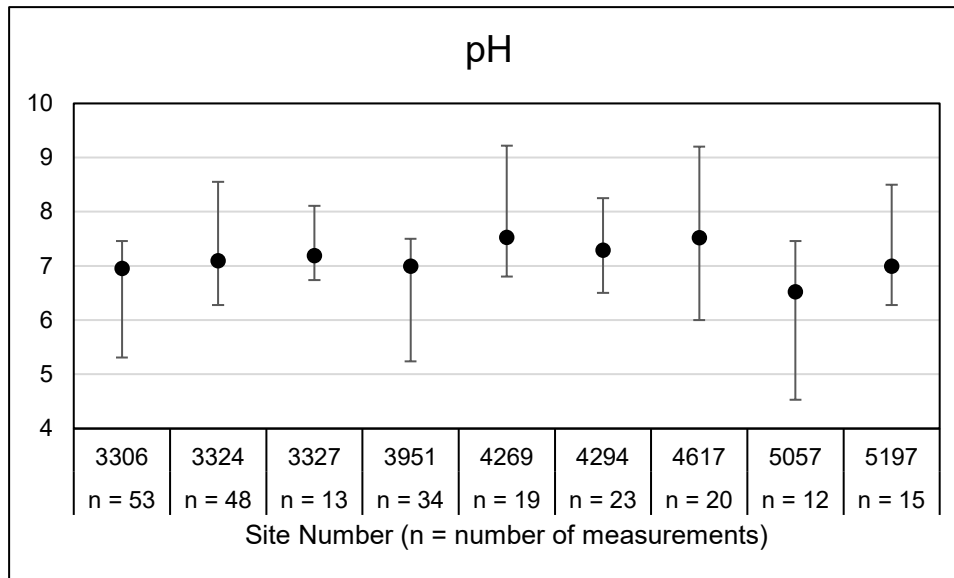
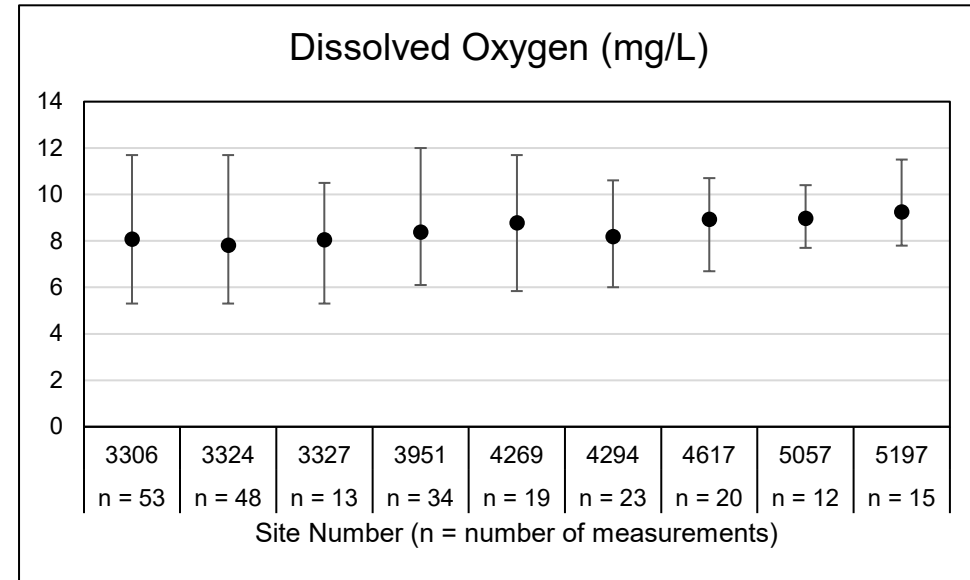
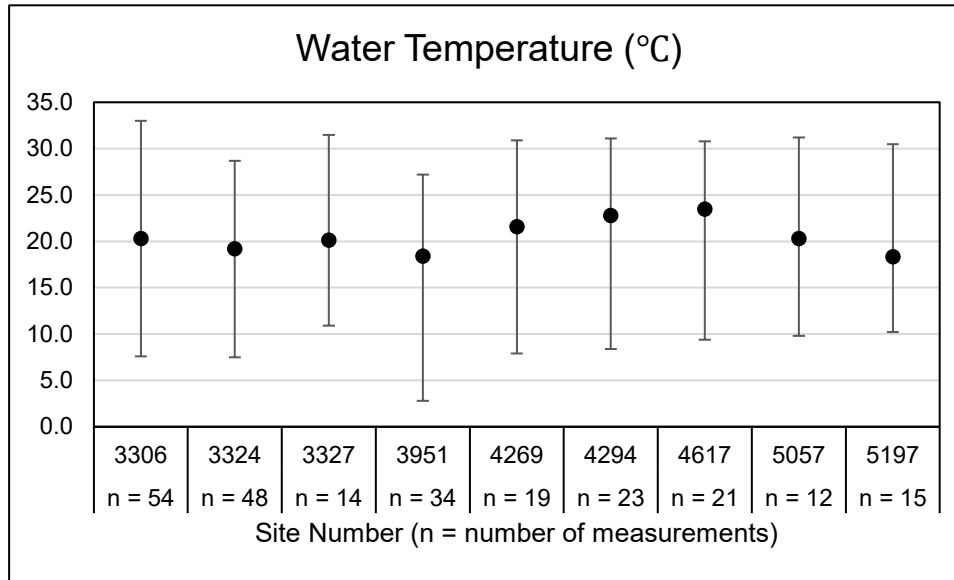
DO



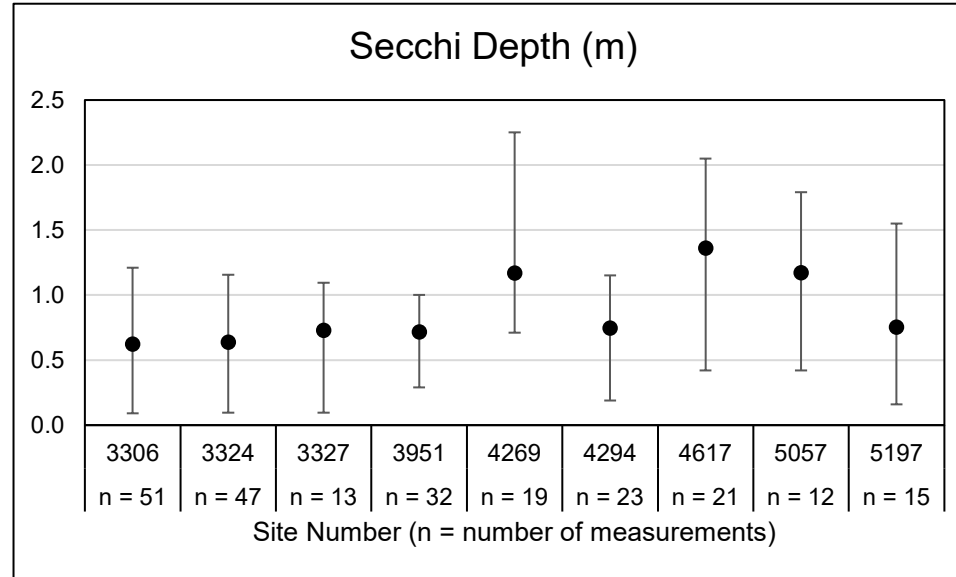
Water Temperature



Adopt-a-Lake Monitoring Data, 2014-2021

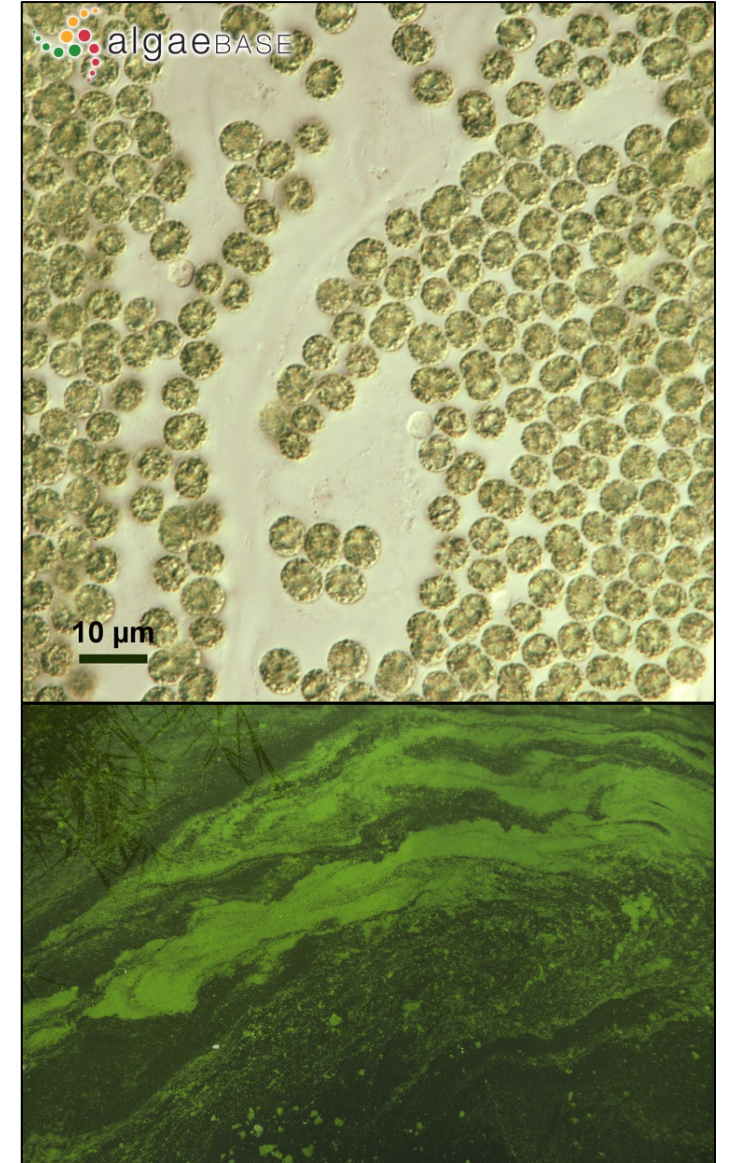


Adopt-a-Lake Monitoring Data, 2021



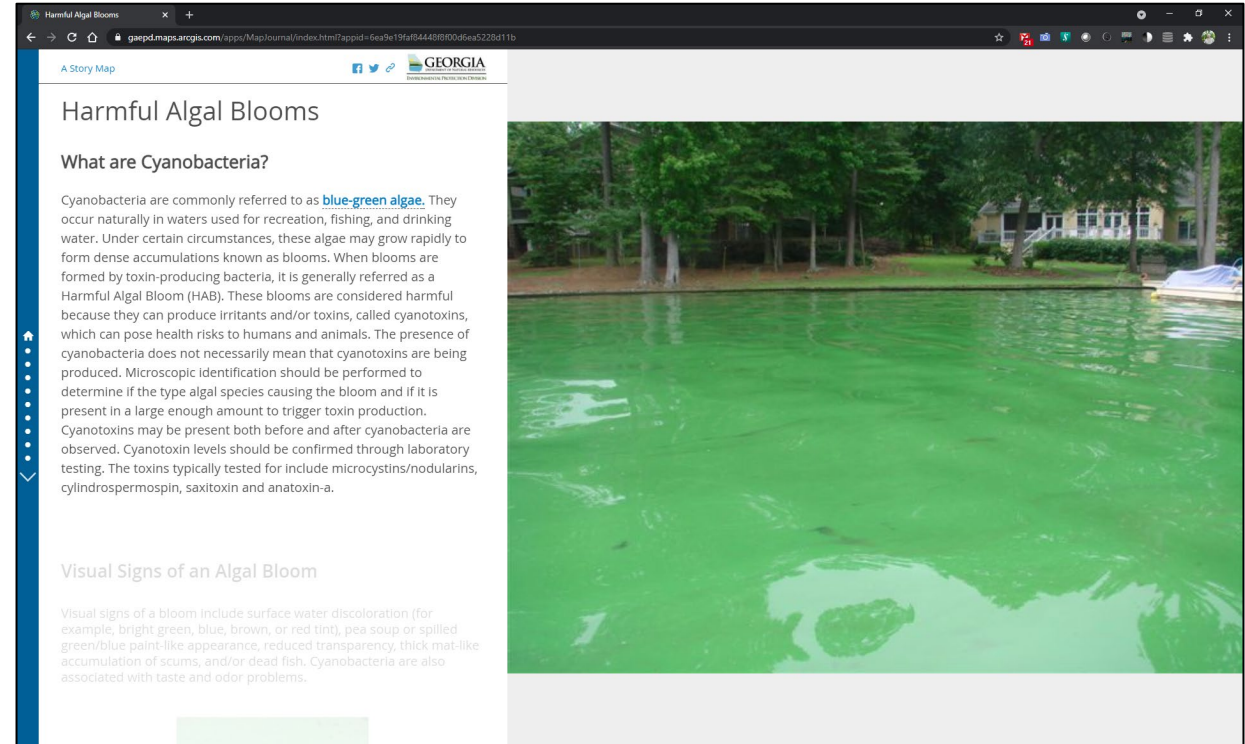
Algal Blooms

- Nutrient enrichment from point and non-point sources can increase frequency, duration, and intensity
- Cyanobacteria blooms on Lake Jackson were reported in several years from 2007 to 2018
- Cyanobacteria blooms assessed in 2007, 2014, and 2015 contained *Microcystis* species, including *M. aeruginosa*
 - *M. aeruginosa* can produce the toxin microcystin
 - Samples assessed had cell densities below WHO guidelines
- Blooms were associated with drought, elevated water temperatures ($>30^{\circ}\text{C}$), and low reservoir inflows
- Wilson's bloom forecasting model predicts low risk for toxic bloom development for Lake Jackson, although extreme conditions (i.e., drought) increase risk



Algal Blooms

- Georgia Power voluntarily implements a visual-based cyanobacteria bloom assessment guideline on its lakes
- GEPD Harmful Algal Bloom Working Group formed in 2019
 - Develop means to better detect blooms
 - Assess whether toxins are present
 - Better inform the public



GEPD Story Map: <https://arcg.is/1erafP>

Study Results

Ocmulgee River Downstream

Water Quality of Ocmulgee River Downstream

- Sources of water quality data:
 - Georgia Power tailrace data, 2019-2020
 - GEPD tailrace data, 2009
 - Seasonal data collected in 19-mile fishery study reach, 2010-2011 (Pruitt 2013)
 - GEPD data from Georgia Hwy 83, 14.5 miles downstream of Project, 2016 and 2018
- Analysis:
 - Downstream river meets applicable water quality criteria
 - GEPD lists the Ocmulgee River as supporting its designated uses from Lloyd Shoals Dam downstream 17 miles to confluence with the Towaliga River



Summary

Lloyd Shoals Tailrace Area

- Continuous monitoring demonstrated effective performance of draft tube aeration system in maintaining summer DO levels above applicable criteria
- Water chemistry analyses found nutrient levels similar to ecoregional averages

Lake Jackson

- Exhibits seasonal vertical stratification typical of southeastern reservoirs
- Water chemistry analyses indicate good overall water quality conditions
- Cyanobacteria blooms occur periodically during prolonged periods of high water temperature, low reservoir inflows, and increased retention time
- *Microcystis aeruginosa*, the dominant cyanobacterium in Lake Jackson, can produce toxins but modeling predicts low risk for development of toxic blooms

Summary (Continued)

Ocmulgee River Downstream of Project

- Water quality measurements in a 17-mile reach downstream of Lloyd Shoals Dam indicate the river is meeting applicable water quality criteria
- Tailrace water chemistry analyses indicate good overall water quality
- Surface water resources within the Middle Ocmulgee water planning region are considered adequate to meet future water demands (GEPD 2017)



Georgia
Power



Recreation and Land Use

Presented by: Joey Charles and Dawson Ingram

Updated Study Results Meeting
Lloyd Shoals Project
June 3, 2021

Study Objectives

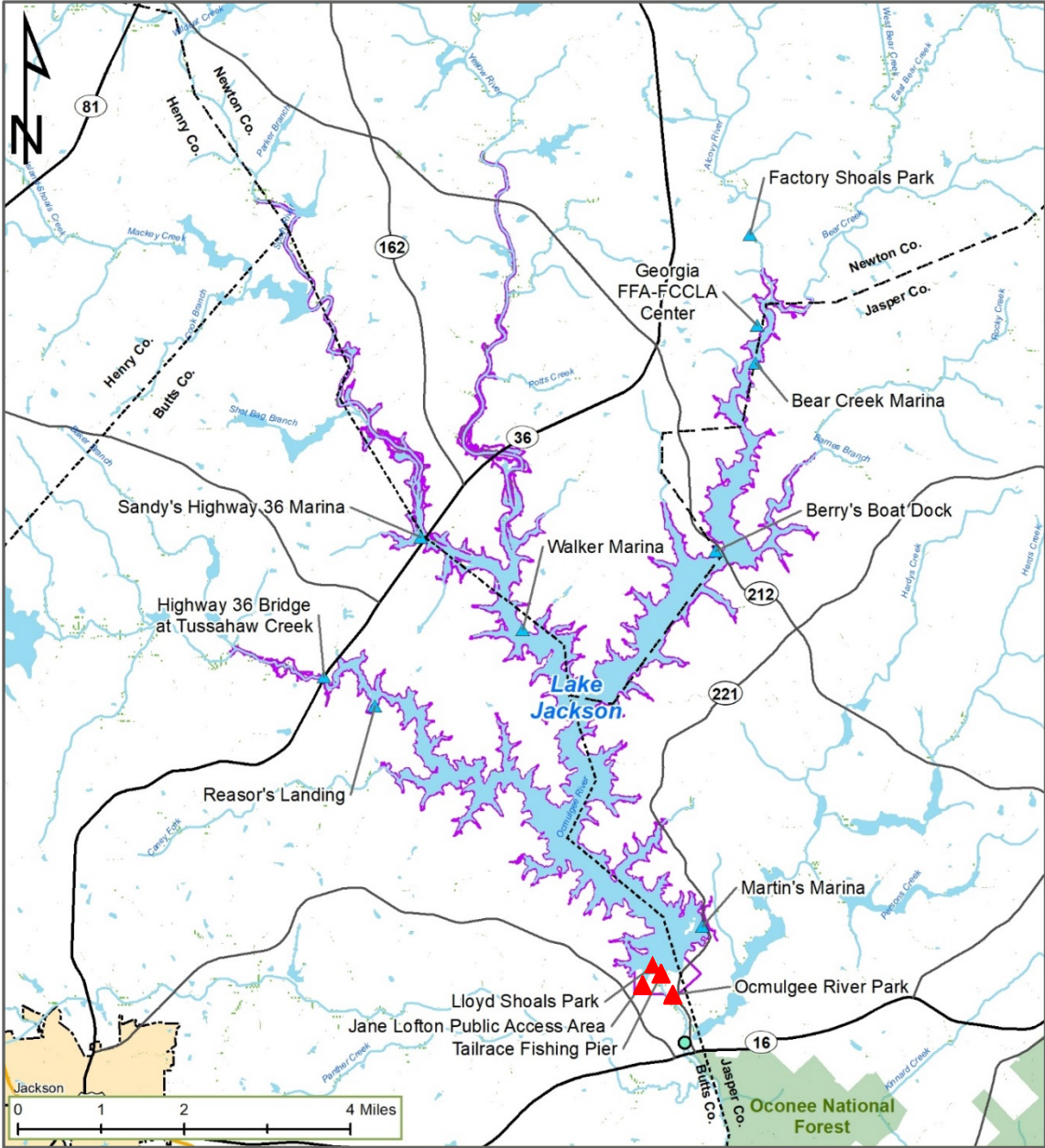
- Review existing information to describe existing recreation and land use
- Characterize the effects of continued project operation on recreational opportunities
- Characterize existing recreational capacity and usage on Lake Jackson and Lloyd Shoals tailrace
- Evaluate the adequacy of existing recreational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



Study Area

- FERC Project boundary around Lake Jackson and the Lloyd Shoals tailrace area, including four project recreation facilities
- Four counties adjacent to the Project and 20-county region

- Project Boundary
- ▲ Project Recreation Facilities



Study Methods

Methods – Recreational Use Assessment

- Characterize existing recreation facilities and opportunities at the Project and in the region
- Conduct recreation surveys in 2019 and 2021 to assess user trends and satisfaction (spring 2020 surveys cancelled due to COVID-19)
- Estimate current recreational use based on:
 - 2015 FERC Form 80 and supporting data
 - Article 405 Recreation Report (2015)
 - Attendance records
 - Data from 2019 and 2021 field surveys
 - Estimated population change from 2014 to 2019



Methods – Recreation Field Surveys

- Conducted surveys at four project recreation facilities on 3 days in 2019
 - Lloyd Shoals Park
 - Ocmulgee River Park
 - Tailrace Fishing Pier
 - Jane Lofton Public Access Area
- Surveys also conducted at informal bank fishing area at Hwy 36 bridge at Tussahaw Creek
- Cancelled surveys rescheduled to spring 2021 under study plan amendment
 - Online surveys: March 15 to April 30
 - Drop-box surveys: March 15 to May 4
 - Spot user counts: March 25 and April 11

Georgia Power Company Lloyd Shoals Project Recreation Use Survey		Georgia Power Company is conducting this survey to learn about recreational use at Lake Jackson, user satisfaction with existing recreation facilities, and whether facility improvements may be needed. Please take a few minutes to answer some questions about your visit today. Thank you for your participation.	
Location: _____		Site Info	
Weather: <input type="checkbox"/> Clear <input type="checkbox"/> Partly Cloudy <input type="checkbox"/> _____			Time: _____ Temperature: _____
Investigator: _____			
1. What is your county and state of residence? County: _____ State: _____			
2. How many people (including you) are in your group today? _____ people			
3. What is your age group? <input type="checkbox"/> 18-24 <input type="checkbox"/> 25-34 <input type="checkbox"/> 35-44 <input type="checkbox"/> 45-54 <input type="checkbox"/> 55+			
4. If you are in multiple age groups? (check all that apply)			
<input type="checkbox"/> Youth (13-17)		<input type="checkbox"/> Adults (18-55)	
<input type="checkbox"/> Senior Adults (over 55)			
5. How many hours have you spent here today? _____ hours			
6. How many times (including today) have you visited Lake Jackson or its parks in the last 30 days? _____ times			
7. How many times do you visit Lake Jackson annually? _____ times			
8. Do you use the reservoir at night? <input type="checkbox"/> Yes <input type="checkbox"/> No If "yes", how many times per year? _____ times			
9. Are the parks at this reservoir your primary destination for outdoor recreation activities? <input type="checkbox"/> Yes <input type="checkbox"/> No			
10. What other parks and lakes in the area do you frequent for recreation? (list below)			

11. What is the primary reason for your visit today? (check all that apply)			
<input type="checkbox"/> Boat fishing	<input type="checkbox"/> Canoeing/kayaking	<input type="checkbox"/> Hiking/walking	
<input type="checkbox"/> Bank fishing	<input type="checkbox"/> Surfboarding	<input type="checkbox"/> Shoreline relaxation	
<input type="checkbox"/> Tournament fishing	<input type="checkbox"/> Water skiing	<input type="checkbox"/> Picnicking/playing	
<input type="checkbox"/> Pleasure boating	<input type="checkbox"/> Jet skiing	<input type="checkbox"/> Swimming/wading	
<input type="checkbox"/> Other (list below): _____			
12. If you came to fish today, what were you fishing for? (check all that apply)			
<input type="checkbox"/> Largemouth bass	<input type="checkbox"/> Striped bass	<input type="checkbox"/> Channel catfish	<input type="checkbox"/> _____ (list below):
<input type="checkbox"/> Crappie	<input type="checkbox"/> Hybrid bass	<input type="checkbox"/> Blue catfish	
<input type="checkbox"/> Sunfish/bream	<input type="checkbox"/> White bass	<input type="checkbox"/> Flathead catfish	
13. Please rate the quality of the existing facilities at this access area. (choose one description for each)			
Parking: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor	Restrooms: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor		
Boat ramp: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor	Cleanliness: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor		
Dock: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor	Bank fishing access: <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor		
14. List any specific improvements you would like to see at this access area, and any other comments or suggestions.			
Desired Improvements			

Methods – Drop Box Locations



Lloyd Shoals Park



Ocmulgee River Park



Tailrace Fishing Pier



Methods

- **Future Recreational Use**

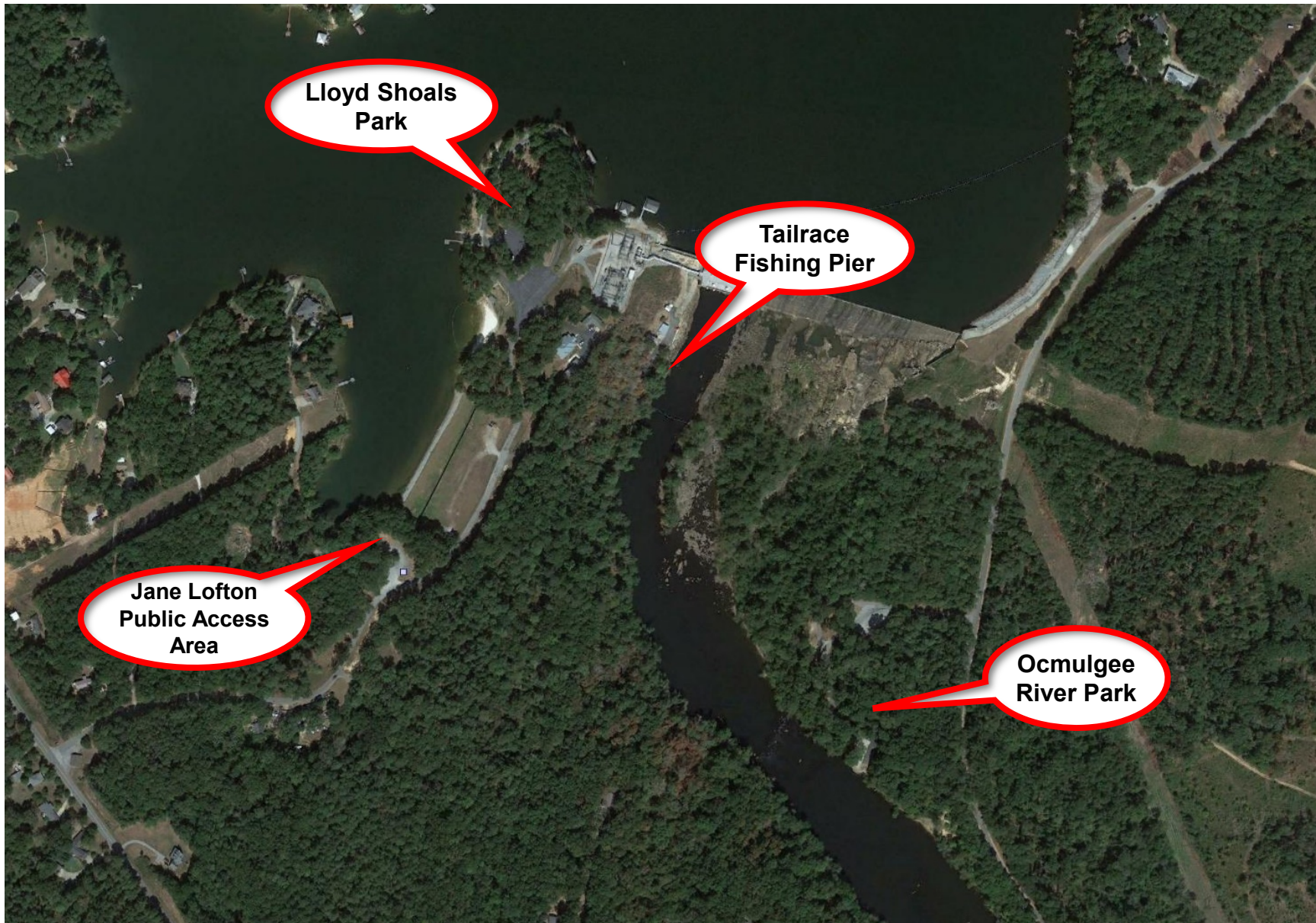
- Forecast future recreational demands based on projected population change
- Compare future demand to the estimated carrying capacity of project recreation facilities

- **Land Use**

- Map land use within project boundary and 2,000-ft zone around Project
- Map Georgia Power-owned lands within project boundary
- Review Georgia Power's shoreline management program

Existing Recreation Facilities

Project Recreation Facilities



Project Recreation Facilities

Recreation Site	County	Location	Acreage	Amenities
Lloyd Shoals Park	Butts	Lake Jackson	5 acres	50 parking spaces (with trailer slots), picnic/day use area, swimming beach, playground, pavilion, barrier-free fishing pier, restrooms, 2-lane barrier-free boat ramp, courtesy dock, shoreline fishing
Lloyd Shoals Tailrace Fishing Pier	Butts	Tailrace Area	0.6 acre	10 parking spaces, barrier-free boardwalk path to fishing pier with seats for fishing as well as a secluded seated area for viewing
Ocmulgee River Park	Jasper	Tailrace Area	4 acres	15 parking spaces, 1-lane boat ramp, picnic/day use area, bank fishing
Jane Lofton Public Access Area	Butts	Lake Jackson	0.7 acre	Bank fishing, gravel parking area

Project Recreation Facilities

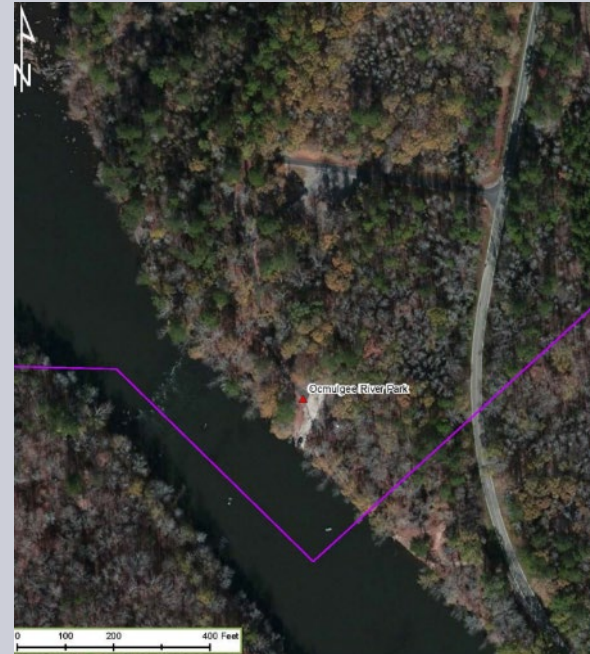
Lloyd Shoals Park



Tailrace Fishing Pier



Ocmulgee River Park






Jane Lofton Public Access Area

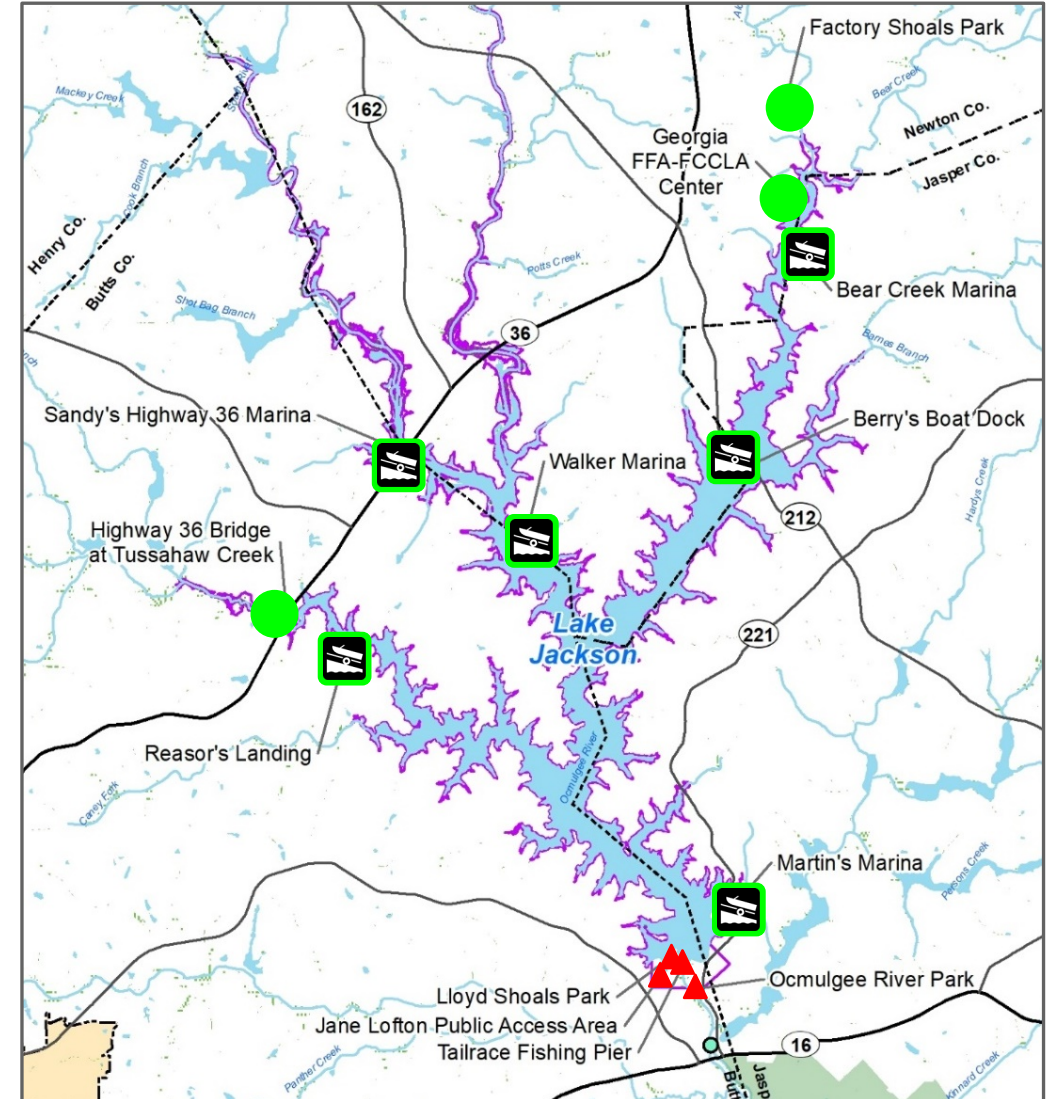


Other Publicly or Privately Owned and Operated Facilities

- Nine facilities and access areas:
 - 6 private marinas with boat ramps
 - Factory Shoals Park (Newton County)
 - Georgia FFA-FCCLA Center (State)
 - Informal bank fishing (Georgia Power)

Non-project Recreation Facilities:

-  Marinas/boat ramps
-  Other facilities/access
-  Project Recreation Facilities



Regional Recreation Opportunities

- Georgia Power reservoirs
 - Lake Sinclair (15,330 acres)
 - Lake Oconee (19,050 acres)
 - Lake Juliette (3,600 acres)
- Oconee National Forest
- State Parks (4)
- GDNR Wildlife Management Areas (5)
- Piedmont National Wildlife Refuge
- Ocmulgee Mounds National Historic Park
- Jarrell Plantation State Historic Site
- Amerson River Park

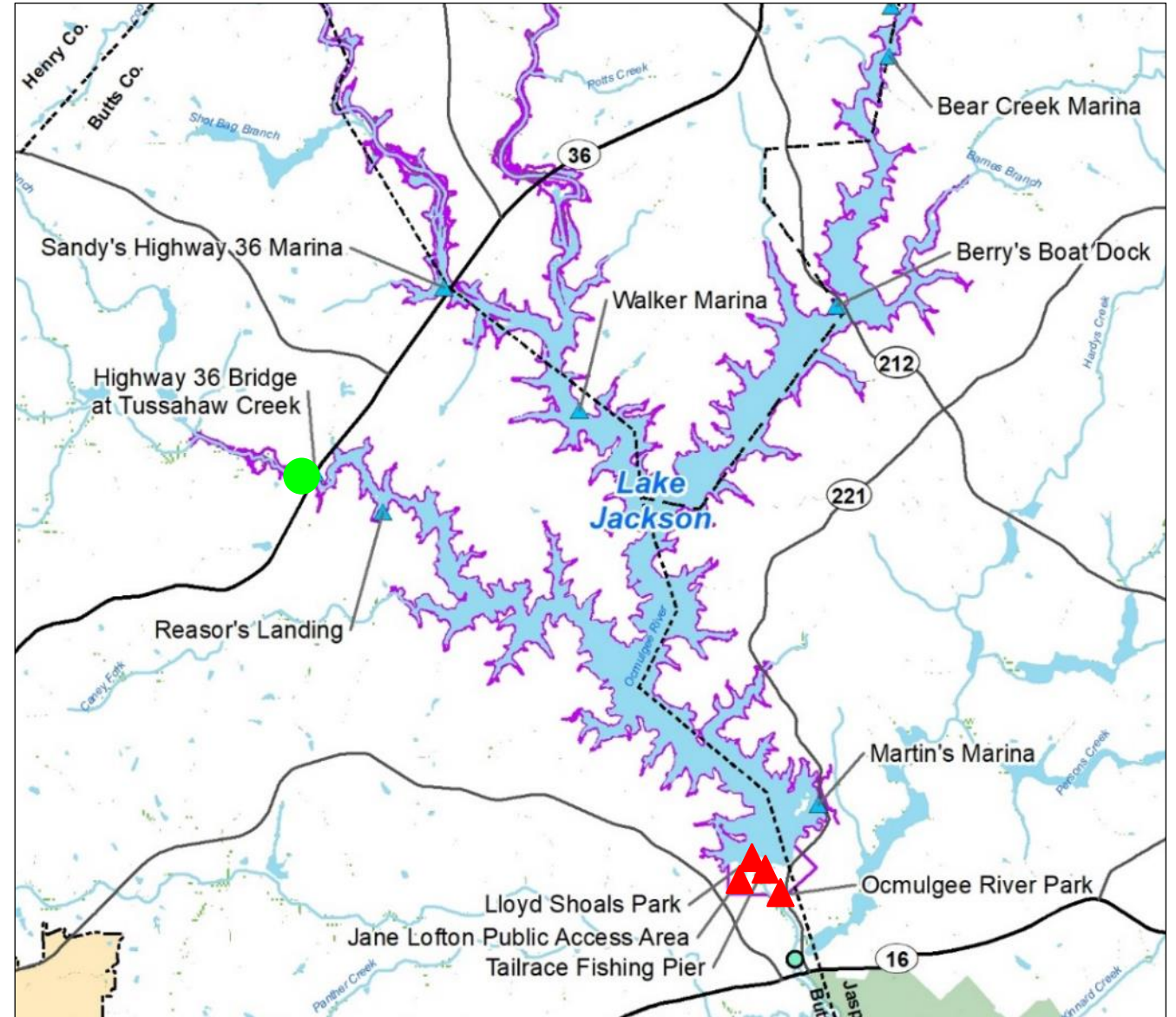


High Falls SP - Photo from GDNR State Parks & Historic Sites



Recreation Survey Locations

- ▲ Project recreation facilities
 - Lloyd Shoals Park
 - Tailrace Fishing Pier
 - Ocmulgee River Park
 - Jane Lofton Public Access Area
- Informal bank fishing area at Hwy 36 bridge at Tussahaw Creek

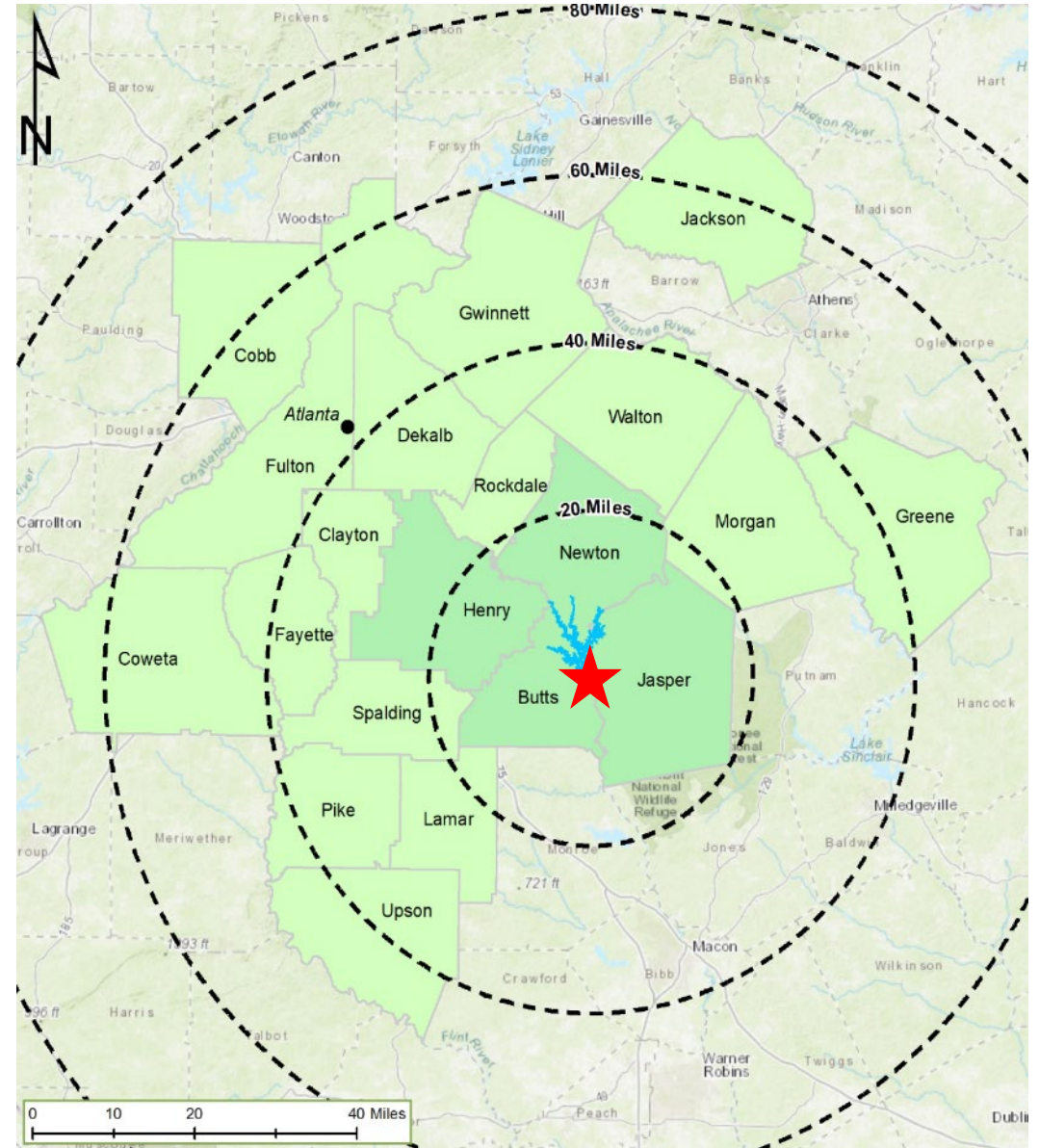


Number of Recreation Surveys Administered

Location	June 27, 2019 (Weekday)	July 7, 2019 (Holiday)	August 4, 2019 (Weekend)	Spring 2021	Access Point Total
Lloyd Shoals Park	15	36	13	2	66
Tailrace Fishing Pier	3	4	7	4	18
Ocmulgee River Park	9	14	14	6	43
Jane Lofton Public Access Area	0	0	0	0	0
Hwy 36 at Tussahaw Creek	0	0	2	0	2
Total	27	54	36	12	129

Origin of Users Surveyed at Project

- Users came from 32 Georgia counties and other states
- 20 counties totaled 89 percent of users surveyed and included metro Atlanta
- Top 5 counties (71 percent):
 - Henry
 - Spalding
 - Butts
 - Newton
 - Jasper



Primary Reasons for Visits

Percent of Responses:

Activity	Lloyd Shoals Park	Tailrace Fishing Pier	Ocmulgee River Park	Hwy 36 at Tussahaw Creek	Total
Bank Fishing	<u>11.7</u>	<u>57.9</u>	<u>34.4</u>	<u>100.0</u>	<u>24.4</u>
Swimming/Wading	<u>27.0</u>	5.3	3.3	0.0	<u>17.1</u>
Picnicking/Playing	<u>19.8</u>	0.0	4.9	0.0	<u>13.0</u>
Shoreline Relaxation	<u>12.6</u>	<u>21.1</u>	<u>9.8</u>	0.0	<u>12.4</u>
Boat Fishing	<u>11.7</u>	0.0	<u>14.8</u>	0.0	<u>11.4</u>
Pleasure Boating	7.2	0.0	6.6	0.0	6.2
Canoeing/Kayaking	0.9	0.0	<u>16.4</u>	0.0	5.7
Hiking/Walking	0.9	<u>10.5</u>	3.3	0.0	2.6
Water Skiing	2.7	0.0	0.0	0.0	1.6
Jet Skiing	2.7	0.0	0.0	0.0	1.6
Other	2.7	5.3	6.6	0.0	4.1

Note: Top reasons indicated by bold underline

User Ratings of Georgia Power Facilities

- Boat ramps, parking, cleanliness, and bank fishing were rated good by vast majority of users
- Facilities rated fair by larger proportions of users: Lloyd Shoals Park restroom and parking; Tailrace Fishing Pier dock and bank fishing access

Percent of Respondents:

Park	Rating	Parking	Boat Ramp	Dock	Restroom	Cleanliness	Bank Fishing Access
Lloyd Shoals Park	Good	<u>72</u>	<u>95</u>	<u>90</u>	<u>64</u>	<u>83</u>	<u>94</u>
	Fair	23	5	8	32	12	3
	Poor	5	0	2	4	5	3
Tailrace Fishing Pier	Good	<u>80</u>	NA	<u>83</u>	NA	<u>79</u>	<u>77</u>
	Fair	20	NA	17	NA	7	23
	Poor	0	NA	0	NA	14	0
Ocmulgee River Park	Good	<u>93</u>	<u>91</u>	NA	NA	<u>89</u>	<u>76</u>
	Fair	7	0	NA	NA	11	18
	Poor	0	9	NA	NA	0	6

Improvements Desired at Georgia Power Parks

Proportion of Total User Comments:

Lloyd Shoals Park

- Restrooms (25%)
- Parking (21%)
- Trailer parking (8%)

Tailrace Fishing Pier

- Trash cans (17%)
- Cleaning (17%)
- Shoreline access (11%)

Ocmulgee River Park

- Restrooms (32%)
- Trash cans (21%)
- Shoreline access (21%)



Current and Projected Future Recreational Use

- 2019 annual recreation use estimate:
 - 69,789 visits, including 68,393 day-use visits and 1,396 night-use visits
- Future recreation use based on forecasted population change in 4-county area

Facilities	2019	2030	2040	2050
Lloyd Shoals Park	33,579	39,623	44,774	49,699
Ocmulgee River Park	5,982	7,059	7,977	8,854
Tailrace Fishing Pier	936	1,105	1,248	1,385
Georgia Power Project Recreation Use	40,497	47,786	53,999	59,939
Non-Georgia Power Recreation Use	29,292	34,564	39,057	43,354
Total Recreation Use	69,789	82,351	93,056	103,292
		2020-2030	2030-2040	2040-2050
4-County Forecasted Growth Rates	--	18%	13%	11%

Carrying Capacity and Future Demand

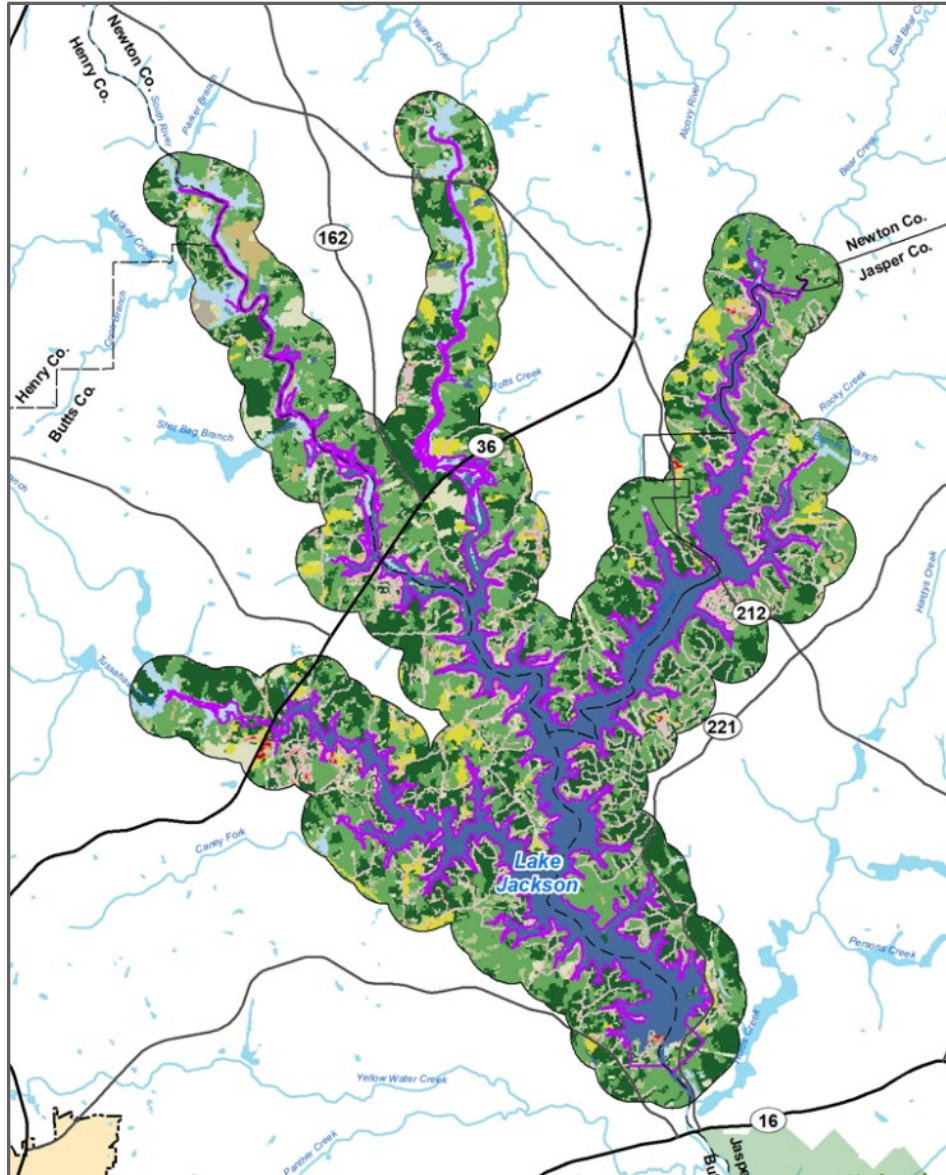
- Carrying capacity at all Georgia Power facilities is adequate to accommodate projected average spring and summer use into the near future
- Peak use during holiday weekends exceeds capacity at Lloyd Shoals Park



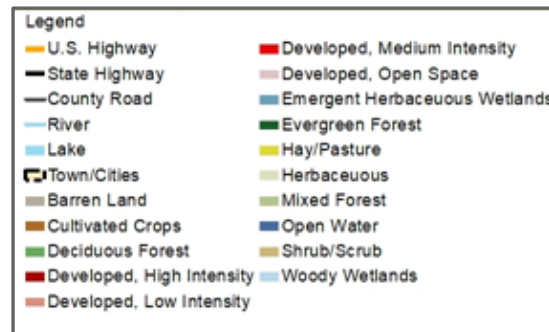
	Total Parking Capacity	Average Observed Spring/Summer Use in 2019	Peak Observed Use in 2019	Projected Average Spring/Summer Use in:		
				2030	2040	2050
Lloyd Shoals Park	50	17	78	20	23	25
Tailrace Fishing Pier	10	2	5	2	3	3
Ocmulgee River Park	15	7	10	8	9	10

Project Land Use

Land Uses within the Project Area

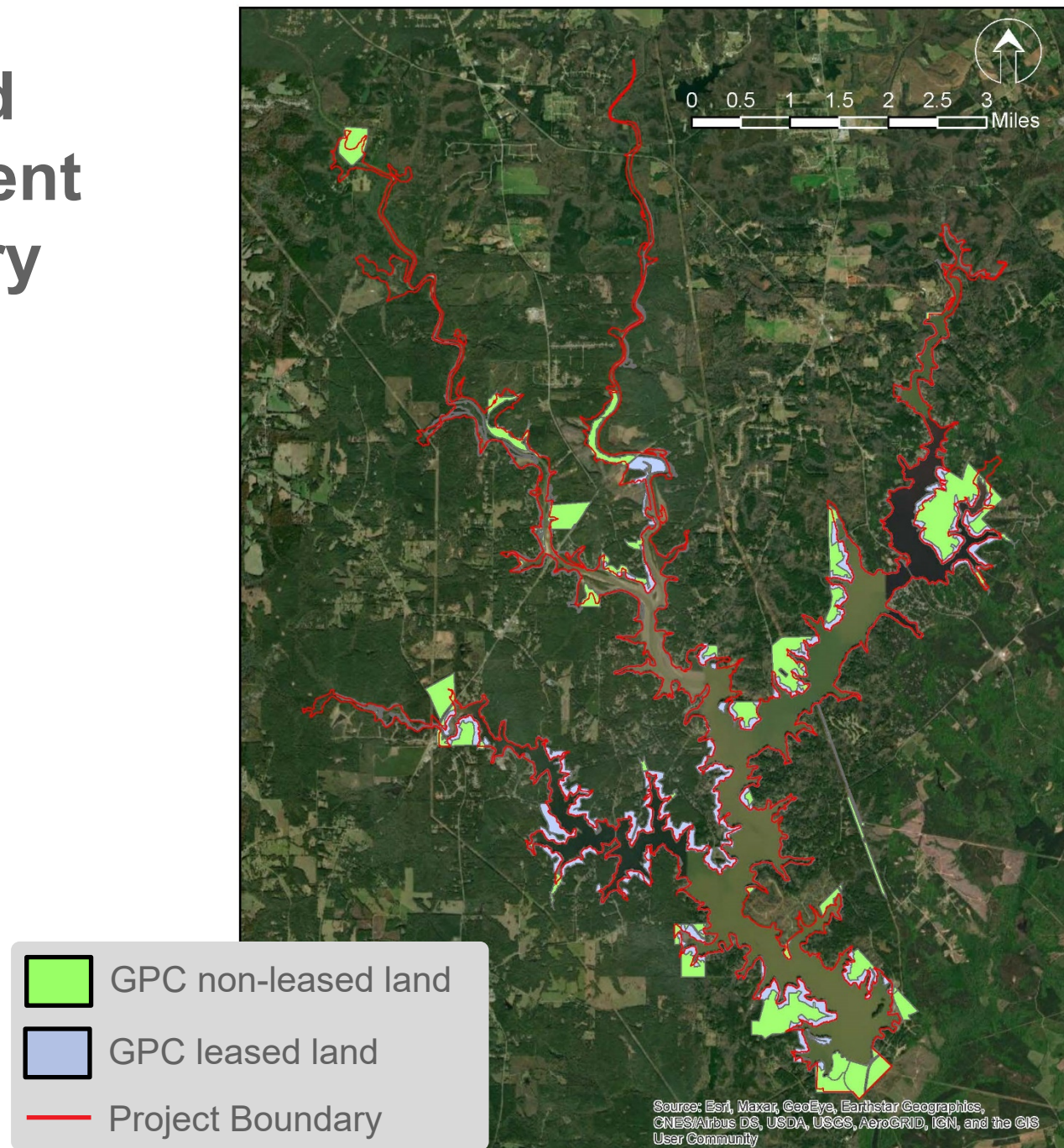


- Predominant land uses (81 percent)
 - Deciduous forest
 - Evergreen forest
 - Developed open space
 - Mixed forest
 - Woody wetlands
 - Herbaceous
 - Hay/pasture
- Developed areas (10 percent)



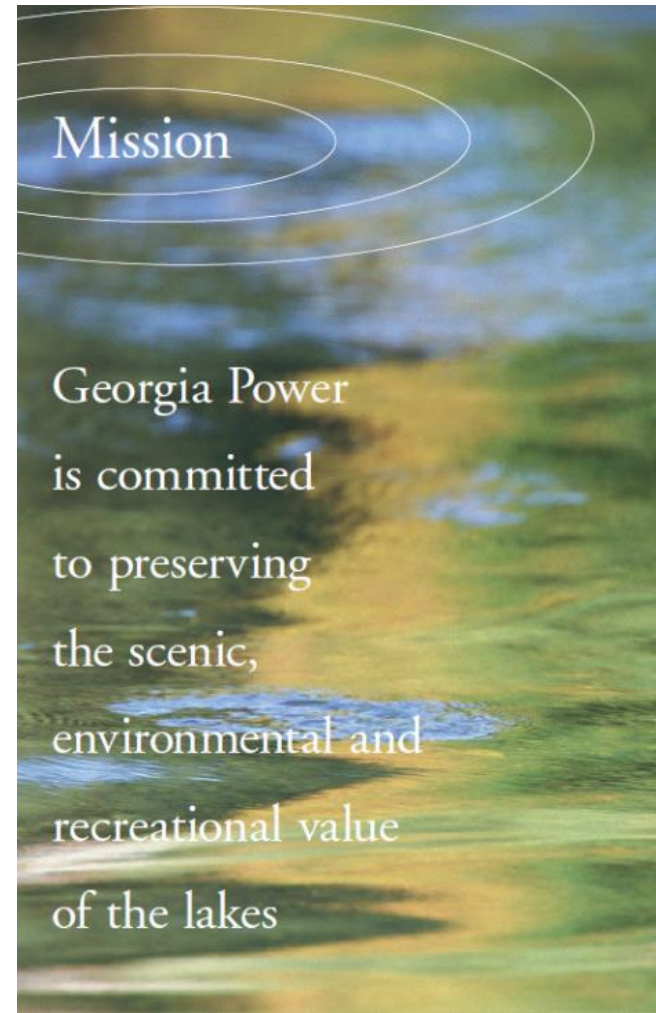
Source: National Land Cover Database 2016
(Multi-Resolution Land Characteristics Consortium)

Georgia Power-owned Lands within and adjacent to the Project Boundary



Shoreline Management Program

- Landowner agreement types
 - Residential lease lots
 - Access lease agreement
 - License agreement
- Permit Program for all construction, renovation, tree removal, grading, and dredging
- Shoreline Management Guidelines for structure size, setbacks, docks, seawalls, boat houses, gazebos, etc.



Shoreline Management Web Access



Shoreline Guidelines & Permit Applications

Please choose the applicable permit form(s) below. You may select a form(s) to submit online, or select each applicable PDF to print, fill out, then mail or fax to your Land Management Office. Before starting any of the activities listed below, a valid Georgia Power permit must be obtained by every homeowner for any activity on Georgia Power land. This permit requirement applies to Georgia Power leases and deeded properties.

<http://georgiapowerlakes.com/lakejackson/shoreline-management/>

Seawall



- ▶ VIEW DETAILS
- ▶ SUBMIT ONLINE FORM
- ▶ DOWNLOAD PDF

Docks



- ▶ VIEW DETAILS
- ▶ SUBMIT ONLINE FORM
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Boathouses



- ▶ VIEW DETAILS
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Dredging



- ▶ VIEW DETAILS
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Tree Removal and Landscaping



- ▶ VIEW DETAILS
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Residential Dwelling



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Boatlifts and PWC Lift



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Outbuilding Construction



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Marinas



- ▶ VIEW DETAILS

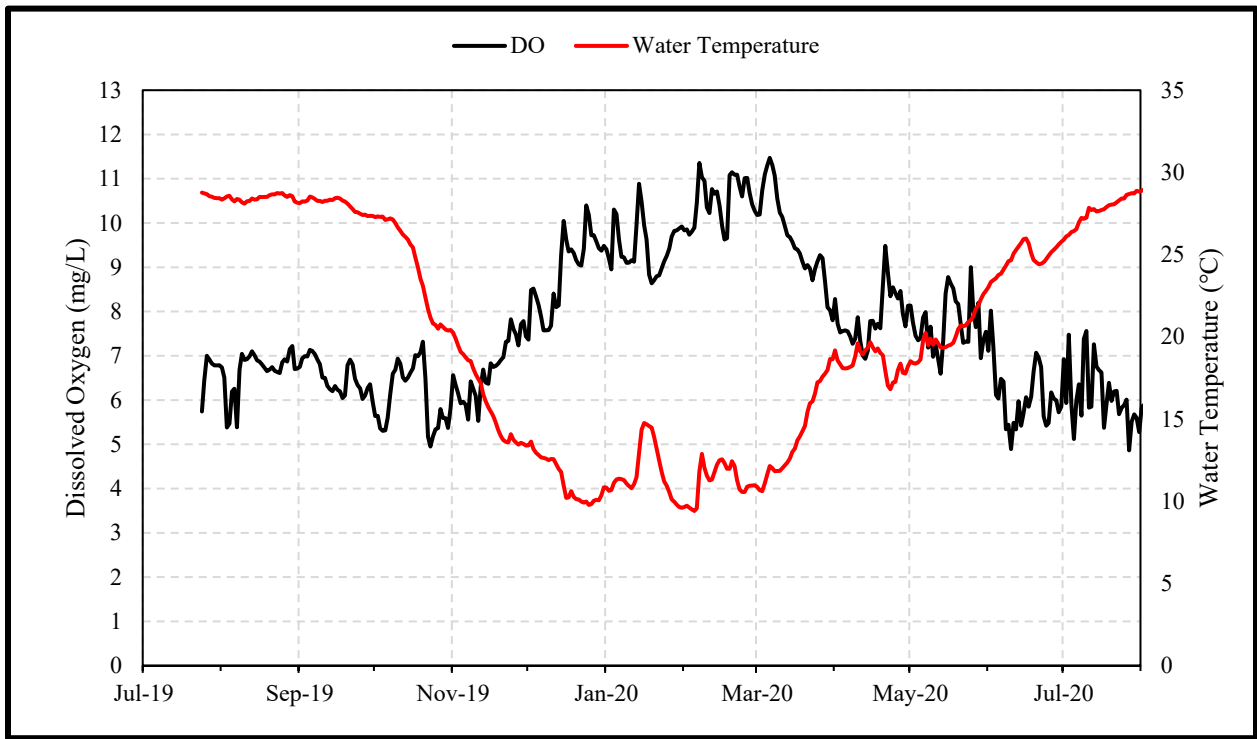
Recreation and Land Use Summary

- Substantial existing information on recreational use was supplemented with user surveys at Georgia Power-owned recreation facilities
- Recreational opportunities within the region are numerous and diverse
- Usage estimates and projections indicate there is sufficient capacity to meet current and near-future recreation demands
- Recreation users are generally pleased with existing amenities
- Improvements desired by users include more parking, restroom, trash receptacles, and improved shoreline access for bank fishing
- Georgia Power's Shoreline Management Program is comprehensive and successful at preserving the scenic, environmental, and recreational values of Lake Jackson



Georgia
Power

ATTACHMENT E
LLOYD SHOALS PROJECT
REVISED UPDATED WATER RESOURCES STUDY REPORT FIGURE 5



Source: Georgia Power

FIGURE 5 LINE PLOT OF DAILY AVERAGE DO AND WATER TEMPERATURE FROM TAILRACE MONITOR