## APC Harris Relicensing

**From:** Sarah Salazar <Sarah.Salazar@ferc.gov>
**Sent:** Monday, January 4, 2021 8:02 AM
**To:** APC Harris Relicensing
**Subject:** RE: schedule question - Harris P-2628

Happy New Year to you as well Angie! Thanks for letting me know. I'll let the rest of the licensing team know too for workload planning purposes.

Best,

Sarah L. Salazar ✧ *Environmental Biologist* ✧ *Federal Energy Regulatory Commission* ✧ *888 First St, NE, Washington, DC 20426* ✧ *(202) 502-6863*


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**From:** APC Harris Relicensing <g2apchr@southernco.com>
**Sent:** Sunday, January 03, 2021 2:36 PM
**To:** Sarah Salazar <Sarah.Salazar@ferc.gov>
**Subject:** RE: schedule question - Harris P-2628

Hi Sarah,

I wanted to give you a heads up that we are not going to request a schedule change for filing the Updated Study Report early. We will stick to the schedule in the Scoping Document.

Happy New Year!

**Angie Anderegg**
Hydro Services
(205)257-2251
arsegars@southernco.com

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**From:** Anderegg, Angela Segars <ARSEGARS@southernco.com>
**Sent:** Friday, October 16, 2020 9:03 AM
**To:** Sarah Salazar <Sarah.Salazar@ferc.gov>
**Subject:** RE: schedule question - Harris P-2628

Hi Sarah,

Absolutely. As I mentioned, we're looking at filing the USR ~1 month earlier than the current schedule (with the USR meeting within 15 days of filing, the meeting summary filed within 15 days after that, etc.). We'll file a request as soon as we've nailed it down.

Thanks!

**Angie Anderegg**
Hydro Services
(205)257-2251
arsegars@southernco.com

**From:** Sarah Salazar <Sarah.Salazar@ferc.gov>
**Sent:** Tuesday, October 13, 2020 12:56 PM
**To:** Anderegg, Angela Segars <ARSEGARS@southernco.com>
**Subject:** RE: schedule question - Harris P-2628



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Hi Angie,

Whenever you have the proposed dates for the USR filing and meeting ready, could you file the request to change that part of the schedule with the Secretary so that we can officially respond? If you all have received any feedback from any stakeholders on the idea, that would be good to include with the request. Let me know if you have any follow-up questions.

Thanks in advance,

Sarah L. Salazar ✧ *Environmental Biologist* ✧ *Federal Energy Regulatory Commission* ✧ *888 First St, NE, Washington, DC 20426* ✧ *(202) 502-6863*


**From:** Anderegg, Angela Segars <ARSEGARS@southernco.com>
**Sent:** Friday, October 09, 2020 9:57 AM
**To:** Sarah Salazar <Sarah.Salazar@ferc.gov>
**Subject:** RE: schedule question - Harris P-2628

Thanks, Sarah! I'm off through first of next week as well. Have a wonderful long weekend!

**Angie Anderegg**
Hydro Services
(205)257-2251
arsegars@southernco.com

**From:** Sarah Salazar <Sarah.Salazar@ferc.gov>
**Sent:** Thursday, October 8, 2020 2:57 PM
**To:** Anderegg, Angela Segars <ARSEGARS@southernco.com>
**Subject:** schedule question - Harris P-2628



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Hi Angie, I sent forward your question regarding the potential updated study report (USR) filing and USR meeting schedule change and I will let you know as soon as I have a response. Note-I'm off tomorrow through Monday (holiday). So if I don't have a response this week, I'll get in touch first thing next week.

Thanks in advance for your patience and have a nice weekend!

Sarah L. Salazar ✧ *Environmental Biologist* ✧ *Federal Energy Regulatory Commission* ✧ *888 First St, NE, Washington, DC 20426* ✧ *(202) 502-6863*

# HAT 4 - Revised Draft Shoreline Management Plan based on comments received

APC Harris Relicensing <g2apchr@southernco.com>

Tue 1/5/2021 7:37 PM

**To:** APC Harris Relicensing <harrisrelicensing@southernco.com>
**Bcc:** damon.abernethy@dcnr.alabama.gov <damon.abernethy@dcnr.alabama.gov>; nathan.aycock@dcnr.alabama.gov <nathan.aycock@dcnr.alabama.gov>; steve.bryant@dcnr.alabama.gov <steve.bryant@dcnr.alabama.gov>; todd.fobian@dcnr.alabama.gov <todd.fobian@dcnr.alabama.gov>; keith.gauldin@dcnr.alabama.gov <keith.gauldin@dcnr.alabama.gov>; chris.greene@dcnr.alabama.gov <chris.greene@dcnr.alabama.gov>; keith.henderson@dcnr.alabama.gov <keith.henderson@dcnr.alabama.gov>; mike.holley@dcnr.alabama.gov <mike.holley@dcnr.alabama.gov>; evan.lawrence@dcnr.alabama.gov <evan.lawrence@dcnr.alabama.gov>; matthew.marshall@dcnr.alabama.gov <matthew.marshall@dcnr.alabama.gov>; amy.silvano@dcnr.alabama.gov <amy.silvano@dcnr.alabama.gov>; chris.smith@dcnr.alabama.gov <chris.smith@dcnr.alabama.gov>; ken.wills@jcdh.org <ken.wills@jcdh.org>; matt.brooks@alea.gov <matt.brooks@alea.gov>; coty.brown@alea.gov <coty.brown@alea.gov>; arsegars@southernco.com <arsegars@southernco.com>; dkanders@southernco.com <dkanders@southernco.com>; jefbaker@southernco.com <jefbaker@southernco.com>; jabeason@southernco.com <jabeason@southernco.com>; jcarlee@southernco.com <jcarlee@southernco.com>

2 attachments (770 KB)
2021-01-05 DRAFT Harris SMP.pdf; 20201019A.pdf;

HAT 4,

Alabama Power provided a draft Shoreline Management Plan (SMP) to HAT 4 on October 5, 2020. Comments regarding the draft document were discussed during a HAT 4 meeting on October 19th, 2020 and could also be submitted in writing no later than November 2, 2020. A revised draft SMP is attached to this email based upon the written and verbal comments received. Please review the attached draft and provide any comments no later than February 6, 2021.

The Alabama Glade Conservation Coalition (AGCC) provided verbal comments during the October 19th HAT 4 meeting as well as submitted written comments on October 19, 2020 (attached for reference). Verbal comments received during the October 19th HAT 4 meeting are summarized within the meeting notes as previously provided to HAT 4 participants, which can be found in the HAT 4 folder on the Harris relicensing website.

No other comments on the draft SMP were received.

Alabama Power has included within its Project Land proposal the reclassification of +/- 57 acres of existing Project lands (identified as RC7 within the Final Phase 1 Project Lands Evaluation Report) from Recreation to Natural/Undeveloped due to the presence of the rare Blake's Ferry Pluton.

Comments on the draft SMP as submitted by AGCC pertained to the reclassification and/or the use of a sensitive designation of the Flat Rock backcountry area, aka Flat Rock Botanical Conservation Area, as part of the FERC relicensing process for the Harris Project. Specifically, the following recommendations were included in the comments:

1. Minimize heavy recreational/vehicle impacts
2. Removal and reduction of exotic invasive plants
3. Controlled reintroduction of fire to the natural community

Alabama Power has reviewed the recommendations submitted by AGCC and is proposing that the Natural/Undeveloped land use classification meets the recommendations to protect this area. Therefore, no additional land use classification is being proposed. As currently outlined in the draft SMP (Section 4.1.7), the Natural/Undeveloped land use classification ensures that Project lands remain undeveloped for, among other purposes, the purpose of protecting environmentally sensitive areas. As such, management of lands within this

classification in a manner to minimize heavy recreational/vehicle impacts in order to protect the area is consistent with the current proposal. Reclassifying the area from Recreation to Natural/Undeveloped supports the future possible need to take such management actions.

Further, Alabama Power manages land within the Natural/Undeveloped classification in accordance with normal forestry management practices, as outlined in the Draft Harris Wildlife Management Plan being developed in conjunction with the SMP, and the Natural/Undeveloped classification does not preclude the future removal and reduction of exotic invasive plants and/or controlled reintroduction of fire to the natural community as deemed necessary and as determined to be in accordance with Alabama Power's overall timber management practices.

Lastly, Alabama Power does not believe that that a sensitive designation is needed to provide the protections recommended by AGCC. As described in Section 4.2 of the draft SMP, designations are used in conjunction with the shoreline classifications in order to highly restrict or prohibit permitted activities in areas designated as sensitive. For example, a homeowner who submits a permit application for the construction of a boat ramp will be subject to additional requirements and could possibility be denied a permit if the area designated as sensitive. However, the Flat Rock botanical area will not be subject to permitting applications since the land is owned by Alabama Power and will be classified as Natural/Undeveloped.

Therefore, the attached draft has been modified to eliminate the separate land classification for the botanical area as it will be protected under the Natural/Undeveloped classification. Additionally, minor edits have been made within Section 5.1.2 in order to add the Alabama Power website as a method for reporting possible permitting violations.

Thank you,

**Angie Anderegg**
Hydro Services
(205)257-2251
arsegars@southernco.com

# SHORELINE MANAGEMENT PLAN

## R.L. HARRIS HYDROELECTRIC PROJECT

FERC No. 2628

**DRAFT**

***Prepared by:***

Alabama Power

Birmingham, Alabama

January 2021

# SHORELINE MANAGEMENT PLAN

## R.L. HARRIS HYDROELECTRIC PROJECT

ALABAMA POWER COMPANY
BIRMINGHAM, ALABAMA

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## GLOSSARY OF SHORELINE TERMS AND DEFINITIONS

| TERM | DEFINITION |
|---|---|
| Abandoned structure | A dock, walkway, or other shoreline structure which is free floating, unidentified, and unpermitted and has drifted onto Alabama Power Company shoreline property. |
| Alabama Power | Alabama Power Company (APC) |
| Alabama Power Fee Simple Lands | Lands owned wholly by the Alabama Power Company. |
| Bank / shoreline stabilization | Any activity intended to reduce the amount of erosion on the reservoir boundary (*e.g.*, installation of sea walls, riprap, and vegetation). |
| BMP | Best Management Practice(s) – On-site actions generally taken by property owners to lessen impacts to a particular resource which is the result of direct or indirect use of that resource. |
| Boat dock | A facility for storing or mooring watercraft. |
| Boat ramp | A boat launch used to back a trailer into the water in order to float a vessel. |
| Boat slip | A fixed or floating unroofed structure, confined on three sides, used for temporary or permanent storage and/or mooring of a watercraft. |
| Boathouse | A fixed or floating roofed structure on Project lands and waters designed for permanent or temporary watercraft storage. |
| Buffer | A naturally managed vegetative filter strip designed to minimize the impacts of developed areas on natural resources. |
| Buffer Zone | An area of land specifically designed to separate one zoning use from another, such as separating a residential neighborhood from an industrial area. |
| Causeways | A man-made connection between the reservoir shoreline and an island. |
| Channelization | The process of diverting project waters to create an artificial waterway. |
| Commercial recreation facilities | Shoreline facilities operated for profit (*e.g.*, marinas, boat ramps/launches). |
| Cultural resources | Sites, items, and structures of historical, archaeological, or architectural significance. |
| Dilapidated structure | Privately-owned shoreline structures and/or facilities affixed to an adjoining landowner's property that are no longer serviceable. |

| TERM | DEFINITION |
|---|---|
| Dredging | The process of removing silt, soil or other rock material from within the full pool elevation of the Project as authorized by the Federal Energy Regulatory Commission. |
| Encroachment | Any use or occupancy of Project lands for which the user does not have the necessary rights or permission. |
| Erosion | The scouring of land or soil by the action of wind, water, or ice. |
| FERC | Federal Energy Regulatory Commission - An independent agency that regulates the interstate transmission of electricity, natural gas, and oil. FERC is responsible for licensing non-federal hydropower Projects in the U.S. |
| Filling | The process of depositing soil or other materials in an area. |
| Gabion | Construction technique using wire mesh forms filled with rock, or concrete that often is used on shorelines and in streams to prevent erosion and provide foundational or structural support for nearby structures or soils. |
| Habitat | The locality or external environment in which a plant or animal normally lives and grows. |
| Legacy structures | Structures that predate Alabama Power's current shoreline permitting program that may or may not conform to current "General Guidelines for Shoreline Permitting". |
| Natural vegetation management | Preserving native trees, shrubs, and other plants in their natural state by limiting removal, trimming, and clearing. The intent of this set of practices is to improve soil retention, slow and filter storm water, and provide cover and forage for native species. |
| Non-conforming structure | A structure that does not meet Alabama Power's current "General Guidelines for Shoreline Permitting." |
| Operating license | The terms and conditions in which Alabama Power is granted permission by FERC to operate its hydroelectric Projects. |
| Permit | The written authorization from Alabama Power to an individual or entity, allowing performance of a specific activity, placement, or use of a structure and/or facility on Project lands. |
| Permitted facilities | Structures and/or facilities that have been approved and permitted by Alabama Power. |
| Permittee | The holder of a permit approved and issued by Alabama Power. |
| Pier | A structure, generally providing recreational access from land to water. |
| Project | The lands, equipment and facilities necessary to operate a FERC licensed hydroelectric facility. |
| Project boundary | A line established by FERC to define the lands, waters, and structures needed to operate a licensed hydroelectric Project. |

| TERM | DEFINITION |
|---|---|
| Project lands | Lands within the FERC-designated Project Boundary. |
| Project operations | A shoreline classification that allows for limited public use. May also refer to the actual operation of the hydroelectric facility. |
| Rain garden | A perennial garden planted with locally adapted plants and flowers that are positioned between storm water runoff sources (roofs, driveways, parking lots) and destinations (storm drains, streets, and creeks). Rain gardens are designed to capture, retain and provide infiltration opportunities for storm water runoff, while plants and flowers remove pollutants from runoff. |
| Reservoir | A man-made lake into which water flows and is stored for future use and is controlled in accordance with the FERC license and U.S. Army Corps of Engineers manual, if appropriate. |
| Relicensing | The administrative proceeding in which FERC, in consultation with other federal and state agencies and interested stakeholders, decides whether and on what terms to issue a new license for an existing hydroelectric Project. |
| Riprap | Layer of large, durable materials (usually rocks) used to protect the reservoir shoreline boundary from erosion; may also refer to the materials used. |
| Runoff | Water from rain, melted snow, landscaping irrigation, and other sources that flows over land and into local creeks, streams, and waterways. |
| Seawall | A structure of stone, concrete, wood or other sturdy material built along the shoreline to prevent erosion and/or to hold back soil on steep slopes (also known as “bulkhead”). |
| SMP | Shoreline Management Plan. |
| Shoreline classification | A system of land use categories based on existing and potential future land use, ownership, and resource value. Used as a planning tool to help provide an overall framework for long-term shoreline management activities and development. |
| Shoreline Compliance Program (SCP) | A program initiated by Alabama Power to ensure compliance of activities that occur on Project shorelines and to implement the SMP. The six-component program includes (1) a shoreline permitting program; (2) structure identification, assessment, and resolution; (3) public education and communication; (4) a surveillance program; (5) shoreline litigation; and (6) shoreline preservation initiatives. |
| Shoreline development | A general reference to the many structures and uses which may be present along reservoir shorelines including homes and commercial, industrial, private philanthropic and recreational developments. |

| TERM | DEFINITION |
|---|---|
| Stakeholders | Private citizens, community groups, non-governmental organizations, and State and Federal agency representatives with interest in shoreline management activities. |
| Use and Occupancy | A license article, also referred to as the Standard Land Use Article, in Alabama Power's existing operating license(s) guiding Alabama Power's authority to grant permission for certain types of use and occupancy of Project lands and waters and convey certain interests in Project lands and waters. |

**SHORELINE MANAGEMENT PLAN**

**R.L. HARRIS HYDROELECTRIC PROJECT**
**(FERC NO. 2628)**

**ALABAMA POWER COMPANY**
**BIRMINGHAM, ALABAMA**

# 1.0 INTRODUCTION

The Alabama Power Company (Alabama Power) manages its hydroelectric reservoir shorelines and project lands to comply with its Federal Energy Regulatory Commission (FERC) operating licenses and to serve the greater public interest by providing recreational access, protecting wildlife habitat, producing low cost electricity, and preserving cultural as well as aesthetic resources. In an effort to guide existing and future management actions within the boundary established by FERC for the R.L. Harris Hydroelectric Project ("the Harris Project" or "the Project"), Alabama Power developed this Shoreline Management Program (SMP). This SMP was developed in accordance with established FERC guidelines for developing Shoreline Management Programs and in cooperation with relicensing stakeholders, including federal and state regulatory agencies, interested non-governmental organizations (NGOs), and concerned citizens. The SMP is submitted as a part of Alabama Power's R.L. Harris Hydroelectric Project Application for a New License, (License Application) filed with FERC in 2021. The SMP was developed in consultation with the Harris Action Team (HAT) 4. A detailed listing of those individuals, their affiliation, and meeting dates, along with a list of their comments on the draft SMP, is provided in Appendix A. Along with developing the SMP, HAT 4 members also reviewed Alabama Power's proposal for adding, removing, and reclassifying lands within the Project Boundary as well as the draft Wildlife Management Plan. The results of adding, removing, and reclassifying lands are detailed in Exhibit E of the License Application, and the draft Wildlife Management Plan is provided as well.

The Harris SMP is modeled after the Martin Dam Project (FERC No. 349) and Warrior River Project (FERC No. 2165) SMPs with the overall objective for Alabama Power to have a uniform system for managing the Project shorelines across all Alabama Power hydroelectric projects.

## 1.1 PROJECT DESCRIPTION

Alabama Power owns and operates the Harris Project, FERC Project No. 2628, licensed by FERC. Alabama Power is relicensing the 135-megawatt (MW) Harris Project, and the existing license expires in 2023. The Harris Project consists of a dam, spillway, powerhouse, and those lands and waters necessary for the operation of the hydroelectric project and enhancement and protection of environmental resources. These structures, lands, and water are enclosed within the FERC Project Boundary. Under the existing Harris Project license, the FERC Project Boundary encloses two distinct geographic areas, described below.

Harris Reservoir is the 9,870-acre reservoir (Harris Reservoir) created by the R.L. Harris Dam. The lands adjoining the reservoir total approximately XXXX acres, comprised of 367 miles of shoreline, and are included in the FERC Project Boundary (Figure 1-1). This includes land to 795 feet mean sea level (msl)[1], as well as natural undeveloped areas, hunting lands, prohibited access areas, recreational areas, and all islands.


The Harris Project also contains 15,063 acres of project lands within the James D. Martin-Skyline Wildlife Management Area located in Jackson County, Alabama. These lands are located approximately 110 miles north of Harris Reservoir and were acquired and incorporated into the FERC Project Boundary as part of the July 29, 1988 Harris Project Wildlife Mitigative Plan and the June 29, 1990 Wildlife Management Plan.

The only waterbody managed by Alabama Power as part of its FERC license for the Harris Project is the Harris Reservoir. Therefore, because the project lands at Skyline are not on a waterbody, these lands are not a part of this SMP. Management of these Project lands is outlined in the Harris Wildlife Management Plan, and the term "Project Boundary" within this document refers to only those Project lands located at Lake Harris.

[1] Also includes a scenic easement (to 800 feet msl or 50 horizontal feet from 793 feet msl, whichever is less, but never less than 795 feet msl).

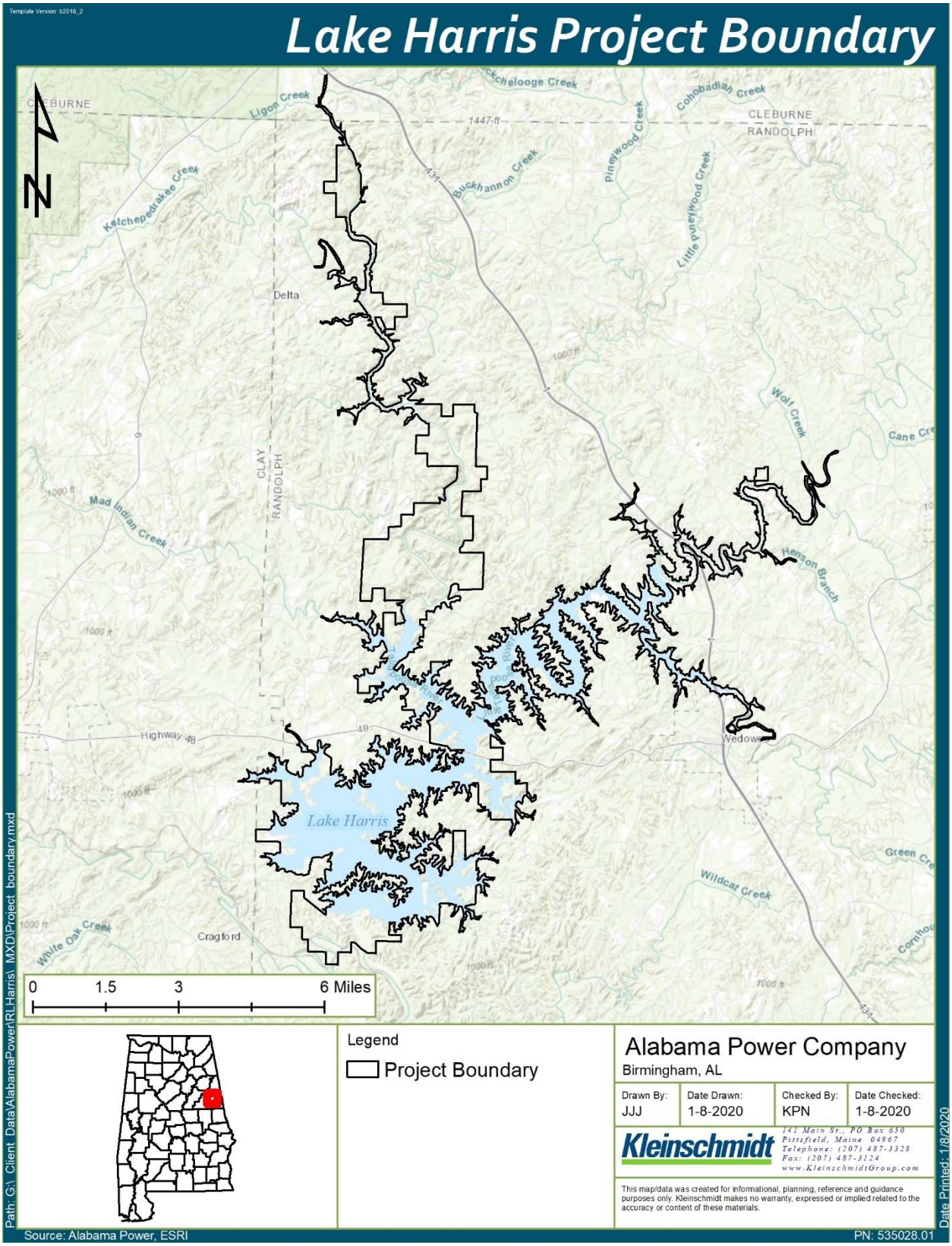



**FIGURE 1-1 LAKE HARRIS PROJECT BOUNDARY**

# 2.0 PURPOSE AND GOALS OF THE SHORELINE MANAGEMENT PLAN

This SMP serves as a comprehensive guide for managing Project shoreline lands consistent with license requirements and Project purposes. The overarching goal of the SMP is to ensure that shoreline development is consistent with the protection and enhancement of environmental, scenic, cultural, and recreational values, while ensuring the continued safe and reliable production of hydroelectric power at the Project.

General goals discussed under this SMP include the following:

- facilitate compliance with license articles;
- provide for reasonable public access;
- protect fish and wildlife habitat;
- protect cultural resources;
- protect operational needs;
- minimize adverse impacts to water quality;
- minimize erosion;
- minimize sedimentation
- minimize adverse scenic effects; and
- guide shoreline development.

The above goals are achieved through the implementation of this SMP as well as through the implementation of several related relicensing management plans. A variety of protection, mitigation, and enhancement measures agreed to by Alabama Power and the HATs as well as the enforcement of applicable federal, state, and local laws and regulations also serve to achieve the goals outlined in this plan[2].

[2] The SMP itself, along with its proposed BMPs, land classifications, and changes to the permitting program, all encompass protection, mitigation, and enhancement measures. There are also many proposals being put forth in the License Application that protect, mitigate, and enhance, directly or indirectly, shoreline resources.

# 3.0 SHORELINE MANAGEMENT POLICIES

The overarching Shoreline Conservation Policy and the following shoreline management policies are designed to guide existing and future shoreline management actions at the Project.

## 3.1 SHORELINE CONSERVATION POLICY

Alabama Power created the following policy to help guide future shoreline management actions. This policy provides a general statement affirming Alabama Power's position on shoreline resources, as follows:

> *Alabama Power Company actively promotes the conservation and protection of Project shoreline lands and their associated scenic, cultural, recreational, and environmental values.*

Working cooperatively with other parties, Alabama Power will implement this policy through a combination of regulatory and voluntary actions. Regulatory actions include the enforcement of existing state and federal regulations including, but not limited to, the Clean Water Act, Endangered Species Act, Wetlands Protection Act, National Historic Preservation Act, and the Federal Power Act. Regulations under these statutes are enforced by the appropriate state and federal resource agencies working in cooperation with Alabama Power and Alabama Power's Shoreline Compliance Program (SCP), which is discussed in Section 5.0. Alabama Power will work with other parties, including private property owners, to promote a set of shoreline best management practices (BMPs) designed to protect and enhance valuable shoreline resources in addition to resources specifically protected by existing laws and regulations.

In addition to the overall policy to guide shoreline management actions, several other key policies have been incorporated to support and uphold management decisions concerning the Project.

## 3.2 SHORELINE MANAGEMENT POLICIES

**Bank Stabilization:** Considerable concern has been expressed regarding the use of seawalls for bank stabilization on Alabama Power lakes. Such structures typically impact aquatic habitat (and provide little aquatic habitat value), often increase run-off (particularly if all woody vegetation is removed), and are not sustainable without continued, long-term maintenance. In many cases, such structures can degrade bank stability over time, either at the site of construction or adjacent to it.

Riprap and natural bank stabilization are the preferred methods of erosion control; however, use of seawalls will be evaluated and may be approved on a case-by-case basis. Alabama Power generally restricts the use of new seawalls to areas where there is:

- evidence of significant active erosion,
- high potential for substantial wave action (due to the area's location on open waters),
- heavy and/or frequent boat traffic,
- a previously installed seawall which has failed,
- a combination of the above.

*Alabama Power Company encourages the use of alternative bank stabilization techniques other than seawalls. Such alternatives include, but are not limited to, riprap, bioengineering techniques, natural vegetation with riprap, and gabions. Alabama Power requires, as a condition of a permit, that any future seawall proposals include the placement of riprap, for fish and other semi-aquatic species habitat and increased stability, in front of the seawall. Only in very limited cases where the Alabama Power regional coordinator is convinced that riprap would not be an effective source of bank stabilization, or would be economically unfeasible, would seawalls without riprap be permitted.*

**Dredging:** Alabama Power conducts its dredging activities in accordance with the July 6, 2011 FERC-approved Dredge Permit Program (Appendix B) and its operating licenses. The Dredge Permit Program was developed in consultation with the U.S. Army Corps of Engineers (USACE) and other agencies and covers all of Alabama Power's hydroelectric Projects on the Warrior,

Coosa, and Tallapoosa Rivers. The program establishes the process and procedures for permittees seeking to obtain direct authorization from Alabama Power for dredging activities up to 500 cubic yards (CY) of material (below the full pool elevation). The Program is not intended to cover applications for dredging on lands determined to be "sensitive" as described in Section 4.2 and as noted within each Project's respective SMP.

> *Dredging may be allowed but will be restricted in and around sensitive resource areas. Requests for dredging will be considered on a case-by-case basis and must be approved by Alabama Power prior to the initiation of any dredging activities.*

**Channelization:** Alabama Power receives numerous inquiries from property owners adjacent to its reservoirs concerning the excavation of channels and sloughs to create additional shoreline. Typically, these proposals involve removal of soil adjacent to the reservoir in order to divert Project waters onto non-project land for developmental purposes. Any such changes to the shoreline constitute a deviation from Alabama Power's FERC-approved project boundary maps and can have significant impacts to fish and wildlife habitat. In addition, allowing channelization can lead to uncontrolled development of Project lands and waters and can create conflict between adjoining property owners.

> *It is the policy of Alabama Power to prohibit channelization on its reservoirs. This general prohibition includes channelization proposals by both private and commercial interests. Alabama Power's channelization policy is an important element of Alabama Power's efforts to best manage Project lands and waters consistent with its FERC-issued licenses, to control shoreline development, and to protect habitat and other natural resource features of these Projects.*

**Water Withdrawals:** Alabama Power impounds a substantial amount of water in its project reservoirs and, as a result, various entities seek permission to use these reservoirs to meet municipal, industrial, and agricultural water supply needs. Since these withdrawals require the use of Alabama Power's Project lands and waters, FERC has jurisdiction over these "joint uses." For this reason, FERC has included provisions in Alabama Power's license that require Alabama Power to obtain FERC authorization before permitting a water withdrawal greater than 1 million

gallons per day (mgd) from a Project reservoir. FERC has delegated approval authority to Alabama Power for joint uses of 1 mgd or less. Furthermore, the license states that Alabama Power may receive reasonable compensation for the impacts of the withdrawal of water from the Project. Through either specific FERC authorization or through its delegated authority, Alabama Power has approved numerous water withdrawals from its Project reservoirs and has charged withdrawers a reasonable cost for the resulting impacts on Alabama Power's hydroelectric lands and operations, consistent with these license provisions. Among other things, the compensation policy is intended to encourage conservative use of water and promote the development of additional water storage facilities in Alabama.

> *It is the policy of Alabama Power to evaluate each application for permission to withdraw water from its Project reservoirs, and, in appropriate circumstances, seek FERC authorization to permit water withdrawals on Project lands. In accordance with the provisions of its licenses, Alabama Power will receive reasonable compensation, as applicable, for water withdrawals. This reasonable compensation may include administrative costs, the replacement cost of the energy lost as a result of the withdrawal and the replacement cost of the storage in the reservoir allocated to the withdrawer. Adjacent single-family home uses, such as lawn/garden watering or other similar de minimus uses are excluded from this policy.*

**Causeways:** Many of Alabama Power's reservoirs have islands which lie relatively close to the shore of the mainland or other islands. From time to time, Alabama Power receives a request for permission to construct a causeway to connect an island to the mainland or other islands to facilitate development or some other use. In most cases, creating a causeway involves placing fill material within Alabama Power's reservoir. Filling of Project lands and waters may destroy fish habitat, impair navigability, and reduce the available storage in the reservoir for power generation and flood control. In addition, changes to the shoreline caused by the construction of causeways constitute a deviation from FERC-approved Project maps and exhibits.

> *It is the policy of Alabama Power to prohibit the creation of causeways on its reservoirs to connect islands to the mainland or to other islands. This policy is*

*intended to protect the integrity of the existing Project features and shoreline, as well as fish habitat, navigation, and Project operations. When Alabama Power receives an inquiry concerning the construction of a causeway, Alabama Power will work with the property owner to investigate potential alternatives that may be acceptable to Alabama Power and FERC.*

# 4.0 SHORELINE MANAGEMENT CLASSIFICATIONS

Alabama Power's shoreline classifications for the Project are based on an evaluation of existing land use, land ownership, and knowledge regarding shoreline resource values. Descriptions of the shoreline classifications, descriptions of allowable and prohibited uses for each of the classifications, and a table depicting the acreage in each classification are described in detail below.

## 4.1 SHORELINE CLASSIFICATION SYSTEM

In consultation with stakeholders and agencies, Alabama Power developed a shoreline classification system to guide management and permitting activities within the Project Boundary. The shoreline classifications are based on an evaluation of existing and potential land use. Information about current use of land abutting the Project Boundary provided a baseline for determining the most appropriate designations for shoreline property within the Project Boundary. For example, the presence of a residential area immediately outside of an undeveloped strip of land within the Project Boundary generally would preclude classifying that Project land as Natural/Undeveloped. Appendix C provides the shoreline classification maps for each Project development.

The seven shoreline classifications for the Project lands are defined below.

### 4.1.1 PROJECT OPERATIONS

This classification includes Project lands reserved for current and potential future operational activities. This includes all Project lands used for hydroelectric generation, switchyards, transmission facilities, rights-of-way, security, and other operational uses. Alabama Power owns these lands in fee simple title. For security, the allowable uses in this classification are primarily restricted to Alabama Power personnel; however, in some cases, such as guided public tours, limited public access is available. XXXX acres of land are classified for Project Operations.

### 4.1.2 RECREATION

This classification includes Project lands managed by Alabama Power for existing or potential future recreational activities. This includes land that is developed for public recreation, open space, water access, and future recreational development. Alabama Power typically owns these lands in fee simple title, but they may be operated by a third party under a lease agreement with Alabama Power. The allowable uses in the Recreation classification include public access and day and evening recreational use. This classification may allow facilities/structures, such as parks with boat slips, beach areas, dry boat storage facilities, trails etc. XXXX acres of land are classified for Recreation.

### 4.1.3 COMMERCIAL RECREATION

These lands contain or are designated for concessionaire-operated public marinas and recreational areas that provide a wide variety of recreational services to the public on a fee basis. Structures on these lands are generally subject to approval by FERC through the process outlined in Section 5.1.1.3. XX acres of lands are classified as Commercial Recreation.

### 4.1.4 FLOOD STORAGE

This classification includes lands located between the 793' mean sea level (msl) contour and the 795' msl contour (Figure 4-1). These lands are owned in fee simple by Alabama Power and are used for the project purpose of storing flood waters from time to time.

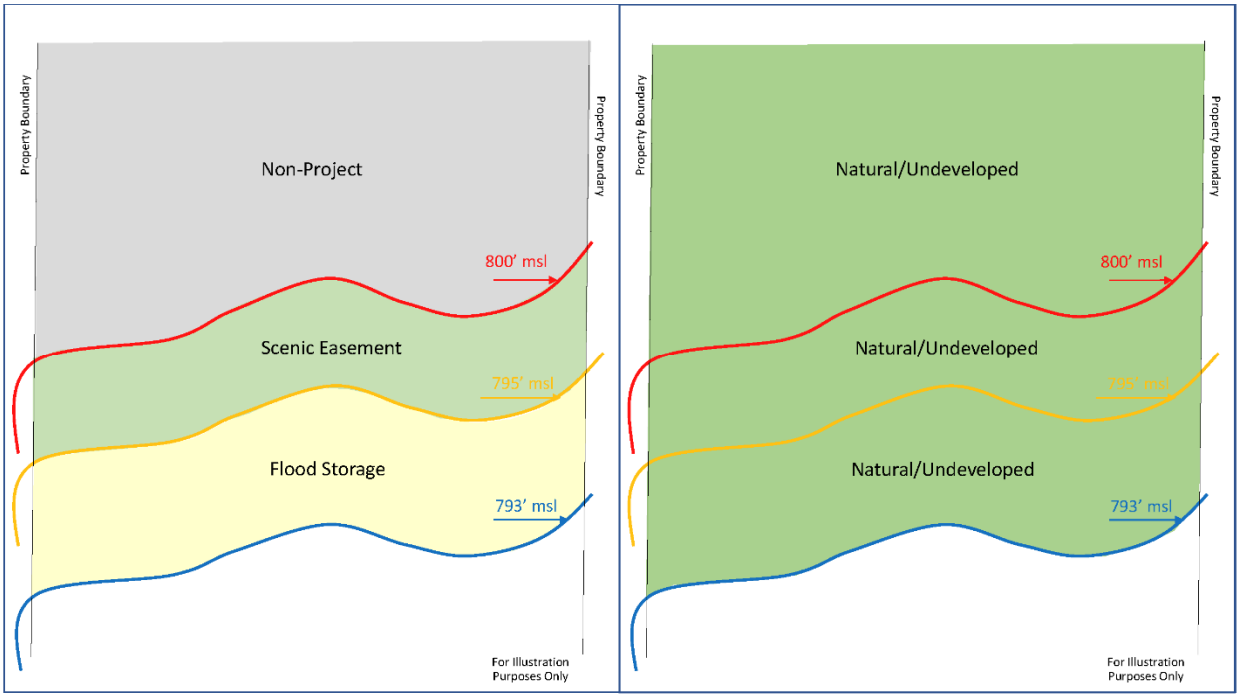
These lands…XX acres of lands are classified as Flood Storage.

### 4.1.5 SCENIC EASEMENT

This classification includes lands located between the 795' msl contour and the 800'[3] msl contour (Figure 4-1). These lands are controlled by easement for the project purpose of protecting scenic and environmental values.

These lands…XX acres of lands are classified as Scenic Easement.

[3] Or 50 horizontal feet from 793 feet msl, whichever is less, but never less than 795 feet msl.




**4-1 ILLUSTRATION OF CLASSIFICATIONS**

### 4.1.6 HUNTING

This classification includes lands that are managed to provide hunting opportunities (either through hunting leases or individual permits) as prescribed in accordance with the existing Harris Project Wildlife Management Plan[4]. Non-hunting related public access is allowed from May 1 until September 30 of each year for activities such as hiking, backpacking, camping, wildlife observation, and bank fishing opportunities. XX acres of land are classified as Hunting.

### 4.1.7 NATURAL/UNDEVELOPED

Lands included in the Natural/Undeveloped classification include Project lands which will remain undeveloped for the following specific Project purposes:

- protecting environmentally sensitive areas;
- preserving natural aesthetic qualities;
- serving as buffer zones around public recreation areas; and
- preventing overcrowding of partially developed shoreline.

[4] Harris Project lands located at Skyline are leased to and managed by the State of Alabama for wildlife management and public hunting. Because these lands do not have shoreline, management of these Project lands is outlined in the Harris Wildlife Management Plan

This classification allows for public hiking trails, nature studies, primitive camping, wildlife management (excluding hunting), and normal forestry management practices (as outlined in the Harris Wildlife Management Plan). Alabama Power typically owns these Project lands in fee simple title and manages them for effective protection of associated resource values. XX acres of lands are classified as Natural/Undeveloped.

## 4.2 SENSITIVE RESOURCES DESIGNATION

"Sensitive Resources" is a **designation** used in conjunction with the shoreline classifications (e.g., Recreation, Natural/Undeveloped, etc.), as appropriate. For example, a portion of an area classified as "Recreation" may also be designated as "Sensitive Resources." This designation is used on Project lands managed for the protection and enhancement of resources which are protected by state and/or federal law, executive order, or where other natural features are present which are considered important to the area or natural environment. This may include cultural resources, sites and structures listed on, or eligible for listing on, the National Register of Historic Places (NRHP); wetlands; Rare, Threatened, and Endangered species (RTE) habitat protection areas; significant scenic areas; and other sensitive ecological areas. Federal and state regulations require some information concerning the Sensitive Resources designation to remain confidential or proprietary.

Permitted activities in these areas, if applicable, may be highly restrictive or prohibited in order to avoid potential impacts to sensitive resources. A geographic information system (GIS) data layer that includes all known sensitive resource areas has been developed that provides information to Alabama Power Shoreline Representatives on the areas designated as Sensitive Resources. This GIS data layer is continuously updated as new information becomes available and Alabama Power will continue to use this GIS layer to record areas designated as Sensitive. Additionally, the SMP map included in Appendix C generally illustrate areas that are designated as sensitive. As stated above, the information depicted on this map is continuously updated; therefore, this map is accurate as of the filing of this updated SMP.

When a permit application is received for an area that is designated as Sensitive Resources, an environmental review by Alabama Power's Environmental Affairs Department (EA) is triggered.

This review must be completed prior to permitting. Of the 367 miles of shoreline within the Project Boundary. XX miles are currently designated as Sensitive Resources.

The allowable uses in the Sensitive Resources designation are described below.

### 4.2.1 ALLOWABLE USES IN AREAS DESIGNATED AS SENSITIVE RESOURCES

Alabama Power has developed guidelines for permitting activities on lands designated as Sensitive Resources within the Project Boundary. These guidelines for residential shoreline permits[5] will expedite the Alabama Power permitting process and will at the same time ensure the protection of cultural resources and wetlands.

#### 4.2.1.1 WETLANDS

The Sensitive Resources GIS data layer contains information on Project wetlands taken from surveys completed by Alabama Power's wetlands experts and/or areas identified on National Wetland Inventory (NWI) maps.

In addition, Alabama Power Shoreline Management Representatives receive training on the more common features of wetlands. If they suspect wetlands are present in an area where a permit has been requested, they will forward the permit to EA for review just as they would if the area had been designated as Sensitive Resources.

Any disturbance within wetlands is discouraged; however, if permittee wishes to pursue a Project within wetlands, EA will review all permit requests in areas sensitive for potential wetlands and will make a determination of impacts in consideration of all applicable rules and regulations. USACE granted Alabama Power permission to issue permits under the auspices of the USACE Mobile District Office under a Programmatic General Permit (PGPs) (Appendix D). However, the PGP does not authorize APC to permit dredge or fill in wetlands. Fill may include, but is not limited to, boat ramps, shoreline stabilization measures and spoil activity.

[5] Non-residential permits are reviewed in a separate process. Alabama Power evaluates the non-residential permits based on shoreline classification and agency review is required.

#### 4.2.1.2 CULTURAL RESOURCES

Cultural resources include archaeological and historic sites. When approved by FERC, Alabama Power will use the the R.L. Harris Hydroelectric Project Historic Properties Management Plan (HPMP) and Programmatic Agreement (PA), which are the governing documents, contain guidance on managing the Project in relation to the presence, or potential presence, of archeological and historic properties. No disturbance is allowed on the site of any known cultural resources prior to consulting with Alabama Power's EA Department. EA personnel will determine if a known site is present and if further testing is required. Upon completion of all required consultations, EA will contact Alabama Power's Shoreline Management Representative with notice that the permitted activity may proceed. In addition, if human remains, historic resources, or archaeological resources are discovered during any construction, all activities shall cease, and the permittee or its contractor shall contact Alabama Power immediately.

Alabama Power Shoreline Management Representatives are trained annually on how to identify areas with a high potential to contain archaeological properties and how to spot looting. If the Alabama Power Shoreline Management Representative encounters any possible cultural resources or looting, they will notify EA. EA will visit the site and conduct the appropriate level of archeological/historic testing and/or evaluation, if necessary.

**TABLE 4-1 EVALUATION MATRIX FOR R.L. HARRIS SENSITIVE RESOURCE AREAS - CULTURAL RESOURCES**

| SMP PERMITTED ACTIVITY | IF CULTURAL RESOURCES PRESENT |
|---|---|
| Piers and walkways – construction and maintenance | According to the HPMP, if known cultural resources are present:<br>1. Determine if the activity will affect cultural resources.<br>If yes, move to Step 2. If no, proceed with permitting process.<br>2. Determine if the cultural resources are significant.<br>o Check Alabama State Site File.<br>o Contact State Historic Preservation Office (SHPO), if needed.<br>If yes, move to Step 3. If no, proceed with permitting process.<br>3. If cultural resources are significant, one or more of the following actions will occur.<br>o Contact SHPO.<br>o Conduct a field survey.<br>o Avoid the area, relocate the permitted activity.<br>o Conduct additional testing. |
| Floating and Stationary Boathouses, Wetslips, and Boatslips with anchoring – construction and maintenance | This activity may be allowed or restricted based on coordination with SHPO, in accordance with the HPMP. See piers and walkways procedure. |
| Marine Rails – construction and maintenance | This activity may be allowed or restricted based on coordination with SHPO, in accordance with the HPMP. See piers and walkways procedure. |
| Boat Ramps – construction and maintenance | This activity may be allowed or restricted based on coordination with SHPO, in accordance with the HPMP. See piers and walkways procedure. If the boat ramp construction requires excavation, see procedure listed for spoil. |
| Shoreline Stabilization – new construction and extension of existing shoreline stabilization structures | This activity may be allowed or restricted based on coordination with SHPO, in accordance with the HPMP. See piers and walkways procedure. |
| Dredging/Spoil Area | All dredging requires review by EA. All spoil area determination requires consultation with SHPO, unless spoil will be located behind an existing seawall or in an approved landfill. |

| SMP PERMITTED ACTIVITY | IF CULTURAL RESOURCES PRESENT |
|---|---|
| Repair of an existing erosion site | This activity may be allowed or restricted based on coordination with SHPO, in accordance with the HPMP. See piers and walkways procedure. |

## 4.3 SUMMARY OF ACRES IN EACH CLASSIFICATION

Table 4-4 shows the acreages associated with each SMP classification as well as the Sensitive Resources designation.

**TABLE 4-4 R.L. HARRIS HYDROELECTRIC PROJECT SHORELINE CLASSIFICATIONS**

| CLASSIFICATION | ACRES | SHORELINE MILES | SHORELINE MILES SENSITIVE |
|---|---|---|---|
| Project Operations | XX | XX | XX |
| Recreation | XX | XX | XX |
| Commercial Recreation | XX | XX | XX |
| Flood Storage | XX | XX | XX |
| Scenic Buffer Zone | XX | XX | XX |
| Hunting | XX | XX | XX |
| Natural/Undeveloped | XX | XX | XX |
| **TOTAL**[6] | XX | XX | XX |

[6] Totals based upon updated calculations using LiDAR data and may not match totals reported in the past.

# 5.0 ALABAMA POWER'S SHORELINE COMPLIANCE PROGRAM

FERC is responsible for issuing licenses for the construction, operation, and maintenance of non-federal hydropower projects. Alabama Power, as the licensee, is responsible for operating and maintaining its FERC-licensed Projects in accordance with the license requirements and Project purposes (e.g., power generation, public recreation, environmental protection, aesthetic values). According to the provisions of its license, Alabama Power may authorize specific uses and occupancies of the Project reservoir's shoreline that are not related to hydroelectric power production or other Project purposes. Such uses of project lands and waters are typically referred to as "non-project uses."

During the mid-1980s, Alabama Power initiated a formal permitting program on Harris, and in 1992, it initiated a formal permitting program for its remaining 11 hydroelectric reservoirs. The USACE granted Alabama Power permission to issue permits under the auspices of the USACE Mobile District Office under a Programmatic General Permit (PGPs) (Appendix D). Alabama Power has continued working with the USACE to update the PGPs as necessary as well as to ensure compliance with its regulations.

In 2006, Alabama Power instituted an enhanced Shoreline Permitting Program, and in 2009 Alabama Power began identifying both permitted and unpermitted structures around its reservoirs and conducting surveillance quarterly and increased the frequency of reservoir surveillance as needed to reduce the number of new encroachments. On March 14, 2012, Alabama Power filed a Shoreline Compliance Plan (SCP) with FERC that incorporates Alabama Power's existing programs and processes along with a method to assess and resolve unpermitted structures on each of its reservoirs. FERC acknowledged that the SCP is consistent with Alabama Power's overall responsibilities under its project licenses to oversee and control shoreline development at the projects in a letter issued on August 17, 2012. The SCP includes six components:

(1) shoreline permitting;

(2) structure identification, assessment, and resolution;

(3) public education and communication;

(4) surveillance program;

(5) shoreline litigation; and

(6) shoreline preservation initiatives.

## 5.1 SHORELINE PERMITTING

A permit is needed when an activity proposed by an entity, often a shoreline property owner, could affect lands within the Project Boundary. Activities requiring permits include, but are not limited to, construction or modification of boat docks, boathouses, boat ramps, piers, shoreline stabilization materials (e.g., sea walls, riprap), and any activity that requires conveying an interest in, on, or across Project lands. Any development or construction along reservoir shorelines and within the Project Boundary must be permitted before work can begin. Depending on the nature, size, and location of the proposed activity, Alabama Power may implement a phased approach for permitting in which permits are issued sequentially for phases/components of large developments. Compliance with all initial conditions of existing permits is required before subsequent permits can be issued. Certain activities may be restricted or prohibited on shorelines designated as Sensitive Resources.

FERC has defined three levels of use in the Use and Occupancy Article. Uses covered in Paragraph (b) of the article typically involve residential piers, boat docks, and retaining walls. FERC has delegated the authority to review and approve these types of uses to Alabama Power. Uses covered in Paragraph (c) involve the conveyance of easements, rights-of-way, or leases and typically include activities such as replacement or maintenance of bridges and roads and structures such as: storm drains and water mains; telephone, gas, and electric distribution lines; minor access roads, and other similar structures. These requests require consultation with the appropriate state and federal agencies and stakeholders and ultimately can be permitted by Alabama Power after its review is complete. Paragraph (c) permits are reported to FERC on an annual basis. Uses covered in Paragraph (d) involve the conveyance of fee title, easements or right-of-ways, and leases, for activities such as the construction of new roads and bridges, sewer lines that discharge into Project waters, marinas, and other similar structures. These requests also require review by Alabama Power and consultation with the appropriate local, state, and federal agencies and stakeholders and also must be submitted to FERC for review and approval. Alabama Power generally considers all activities in paragraphs (c) and (d) and those activities not specifically defined in the Use and Occupancy article, as Non-Residential Permits.

Whether the non-project use is approved under the delegated authority described in the Use and Occupancy article or through formal FERC approval, Alabama Power is responsible for ensuring that the use is consistent with the purposes of protecting or enhancing the scenic, recreational, and other environmental values of the Project. Alabama Power has a responsibility under the license articles to supervise and control the use and occupancies for which it seeks or grants permission and to ensure compliance with the permits and instruments of conveyance that are executed.

In addition to these federally mandated review processes, the shoreline land classifications outlined in Section 4.1 will also be considered prior to permitting a requested activity, to ensure that the proposed land use activity is a permissible use within the applicable land-use classification. For example, permits requested on shorelines designated as Sensitive Resources will automatically trigger a review by EA who will decide if the proposed activity will significantly affect these sensitive resources; therefore, certain activities may be restricted or prohibited on some properties so designated.

### 5.1.1 PERMITTING GUIDELINES

Alabama Power has developed the "General Guidelines for Residential Shoreline Permitting and Permit Terms and Conditions" (guidelines) (Appendix E) for various types of activities. These guidelines are considered general, since each reservoir and lot is unique, and permitting policies may need to be adjusted periodically for various situations. As guidelines change (see Section 7.0), the most current guidelines will be attached to the SMP as it is updated over the term of the new license.

Alabama Power monitors new applications (and existing permits) through GIS and Records Management System, or RMS, latest software system. This information is used during regular surveillance activities to assess compliance with the terms and conditions of the applicable permit. Alabama Power uses the GPS coordinates of new permit applications to analyze the exact location of the proposed activity and identify any permit stipulations that may be required as a result of the associated land classification.

Alabama Power does not approve the design, engineering, etc. of structures within the Project, but instead approves the types, sizes, locations, and uses. The ownership, construction, operation, and maintenance of any permitted facility are the responsibility of the applicant, who is subject to and solely responsible for complying with all applicable federal, state, and local laws and regulations, including any applicable building or electrical codes. The applicant is responsible for all expenses related to obtaining any necessary federal, state, local permits or approvals.

Permit approval and acceptance by the applicant releases Alabama Power, its officers, agents and employees from any and all causes of action, suits at law or equity, or claims or demands, or from any liability of any nature whatsoever for or on account of any damages to persons or property, including the permitted facility, arising out of the ownership, construction, operation or maintenance by the permittee of the permitted facilities.

#### 5.1.1.1 RESIDENTIAL PERMITTING

A shoreline property owner generally initiates the permit process by contacting Alabama Power to request information about how to obtain a "Lakeshore Use Permit" (permit). During this initial contact, an Alabama Power Shoreline Management Representative explains the general permitting process and reviews the guidelines with the applicant. These guidelines do not attempt to address every specific situation that may exist on Alabama Power reservoirs but are provided as a general guide to assist property owners and their contractors with development and construction actions. Recognizing that site-specific circumstances may warrant special consideration, Alabama Power may make exceptions and modify these guidelines at its discretion.

Following the initial contact, an appointment may be made for an Alabama Power Shoreline Management Representative to visit and/or discuss the proposed activity/use, within the Project, with the property owner. During this meeting, the Alabama Power Shoreline Management Representative reviews drawings of the proposed activity or facility and examines the shoreline. After the Alabama Power Shoreline Management Representative reviews the applicable

guidelines with the property owner, the "Request for Lakeshore Use Permit," is completed and provided to Alabama Power for review [7].

As part of the review process, the application is reviewed to determine if the proposed project meets the General Guidelines for Residential Shoreline Permitting (Appendix E), the USACE PGP Conditions (Appendix D), and the Dredge Permit Program (Appendix B). If the application meets the PGP parameters (as well as other respective guidelines), the activity is authorized according to the applicable PGP(s) in the form of an approval letter[8] to the applicant and a copy of the letter is saved at the respective Shoreline office. Upon approval of the permit, the permittee is required to complete all facility construction within 1 year. If construction is not completed within the time allotted, the permit will become null and void unless the property owner obtains an extension of time from Alabama Power.

If the permit application is not approved or is found insufficient, Alabama Power's Shoreline Management Representative will explain the deficiencies to the property owner. Insufficient applications generally require an additional site inspection to review and discuss possible adjustments necessary to obtain approval. Alabama Power's Shoreline Management Representative makes the final permit decision.

#### 5.1.1.2 NON-RESIDENTIAL PERMITS (NRPS)

Non-Residential Permit applications corresponding to the appropriate paragraphs in the Use and Occupancy article are initiated through the local Alabama Power Shoreline Management Representative. Alabama Power generally conducts an on-site meeting with the applicant to discuss the guidelines and permitting process. The process to apply for and obtain a permit from Alabama Power for certain uses of the lands associated with each hydroelectric Project, including lake shorelines, consists of three phases:

- **PHASE 1 (INITIAL REVIEW)** – The period of time from an Applicant's receipt of the NRP Application Phase 1 Information Checklist (usually distributed at, or soon after, the initial

[7] If the proposed activity lies within a Sensitive Resource area, the procedures outlined in Section 4.2 apply.
[8] Approval letters are valid for a period of one year from issuance; if construction requiring both an approval letter and a permit is not completed within the one-year timeframe, the property owner must obtain an extension of time from Alabama Power on both the letter and the permit.

onsite meeting) until Alabama Power determines the Application is complete and ready for stakeholder consultation.

- **PHASE 2 (AGENCY/STAKEHOLDER CONSULTATION)** – The period of time from Alabama Power determining the Phase 1 Information is complete until Alabama Power determines agency/stakeholder consultation is complete. Upon completion of Phase 2, the Application is ready for filing for FERC authorization or issuance of a conveyance.
- **PHASE 3 (FERC REVIEW)** – The period of time from Alabama Power's filing of the Application with FERC until FERC issues its approval.

Alabama Power places NRPs into three groups: Non-Residential, Multiple Single-Family Type Dwellings, and Easements. Non-Residential permits cover marinas, and may also cover parks, overnight campgrounds and other similar facilities depending upon project details. Multi-Family permits[9] may be used for condominiums, planned residential facilities, long-term campgrounds, etc. Easement requests are often used for utility and road crossings as allowed for in Paragraphs (c) and (d) of the Use and Occupancy Article. Some developments may have a combination of the above-mentioned groups and may also include residential permits depending upon facility details. Alabama Power's guidelines for Non-Residential facilities and Multiple Single-Family Type Dwellings are provided in Appendix F.

### 5.1.2 PERMIT ENFORCEMENT

Alabama Power closely monitors activities along the shoreline to ensure that they are permitted and are being performed in accordance with the conditions outlined in the applicable permit. Alabama Power's surveillance program monitors each development on a regular basis. Unauthorized or unpermitted activities within the Project Boundary are treated as encroachments or violations. Alabama Power works with the responsible property owner to bring the activity into compliance with its permitting guidelines and terms and conditions. This may involve modification or removal of the structure(s) and restoration of disturbed shoreline at the owner's expense, permitting after completion of corrective actions, remediation, mitigation, litigation, or any combination of these. When unauthorized work is discovered, Alabama Power may seek a

[9] Certain multi-family permits may be permitted using Alabama Power's residential permitting process depending upon the facility details. For information regarding which multi-family permits will require the NRP process, reference Alabama Power's guidelines for Non-Residential facilities in Appendix F.

temporary restraining order to stop further construction work within the project, which can result in unwanted construction delays and additional expense for the owner.

A construction permit tag is issued with each approved permit, and a permanent permit tag is issued upon completion. These tags aid in the monitoring and surveillance of the reservoirs. Permit tags are posted on the permitted facility or on the land areas covered by the permit so that they can be visually checked with ease from the water.

The assistance of reservoir stakeholders in shoreline surveillance should not be overlooked. Stakeholders are encouraged to report possible permitting violations by calling the local Alabama Power Shoreline Management office, by calling 1-800-LAKES11 and following the prompts for the appropriate reservoir, or by visiting Alabama Power's Shoreline Management website located at: https://apcshorelines.com.

### 5.1.3 PERMIT TRANSFERABILITY

Permits are transferable by the permittee upon approval by Alabama Power. When a property is sold, or ownership is transferred, the new owner and permittee must contact Alabama Power to receive a permit transfer issued in their name. Alabama Power is available to consult with permittees prior to the sale or transfer of property to determine whether the permitted facilities are in compliance with Alabama Power permitting guidelines.

### 5.1.4 PERMIT REVOCATION

If a permittee fails to comply with any of the conditions of a permit, or with any additional conditions imposed by Alabama Power, or any federal, state or local agency, the permittee shall be required to take appropriate action to correct the violation. If the violation is not corrected within 60 days after written notification, Alabama Power may cancel the permit and require the removal of any facilities that were formerly permitted. Alabama Power may revoke a permit whenever it determines that the public interest necessitates such revocation or when it determines that the permittee has failed to comply with the conditions of the permit. The revocation notice, mailed by registered or certified letter, shall specify the reasons for such action. Alabama Power

may summarily revoke a permit in emergency circumstances. Alabama Power will consider extensions of the noted time frames on a case-by-case basis.

### 5.1.5 DILAPIDATED, ABANDONED AND UNPERMITTED STRUCTURES

Because the Project reservoirs have developed at different rates due to factors such as locality, population density, and age of development, the design and condition of structures on the reservoirs varies. Some structures do not meet current permit requirements, and some structures are in disrepair. Unpermitted structures are discussed in Section 5.2.

A dilapidated structure is one that is anchored or otherwise affixed to a piece of property and can no longer be considered serviceable due to its poor state of repair. Several structures on Alabama Power's reservoirs are considered dilapidated because of inadequate flotation or failing structural integrity, or both. Abandoned structures are free floating and not associated with any particular property.

Through the SCP, Alabama Power has established a program to address dilapidated and abandoned structures. Alabama Power removes abandoned structures from the reservoir in coordination with Renew Our Rivers and the Alabama Law Enforcement Agency - Marine Patrol. In the case of a dilapidated structure, a notice is issued to the property owner, asking the owner to contact Alabama Power. Alabama Power explains the issue and requests cooperative action from the owner to repair or remove the dilapidated structure. Alabama Power may pursue removal of these structures when it deems removal appropriate or when the Alabama Law Enforcement Agency - Marine Patrol determines a safety hazard exists.

## 5.2 STRUCTURE IDENTIFICATION, ASSESSMENT AND RESOLUTION

In 2009, Alabama Power began identifying all existing permitted structures and unpermitted legacy structures within the boundaries of its Projects. Each structure was assessed based on physical attributes, legal status, permitting status and the Project purpose of the occupied lands. Alabama Power began working with unpermitted legacy structure owners and other stakeholders to reach resolutions for non-conforming structures so that they can be brought within Alabama Power’s Shoreline Permitting program.

## 5.3 SURVEILLANCE PROGRAM

Alabama Power began its formal surveillance program in 1992 and initiated a revamped surveillance program in 2006. In 2009, Alabama Power continued improving its surveillance program by beginning to survey each reservoir on a quarterly basis in order to document emerging issues and track them to resolution. Beginning in 2011, Alabama Power further upgraded its surveillance program by increasing the frequency of reservoir surveillance and began utilizing newly developed RMS/surveillance tracking software to document potential compliance issues and to track them to resolution. Alabama Power surveys the 367 miles of shoreline associated with the Project on a regular basis.

# 6.0 BEST MANAGEMENT PRACTICES AND EROSION AND SEDIMENTATION CONTROL

## 6.1 BEST MANAGEMENT PRACTICES

Best management practices are on-site actions implemented by an individual or group to lessen the potential direct or indirect effects of the use of a particular resource. For example, if a property owner chooses to cut vegetation from his or her shoreline property to improve access or to improve the view-shed, the property owner may choose to clear selectively, replant low-lying vegetation that will help maintain the stability of the bank, or both. Selective clearing and replanting would be considered to be BMPs because they are on-site actions that would lessen the potential effects of clearing vegetation. Although the use of BMPs is not required by regulations, regulatory agencies throughout Alabama and the country actively promote the use of BMPs on shoreline projects to reduce potential adverse effects and assist in the conservation and protection of valuable shoreline resources.

Alabama Power, with assistance from relicensing stakeholders and other interested parties, supports public education efforts to encourage the adoption of shoreline BMPs as well as any other BMPs promoted by state and regulatory authorities. In addition, Alabama Power is committed to implementing applicable BMPs on Alabama Power fee simple owned lands classified as Recreation and Natural/Undeveloped. Alabama Power recommends that adjoining property owners adopt shoreline BMPs to maintain and preserve qualities associated with naturally vegetated shorelines, including water quality protection, shoreline stabilization, aesthetics, and wildlife habitat.

In addition to the information on the Alabama Power web site, Alabama Power developed an illustrated brochure entitled *Shoreline Management Practices* (Appendix G) that discusses general and historical information about each development and its reservoir. The *Shoreline Management Practices* brochure includes sections explaining BMPs, recommendations for implementing these practices, and diagrams that educate prospective permittees. Alabama Power's *Shorelines* publication also periodically features educational information regarding

erosion control and BMPs. Information regarding BMP's can be found at: https://apcshorelines.com/shoreline-management/.

### 6.1.1 BUFFERS AND VEGETATION MANAGEMENT

Vegetated shorelines are an important component of a healthy reservoir ecosystem. Naturally vegetated shorelines, including wetlands, can act as natural filters, facilitating the absorption and processing of runoff pollutants. This filtering ultimately reduces the amount of potentially harmful contaminants that enter a particular reservoir and contribute to water quality degradation. In addition to filtering potentially harmful pollutants, shorelines vegetated with native species also work to preserve the physical integrity of the shoreline. The root systems of naturally vegetated shorelines provide a structure that helps to maintain shoreline integrity and reduce excessive erosion that can lower water quality, and in some cases, adversely affect aquatic habitat. Naturally vegetated shorelines also improve the aesthetic integrity of the reservoir as well as the amount of habitat available to aquatic and terrestrial species.

Alabama Power recommends that property owners adopt the following shoreline BMPs to maintain and preserve those qualities associated with naturally vegetated shorelines:

1. Plant native trees, shrubs, and flowers for landscaping and gardens in order to reduce watering as well as chemical and pesticide use. Reference information can be found in Appendix G.
2. Preserve or establish a naturally managed vegetative filter strip along the shoreline to keep clearing of native trees and vegetation to a minimum. Alabama Power recommends a buffer set back of at least 15 feet measured horizontally from the full pool elevation[10].
3. Plant a low maintenance, slow growing grass that is recommended for your soil conditions and climate. Reference information can be found in Appendix G.
4. Maintain the grass as high as possible in order to shade out weeds and improve rooting so less fertilizing and watering are required.
5. Avoid dumping leaves or yard debris on or near the shoreline.

[10] The BMP recommended here does not in any way supersede or replace the requirements of the scenic easement. Scenic easements include covenants running with the land for the project purpose of protecting scenic and environmental values and, as such, are requirements and not recommendations.

### 6.1.2 WATER QUALITY

Water quality is an important indicator of the overall health of the reservoir. Water quality not only affects aquatic and terrestrial wildlife, but also the health and well-being of individuals and communities that surround the reservoir.

Alabama Power recommends that property owners adopt the following BMPs to preserve and improve the water quality of the Project's reservoir:

1. Use permeable paving materials and reduce the amount of impervious surfaces, particularly driveways, sideways, walkways, and parking areas.
2. Avoid or minimize the use of pesticides, insecticides, and herbicides whenever possible.
3. Dispose of vehicle fluids, paints, or household chemicals as indicated on their respective labels and do not deposit these products into storm drains, project waters, or onto the ground.
4. Use soap sparingly when washing your car and wash your car on a grassy area so the ground can filter the water naturally. Use a hose nozzle with a trigger to save water and pour your bucket of used soapy water down the sink and not on the ground.
5. Avoid or minimize applying any fertilizer. Apply fertilizers and pesticides according to the label and never just before a heavy precipitation event. Fertilizer use can also be avoided by using native vegetation in a landscape.
6. Maintain septic tanks and drain fields according to the guidelines and/or regulations established by the appropriate regulatory authority.
7. Discourage livestock from entering project waters or tributaries.
8. Create and maintain a rain garden in the landscape to naturally filter runoff.

### 6.1.3 PROPERTY DEVELOPMENT AND MANAGEMENT

Alabama Power's R.L. Harris Hydroelectric Project includes approximately 367 miles of shoreline. Private residential property occupies a considerable amount of that shoreline and has a significant effect on the shoreline as well as the reservoir itself. Individually, one property does not normally have a large effect upon the shoreline or the reservoir. Cumulatively however, residential activities can have a pronounced effect on reservoirs and their shorelines.

Alabama Power's existing permitting program includes guidelines to follow when considering a shoreline use permit request. These guidelines are specifically designed to minimize impacts to shoreline resources associated with property development. In addition to the existing permit guidelines, Alabama Power recommends that property owners adopt the following shoreline BMPs to help conserve and protect valuable shoreline resources.

1. Deposit excavated materials in an upland area and properly secure them to prevent them from entering the waterway, adjacent wetlands, or bottomland hardwoods through erosion and sedimentation. (required when dredging).
2. Place riprap along the base of existing seawalls.[11]
3. Maintain natural drainage to the maximum extent possible and do not direct concentrated runoff directly into the reservoir.
4. Divert rain gutters/drain pipes and other sources of household runoff, including driveways, to unpaved areas where water can soak into the ground and be naturally filtered before reaching the reservoir.
5. Dispose of yard debris and other biological waste in a compost pile located outside of the 800' msl or at least 50 horizontal feet away from the shoreline, whichever is less.
6. Avoid excessive watering of lawns and water either in the morning and/or in evening.
7. Plant native species to reduce watering.

In addition to the preceding shoreline BMPs, Alabama Power recommends that all activities on lands adjacent to each reservoir follow existing state BMPs (e.g., Alabama's Best Management Practices for Forestry, Alabama Clean Water Partnership BMPs, Alabama Handbook for Erosion Control, Sediment Control and Storm-water Management on Construction Sites and Urban Areas). For a list of references regarding these BMPs, as well as additional sources of information, see Appendix G. Although applicable BMPs are required on Alabama Power owned Project lands classified as Recreation and Natural/Undeveloped Lands, not all BMPs will be practicable on specific sites. BMPs will be required at these sites on a case by case basis.

## 6.2 EROSION AND SEDIMENT CONTROL

Alabama Power's permitting process and BMPs include numerous provisions for controlling soil erosion and sedimentation, including bio-engineering techniques such as planting willow and wetland species.

Bioengineering techniques involving marsh creation and vegetative bank stabilization (soil bioengineering) may be effective at sites with limited exposure to erosion forces (e.g., strong currents, wind-generated waves, etc.). In cases with increased erosional forces an integrated approach that employs structural systems (e.g., seawalls) in combination with soil bioengineering techniques may be more appropriate.

Basic principles of soil bioengineering include the following (USDA-NRCS, 1992):

- fitting the soil bioengineering system to the site;
- evaluating topography and exposure (e.g., note the degree of slope, presence of moisture);
- characterizing geology and soils (e.g., determine soil depth and type);
- studying the hydrology (e.g., calculate peak flows in the Project area);
- retaining existing vegetation whenever possible;
- limiting removal of vegetation;
- stockpiling and protecting topsoil;
- protecting areas exposed during construction; and
- diverting, draining, or storing excess water

Some appropriate bioengineering practices include installing coconut fiber rolls or live fascines, live staking, restoring or creating marsh, and preserving or creating vegetative buffers. Some appropriate integrated practices include bank shaping and planting; joint planting; and installing live crib-walls, vegetated gabions, vegetated reinforced soil slopes, or vegetated geogrids.

# 7.0 SHORELINE MANAGEMENT PLAN (SMP) REVIEW PROCESS

In order for the SMP to remain relevant in the coming years, Alabama Power intends to review this document every 10 years with continued input from interested parties. Information related to Sensitive Resources (e.g., wetlands, threatened and endangered species and cultural resource locations) will be updated continuously as new information becomes available (e.g. as new federally listed species and/or federally designated critical habitat are designated). Due to the pace at which conditions around the reservoir will change over the foreseeable future, the 10-year time frame allows for Alabama Power to assess new issues that may arise as a result of development. A shorter time frame would preclude any meaningful analysis of cumulative effects; however, Alabama Power is always willing to listen to concerned stakeholders if unforeseeable circumstances warrant an interim review of particular sections of the SMP. This review process will provide the means for the permitting program to change, if necessary, or for additional BMPs to be adopted or replaced as their effectiveness is tested.

Alabama Power will meet with consulting agencies by December 31 of the nineth year of the 10-year cycle to determine the progress of implementing the SMP and to address any suggested modifications to the SMP. Additionally, Alabama Power will issue a report through various media outlets (e.g., the Alabama Power shoreline management web site, the *Shorelines* newsletter) with the number of permits it has processed on each shoreline classification type on each reservoir. Any request for this information in the intervening time will be considered on a case-by-case basis. A public workshop is then held to provide concerned stakeholders a forum to address any modifications. The public workshop is advertised in various media formats (e.g., website, Shorelines, contact with homeowner associations) one month before it begins. After the public workshop, the SMP review process will culminate by December 31 of each 10-year cycle in a filing that describes the agency consultation, any recommended modifications, and how Alabama Power addressed any proposed modifications to the SMP.

Alabama Power will host annual public education workshops to address SMP questions, especially with regard to permitting, during the ten-year review process.

# 8.0 LITERATURE CITED

USDA-NRCS (United States Department of Agriculture, Natural Resource Conservation Service). 1992. Engineering Field Handbook, Chapter 18 Soil Bioengineering for Upland Slope Protection and Erosion Reduction.

## APC Harris Relicensing

**From:** Ken Wills <memontei@aol.com>
**Sent:** Monday, October 19, 2020 4:50 PM
**To:** APC Harris Relicensing; ken.wills@jcdh.org
**Subject:** Comments of Flat Rock BackcountryClassifications/Management

Hello all,

On behalf of the Alabama Glade Conservation Coalition, I wanted to follow up on this mornings HAT 4 discussions with some written comments regarding the reclassification of the Flat Rock backcountry area aka Flat Rock botanical conservation area as part of the FERC relicensing process for the Harris Hydro project. While our coalition strongly approves the backcountry area being reclassified from Recreation to the more protective Natural Undeveloped, HAT discussions over the last year along with the results from the initial botanical inventory illustrate the need for a special management plan for this unique natural area whether it be under the Natural Undeveloped land use classification or a special Botanical Area land use classification.

National Forests use Botanical Area as one of their land use classifications to recognize and address special management requirements for areas with unique and/or diverse plant species. Considering the initial botanical survey has found at least 10 plant species of state and global conservation concern in and around a rare habitat (Piedmont granite outcrops) as well as a good overall representation of plant communities found with Alabama's Piedmont region, this backcountry area should certainly be recognized/managed as a botanical conservation area whether or not a special botanical land use designation is added to the land use plan.

In regards to management, I am currently unable to access some of my computer files, but I believe some specific land protection/management recommendations were included within the cover letter that was sent by our botanical survey team to Alabama Power along the results from the initial botanical survey. I will submit that information when I can regain access or obtain a replacement. In the meantime, I can in more detail describe the special management that would be beneficial for conservation and enhancement of the rare as well as more common native botanical resources of the Flat Rock backcountry area.

1. Minimize heavy recreational/vehicle impacts- The wooded buffer between the backcountry granite outcrops and the main portion of Flat Rock Park continues to filter out heavy foot traffic while allowing the truly interested members of the public, educators and researches to still access the rare granite habitats. Considering the wooded buffer is part of the proposed conservation land use change, maintaining it should be relatively easy. In contrast, illegal ATV use is one off the greatest threats to the rare and sensitive plans of the area. Alabama Power has made great progress in blocking ATVs from accessing these sensitive habitats, but our botanical research team has recently found that the ATV users are finding new ways around the vehicle barriers into the track. Preventing ATVs from accessing the track and running over the rare plants of the granite outcrop habitats will be an ongoing issue that will require management.

2. Removal and reduction of exotic invasive plants- Like many glade habitats across the Southeast, the backcountry area of Flat Rock has a significant infestation of exotic invasive plants, especially Chinese Privet. The problem of removal and subsequent control can tackled in part through the use of supervised volunteers in the sensitive habitats along the edges of the granite habitats. However, more extensive control efforts may be needed in some of the less sensitive fully forested habitats where some of the largest privet infestations are found. Exotic plants control involves initial removal and treatments, but controlling their resprout/return is an ongoing issue that will require management. The Alabama Glade Conservation Coalition will be happy to assist in this process in part by providing and supervising volunteers in removal and control of exotics such as privet.

3. Controlled reintroduction of fire to the natural community- Like many of the drier habitats of Southeast, the ridge top and upper slope habitats surrounding granite outcrops were historically subject to frequent natural and aboriginal fire which help keep them open and diverse. Some of the lands that were recently added to the proposed conservation area even contain longleaf pine which is very fire dependent. If controlled burns could be safely reintroduced to the lands within the proposed botanical conservation area, it would help to open up habitats including some of the granite based rare plant habitats that have become chocked with shading overgrowth as well as restore more diversity to the herbaceous layer in other upland habitats such as pine hardwood forest. Controlled burns are also very beneficial for reducing fuel loads that could result in more catastrophic wildfires. The suitability of the area for controlled burns will require evaluation in relation to dwellings/structures on adjacent properties. The Alabama Glade Conservation Coalition

includes such groups as the Nature Conservancy of Alabama that have experience in evaluating the potential for as well as supervising controlled burns in landscapes of various states of development, and those groups may be willing to help evaluate the potential for controlled burns in the proposed botanical conservation area. If controlled burns can be safely reintroduced into this area, then ongoing management will be required to maintain a program of periodic controlled burns.

In related matters, considering the proposed botanical conservation area contains at least 10 plants of state and global conservation concern and many of those plants are very sensitive to certain impacts, it would seem the Sensitive land use classification overlay should be considered for the proposed Flat Rock backcountry conservation lands whether they are is reclassified as Natural Undeveloped or a special Botanical Area designation. However, if the Sensitive land use classification overlay would restrict/prohibit walk in public access to the area for those who want to appreciate the plants and other natural features and/or restrict/prohibit any of the above forms of active management needed to help maintain the botanical resources of the area then the Sensitive land use classification overlay would not be appropriate for the proposed botanical conservation area.

In summary, we respect the ability of the decision makers for the Harris Project land management plan to evaluate and determine the best protective land use classification for the proposed botanical conservation area, but we do feel that the lands should be recognized as a botanical conservation area (at least within the land management plan) and a specific management plan should be developed for the botanical conservation area. If the specific botanical area management plan can be developed and added as an appendix to the final overall land management plan, that would be great, but we realize that development of such a plan may take time beyond the deadlines of this FERC relicensing process. The Alabama Glade Conservation Coalition will be happy to assist the development of a management plan for the proposed Flat Rock backcountry botanical conservation area as well as assist in the ongoing management of this unique and special area.

Thanks,
Kenneth Wills
Acting Coordinator
Alabama Glade Conservation Coalition
(205) 515-9412

**From:** Colin Dinken <Colin.Dinken@Kleinschmidtgroup.com>
**Sent:** Thursday, January 14, 2021 12:35 PM
**To:** Fobian, Todd
**Cc:** Anderegg, Angela Segars
**Subject:** Harris T&E Species sources



Hey Todd,

During the comment period for the Draft T&E Species Desktop Assessment you recommended some literature to incorporate into the final report. I was able to find a couple of these sources, but was not able to locate Fobian et al. (2015), which describes host fish species for Pale Lilliput, or Watters et al. (2005) which describes some of the host fish species for Rabbitsfoot. Could you please send information on these sources for our reference section of the final report?

Thank you,

**Colin Dinken**
**Staff Scientist**
Kleinschmidt
**Office: 205-588-4613**
www.KleinschmidtGroup.com [kleinschmidtgroup.com]

**From:** Fobian, Todd <Todd.Fobian@dcnr.alabama.gov>
**Sent:** Friday, January 15, 2021 9:14 AM
**To:** Colin Dinken <Colin.Dinken@Kleinschmidtgroup.com>
**Subject:** RE: Harris T&E Species sources

Hi Colin,

Attached are the two documents requested. One is a poster presentation from FMCS meeting and the other is from Ellipsaria 2009. I apologize there was an error in the 2005 citation included in the comments. Watters et al. completed a 2005 host fish update in Ellipsaria but also had one in 2009 as well. The 2009 note includes the Rabbitsfoot host fish information page 19. Please let me know if you have any additional questions.

Corrected citation:
Watters, G. T., T. Gibson, and B. Kelly. 2009. Host identifications or confirmations. Ellipsaria 11(1):19.

Thanks, Todd

Todd Fobian
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Cell: 334-850-3798
Todd.Fobian@dcnr.alabama.gov

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**From:** Colin Dinken <Colin.Dinken@Kleinschmidtgroup.com>
**Sent:** Thursday, January 14, 2021 12:35 PM
**To:** Fobian, Todd <Todd.Fobian@dcnr.alabama.gov>
**Cc:** Anderegg, Angela Segars <ARSEGARS@southernco.com>
**Subject:** Harris T&E Species sources

Hey Todd,

During the comment period for the Draft T&E Species Desktop Assessment you recommended some literature to incorporate into the final report. I was able to find a couple of these sources, but was not able to locate Fobian et al. (2015), which describes host fish species for Pale Lilliput, or Watters et al. (2005) which describes some of the host fish species for Rabbitsfoot. Could you please send information on these sources for our reference section of the final report?

Thank you,

**Colin Dinken**
**Staff Scientist**
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# REPRODUCTIVE BIOLOGY AND REINTRODUCTION OF PALE LILLIPUT (*TOXOLASMA CYLINDRELLUS*, LEA 1868) INTO THE DUCK RIVER

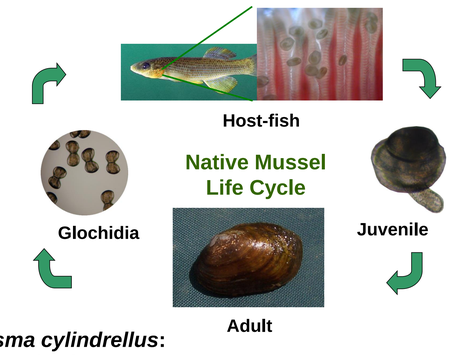
Todd Fobian1, Michael Buntin1, Jeff Powell2, Don Hubbs3, Jeff Garner1 and Paul Johnson1. 1Alabama Department of Conservation and Natural Resources (ADCNR), Alabama Aquatic Biodiversity Center (AABC), 2200 Highway 175, Marion, AL 36756. United States Fish and Wildlife Service (USFWS), 1208 Main Street, Daphne, AL 36526, 3Tennessee Wildlife Resources Agency (TWRA), Camden, TN 38320.

## Abstract

*Toxolasma cylindrellus* was listed as endangered by the USFWS in 1976. A middle-Tennessee River Basin endemic, *T. cylindrellus* historically ranged from the Duck River system in central Tennessee to northeastern Alabama. The species currently occupies 20 km of the upper Paint Rock River system, with only a few live individuals encountered in the last decade. *Toxolasma cylindrellus* is often considered to be one of the most imperiled mussel species in North America. However, one extremely localized healthy population in the Estill Fork a tributary to the Paint Rock River has been discovered in recent years. In 2013, a quantitative survey at the site indicated an estimated current population of approximately 720 individuals. State resource agencies (ADCNR and TWRA) and the USFWS have identified *T. cylindrellus* as a priority for recovery through artificial propagation and reintroduction. *Toxolasma cylindrellus* has rapid glochidial development and mature glochidia can be found from early May to July. Fecundity ranged from about 2,000 to 20,000 glochidia per female. Multiple host trials determined that Northern Studfish (*Fundulus catenatus*), Blackspotted Topminnow (*Fundulus olivaceus*) and Blackstripe Topminnow (*Fundulus notatus*) likely serve as the primary hosts. *Toxolasma cylindrellus* gravid females were found predominantly in very shallow water along stream margins, often near American Water-willow (*Justicia americana*). This may spatially position the females in such a way that maximizes contact with the primary hosts which often occupy marginal shallows. To date, a total of 802 *T. cylindrellus* have been propagated and reintroduced to one locality on the Duck River, and approximately 1200 additional animals are under culture pending release in 2015. Site selection followed flow and oxygen concentration improvements and habitat restoration in the Duck River which have been underway since 1991. The released mussels were tagged and will be monitored in 2015. Additional Duck River releases are planned in an effort to establish self-sustaining populations and improve genetic diversity. Other reintroductions will be carried out in historical range of this species.

## Introduction

Freshwater mussels of the family Unionidae have an obligate, parasitic larval stage, the glochidium, which attaches to the gills or fins of a host fish. Mussels are generally host-specific, i.e., able to use only one or a few species of hosts. Glochidia that attach to a compatible host transform to the juvenile stage within a few weeks. After transformation the juveniles leave the host and move to the bottom the river, where they may survive for decades.




**Conservation Status of *Toxolasma cylindrellus*:**

- Middle-Tennessee River Basin endemic
- Critically endangered –USFWS on June 14, 1976
- Recovery priority number (RPN) is 5
- Priority 1 species -Alabama Department of Conservation (ADCNR)
- Tier 1 priority species -Cumberlandian Region Mollusk Restoration Committee
- Ranked as G1 -NatureServe
- “Endangered” -American Fisheries Society (AFS)
- The only extant population is believed to be in the upper Paint Rock River in Jackson County, Alabama (20 km).

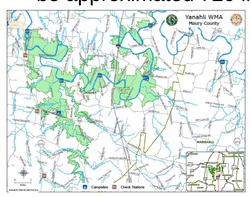
The USFWS *T. cylindrellus* Recovery Plan (1984) specifies the following down-listing criteria.

1. Stable populations occurring in Paint Rock River, Estill Fork and Hurricane Creek so that any one event would not result in the loss of the species from the basin.
2. Establish or discover new populations in two additional geographically isolated rivers.
3. The species and habitat are protected from present and foreseeable human-related threats.
4. Noticeable improvements in siltation from improved land-use practices, riparian zone restoration in the Paint Rock watershed.

## Methods

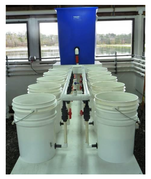
**Site selection**

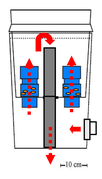
- Followed flow and oxygen concentration improvements and habitat restoration in the Duck River which have been underway since 1991
- Selected site locality contains 25 mussel species, including 5 federally listed mussel species
- Designated critical habitat and Scenic River by FWS and the state of Tennessee
- 2013 Estill Fork 100m quantitative survey indicated current population at site to be approximated 720 individuals at a density of 0.6/m² (random systematic grids)



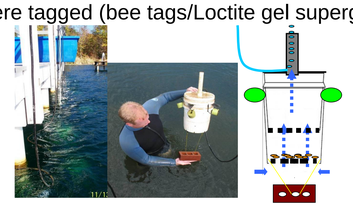

**Propagation Techniques**

- Estill Fork gravid females were collected and monitored to determine timing of reproduction and fecundity ranges.
- Glochidia from one or more females were used to infect potential host fish.
- Tested 19 fish species within 10 genera. Potential host fishes were collected from four Tennessee River System tributaries.
- Glochidia and juveniles were recovered from each fish to determine metamorphosis success, the percentage of attached glochidia that metamorphosed into juveniles.
- Transformed juveniles were placed into laboratory culture systems to determine the practicality of captive grow-out of juveniles for reintroductions.
- Successfully cultured 2-3cm juveniles were tagged (bee tags/Loctite gel superglue)





**Stage 1:** Bucket upwelling “Mucket Bucket” system 454 L–10 bucket system gravity fed from sump, supplied with well and filtered pond water (200µm) 1:3 ratio, supplemental fed commercial Shellfish Diet and Nannochloropsis algae.



**Stage 2:** Pond Culture- “Supsy” suspended upwelling bucket system, powered by an electric air blower using air uplift tubes to create flow through a mesh chambered bucket cage suspended in water column.

## Results

**Summary of transformation success** pairings of *T. cylindrellus* and potential host fish (three infection dates using six different females, two per infection).

| Location/Species Infections 5/14/12, 5/19/13 and 5/26/13 combined | Mean Metamorphosis % | N fish | N Encysted Glochidia | N juveniles | N juveniles/fish |
|---|---|---|---|---|---|
| **Mountain Fork, Madison Co., AL** | | | | | |
| Banded Sculpin (*Cottus carolinae*) | 0 | 4 | 40 | 0 | 0 |
| Whitetail Shiner (*Cyprinella galactura*) | 0 | 2 | 101 | 0 | 0 |
| Rainbow Darter (*Etheostoma cauruleum*) | 0 | 5 | 136 | 0 | 0 |
| Northern Studfish (*Fundulus catenatus*) | 72 | 1 | 88 | 63 | 63 |
| Striped Shiner (*Luxilus chrysocephelus*) | 0 | 2 | 36 | 0 | 0 |
| **Shoal Creek, Lauderdale Co., AL** | | | | | |
| Greenside Darter (*Etheostoma blennoides*) | 0 | 2 | 221 | 0 | 0 |
| **Anderson Creek, Lauderdale Co., AL** | | | | | |
| Logperch (*Percina caprodes*) | 0 | 2 | 150 | 0 | 0 |
| **Larkin Fork, Jackson County, AL** | | | | | |
| Rock Bass (*Ambloplites rupestris*) | 0 | 5 | 2146 | 0 | 0 |
| Largescale Stoneroller (*Campostoma oligolepis*) | 0 | 6 | 345 | 0 | 0 |
| Banded Sculpin (*Cottus carolinae*) | 0 | 5 | 101 | 0 | 0 |
| Greenside Darter (*Etheostema blennoides*) | 0 | 4 | 1268 | 0 | 0 |
| Rainbow Darter (*Etheostema caeruleum*) | 0 | 13 | 573 | 0 | 0 |
| Blackside Snubnose Darter (*Etheostema duryi*) | 0 | 2 | 41 | 0 | 0 |
| Fantail Darter (*Etheostema flabellare*) | 0 | 1 | 30 | 0 | 0 |
| Stripetail Shiner (*Etheostema kennicotti*) | 0 | 6 | 298 | 0 | 0 |
| Snubnose Darter (*Etheostema simoterum*) | 0 | 2 | 28 | 0 | 0 |
| Northern Studfish (*Fundulus catenatus*) | 84 | 2 | 260 | 222 | 111 |
| Blackstripe Topminnow (*Fundulus notatus*) | 69 | 10 | 481 | 392 | 39 |
| Longear Sunfish (*Lepomis megalotis*) | 0 | 5 | 1052 | 0 | 0 |
| Striped Shiner (*Luxilus chrysocephalus*) | 0 | 8 | 840 | 0 | 0 |
| Tennessee Shiner (*Notropis leuciodus*) | 0 | 7 | 122 | 0 | 0 |

## Results, continued

**Field observations**

- Gravid females were found predominantly in very shallow water along stream margins, often near American Water-willow (*Justicia americana*)

**Timing of reproduction**

- Gravid females were collected from early May to July

**Fecundity range**

- Fecundity ranged from 2,000 to 20,000 glochidia per female

**Culture and Release**

- N = 9299 metamorphosed juveniles were recovered (2009-2014)
- Juvenile survival in captive culture, N= 2002 of 9299 metamorphosed (250+ days – 22%)
- Grown from 250µm to 2-3 cm shell length over 500 days
- N = 802 were tagged (bee tags/superglue gel 2-3cm shell length) and released by TWRA to one locality on the Duck River Marshall County, TN on 9/10/14.
- N ≈ 1200 additional animals are under culture pending release in 2015

## Conclusions

- Adult gravid females appear to spatially position in very shallow water along stream margins to maximize contact with the primary hosts which often occupy marginal shallows.
- Our laboratory trials indicate that Northern Studfish (*Fundulus catenatus*), Blackstripe Topminnow (*Fundulus notatus*) and Blackspotted Topminnow (*Fundulus olivaceus*) are primary hosts.
- *Toxolasma cylindrellus* is capable of being cultured and reared in laboratory and pond culture systems for >500+ days and up to a 2-3cm shell length.
- Released mussels will be monitored in 2015.
- Additional Duck River releases are planned in an effort to establish self-sustaining populations and improve genetic diversity.
- Other reintroductions are planned within the historical range of this species in Alabama and Tennessee.

## Acknowledgements

**Funding**

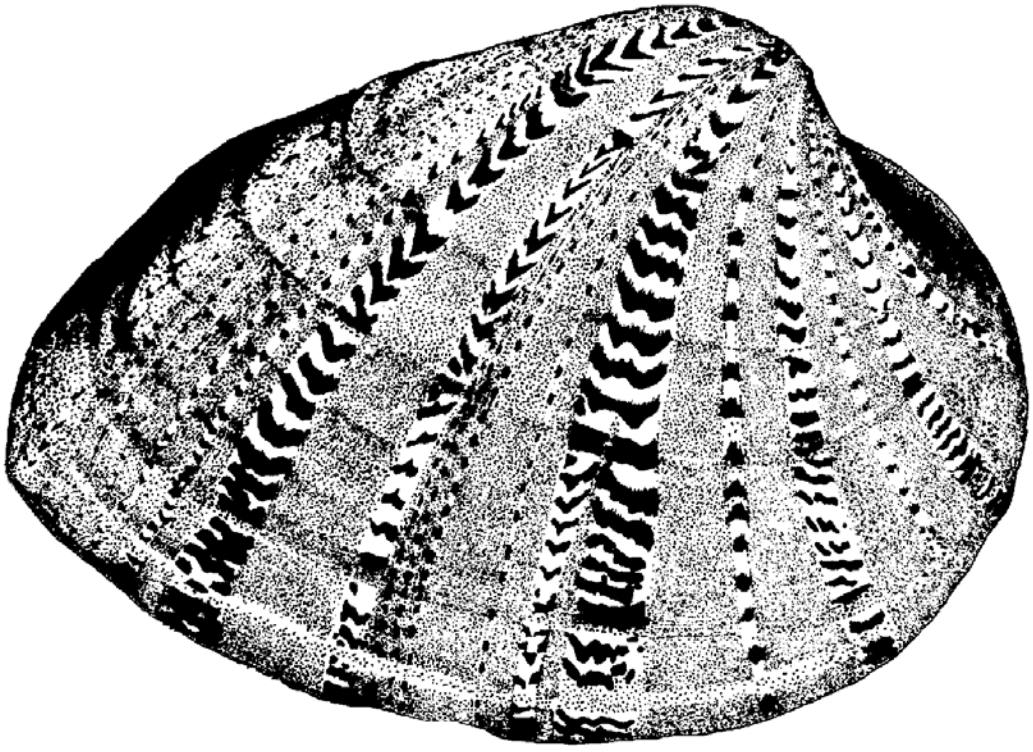
Alabama Wildlife and Freshwater Fisheries, Tennessee Wildlife Resources Agency and US Fish and Wildlife Service

**Partners**

# Ellipsaria

**The Newsletter of the Freshwater Mollusk Conservation Society**

**Volume 11 – Number 1** **April 2009**



## Freshwater Mollusk Conservation Society Officers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ahlstedt@usgs.gov


*FMCS dues are collected in January of each year. If a renewal form isn't included with this newsletter, you may download one from the Society's website.*

### *Ellipsaria* Editor


Christine Mayer
Illinois Natural History Survey
1816 S Oak Street, Champaign, IL 61820
camayer@inhs.uiuc.edu


Submissions for the August 2009 issue of *Ellipsaria* may be sent to the editor at any time but are requested by **July 31, 2009**. Anyone may submit an article but you must be a member of FMCS to receive *Ellipsaria*. Please limit submissions to about one page. Categories for contributions include news, new publications, meeting announcements, current issues affecting mollusks, job postings, contributed articles (including ongoing research projects), abstracts, and society committee reports. Electronic submissions are preferred; contact the editor with any questions. Note that submissions are not peer reviewed, but are checked for content and general editing.

*Please send change of address information to the Secretary.*

# *Ellipsaria*

NEWSLETTER OF THE FRESHWATER MOLLUSK CONSERVATION SOCIETY

Volume 11, No. 1 http://ellipse.inhs.uiuc.edu/FMCS/ April 2009



## President's Message

Greetings,

By the time you receive the April edition of *Ellipsaria* we will have completed our 2009 FMCS International Symposium. Since this is my final message as president I want to personally thank Catherine Gatenby and her committee for all their hard work with the symposium. These are very tough economic times affecting all of us and basically this has been a perfect storm that hit right during our 2009 symposium. I wish to acknowledge our sponsors (state, federal and private consultants) that provided critical sponsorship funding plus all the in-kind help with the symposium. I also wish to personally say thanks to all our committee chairs that have worked diligently on various issues and Heidi Dunn, Christine Mayer, and Greg Zimmerman who are all critical individuals needed for the success of our society.

My final message to all of you is to get involved with FMCS. We still have a lot of work to be done in moving our society forward plus all this work doesn't need to fall on the shoulders of a few individuals. This is our society and we can make a difference concerning the protection and restoration of our mollusk resources.

*Steve Ahlstedt, FMCS Past-President*

## ~~ FMCS Officer Election Results ~~

**President-Elect: Caryn Vaughn**
**Secretary: Greg Zimmerman**

I received a total of 100 ballots from members that I was able to include in the vote tally (i.e., ballot contained the FMCS member signature and at least one vote). I was very pleased with the participation of the number of members voting. Thanks to all the members who took the time to vote!

*Leroy Koch, FMCS Nominations*

## FMCS 2009 Award Results

**Student Travel Awards**

Five students were selected for travel awards: Andrea Crownhart (Missouri State), Christopher Owen (University of Louisville), Serena Ciapris (Virginia Tech), Nathan Johnson (University of Florida), and Michael Pillow (Missouri State). One additional student travel award specifically for international students was given to Alexandra Zieritz of the University of Cambridge.

**Best Student Platform and Poster Awards**

The best platform award went to Jason Mays (co-authors W.G. Cope, T.J. Kwak, and D. Shea) for his talk entitled "Bioaccumulation of platinum group metals in the freshwater mussel *Elliptio complanata*". The honorable mention platform award went to Dan Allen (co-author C.C. Vaughn) for his presentation on "Mussel diversity destabilizes substrates at high flows". The best poster award went to Joe Daraio (co-authors L.J. Weber, T.J. Newton, and S.J. Zigler) for his poster on "The importance of host fish location at the time of juvenile drop off on dispersal of juvenile mussels in the Upper Mississippi River". The honorable mention poster award went to Nathan Johnson (co-authors I.J. McLean, J.D. Williams, and P.J. Schofield) for his poster on "Salinity tolerance of three freshwater mussel species: a coastal plain species shows tolerance". Congratulations to all the fine student presentations at this year's meeting!!!

**Professional Awards**

Gerry Mackie and Jim Layzer were each presented with the Lifetime Achievement award for 30 years of dedicated service to the conservation of freshwater mollusks. Heidi Dunn and

Christine Mayer were each presented with the Meritorious Service Award for their diligent efforts on behalf of the Society. Photos of some of the award recipients are on page 24 of this newsletter.
*Teresa Newton and Greg Cope*

## 2009 Auction/Raffle Event

This year's meeting gave way to another successful and entertaining auction/raffle event! Amid the last minute sales of raffle tickets, hors d'oeuvres, and "local" brews, Steve Ahlstedt and Tom Watters entertained the crowd with their slapstick talents. Tuesday night's event raised $4675, which will go towards student travel to upcoming meetings.

A great big thank you to those members and nonmembers who donated the items, and especially to those who bought raffle tickets and purchased auction items…some of which were "hidden treasures". We had nearly 70 items that ranged from quirky river booty to beautiful photographs and hand-carved fishes. FMCS has a wealth of artistic talent among its members, and it's always nice to see this displayed at our meetings. Finally, we wanted to recognize some enthusiastic student volunteers who helped with the auction during the week -- a special thanks to Andrea Crownhart and Mike Pillow of Missouri State University for their time and dedication!

Auction Committee:
Cristi Bishop, Lisie Kitchel, Teresa Newton, Jamie Smith

## FMCS Board Meeting

**Marriott Waterfront Baltimore Hotel, Baltimore, MD**
**April 19, 2009, 1 - 5PM**

A quorum is present for the official meeting of the Board of Directors of FMCS. List of attendees:

Steve Ahlstedt (President)
Gregory Cope (President-Elect / Awards Committee)
Heidi Dunn (Treasurer)
Greg Zimmerman (Secretary)
Steve McMurray (Environmental Quality & Affairs Committee)
Tom Jones (Outreach Committee)
Chuck Howard (Guidelines & Techniques Committee)
Janet Clayton (Guidelines & Techniques Committee)
Jim Williams (Mussel Distribution and Status)
Art Bogan (Mussel Distribution and Status)
Tony Brady (Propagation and Restoration Committee)
Teresa Newton (Awards Committee)
Patty Morrison (Symposium Sub-Committee)
Catherine Gatenby (Symposium Sub-Committee)
Robert Anderson (Past President)
Emily Monroe (Genetics Committee)
John Jenkinson (Information Exchange)
Mark Hove (Photography)
Andy Roberts (Co-chair Outreach Committee)
Leroy Koch (Chair Nominations Committee)
Nate Johnson
Chris Barnhart

**BOARD MEETING AGENDA**

**Committee Reports**

**Awards:**
Greg Cope and Teresa Newton

**Environmental Quality and Affairs:**
Ryan Evans and Steve McMurry
- No need for separate committee to handles toxicity issues
- Bylaws need to be updated – post on website
- Pursue development of operations manual (covers duties of committee chairs)

**Gastropod Status and Distribution:**
- Paul Johnson (TN/CU/Mobile River Basin mollusk restoration plan)
- Blueprint mollusk restoration plan will address Eastern Gulf Slope
- American Fisheries Society (Conservation Status of North American Freshwater Gastropods)
- Compendium of type specimens, photography of Smithsonian types. Original descriptions, original plate, new images will be web based.
- Updating AFS Conservation Status of Freshwater Mussels
- Eventual posting of mussel and snails on FMCS web site

**Genetics:**
David Berg
- Possible subgroup under genetics (roles of taxonomy and rules of nomenclature…ignoring established nomenclature?)

**Guidelines and Techniques:**
Chuck Howard and Janet Clayton
- Freshwater mussel certification process

**Information Exchange:**
*Walkerana* update – Tom Watters, Editor and John Jenkinson, Assistant Editor
- Drafting purpose and goals statement for the journal
- Compiling list of potential members on editorial board
- Need to develop business plan for the journal
- Journal name…do we wish to change the name
- Journal content…board needs to sanction or change it
- Frequency of publication
- Increasing dues to reflect publishing Journal
- Fund part-time position for Journal preparation
- Page charges…will authors pay page charges or will dues offset costs
- Back issues of *Walkerana* (storage, cost of back issues)
- *Ellipsaria* – continue as a vehicle for FMCS announcements, members, short notes etc. Board needs to clarify between the Journal and *Ellipsaria*

**Mussel Status and Distribution:**
Arthur Bogan and Jim Williams
- Roles of taxonomy and rules of nomenclature (genetics subgroup?)

**Outreach:**
Tom Jones and Andy Roberts (FMCS webpage update status)
- Urgent need for updated membership list (mass emailing, dues, announcements)
- Funding available to incorporate Andy Roberts web page with FMCS (possible student scholarship to handle this)

**Propagation, Restoration, and Introduction:**
Tony Brady

**National Strategy**
Rachel Muir
- Update/prioritize National Strategy (status?)

**Symposium 2009:**
Catherine Gatenby
- Update on symposium 2009 (cost, sponsorship money)

**Old Business**
- Propose FMCS to document history and past presidents – responsibility (past presidents)?
- Update/prioritize National Strategy (Rachel Muir, Committee Chair)

**New Business**
- Revisit webpage/FMCS member list system (Greg Zimmerman) see Outreach
- Need ideas and sponsors for 2010 FMCS workshop (topics, location, sponsor)
- FMCS committee dedicated to fund raising (workshops/symposia)
- Recommend Virginia Tech for future conferencing services
- Require all committees to provide biannual updates or discontinue
- Form special International and Tribal Committee to continue collaboration/membership
- Member-at-large committee responsible for increasing membership-Pacific NW Mollusk Group
- Make contact with Pacific NW Mollusk Group for future FMCS symposium (2013)
- Possible FMCS symposium 2013 Guntersville State Park, Alabama (Paul Johnson)
- Raise membership fees (2 year membership), pay at symposium

**Treasurer's Report** –
Submitted by Heidi Dunn

In 2008 income was from interest ($471.16), memberships ($7,800), and sale of hats and t-shirts from the outreach booth at the SCB meeting ($343). Overall, the workshop was a success. We received $9,000 in donations, a check from SCB of $3,822 (in 2009) for income of $12,822. SCB workshop expenses totaled $4,288.98, so profit from the workshop was $8,099.02. Thanks to all who helped make this a success. We also successfully acquired *Walkerana*. We hired a lawyer to make sure the transaction was legal. The lawyer donated much of his time and only charged us $500. Credit card, bank fees, and annual registration fee made up the other expenses. Total income $17,614.16, expenses $10,222.52, for a net gain of $7,391.64.

So far in 2009, we have income from memberships ($5,810), interest ($119.62), 2008 workshop ($3,822) and the 2009 auction ($4,703.92). Expenses include the t-shirts for the symposium ($521.52; all were sold so this cost will be recouped), hats ($1,518.40; many of these were also sold at the symposium), some symposium expenses, and some credit card fees. It will be a few months before we receive the balance from the symposium, but it appears we are in the black with this one (yeah!). Catherine Gatenby obtained $44,000 in donations to cover some of the expense. Total income so far in 2009 $14,455.54, expenses $5,454.03, net $8,910.51.

FMCS now has $69,815.82 in the bank.

**Secretary's Report** –
Submitted by Greg Zimmerman

We will work to get the most recent Society's bylaws added to the website. Keeping track of the membership between *Ellipsaria*, the treasurer, the secretary, and others has been problematic as the society grows. Hopefully, upcoming website improvements will minimize these problems and help keep the society growing.

As a reminder, all official FMCS documents such as those signed by the president should get forwarded to the secretary. Then these documents will be posted on the website for reference.

In an effort to reduce redundancy and get all of the information in the same place, some of the Board Meeting discussions have been appended to the Committee reports where noted.

**Committee Reports –**
All members are encouraged to join and be active in FMCS committees. You don't have to wait until the next meeting! See the FMCS website for the respective committee chair's contact information.

**Awards Committee**
Submitted by Teresa Newton and Greg Cope
(Note: Dr. Emy Monroe has agreed to co-chair the Awards Committee in addition to Greg Cope and Teresa Newton.)

*Student Travel Awards*
The Awards committee announced and solicited nominations and applications for student awards to be presented at the biennial symposium. At the request of the 2009 Symposium Planning Committee, a procedural change was made for the student travel awards during 2008-2009. Rather than issuing individual monetary student travel awards to applicants, rooms would be booked and paid for by the Society for the selected students to assist the Society with making the contracted number of room nights at the host hotel. A total of 23 applications were received for student travel awards. Based on the allotted funds for all awards from the Society, the room cost per night at the hotel for four nights, and the estimated cost of award plaques, 5 student travel awards were possible. Five students were selected for travel awards: Andrea Crownhart (Missouri State), Christopher Owen (University of Louisville), Serena Ciapris (Virginia Tech), Nathan Johnson (University of Florida), and Michael Pillow (Missouri State). Through fund raising efforts of the 2009 Symposium Chair, one additional student travel award specifically targeted for international students was made possible. The international student selected was Alexandra Zieritz of the University of Cambridge. If this model works well in 2009, the Committee will consider adopting the hotel room night payment as the standard student travel award for future Symposia.

*Best Student Platform and Poster Awards*
A total of 52 students submitted abstracts for platform (26) and poster (26) presentations for the 2009 Symposium that required judging for the Best Student Platform and Best student Poster Awards. This large number of student presentations required over 20 judges from the Society membership. The awards committee wishes to send a huge thanks to all members who helped in this important endeavor!! The best platform award went to Jason Mays (co-authors WG Cope, TJ Kwak, and D Shea) for his talk entitled "Bioaccumulation of platinum group metals in the freshwater mussel Elliptio complanata". The honorable mention platform award went to Dan Allen (co-author CC Vaughn) for his presentation on "Mussel diversity destabilizes substrates at high flows". The best poster award went to Joe Daraio (co-authors LJ Weber, TJ Newton, and SJ Zigler) for his poster on "The importance of host fish location at the time of juvenile drop off on dispersal of juvenile mussels in the Upper Mississippi River". The honorable mention poster award went to Nathan Johnson (co-authors IJ McLean, JD Williams, and PJ Schofield) for his poster on "Salinity tolerance of three freshwater mussel species: a coastal plain species shows tolerance". Congratulations to all the fine student presentations at this year's meeting!

*Professional Awards*
The Awards committee announced and solicited nominations and applications for professional awards to be presented at the biennial symposium. We received two nominations for the Meritorious Service Award and two nominations for the Lifetime Achievement Award. At the 2009 FMCS meeting, Heidi Dunn and Christine Mayer were each presented with the Meritorious Service Award for their diligent efforts on behalf of the Society. Gerry Mackie and Jim Layzer were each presented with the Lifetime Achievement award for 30 years of dedicated service to the conservation of freshwater mollusks.

**Environmental Quality and Affairs Committee**
Submitted by Ryan Evans and Steve McMurray

The Environmental Quality and Affairs Committee has been busy since the Little Rock Symposium. Several letters addressing mollusk concerns have been drafted for the President's signature. These included:

- A letter to the USEPA was written requesting that national water quality criteria standards for ammonia be revised to include studies on the effects of ammonia on freshwater mussels.
- A letter in support of NSF funding for the curation of the Athearn collection at the North Carolina State Museum.
- A letter to the USFWS expressing our concerns with the proposed amendments to the ESA.
- A letter to the USEPA expressing our opposition to the modifications proposed to the OSM "Stream Buffer Zone" rule.
- A letter in support of the petition by the Center for Biological Diversity (CBD) to list 42 species of freshwater snails under the ESA was sent to the USFWS.
- A letter in support of the proposed rule to list five mussels Endangered or Threatened in Pennsylvania was sent to the Pennsylvania Fish and Boat Commission.

All of these letters are available on the Society's website. Currently a letter is being drafted to again reiterate our concerns to the Obama Administration concerning repeal of several of the amendments to the ESA. During our meeting at the Symposium in Baltimore, it was decided that Ryan Evans and Steve McMurray would continue as committee co-chairs. One issue that needs to be addressed is the proposed water quality criterion for cyanide. Due to a lack of data on the effects of cyanide on freshwater mussels, the determination of effects relied on the effects to host fish. The committee would like to see a research laboratory conduct toxicity testing to determine the effects of cyanide on glochidia, and juvenile and adult mussels to better inform the process. In a related matter, the committee would like to facilitate communications between Endangered Species Biologists and Toxicologists/Contaminants Specialists. A group of committee members is working on developing a position paper/information report on the issues surrounding gas drilling and frac water toxicity, as it could have both national and international implications. If you know of other environmental issues affecting freshwater mussels that have regional, national or even international implications, or would like to assist with some of the active issues, please contact one of the co-chairs.

It was also noted during the board meeting that FMCS should consider guidance for FERC licensees regarding minimum DO and temperature, etc.

**Gastropod Status and Distribution Committee**
Paul Johnson unfortunately could not make the symposium but Paul is working on the Tennessee / Cumberlandia / Mobile River mollusk conservation plan and other items with Jeff Powell as noted on the gastropod meeting agenda shown below. Due to a scheduling problem, the Gastropod meeting did not occur in Baltimore with the committee chairs. For more information, committee members and others should contact Paul Johnson or Jeff Powell.

Old Business:
<u>FMCS Web Site</u>
- Tom Jones (Outreach Chair) to lead effort to revamp FMCS web site. Once this is complete, committee will hopefully become more active
- Take suggestions from attendees on functions / items to be pursued on the website

<u>Status of AFS Project:</u>
- Effort to publish a checklist evaluating the basic Conservation Status Review of North American Freshwater Gastropods
- 10 member committee of US and Canadian participants.
- Taxonomic / Systematic review are NOT an objective of the project
- Database has completed 3 reviews, and is now under 4th review
- AFS Turgeon et al, NatureServe / Heritage Database, and COSEWIC lists were the building blocks of the review (all

lists have been vetted several times)
- Updated lists revised based on recent published manuscripts
- Revised database to be sent to committee in May or June 2009 along with an outline of draft article
- AFS article expected in 2010
- Hopefully AFS will allow an electronic database to be posted on FMCS website (build upon initial list as more distributional / taxonomic information becomes available).
- Hope the article will help generate more interest nationally in freshwater snails

Mollusk Restoration Plans:
25 conservation target species for the Cumberlandian Region
28 conservation target species for the Mobile River Basin 12 proposed conservation targets for the Choctawhatchee, Yellow, & Escambia river basins
- Once finalized copies of the plans will be available on request
- Mobile and Cumberland plans should be finalized by this summer
- Hope to make PDF's available on AABC website within a year
- Accounts have been drafted for the Cumberlandian and Mobile taxa, but not the eastern gulf slope species. The gulf coast accounts will be drafted over the next year.
- The accounts specify basic priority actions for each species and begin to form a general outline of recovery activities for each species (for many species - the first priority specifies a systematic / taxonomic status review)
- Are taxa missing from the lists that should be included?
- Plans will be revised approximately every 5 years to include changes in species status and priority recovery activities

New Business:
What are the special interests of gastropod committee in light of the possible initiation of society journal, prior to the 2011 meeting in Kentucky?

News from the AABC:
- Gastropod facility operational, culture efforts underway for 5 species
- Culture efforts are limited while construction of other facilities are completed this year
- Successfully established a new reproducing population of Leptoxis plicata (Plicate Rocksnail) with cultured stock – additional monitoring to continue
- Other test releases will be conducted later this year

Pleuroceridae Type Catalog:
- A review of all type specimens of the Pleuroceridae including original descriptions and lithographs
- Project cooperators: Smithsonian Museum of Natural History, North Carolina Museum of Natural Sciences, Alabama Aquatic Biodiversity Center
- Production of high quality plates of
- Objective is a 2 volume series published in the Smithsonian Contributions to Zoology – Volume 1 to include all USNM Types (approximately 400 types).
- Photography nearly complete for USNM Types, and approximately half the plates have been assembled for the first volume
- Possible web-based version

Nominations and election of new gastropod committee chair and alternate?
[Appendix and plates provided with agenda were not included here but can be obtained directly from Jeff Powell]

**Genetics Committee**
David Berg noted problems regarding genetics work ignoring established nomenclature. This also echoed Art Bogan's comments.

**Guidelines and Techniques Committee**
Submitted by Chuck Howard
Chuck Howard and Janet Clayton re-elected as co-chairs.

In 2008-2009, the co-chairs have been evaluating the concept of a Mollusk Taxonomy and Field Techniques Education / Certification Program. Evaluations have included a pilot mussel surveyor certification program by the Pennsylvania Fish and Boat Commission, conceptual ideas for a certification program in North Carolina (Art Bogan), and existing professional certification programs in practice by the North American Benthological Society and American Fisheries Society.

At the April 21, 2009 lunch meeting, a list of Committee Goals and Potential Initiatives for Consideration by the committee were presented to committee meeting attendees. The co-chairs invited members to address these or other initiatives over the next two years, but encouraged a unified effort to help with the development of a Mollusk Taxonomy and Field Techniques Education / Certification initiative. A draft list of tasks needed to develop this dual initiative was presented to the committee.

The committee met again the evening of April 21 to continue discussion of developing a Mollusk Taxonomy and Field Techniques Education / Certification Program. The primary tasks outlined for these initiatives included: format, certification level, geographic criteria, development of a taxonomic guidance committee, development of educational materials, testing, funding, and legal issues.

Once the co-chairs receive a complete list of society members wishing to actively serve on the Guidelines and Techniques Committee, committee members will be asked to sign up for or will be assigned to one or more tasks needed to develop this initiative. Deadlines will then be set for status reports and completion of the various tasks. Development of the taxonomic education / certification program in particular will require a long-term commitment to this endeavor by taxonomic experts and institutions (such as museums, universities, and regulatory agencies) across the country; therefore, we encourage leaders in our field to evaluate how they and their institutions could support development of this initiative and contribute to the long-term commitments (e.g., education centers or evaluation sites) of an education / certification program.

We look forward to working with committee members and members of the society to develop this important initiative

that supports the society's stated purposes to promote education of freshwater mollusks and their function in freshwater ecosystems and facilitate science-based management of freshwater mollusks. We hope to communicate with current committee members in June 2009 and assign working groups for each task.

**Mussel Status and Distribution Committee**
Submitted by Jim Williams and Art Bogan

During the past year we have researched the conservation status of freshwater mussels in the United States, Canada and Mexico. We have assigned conservation status to the approximately 370 taxa that are currently being recognized. The spreadsheet has been circulated to the Committee members with a request that corrections to conservation status, distribution, etc. be noted and returned by 15 May 2009. The introductory text for the manuscript is being drafted and should be completed by June 2009. NatureServe has also requested that we submit the spreadsheet to them for their review to be sure that their conservation status is in line with that proposed by the Committee. We plan to submit the final document to the American Fisheries Society for publication no later than July 2009. During our Committee meeting several individuals requested that they be allowed to review the spreadsheet to be sure recent changes in conservation status and distribution were included before submission for publication.

The distribution atlas committee has not been able to attract funding to support the required museum visits to document the historical distribution of the freshwater mussels of North America. John Alderman and I in collaboration with about 12 others have taken a new approach to examine the modern distribution of the freshwater mussels of the south Atlantic Slope. This region includes the Atlantic Coast rivers from Maryland south to north Florida. We have gathered together information from the state agencies for most of the five included states. We have worked with the state agencies to donate their survey data on freshwater mussels and are in the process of incorporating this data as layers in ArcGIS. All species distribution maps will be published at the 8 digit HUC units and no dot maps will be provided. This project can be used as a new focus to bring together the first cut of information on a particular state through the cooperation of agencies responsible for collecting distribution data. I work for a state agency and have agreed to host the various state's data on a secure server with no external access or third party access. We are suggesting the South Atlantic Slope Atlas might be a first step to gathering regional data to work toward a national atlas. However, you still have to be careful of the identifications.

**Outreach Committee**
The following is a summary of the Baltimore Board Meeting Discussions:

The mixer was paid for by outreach activities performed by Tom Jones at Aquarium on Saturday, the day before the symposium.

New initiatives include building a smaller outreach materials set, or sets, so they could be more easily and cost-effectively shipped. The existing "Tools for Outreach" set is in Janet Butler's possession (per Patty Morrison). Andy and Tom Jones are requesting video clips for website, photos, and other non-proprietary materials for distribution or website use.

Other ideas included special mussel areas of the US – modules. Steve A. has material that he gave Catherine on commercial shell industry and native shell mounds that could be incorporated into outreach materials.

**Propagation Committee**
Tony Brady has been working trying to catch up with recent staff shortages and a change in job description.

It was noted that a data clearinghouse for translocations is critical. For example, with southeastern fishes the translocation of native fishes without documentation into new streams has resulted in a "nightmare" (Jim Williams). The USACE and TN system has a database, however - we need a running tally of where these mussels are going, what species, and, to where. Matt Patterson had a database but the status of the database was unknown.

Sources of mussels for toxicology studies are also needed. It would be a good idea if the Propagation Committee could compile a list of available sources for toxicology studies.

*Committee Meeting Report – Submitted by Tony Brady*
Tony Brady opened meeting with seven members present. Tony was asked by the committee to remain as chair for the next two years. He agreed. Tony explained to the committee the charge from the FMCS board to develop a database of current propagators, species being propagated and stocking locations. After discussion, the committee decided to begin by generating a list of current propagation facilities, and state coordinators. Information such as species propagated can be answered by contacting the facilities and stocking locations by contacting state coordinators. The meeting was then adjourned. The next day, Tony asked Rachel Muir to co-chair the committee with him. The propagation committee now falls in line with most of the other FMCS committees by having co-chairs.

**Information Exchange Committee / *Walkerana* Journal**
The following is a summary of the Baltimore Board Meeting discussions, edited by John Jenkinson, additional comments by Tom Watters:

The *Walkerana* journal has been officially and legally purchased from Jack Burch. Tom Watters has agreed to serve as Editor and John Jenkinson has agreed to serve as Assistant Editor. Currently, the editors are working on a draft purpose and goals statement for the journal and are compiling a list of potential members of an editorial board. Many thanks to Jack Burch, Heidi Dunn, Kevin Cummings, Steve Ahlstedt, and others who made the transfer possible.

The official name and logistics of the journal was discussed in-depth. There are a large number of business and logistical reasons that the exact name is important. The name may be put to a vote. Proposed names:

1) "Walkerana: Journal of the Freshwater Mollusk Conservation Society"
2) "JFMCS: Walkerana"

3) "The Journal of the Freshwater Mollusk Conservation Society"

*Ellipsaria* will be maintained as an information exchange medium for FMCS members.

Journal details: The volume numbers should be contiguous with *Walkerana*, and it was suggested that we put a transitional letter from Jack Burch on the inside cover of the first FMCS issue. Art Bogan suggested the content should include both contributions and, unlike other journals, survey reports. Jim Williams suggest we do not include notes, as it is difficult to get credit for notes professionally.

Other items discussed included the development of a Business Plan, color vs. black and white, page charges, fees, and having an electronic submission process. It was also concluded that the journal probably should shift to 8.5" x 11" because that size is more economical to print and format. Back issues should be stored in one place and sold as part of the operation of this journal; we ask the Board to consider the logistics of this, as well as setting prices for back issues. Should the journal be electronic only or print? Electronic only would streamline production, be "green," and minimize cost; distribution to a wider audience would be made through pay-per-download services such as JSTOR. Will it accept new species descriptions? If so, then a paper copy is required. FMCS should accept the AFS list or publish.

The journal will likely require a funded part-time layout/printer liaison person, which should be incorporated into the business plan. The initial goal for publication will likely be two issues per year with a long-term goal of 4x per year. If the journal will be distributed in printed form it may require that FMCS raise membership fees. If so, we also might switch to a two-year membership structure to reduce administrative work. The exact amount of increase will depend on the cost of printing the journal.

The editors were requested to prepare a business plan for this journal, including the anticipated costs of whatever options appear to be viable. That plan will be reviewed and approved or modified by the Executive Committee before Society funds are spent on this journal.

**Symposium Committee**

The following is a summary of the Baltimore Board Meeting Discussions:

Catherine Gatenby – The conference is breaking even, with approximately 225 registered from 15 countries! Approximately $44,000 in donations were obtained by Catherine to cover some of the expense.

Heidi suggested that we publish a protocol for symposia – basically a lesson's learned such as accommodating persons with limited mobility, etc. We also need a clearing house of FMCS logos to get t-shirts, etc. The subcontracting of an outfit to do registration was a great success and recommended for future meetings.

**OLD BUSINESS**

History of Past FMCS Presidents – The issue of documenting the work history of past presidents was re-raised, and what was the status of that effort? It was recommended that the past president (Robert Anderson) should compile an outline of past president's work history.

National Strategy – Status?? In 2007 it was agreed to have committees take their piece of conservation strategy and revise and present in March 08, with Rachel Muir to take the lead. To date this has not been accomplished. We also need a synopsis of what has been accomplished to date; this could be included as an appendix. We also still need electronic version of the original document in word format. The board will send an email out regarding number of action items for each committee. The Tennessee / Cumberland mussel conservation strategy is basically complete and can be used as a template as well.

**NEW BUSINESS**

Website News – Tom Jones should have time in the coming months to develop the website. A motion for a $1,500 / year Scholarship for a Marshall Student to maintain the website was proposed by Greg Cope. The scholarship will ensure that the new website is properly maintained and hosted. The motion was seconded and all were in favor.

FMCS Workshop 2010 and 2011 Symposium –

A number of options were discussed for the 2010 workshop and 2011 symposium. The 2010 FMCS Workshop will be held in (or near) St. Louis, MO. The general topic will be Regional Identification of Mussel Fauna and Sampling Methods.

For future symposia / workshops we are also considering a joint meeting with the Southeast Fishes Joint Regional Taxonomy Workshop in Guntersville, AL. The facility can accommodate 200. Steve Ahlstedt will continue to help look at locations with the incoming administration. Steve said a major key to the success of past symposia and workshops has been strong local sponsorship.

It was also discussed that the committees could also be a focus of the workshops, as was the original intent of the committees. It was suggested that the workshops include a field component but have the ability to plan for a weather contingency. There will also need to be an early November date for the board meeting.

**Other Topics / Discussions**

Jim Williams – through FMCS – working on a letter regarding Coosa River for FERC requirements / re-licensing. Jim and Art Bogan also requested the states to review the mussel Atlas. It was proposed to try to publish the new official mussel names in Ellipsaria, however it may be problematic as AFS is protective of publishing new fish/mussel names.

Art Bogan - suggested that a document "Addressing ethical and zoological nomenclature guidelines for documenting

mussel species" should be developed – can the genetics committee head this effort up? Or would this call under techniques and guidelines? The document would include:

- Series of voucher and photo procedures and recommendations
- Locality information
- Naming conventions

Walkerana / Ellipsaria News – See Information Exchange section for a summary of the discussion. The format of the Journal was discussed and it was agreed to keep Ellipsaria as an information exchange format
-Should there be a discount for pdf copy only of the journal?
-Can we scan and convert old *Ellipsaria* back issues to pdf?

Nomenclature / voucher procedures!!! Art Bogan –Article for Ellipsaria on how to photograph mussels, preserve and voucher specimens? FMCS should consider promoting the taking of some vouchers during surveys as a lack of vouchers is hindering the science. Need to then post article on website

Micro matrix Technology – Heidi Dunn discussed the potential of a developing "Micro matrix" technology which could allow for the species-specific delivery of lethal agents. For example, zebra mussels or silver carp could be targeted because it is species specific.

Genetics – David Berg / others - it was discussed the need to improve communication within the mollusk genetic community. Art Bogan stressed the problems of Genbank due to a lack of voucher documentation. Even photographic evidence has been extremely poor and some photos do not match the species sample. It was recommended that voucher procedures be developed.

Time and Place Sub-Committee – It was proposed that a sub-committee should be set up to be solely in charge of conference / workshop funding, due to the large amount of work required for putting the event together. Catherine added that trying to get donations and funding was about half the work of putting the symposium together. Greg Cope said other organizations have a "Time and Place Committee" where the past Symposium Chair is the head of the T&P, incorporated under the functions of the Symposium Committee.

International Sub-Committee – It was discussed that the international component of the Baltimore symposium was a great success. It was suggested to form a separate committee to promote the international aspect of the society. It was then agreed that the best approach would be to form an Ad Hoc International Committee under the Outreach Committee.

Motion to adjourn by Steve Ahlstedt, second by Jim Williams, all in favor.

*Submitted by Greg Zimmerman, FMCS Secretary*

# *Announcements & News*

## The First Biennial Eastern Gulf Slope Mollusk and Crayfish Meeting

The first Biennial Eastern Gulf Slope Mollusk and Crayfish Meeting was convened 20-22 January 2009 at the 5 Rivers Delta Resource Center, Spanish Fort, Alabama. It was held in conjunction with the Alabama DCNR Mollusk Meeting. Informal reviews and updates were presented for current mollusk and crayfish conservation and research activities in Alabama, Florida, Georgia, Louisiana, and Mississippi. Over 50 attendees from state and federal government, nongovernmental agencies and academia attended.

The next meeting is being planned for 18 January 2011, but location has not been determined. Anyone interested in attending should contact the organizers for specific time and location: Jeff Garner, Bleufer@aol.com, Sandy Pursifull, Sandra_Pursifull@fws.gov, or Jim Williams, fishwilliams@gmail.com .

## Obituary – Louise Russert-Kraemer

http://www.nwanews.com/nwat/obits/74105/

Louise "Weez" Rothmund Russert-Kraemer, 85, professor emeritus of zoology at the University of Arkansas in Fayetteville, died Friday, Feb. 13, 2009, at Hillcrest Hospital in Cleveland [Arkansas].

She was born Dec. 17, 1923, to John W. and Wilhelmina Rothmund Russert in Milwaukee. Weezie, as she was known to her friends, attended the Milwaukee University School and began her college education at Wellesley College, finishing a B.S. in biology at Marquette University. She went to the University of Michigan in Ann Arbor for her graduate studies. On completing her M.S. and graduate course work, she accepted a tenure-track position as assistant professor of zoology at the University of Arkansas in Fayetteville in 1948, where she met William S. Kraemer, professor of philosophy. They married in the spring of 1949. Due to a nepotism rule preventing married couples from teaching in the same college, Louise lost her academic position.

While being the devoted mother to her four children, Weez returned to adjunct teaching in the department of zoology at the University of Arkansas in the mid-1950s. With her four, young children in tow, she revived her graduate studies and completed her Ph.D. from the University of Michigan in 1966 with a specialization in malacology. She regained a full-time position in the U of A zoology department where, as a dynamic teacher and innovative researcher, she quickly rose to the rank of full professor. Nationally and internationally recognized for pioneering research combining malacology and animal behavior, she was elected fellow of the American Association for the Advancement of Science and served as president of the American Malacological Union and of the American Microscopical Society. She was a cofounder of the

Society for the History and Philosophy of Biology. In the school year 1987-1988, she was a visiting fellow at Lucy Cavendish College, Cambridge University until she retired in 1993.

Preceded in death by her husband, William; sisters, Audrey Lowe and Joan Russert-Haber; and brother, Roger Russert-Malakoff, she is survived by her four children, Eric Russert Kraemer and his wife Francine Klein, Robert Russert Kraemer and his wife Ginger, Lisa Russert Kraemer and her husband Richard Lang and Soren Russert Kraemer and his wife Karen; 12 grandchildren; and a great granddaughter.

In lieu of flowers, donations may be made to the Louise Russert-Kraemer memorial fund, University of Arkansas Foundation Inc., University House, Fayetteville, AR 72701.

### Obituary – Dorothea Franzen

http://www.iwu.edu/CurrentNews/newsreleases09/obt_Franzen_0109.shtml

Dorothea S. Franzen, professor of biology emerita, died Dec. 31, 2008, at Kidron Bethel Village, a retirement community in North Newton, Kan. She was 96 years old.

Franzen joined Illinois Wesleyan's faculty in 1952 and retired in 1977 as the George C. and Ella Beach Lewis Chair of Biology. Among the many honors she received in her lifetime, she was named Wesleyan's Teacher of the Year in 1967.

Her research specialty was malacology. Among her discoveries was a new species of mollusk which she found along the shores of Long Lake in southern Michigan and named *Catinella prolongata*. She served as national president of the American Malacological Union and received numerous grants for her research. In 1985 she was named Outstanding Member of the American Association of University Women.

Born to a family of teachers, Franzen received her bachelor's degree from Bethel College in North Newton, Kansas. She earned both a master's degree and doctorate in zoology at the University of Kansas, becoming the first female Bethel graduate to go on to earn a Ph.D. Bethel awarded her its Distinguished Achievement Award in 1975.

In 1976, Franzen was interviewed by Wesleyan's student newspaper, the *Argus*, about her journey as an educator and a pioneer as a woman in her field. "Now women can be reasonably sure of getting a position but must go through the rigors of being prepared and staying qualified," she said. Franzen also issued a challenge to IWU women who she felt "were not availing themselves to the opportunities they have. How many of Wesleyan's women have gone for a Ph.D.?"

While Franzen was devoted to her research, she told the Argus, "Teaching is my life. I've kept up research to keep myself alert as a zoologist. One has to work above one's teaching level to maintain an alert outlook and an alert mind. One must be stimulated to be able to stimulate."

Memorial contributions may be made to Bethel College, 300 E. 27th St., North Newton, KS 67117-0531.

# *Publications*

**Esarey, J., D. Soucek, J. Levengood, R. Hudson, W. Wimer, and R. Halbrook. 2008.** Contaminants in unionid mussels from the confluence of the Mississippi and Illinois Rivers. Illinois Natural History Survey Bulletin 38:197-214.
To order: http://www.inhs.uiuc.edu/resources/bulletin.php

**Graf, D.L., and K.S. Cummings. 2009**. Actual and alleged freshwater mussels (Mollusca: Bivalvia: Unionoida) from Madagascar and the Mascarenes, with description of a new genus, Germainaia. Proceedings of the Academy of Natural Sciences of Philadelphia 158: 221-38.

# *Contributed Articles*

*The following articles were contributed by FMCS members and others in the malacological community. The contributions are incorporated into the newsletter with minimal editing and the opinions expressed therein are those of the authors.*

### Maryland Mussel Workgroup – January 27, 2009 Meeting

On January 27th, 2009 the first meeting of the Maryland Mussel Workgroup was held. We had eight participants at the initial meeting including: Jim McCann, Dave Brinker, Dan Feller (Maryland Natural Heritage Program), Matt Ashton (Maryland Biological Stream Survey), Julie Devers (U.S. Fish & Wildlife Service), Rita Villella Bumgardner, Glenn Nelson, and Cara Campbell (U.S. Geological Survey).

Distribution and status of Maryland's mussels:

(JM) Overview of Maryland's native unionid fauna with emphasis on the status of *A. heterodon*, *A. varicosa*, and *L. subvirids*. What are Maryland's taxonomic issues involving lanceolate *Elliptios*? How can we better determine the identity of *L. cariosa* vs. *L. cardium* in the Potomac River drainage?

Recently completed and ongoing work:

(JM) NHP database, permitting, and supportive surveys. Upper Choptank River survey to follow up 2007 MBSS *A. heterodon* record. (MA) Documenting mussel presence at MBSS sites and using data to describe coincident ecological conditions. Long-term monitoring at sites with exceptional mussel communities. Analyzing factors that describe the distribution of Coastal Plain assemblages. Conducting timed searches in conjunction with EPA NSRA sites on Potomac River and non-wadeable tributaries. (JD) Additional host trials with *E. complanata* and migratory fishes; results support suitability of American eels. Captured eels and translocated them to above Conowingo

Dam; should continue translocations in 2009. Also improving eel passage at Conowingo as part of FERC relicensing. (RV) Summarized surveys in Sideling Hill Creek, C&O Canal, Potomac River below Dam No. 4 and Little Falls. Noted recent sightings of *L. subviridis* in Potomac River. Discussed recent surveys in Potomac tributaries including Cacapon River, Back and Sleepy creeks. Participating in multiagency environmental flow analysis of lower Potomac River. (CC) Developing a landscape model for Atlantic mussels, predictive modeling of *A. heterodon*, thermal and hydrologic stability, indicator species of mussels.

Inventory, research, and conservation priorities:

Identify reasons for decline and persistence in *A. varicosa* and *L. subviridis* populations. Will this require a regional effort? Upcoming MBSS study in Sideling Hill Creek watershed can address some data needs. Work towards a consensus on the status and identification of *Lampsilis sp.* in the Potomac River. Assist those investigating lanceolate *Elliptio* taxonomy. Should we look into propagation facilities and what are Maryland's current options? Data gaps (e.g. tidal fresh and Potomac River).

Because of poor weather the group left several items unattended, including effects of stream blockages, temperature and drought, zebra mussels, and filming a segment on mussels for Maryland Public Television. The group will continue to meet (TBA), but will informally discuss new items at the FMCS Symposia. For further information on the meeting, contact Matt Ashton at mashton@dnr.state.md.us or (410) 260-8604.

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## More about the Expansion of the Distribution of *Dreissena bugensis* in Europe

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In previous short reports I have reviewed the presence of the invasive Quagga mussel *Dreissena bugensis* (Andrusov, 1897) in the lower part of the Danube (Mienis, 2006), in the delta of the Rhine and the possible role of the Main-Danube Canal in its expansion (Mienis, 2007) and its presence in the Netherlands (Mienis, 2008). Although we may not rule out the possibility that the Quagga mussel started its infiltration of Europe's main waterways – the Danube and the Rhine, independently from both ends at about the same time – the Main-Danube Canal seems to play a much more important role. The question is: Where are the records from the intermediate area? Has the Quagga mussel been overlooked or has this species failed in establishing viable populations over large stretches in both the Danube and the Rhine?

Two recently published reports show some more light on the conquest of Europe by the Quagga mussel. Hubenov & Trichkova (2007) have reported the first find of *Dreissena bugensis* in the Bulgarian stretch of the Danube between the villages Koshava (km 811) and Sandrovo (km 477). The collected material turned out to be 2-4 years old according to the size of the mussels. Szekeres, Szalóky & Bodolai (2008) reported Quagga mussels from six localities in the Hungarian part of the Danube: Komárom, Kisoroszi and Leányfalu upstream Budapest, Budapest itself, and two localities downstream Budapest near Dunaújváros.

According to these new localities it is only a matter of time before we may expect the first localities of this invasive mussel species from stretches of the Danube in Moldavia, Croatia, Austria and Germany.

References

Hubenov, Z. & Trichkova, T. 2007. *Dreissena bugensis* (Mollusca: Bivalvia: Dreissenidae) – New invasive species to the Bulgarian Malacofauna. Acta Zoologica Bulgarica, 59(2):203-209.

Mienis, H.K. 2006. How long will it take the Quagga mussel *Dreissena bugensis* to reach Western Europe? Ellipsaria, 8(1):8.

Mienis, H.K. 2007. More news about the Quagga mussels in Europe. Ellipsaria, 9(3):7-8.

Mienis, H.K. 2008. Additional news about the presence of Quagga mussels in the Netherlands. Ellipsaria, 10(1):11-12.

Szekeres, J., Szalóky, Z. & Bodolai, K. 2008. [The first data of *Dreissena bugensis* (Andrusov, 1897) from Hungary.] Malacological Newsletter, 26:33-36. (in Hungarian)

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## Additional Information Concerning the Conquest of Europe by the Invasive Chinese Pond Mussel *Sinanodonta woodiana*. 19. News from Austria, France, Hungary, Moldova, Romania, Serbia and Sweden

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During the second half of 2008 the invasive Chinese Pond mussel *Sinanodonta woodiana* was again in the news in several European countries. The most important information, including the first records from Moldova, is here summarized.

**Austria**

*Sinanodonta woodiana* is incorporated in the list of benthic Neozoa present in the rivers and streams of Austria (Moog et al., 2008)

**France**

Relatively small specimens (8.7-13.5 cm) of the Chinese Pond mussel have been found recently in an eutrophic reservoir the Grand Large, which is part of catchment basin of the river Rhône upstream of Lyon Mouthon, 2008). These mussels are accompanied among others by two other invasive bivalve species *Dreissena polymorpha* (Pallas, 1771) and *Corbicula fluminea* (Müller, 1774) and a native species *Unio pictorum*

(Linnaeus, 1758). *Sinanodonta woodiana* had been recorded since the end of the eighties from various localities in the delta of the Rhône (Girardi & Ledoux, 1989 and Girardi, 2002).

**Hungary**
During a survey of a stretch of the Danube in Hungary and two of its tributaries, the Hosszúvölgyi stream and the Börzsönyi stream, *Sinanodonta woodiana* was located only at two stations (out of 15) in the Danube just south of Budapest and just north of Pacs (Bódis et al., 2008).

**Moldova**
In Moldova empty shells of *Sinanodonta woodiana* were found in Lake Manta in 2003 while living specimens were discovered to be present in Lake Beleu in the summer of 2008 (Munjiu & Shubernetski, 2008). Both localities are situated in the catchment basin of the river Prut. Since the latter is connected to the delta of the Danube near the Black Sea, the discovery of the Chinese Pond mussel in that river was only a matter of time. These records are the first ones from Moldavian territory.

**Romania**
Information is presented about the process of establishment of the Chinese Pond mussel in Romania in general and the Danube in particular (Popa et al., 2008). According to the authors the entire stretch of this major European river was settled by this highly invasive species within a time span of 10 years.

**Serbia**
A hydro-biological survey of the river Sava carried out in Serbia in 2006 showed that *Sinanodonta woodiana* was abundant in bottom habitats predominated by the presence of sand, fine sand and mud (Paunović et al., 2008). This mussel species was only collected by diving. The authors consider the river Sava as an important part of the Southern Invasive Corridor of Europe.

**Sweden**
The situation of the Chinese Pond mussel in Sweden has been described recently by von Proschwitz (2008a-b). So far it has been found at two localities: Hjärnarp in 2005 and Askim (southern part of Göteborg) in 2007. They had reached these localities most probably by means of respectively carp and goldfish infected with glochidia of Sinanodonta woodiana. The locality in Askim forms at this moment the northernmost known in Europe.

References


Bódis, E., Nosek, J., Oertel, N. & Tóth, B., 2008. [Longitudinal distribution of mussel fauna in the water system of river Danube.] Acta Biol. Debr. Oecol. Hung., 18:9-20.

Girardi, H., 2002. Notes sur la présence de mollusques dulçaquicoles en Camargue (Bouche-du-Rhône, France) (Mollusca: Gastropoda et Bivalvia). Documents Malacologiques, 3:3-8.

Girardi, H. & Ledoux, J.-C., 1989. Présence d'*Anodonta woodiana* (Lea) en France (Mollusques, Lamellibranches, Unionidae) . Bulletin mensuel de la Société Linnéenne de Lyon, 58:286-290.

Moog, O., Graf, W., Ofenböck, T. & Schmidt-Kloiber, A., 2008. Bentische Neozoa in österreichischen Fliessgewässern. Mitteilungen der Deitschen Gesellschaft für allgemeine und angewandte Entomologie, 16:113-116.

Mouthon, J., 2008. Découverte de *Sinanodonta woodiana* (Lea, 1834) (Bivalvia: Unionacea) dans un réservoir eutrophe: le Grand Large en amont de Lyon (Rhône, France). MalaCo, 5:241-243.

Munjiu, O. & Shubernetski, I., 2008. First record of *Sinanodonta woodiana* (Lea, 1834) (Bivalvia: Unionidae) in Moldova. Aquatic Invasions, 3(4):453-454.

Paunović, M.M., Borković, S.S., Pavlović, S.Z., Saićić, Z.S. & Cakić, P.D., 2008. Results of the 2006 Sava survey – Aquatic Macroinvertebrates. Arch. Biol. Sci., Belgrado, 60(2):265-271.

Popa, O.P., Murariu, D. & Popa, L.O., 2008. Freshwater mollusc species invasive in Romania. In P. Pyšek & J. Pergl (Eds.): Neobiota: towards a Synthesis. 5th European Conference on Biological Invasions. Prague (Czech Republic), 23-26 September 2008. Book of Abstracts: 99.

Proschwitz, T. von, 2008a. The Chinese giant mussel – *Sinanodonta woodiana* (Lea, 1834) (Bivalvis, Unionidae) – an unwelcome addition to the Swedish fauna. Basteria, 72(4-6):307-311.

Proschwitz, T. von, 2008b. Faunistical news from the Göteborg Natural History Museum 2007 – snails, slugs and mussels – with some notes on *Vertigo ultimathule* von Proschwitz – a landsnail species from northernmost Sweden new to science. Göteborgs Naturhistoriska Museum Årstryck 2008:51-72.


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## New malacological records from Paraná State, Southern Brazil region, with a general synthesis of current knowledge


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Since the year of 2001 (Agudo 2008a; Agudo-Padrón 2008b), we have been developing the continental inventory of freshwater/limnic and terrestrial mollusk fauna present in the territory of Paraná State, Southern Brazil region (Fig. 1), with a total of 133 species and subspecies confirmed (77 terrestrial and 56 freshwater; 23 mussel/clams & 33 gastropods), systematically included in 2 classes, 35 families, and 64 genera (classification based on Bouchet & Rocroi (2005), Poppe & Tagaro (2006), Simone (2006) and Thomé et al (2006, 2007)). Once we incorporate information concerning the regional marine/estuarine species (193 forms), the total number of known species and subspecies will rise to 326 forms .

The chronological results of research previously generated can be found in the contributions of Agudo (2005, 2006 a-c, 2007 a), Agudo-Padrón (2007), Agudo (2007 b, 2008 a-c), and Agudo-Padrón (2008 a-b, 2009).

Figure 1. Geographical location of the Paraná's State, Brazil

Additional registrations of species for the State included, in this opportunity, two not certain aquatic/limnic species of the Alluvial Plain (or of Flood) of the High Paraná River, located in the extreme Northwest of the State, regional Third Plateau (Souza *et al* 2008: 310) (Fig. 1):

Systematic Species List :
Class GASTROPODA
Subclass Caenogastropoda / Prosobranchia
Family THIARIDAE
- *Aylacostoma* sp
Class BIVALVIA
Order VENEROIDA
Family SPHAERIDAE
- *Eupera* sp (the first well-known record)

Finally, some other geographical registrations, referred in the regional specialized literature, including researches in the general State territory (Belz & Netto 2008) and specific localities of the Coastal Plain (Agudo 2008 c: 12; Arruda *et al* 2009)(*), the Southwest ("Chopinzinho") and Central North ("Londrina") regions (Carboni *et al* 2006; Guardia 2006)(**), the Metropolitan region of "Cascavel" (Netto et al 2008; Pereyra *et al* 2008), border places localities of the "Iguazú Waterfalls National Ecological Park" (Rumi *et al* 2005, 2008; Gregoric *et al* 2008), the Alluvial Plain of the High Paraná River, in the Third Plateau (Takeda *et al* 2002; Sorte & Martins-Silva 2008; Souza *et al* 2008), and the organization of a coastal malacological collection in Museum of Natural History (Fraguas *et al* 2002).

(*)For the amphibian slug *Omalonyx matheroni* (Potiez & Michaud, 1835), in the "Inferninho River", Paranaguá …
(**)For the native giant freshwater mussel naiad *Anodontites trapesialis* (Lamarck, 1819) …

References:
Agudo, A.I. 2005. Preliminary notes on the freshwater mussels/naiades of the Paraná State, Southern Brazil. *FMCS Newsletter Ellipsaria*, 7(3): 9-11.
Agudo, A.I. 2006 a. New records of Continental Mollusks (Bivalvia & Gastropoda) from Paraná and Santa Catarina States, Southern Brazil region. *FMCS Newsletter Ellipsaria*, 8(1): 10-11.
Agudo, A.I. 2006 b. Preliminary notes on the freshwater and terrestrial gastropod mollusks of the Paraná State, Southern Brazil. *FMCS Newsletter Ellipsaria*, 8(3): 9-12.
Agudo, A.I. 2006 c. Additional records of land and freshwater mollusks (Gastropoda & Bivalvia) from Paraná State, Southern Brazil region. *FMCS Newsletter Ellipsaria*, 8(3): 12.
Agudo, A.I. 2007 a. Some observations about continental mollusks (Gastropoda & Bivalvia) in two Ecological Parks of Paraná State, Southern Brazil. *FMCS Newsletter Ellipsaria*, 9(1): 10-11.
Agudo, A.I. 2007 b. Preliminary report of continental mollusks in the Central Paraná State Region, Southern Brazil, with additional information. *FMCS Newsletter Ellipsaria*, 9 (2): 5-7.
Agudo, A.I. 2008 a. Non-marine mollusc diversity in Paraná State, Southern Brasil. *IUCN/SSC Internet Newsletter Tentacle*, Honolulú, Hawaii - USA, (16): 10 - 13, 31.
Agudo, A.I. 2008 b. Freshwater mussel news (Unionoida: Hyriidae) from Paraná State, Southern Brazil region. *FMCS Newsletter Ellipsaria*, 10(1): 17-18.
Agudo, A.I. 2008 c. Malacological news from Paraná State, Southern Brazil region: additional registrations. *FMCS Newsletter Ellipsaria*, 10(2): 11-13.
Agudo-Padrón, A.I. 2007. Inventário preliminar dos moluscos continentais ocorrentes no Estado do Paraná, sul do Brasil. Rio de Janeiro, RJ: Resumos XX Encontro Brasileiro de Malacologia: 219.
Agudo-Padrón, A.I. 2008 a. Member report: Brazil. *UNITAS Malacologica Newsletter*, Dublin - Ireland, (27): 9.
Agudo-Padrón, A.I. 2008 b. Levantamento biogeográfico de moluscos no Estado de Santa Catarina, SC, região Sul do Brasil, Vertente Atlântica do Cone Meridional da América do Sul. *Caminhos de Geografia*, Uberlândia, 9(28): 126-133.
Agudo-Padrón, A.I. 2009. Ordenamento e interpretação biogeográfica preliminar da malacofauna ocorrente na região da Vertente Atlântica do Cone Meridional da América do Sul. *Revista Discente Expressões Geográficas*, Florianópolis, 5(5): ... in Press.
Arruda, J.O.; Pereira, D.; Bergonci, P.E.A.; Santos, C.P. & Mansur, M.C.D. 2009. Novos registros de *Omalonyx matheroni* (Potiez & Michaud, 1835) (Mollusca, Gastropoda, Succineidae) para os Estados de São Paulo e Paraná, Brasil. *Biotemas*, Florianópolis, 22(1): ... in Press.
Belz, C.E. & Netto, O.S.M. 2008. O transporte de areia como vetor de dispersão de moluscos bivalves invasores no Estado do Paraná, Brasil. Valdivia, Chile: Resumos VII Congreso Latinoamericano de Malacologia: ... oral Presentation.
Carboni, M.C.; Scariot, L.A.; Ulbinski, A.C.L.; Carapunarla, L. Souza, F. & Saciloto, M.P. 2006. Estudos preliminares sobre a

ocorrência de *Anodontites trapesialis* (Lamarck, 1819) em tanques de piscicultura. Londrina, PR: Resumos XXVI Congresso Brasileiro de Zoologia: 2210.

Fraguas, G.M.; Gernet, M.V. & Sasaoka, S.K. 2002. Levantamento de moluscos coletados por Frederico Lange de Morretes no litoral Paranaense e tombados no Museu de História Natural Capão da Imbuia. Itajaí, SC: Resumos XXIV Congresso Brasileiro de Zoologia: 6044.

Guardia, P. 2006. Análise morfométrica da concha de *Anodontites trapesialis* (Lamarck, 1819) (Mollusca: Bivalvia). Londrina, PR: Resumos XXVI Congresso Brasileiro de Zoologia: 1946.

Gregoric, D.E.G.; Núñez, V.; Ferrando, N.S. & Rumi, A. 2008. Densidad y crecimiento de *Chilina megastoma* (Gastropoda:Chilinidae) em el Salto Arrechea, Parque Nacional Iguazú, Misiones, Argentina. Valdivia, Chile: Resumos VII Congreso Latinoamericano de Malacologia: ... oral Presentation.

Netto, O.S. M.; Belz, C.E. & Borges, P.D. 2008. Bioincrustação de *Limnoperna fortunei* (Dunker, 1857) em diferentes substratos artificiais no Reservatório da Usina Hidrelétrica Governador José Richa, Rio Iguaçu, Paraná, Brasil. Valdivia, Chile: Resumos VII Congreso Latinoamericano de Malacologia: ... oral Presentation.

Pereyra, P.J.; Maroñas, M. & Darrigran, G. 2008. Crecimiento individual del mejillón invasor, *Limnoperna fortunei* (Bivalvia: Mytilidae) en una central hidroeléctrica sobre el río Paraná. Valdivia, Chile: Resumos VII Congreso Latinoamericano de Malacologia: presentación Poster.

Poppe, G.T. & Tagaro, S.P. 2006. The new classification of gastropods according to Bouchet & Rocroi, 2005. VISAYA, Cebú-Philippines: 1-10.
http://www.conchology.be/en/shelltopics/visaya-net

Rumi, A.; Gregoric, D.E.G. & Ferrando, N.S. 2005. Aspectos poblacionales de *Acrorbis* aff. *petricola* Odhner, 1937 (Gastropoda:Planorbidae) em la Província de Misiones, Argentina. Rio de Janeiro, RJ: Resumos XIX Encontro Brasileiro de Malacologia: 304.

Rumi, A.; Gregoric, D.E.G.; Núñez, V. Ferrando, N.S 2008. Gasterópodos del Parque Nacional Iguazú, Argentina, y su disposición en hábitat de saltos. Valdivia, Chile: Resúmenes VII Congreso Latinoamericano de Malacologia: ... oral Presentation.

Simone, L.R.L. 2006. Land and freshwater molluscs of Brazil. São Paulo, SP: FAPESP, 390 p.

Sorte, P.D.B. & Martins-Silva, M.J. 2008. Estudo da bioinvasão de *Corbicula fluminea* (Müller, 1774) no Lago Paranoá (Bacia do Alto Paraná). Valdivia, Chile: Resumos VII Congreso Latinoamericano de Malacologia: ... presentation Poster.

Souza, G.T.R. e; Machado, M.H.; Dias, M.L.G.G.; Yamada, F.H.; Pagotto, J.P.A. & Pavanelli, G.C. 2008. Composição e sazonalidade dos moluscos do alto rio Paraná, Brasil, e sua potencialidade como hospedeiros intermediários de digenéticos. *Acta Sci. Biol. Sci.*, Maringá, 30(2): 309-314.

Takeda, A.M.; Fujita, D.S. & Fontes, H.M. Jr. 2002. Perspectivas de proliferação de Bivalvia exóticas na Planície Aluvial do Alto Rio Paraná. 3. Componente Biótico, pp. 93-96. *In*: A Planície de Inundação do Alto Rio Paraná. Maringá, PR: Universidade Estadual de Maringá – UEM, Projeto Programa PELD/CNPq.

Thomé, J.W.; Arruda, J.O. & Silva, L.F. da. 2007. Moluscos terrestres no Cone Meridional da América do Sul, diversidade e distribuição: 9-28. Ciência & Ambiente, Fauna Neotropical Austral, (35): 9-28.

Thomé, J.W.; Gomes, S.R. & Picanço, J.B. 2006. Os caracóis e as lesmas dos nossos bosques e jardins. Pelotas, RS: Editora USEB, 123 p.

## General mollusk fauna of Rio Grande do Sul State, Southernmost Brazil region: a preliminary revision rehearsal

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A brief revision and preliminary bibliographical compilation of the mollusk fauna for the Rio Grande do Sul State is presented in this report, based on the fact that abundant and diversified references exist, included general ecological aspects and specific descriptions, but are dispersed and not always of easy access, seeking to minimize part of this informative deficiency.

Located in the brazilian Southernmost region, Rio Grande do Sul State is the largest geo-political portion of the South area of the country (Fig. 1), geographically close to the remaining States of the brazilian Southern region, Santa Catarina and Paraná and the neighboring countries of Uruguay and Argentina, of the "Atlantic Slope of the Southern Cone of South America", placed in the oriental face of the Andean Mountain range. Occupying a total area of 282.062 km², and an large Atlantic sandy coast with more than 622 kilometers of extension, Rio Grande do Sul possesses a soft, super-humid subtropical, mesothermal climate, with hot summer and without station it evaporates very defined. The annual medium temperature oscillates between 16 and 20°C. The average of the hottest month is between 22ºC and 26°C and the average of the coldest month between 10° and 15°C. The annual pluviometric precipitation varies between 1000 and 1500 mm and the number of frosts a year varies since 1º, in "Torres" - emblem with coast Atlantic of Santa Catarina's State , to the North, to more than 15º in "Santa Vitória do Palmar", in the close interior to the end South of the State.

The Metropolitan area of Porto Alegre, also known as Great Porto Alegre, located between the Central Depression and the portion of the Coastal Plains that outline the hidrographic delta of the Jacuí River, the "Guaíba Lake" and the "Patos Lagoon" (Fig. 1), it gathers 31 of the Municipal districts of RS, in intense process of urban occupation, term that refers to the extension of capital Porto Alegre, forming with its bordering Municipal districts a continuous urban stain, in a mixture of areas typically urban, agricultural rural spaces and representative several remainders of the original natural environment, now integrating 9.800,194 km².

In general, reasonable swinging of 562 species and confirmed subspecies, including 271 continental – 106 freshwater (53 limnic mussels/clams and 53 gastropods – Caenogastropoda/Prosobranchia and Pulmonata) & 165 terrestrial, besides 291 marine forms it is the preliminary general result of this regional analysis.


Figure 1. Rio Grande do Sul State, territory (top) in Brazil, and the Atlantic Slope of the Southern Cone of South America (bottom).

A compilation on some main bibliographical sources of interest follows, seeking to contribute to the regional knowledge of this diversified invertebrate fauna:


I. GENERAL FORMS

+ AGUDO-PADRÓN, A. I. & SILVEIRA, E. F. da. 2008. Levantamento preliminar dos moluscos continentais ocorrentes no Município de Cachoeirinha, Mesorregião da Grande Porto Alegre, RS. Canoas, RS: Resumos VIII Fórum de Pesquisa e XIV Salão de Iniciação Científica e Tecnológica da Universidade Luterana do Brasil - ULBRA, 1 CD-Rom: 84.

+ ALLAGIO, G. M. T. C. 1981. Lista dos moluscos brasileiros da coleção do Museu de Ciências da Pontifícia Universidade Católica do Rio Grande do Sul. *Comunicações do Museu de Ciências da PUC-RS*, Porto Alegre, (22-23): 1-82.

+ BUCKUP, L. & BUCKUP, E. H. 1957. Catálogo dos moluscos do Museu Rio-Grandense de Ciências Naturais. *Iheringia, Série Zoologia*, Porto Alegre, (1): 1-40.

+ FLORA, M. D. *et al*. 2008. Estudo da malacofauna na Ilha São Francisco do Rio Uruguai – Porto Xavier / RS. Curitiba, Paraná: Resumos XXVII Congresso Brasileiro de Zoologia, Malacologia, P-1635.

+ MAGALHÃES, J. & S. MEZZALIRA. 1953. Moluscos fósseis do Brasil. Rio de Janeiro, RJ: Instituto Nacional do Livro, Departamento de Imprensa Nacional, 287 p.

+ MANSUR, M.C.D. *et al*. Moluscos, pp. 49-71. *In*: FONTANA, C. S.; BENCKE, G. A. & REIS, R. E. Livro vermelho da fauna ameaçada de extinção no Rio Grande do Sul. Porto Alegre, RS: EDIPUCRS, 2003, 632 p.

+ MORRETES, F.L. 1949. Ensaio de Catálogo dos Moluscos do Brasil. Curitiba: *Arquivos do Museu Paranaense*, Curitiba, 7(1):5-216.

+ MORRETES, F. L. 1953. Addenda e Corrigenda ao Ensaio de Catálogo dos Moluscos do Brasil. Curitiba: *Arquivos do Museu Paranaense*, Curitiba, 10 (2): 37-76.

+ OLIVEIRA, M. P. de & ALMEIDA, M. N. de. 1999. Conchas dos caramujos terrestres do Brasil / Land shells from Brazil. Juiz de Fora, MG: Editar Editora Associada, 61 p. + Ficha bibliográfica.

+ PITONI, V. L. L. *et al*. 1976. Moluscos do Rio Grande do Sul: coleta, preparação e conservação. *Iheringia, Série Divulgação*, Porto Alegre, (5): 25-68.

+ SIMONE, L.R.L. 2003. Histórico da malacologia no Brasil. *Revista de Biologia Tropical*, San José de Costa Rica, 51 (Suppl. 3): 139-147.

+ SIMONE, L.R.L. 2006. Land and freshwater molluscs of Brazil. São Paulo, SP: FAPESP, 390 p.

+ SIMONE, L.R.L. de & MEZZALIRA, S. 1994. Fossil molluscs of Brazil. *Boletim do Instituto Geológico*, São Paulo, (11): 1-202.

+ THOMÉ, J. W. 1971. Os moluscos da pré-história aos nossos dias. *Iheringia, Série Divulgação*, Porto Alegre, (1): 11-16.

+ VEITENHEIMER-MENDES, I. L. *et al*. (Orgs.). Guia Ilustrado de Fauna e Flora para o Parque COPESUL de Proteção Ambiental. Porto Alegre, RS: Companhia Petroquímica do Sul – COPESUL/Fundação Zoobotânica do RS - FZB, 1995, 209 p.

+ VEITENHEIMER-MENDES, I.L. & POSTAL, M. 2003. Moluscos terrestres e límnicos registrados para a sub-bacia hidrográfica do arroio Itapuã, Rio Grande do Sul, Brasil. *Revista Brasileira de Biociências*, 1(2): 55-69.

II. MARINE / ESTUARINE FORMS

+ AMARAL, A.C.Z. *et al*. Manual de identificação dos invertebrados marinhos da região Sudeste - Sul do Brasil. São Paulo, SP: EDUSP, 2006, 288 p.

+ CAETANO, C.H.S. *et al*. 2007. Biogeografia e batimetria dos Scaphopoda (Mollusca) da Plataforma e Talude Continental do Brasil. Florianópolis, SC: Resumos XII Congresso Latino Americano de Ciências do Mar: 16-17.

+ GIL, G.M. & THOMÉ, J.W. 1998. *Donax hanleyanus* Philippi, 1847 como indicador ambiental. *Biociências*, Porto Alegre, 6:189-193.

+ GIL, G.M. & THOMÉ, J.W. 2000. Interações biológicas entre moluscos na praia de Arroio Teixeira, RS. *Revista Brasileira de Zoociências*, Juiz de Fora, 2: 41-50.

+ GIL, G.M. & THOMÉ, J.W. 2001. Abundância, freqüência e densidade relativa da Malacofauna da praia de Arroio Teixeira, Rio Grande do Sul. *Biotemas*, Florianópolis, 14(1): 127-136.

+ GIL, G.M. & THOMÉ, J.W. 2001. Distribuição vertical de *Donax hanleyanus* (Mollusca,Bivalvia, Donacidae) em uma praia arenosa do Rio Grande do Sul. *Biociências*, Porto Alegre, 9(1):33-44.

+ MARTINS, I.X. *et al*. 2008. Moluscos aplacóforos: registros atuais e perspectiva no estudo desses animais na costa brasileira. Curitiba, PR: Resumos XXVII Congresso Brasileiro de Zoologia, Malacologia: O-2438.

+ MÜLLER, A. C. de P. & LANA, P. da C. Manual de identificação de moluscos bivalves da família dos teredinídeos encontrados no litoral brasileiro. Curitiba, PR: Editora da UFPR, 2004, 148 p.

+ PIMENTA, A. D. & COSTA, P. M. S. 2002. Espécies de moluscos marinhos descritas para o litoral do Brasil posteriores a Rios (1994). *Informativo SBMa*, Rio de Janeiro, 33 (139): 4-5.

+ RIOS, E. C. 1966. Provisional list of Rio Grande do Sul marine molluscs. *Notas e Estudos da Escola de Geologia*, Porto Alegre, 1(2): 15-40.
+ RIOS, E. C. Coastal brazilian seashells. Rio Grande, RS: Fundação Cidade do Rio Grande, Museu Oceanográfico de Rio Grande, 1970, 265 p., 2 maps., 60 pls.
+ RIOS, E. de C. Brazilian marine mollusks iconography. Rio Grande, RS: Museu Oceanográfico da FURG, 1975, 331 p., 91 pls.
+ RIOS, E. de C. Seashells of Brazil. Rio Grande, RS: Fundação Universidade do Rio Grande, Museu Oceanográfico, 1985, 329 p., 102 pls.
+ RIOS, E. de C. Seashells of Brazil. Rio Grande, RS: Fundação Universidade do Rio Grande, Museu Oceanográfico, 2nd. Edition, 1994, 329 p., 102 plts.
+ RIOS, E. de C. *et al*. 1975. Moluscos marinhos de ampla distribuição latitudinal/Marine molluscs of wide latitudinal distribution. *Acta Biológica Paranaense*, Curitiba, 4(3,4):121-133.
+ TARASCONI, J. C. 1989. Novos registros de moluscos marinhos para o litoral de Santa Catarina. *Informativo SBMa*, Rio de Janeiro, 20 (96): 12-16.
+ TARASCONI, J. C. 1993. Ampliação da distribuição geográfica de moluscos marinhos para o litoral Sul do Brasil. *Siratus*, São Paulo, 2 (12): 16-18.
+ THOMÉ, J. W. *et al*. As conchas das nossas praias: guia ilustrado. Pelotas, RS: Editora da USEB, 2004, 96p.
+ WIGGERS, F. & VEITENHEIMER-MENDES, I. L. 2003. Gastrópodes atuais da Plataforma Continental Externa e Talude Continental ao largo de Rio Grande, Rio Grande do Sul, Brasil. *Revista Brasileira de Paleontologia*, Porto Alegre, 6: 55-60.

III. CONTINENTAL FRESHWATER / LIMNIC FORMS

+ AGUDO-PADRÓN, A.I. & OLIVEIRA, J.V. de. 2008. Malacological fauna in irrigated rice fields of the Southern Brazil: a comprehensive general study. *UNITAS Malacologica Newsletter*, Dublin, Ireland, (26): 8.
+ AGUDO-PADRÓN, A.I. & OLIVEIRA, J.V. de. 2008. Mollusk fauna ocorrence in irrigated rice fields of the Southern Brazil: a preliminary general report. *FMCS Newsletter Ellipsaria*, Champaign, Illinois, 10(1): 13-16.
+ AGUDO-PADRÓN, A.I.; OLIVEIRA, J.V. & FREITAS, T.F.S. 2008. Ocorrência de moluscos em lavouras de arroz irrigado do Estado do Rio Grande do Sul - RS, Brasil. I. Levantamento preliminar e avaliação do seu impacto regional como pragas agrícolas. Cachoeirinha, RS: Avulsos Malacológicos / IRGA, Relatório técnico interno, 13 p.
+ BATISTELLA, T. *et al*. 2008. Levantamento da malacofauna limnica do Rio Passo Fundo – Passo Fundo – RS. Curitiba, Paraná: Resumos XXVII Congresso Brasileiro de Zoologia, Malacologia: P-1635.
+ BONETTO, A.A. & MANSUR, M.C.D. 1970. Las naiades de la cuenca del Guaíba. Acta Zoológica Lilloana, 27: 241-260.
+ BURNS, M. D. de M. et al. 2006. Primeiro registro de ocorrência do mexilhão dourado Limnoperna fortunei na bacia de drenagem da Lagoa Mirim, RS, Brasil. Biociências, Porto Alegre, 14(1): 83-84.
+ CASTILLO, A. R. et al. 2007. Moluscos bivalves da localidade de São Marcos, bacia do Médio rio Uruguai, Uruguaiana, Brasil. Biotemas, Florianópolis, 20(4): 73-79.
+ CASTILLO, A. R. et al. 2007. Distribuição e densidade populacional de Corbicula fluminea (Mueller, 1744) do Arroio Imbaá, Rio Uruguai, Uruguaiana, Brasil. Biodiversidade Pampeana, Uruguaiana, 5(1): 25-29.
+ COLARES, E. R. da C. et al. 2002. Diagnóstico e controle do mexilhão-dourado, Limnoperna fortunei, em sistemas de tratamento de água em Porto Alegre (RS/BRASIL). Vitória, ES: VI Simpósio Ítalo Brasileiro de Engenharia Sanitária e Ambiental - VI SIBESA, Setembro 1 a 5 de 2002, I - 029, 4 p.
+ CHOMENCO, L. 1988. Utilização de moluscos gastrópodes do Rio Grande do Sul, Brasil, em experimentos toxicológicos como bioindicadores para avaliação espacial. Acta Limnológica Brasiliensia, Porto Alegre, 11: 723-750.
+ COWIE, R. H. & THIENGO, S. C. 2003. The apple snails of the Américas (Mollusca: Gastropoda: Ampullariidae: Asolene, Felipponea, Marisa, Pomacea, Pomella): a nomenclatural and type catalog. Malacologia, 45(1): 41-100.
+ FOCHT, T. & VEITENHEIMER-MENDES, I. L. 2001. Distribuição sazonal e reprodução de Neocorbicula limosa (Maton) (Bivalvia, Corbiculidae) no Lago Guaíba, Rio Grande do Sul, Brasil. Revista Brasileira de Zoologia, 18(1): 35-43.
+ GARCES, L. M. M. P. et al. 1989. Contribuição à conquiliometria de Neocorbicula limosa (Maton, 1811) (Bivalvia, Corbiculidae). Revista Brasileira de Zoologia, São Paulo, 6(3): 507-516.
+ HAHN, S. et al. Moluscos límnicos. Seção II – Diagnóstico, pp. 252-261. In: BECKER, F G.; RAMOS, R. A. & MOURA, L. de A. (Orgs.). Biodiversidade. Regiões da Lagoa do Casamento e dos Butiazais de Tapes, planície costeira do Rio Grande do Sul. Brasília, DF: MMA/FZB, 2007, 388 p.
+ HÜBEL, I. et al. 2008. Primeiro registro do molusco invasor Limnoperna fortunei (Dunker, 1857) (Mollusca, Mytilidae) para a Bacia Hidrográfica do Rio dos Sinos, Rio Grande do Sul, Brasil. Revista Brasileira de Zoociências, 10(1): 77-79.
+ ITUARTE, C. F. 1994. Corbicula and Neocorbicula (Bivalvia: Corbiculidae) in the Paraná, Uruguay, and Rio de La Plata Basins. The Nautilus, 107(4): 129-135.
+ KOTZIAN, C.B. & SIMÕES, M.G. 2006. Taphonomy of recent freshwater molluscan death assemblages, Touro Passo Stream, Southern Brazil. *Revista Brasileira de Paleontologia*, Porto Alegre, 9(2): 243-260.
+ MANSUR, M.C.D. 1969. Chave dicotômica prática para determinação dos gêneros de moluscos bivalves do Guaíba - P. Alegre (baseada sobre características conquiliológicas). *Boletim CECIRS*, Porto Alegre, (4): 5 p. não numeradas.
+ MANSUR, M.C.D. 1970. Lista dos moluscos bivalves das famílias Hyriidae e Mycetopodidae para o Estado do Rio Grande do Sul. *Iheringia, Série Zoologia*, Porto Alegre, (39): 33-95.
+ MANSUR, M.C.D. 1972. Morfologia do sistema digestivo de *Castalia undosa martensi* (Ihering, 1891) – (Bivalvia, Hydriidae). *Iheringia, Série Zoologia*, Porto Alegre, (41):21-34.
+ MANSUR, M.C.D. 1973. Morfologia do sistema digestivo das espécies do gênero *Diplodon* Spix, 1827 do rio Guaíba, Rio Grande do Sul (Unionacea – Hyriidae). *Iheringia*, Série Zoologia, (43): 75-90.
+ MANSUR, M.C.D. 1974. *Monocondylaea minuana* ORBIGNY, 1835: variabilidade da concha e morfologia do sistema digestivo (Bivalvia, Mycetopodidae). *Iheringia, Série Zoologia*, (45): 3-25.
+ MANSUR, M.C.D. 1999. Gloquídeo de *Diplodon martensi* (Ihering) (Mollusca, Bivalvia, Hyriidae) e seu ciclo parasítico. *Revista Brasileira de Zoologia*, São Paulo, 16(Supl. 2): 185-194.
+ MANSUR, M.C.D. 2003. Problemáticas do mexilhão dourado *Limnoperna fortunei* na bacia do Guaíba-Patos, Rio Grande do Sul, com uma síntese de 4 anos de pesquisa, pp. 19-26. *In*: PTI–Parque Tecnológico Itaipu. I Encontro Sul-Americano de Integração de Ações para Controle do Mexilhão Dourado (*Limnoperna fortunei*)–Recomendações e Resumo do Evento. Foz de Iguaçu, Brasil / Hermandarias, Paraguai: Central Hidroelétrica de Itaipú, 2003, 54 p. + Anexo (Clipping do evento), 39 p.
+ MANSUR, M.C.D. 2005. Dados sobre a dispersão de *Corbicula* spp. na América do Sul e a situação das pesquisas no Brasil (Bivalvia, Corbiculidae). Rio de Janeiro, RJ: Resumos XIX Encontro Brasileiro de Malacologia: 26-27.
+ MANSUR, M.C.D. 2005. Protocolos de padronização e monitoramento de *Corbicula* spp. e *Limnoperna fortunei* no sul do

Brasil (Corbiculidae e Mytilidae). Rio de Janeiro, RJ: Resumos XIX Encontro Brasileiro de Malacologia: 185-186.

+ MANSUR, M.C.D. O mexilhão dourado *Limnoperna fortunei* (Dunker, 1857), invasor de origem asiática, no Sul do Brasil (Mollusca, Bivalvia, Mytilidae), pp. 71-80. *In*: SANTOS, S.B. dos et al (Orgs.). Tópicos em Malacologia – Ecos do XVIII Encontro de Malacologia. Rio de Janeiro, RJ: SBMa, 2007, XIV + 365 p.

+ MANSUR, M.C.D. 2008. Bivalves Sul-Americanos: uma diversidade ameaçada. Curitiba, Paraná: XXVII Congresso Brasileiro de Zoologia, Resumo de Palestra, 2p. http://www.cbz2008.com.br/palestras/Maria%20Cristina%20Mansur%20_%20malacologia.pdf

+ MANSUR, M.C.D. 2008. Experiências e caminhos para a conservação de espécies nativas na rota do mexilhão dourado. Curitiba, Paraná: XXVII Congresso Brasileiro de Zoologia, Resumo de Palestra, 3p. http://www.cbz2008.com.br/palestras/Maria%20Cristin%20Mansur_bioinvas%C3%A3o.pdf

+ MANSUR, M.C.D. & ANFLOR, L.M. 1981. Diferenças morfológicas entre *Diplodon charruanus* ORBIGNY, 1835 e *D. pilsbryi* MARSHALL, 1928 (Bivalvia, Hyriidae). *Iheringia, Série Zoologia*, Porto Alegre, (60): 101-116.

+ MANSUR, M.C.D. & CAMPOS-VELHO, N.M.R. de. 1990. Técnicas para o estudo dos gloquídios de Hyriidae (Mollusca, Bivalvia, Unionoida). *Acta Biológica Leopoldensia*, São Leopoldo - RS, 12(1): 5-18.

+ MANSUR, M.C.D. & CAMPOS-VELHO, N.M.R. de. 2000. The glochidium of *Castalia martensi* (Ihering 1891) (Bivalvia, Unionoida: Hyriidae). *Heldia*, München, 3(1/2): 6-10, 1 plate.

+ MANSUR, M.C.D. & GARCES, L.M.M.P. 1988. Ocorrência e densidade de *Corbicula fluminea* (Mueller, 1774) e *Neocorbicula limosa* (Maton, 1811) na Estação Ecológica do Taim e áreas adjacentes, Rio Grande do Sul, Brasil (Mollusca, Bivalvia, Corbiculidae). *Iheringia, Série Zoologia*, Porto Alegre, (68): 99-115.

+ MANSUR, M.C.D. & OLAZARRI, J. 1995. Redescrição, distribuição e preferências ambientais de *Anodontites ferrarisi* (Orbigny, 1835) revalidada (Bivalvia, Unionoida, Mycetopodidae). *Iheringia, Série Zoologia*, (79): 3-12.

+ MANSUR, M.C.D. & PEREIRA, D. 2006. Bivalves límnicos da bacia do rio dos Sinos, Rio Grande do Sul, Brasil (Bivalvia, Unionoida, Veneroida e Mytiloida). *Revista Brasileira de Zoologia*, São Paulo, 23(4): 1123-1147.

+ MANSUR, M.C.D. & SILVA, M. da G. O. da. 1990. Morfologia e microanatomia comparada de *Bartlettia stefanensis* (MORICAND, 1856) e *Anodontites tenebricosus* (LEA, 1834) (Bivalvia, Unionoida, Muteloidea). *Amazoniana*, Kiel, 11(2): 147-166.

+ MANSUR, M.C.D. & SILVA, M. da G. O. da. 1999. Description of glochidia of five species of freshwater mussels (Hyriidae: Unionoidea) from South America. Malacologia, 41(2): 475-483.

+ MANSUR, M.C.D. & VEITENHEIMER, I. L. 1975. Nova espécie de Eupera (Bivalvia: Sphaeriidae) e primeiros estudos anatômicos dentro do gênero. Iheringia, Série Zoologia, (47): 23-46.

+ MANSUR, M.C.D. & VEITENHEIMER-MENDES, I. L. 1978. Mycetopoda legumen (Martens, 1888): lasídio e desenvolvimento parasitário (Bivalvia, Mycetopodidae). Revista Brasileira de Biologia, Rio de Janeiro, 38(3): 531-536.

+ MANSUR, M.C.D. & VEITENHEIMER-MENDES, I. L. 1979. Redescrição de Mycetopoda legumen (Martens, 1888) (Bivalvia, Mycetopodidae). Revista Brasileira de Biologia, Rio de Janeiro, 39(3): 695-702.

+ MANSUR, M.C.D. et al. 1987. Moluscos bivalves de água doce: identificação dos gêneros do Sul e Leste do Brasil. Acta Biológica Leopoldensia, São Leopoldo - RS, 9(2): 181-202.

+ MANSUR, M.C.D. et al. 1988. Mollusca, Bivalvia de um trecho do curso inferior do Rio Jacuí, Rio Grande do Sul, Brasil. Iheringia, Porto Alegre, Série Zoologia, (67): 87-108.

+ MANSUR, M.C.D. et al. 1991. Moluscos bivalves límnicos da Estação Ecológica do Taim e áreas adjacentes, Rio Grande do Sul, Brasil. Iheringia, Série Zoologia, Porto Alegre, (71): 43-58.

+ MANSUR, M.C.D. et al. 1994. Distribuição e preferências ambientais dos moluscos bivalves do açude do Parque de Proteção Ambiental COPESUL, Município de Triunfo, Rio Grande do Sul, Brasil. Biociências, Porto Alegre, 2(1): 27-45.

+ MANSUR, M.C.D. et al. 1999. Limnoperna fortunei (Dunker, 1857), molusco bivalve invasor, na bacia do Guaíba, Rio Grande do Sul, Brasil. Biociências, Porto Alegre, 7(2): 147-150.

+ MANSUR, M.C.D. *et al*. 2003. Primeiros dados quali-quantitativos do mexilhão-dourado, *Limnoperna fortunei* (Dunker), no Delta do Jacuí, no Lago Guaíba e na Laguna dos Patos, Rio Grande do Sul, Brasil e alguns aspectos de sua invasão no novo ambiente. *Revista Brasileira de Zoologia*, São Paulo, 20(1): 75-84.

+ MANSUR, M.C.D. *et al*. Prováveis vias da introdução de *Limnoperna fortunei* (Dunker, 1857) (Mollusca, Bivalvia, Mytilidae) na bacia da Laguna dos Patos, Rio Grande do Sul e Novos Registros de Invasão no Brasil pelas bacias do Paraná e Paraguai (Cap. 4, pp. 35-38). *In*: SILVA, J. S. V. da & SOUZA, R. C. C. L. de (Orgs.), Água de Lastro e Bioinvasão. Rio de Janeiro, RJ: Editora Interciência, 2004, 224 p.

+ MANSUR, M.C.D. *et al*. 2004. Uma Retrospectiva e Mapeamento da Invasão de Espécies de *Corbicula* (Mollusca, Bivalvia, Veneroida, Corbiculidae) Oriundas do Sudeste Asiático, na América do Sul, Cap. 5: 39-58. *In*: Silva, J. S. V. da & R. C. C. L. de Souza (Orgs.), Água de Lastro e Bioinvasão. Rio de Janeiro, RJ: Ed. Interciência, 224 p.

+ MANSUR, M.C.D. *et al*. 2004. Distribuição e conseqüências após cinco anos da invasão do mexilhão-dourado, *Limnoperna fortunei*, no Estado do Rio Grande do Sul, Brasil (Mollusca, Bivalvia, Mytilidae). *Biociências*, Porto Alegre, 22(2): 165-172.

+ MANSUR, M.C.D. *et al*. 2008. Variação especial do comprimento e do peso úmido total de *Limnoperna fortunei* (Dunker, 1857) no delta do rio Jacuí e lago Guaíba (RS, Brasil). *Biotemas*, Florianópolis, 21(4): 49-54.

+ MANSUR, M.C.D. *et al*. 2008. Ocorrência de moluscos límnicos e crustáceo em macroaglomerados do mexilhão dourado, *Limnoperna fortunei* (Dunker, 1857) sobre sarandi no lago Guaíba (RS, Brasil). *Biotemas*, Florianópolis, 21(4): 179-182.

+ MARTELLO, A.R. *et al*. 2006. Quantitative fidelity of recent freshwater mollusk assemblages from the Touro Passo River, Rio Grande do Sul, Brazil. *Iheringia, Série Zoologia*, Porto Alegre, 96(4): 453-465.

+ MARTELLO, A.R. et al. 2008. Malacofauna límnica associada à macrófitas aquáticas do rio Iguariaçá, São Borja, RS, Brasil. *Ciência e Natura*, Santa Maria - RS, 30(1): 27-41.

+ MARTINS, D. S. & VEITENHEIMER-MENDES, I. L. 2004. Registro de três espécies de *Corbicula* Mühlfeld em simpatria no lago Guaíba, sul do Brasil. Brasília, DF: Resumos XXV Congresso Brasileiro de Zoologia, Mollusca: 1145.

+ MARTINS, D. S. et al. 2003. Registro de *Limnoperna fortunei* (Dunker, 1857) no município de Pelotas, sul do Rio Grande do Sul, Brasil. Rio de Janeiro, RJ: Resumos XVIII Encontro Brasileiro de Malacologia: 213.

+ MARTINS, D. da S. et al. 2006. Aspectos morfológicos e de incubação em três espécies de *Corbicula* Mühlfeld, no lago Guaíba, Rio Grande do Sul, Brasil (Bivalvia, Corbiculidae). Biota Neotropica, 6(2): 1-11.

+ PARAENSE, W. L. 1975. Estado atual da sistemática dos Planorbídeos brasileiros. *Arquivos do Museu Nacional*, Rio de Janeiro, 55: 105-128.

+ PARAENSE, W. L. 1984. *Biomphalaria tenagophila guaibensis* ssp. n. from Southern Brazil and Uruguay (Pulmonata: Planorbidae). I. Morphology. *Memórias do Instituto Oswaldo Cruz*, Rio de Janeiro, 79(4): 465-469.
+ PARODIZ, J. J. 1968. Annotated catalogue of the genus *Diplodon* (Unionacea – Hyriidae). *Sterkiana*, (30): 1-22.
+ PARODIZ, J. J. & BONETTO, A. A. 1963. Taxonomy and Zoogeographic relationships of the South American Naiades (Pelecypoda: Unionacea and Mutelacea). *Malacologia*, 1(2): 179-213.
+ PEREIRA, D. & MANSUR, M.C.D. 2008. Bivalves límnicos da bacia do rio do Camaquã, Rio Grande do Sul, Brasil (Bivalvia, Unionoida e Veneroida). Valdivia, Chile: Programa y Resúmenes VII Congreso Latinoamericano de Malacologia: 17.
+ PEREIRA, P. A. C. & THOMÉ, J. W. 1999. Reconhecimento da localidade de Rodersberg citada por Reinhold F. Hensel em 1867, para o Rio Grande do Sul, Brasil. Revista Brasileira de Zoologia, São Paulo, 16(3): 915-917.
+ PEREIRA, D. *et al*. 2000. Malacofauna límnica do sistema de irrigação da microbacia do Arroio Capivara, Triunfo, RS, Brasil. *Biociências*, Porto Alegre, 8 (1): 137-157.
+ PEREIRA, D. *et al*. 2000. Gastrópodos límnicos da Bacia do Rio Camaquã, RS, Brasil. *Acta Biológica Leopoldensia*, 22(1):55-66.
+ PEREIRA, D. *et al*. 2001. Composição e abundância de espécies de moluscos do bentos marginal da microbacia do arroio Capivara, Triunfo, RS, Brasil. *Biociências*, Porto Alegre, 9(1):3-19.
+ PFEIFER, N. T. S. *et al*. 2000. Levantamento estacional da fauna de moluscos límnicos associada à *Eichornia azurea*, *E. crassipes* e sedimento superficial de fundo no Delta do Jacuí - Bacia do Guaíba - RS. Porto Alegre, RS: XXVII Congresso Interamericano de Engenharia Sanitária e Ambiental, V-084, 5p.
+ PFEIFER, N. T. S. & PITONI, V. L. L. 2003. Análise qualitativa estacional da fauna de moluscos límnicos no Delta do Jacuí, Rio Grande do Sul, Brasil. *Biociências*, Porto Alegre, 11(2): 145-158.
+ SANTOS, S. B. dos. 2003. Estado atual do conhecimento dos ancilídeos na América do Sul (Mollusca: Gastropoda: Pulmonata: Basommatophora). *Revista de Biologia Tropical*, San José de Costa Rica, 51(Suppl. 3): 191-224.
+ SANTOS, C. P. dos *et al*. 2005. Fases larvais do mexilhão dourado *Limnoperna fortunei* (Dunker) (Mollusca, Bivalvia, Mytilidae) na bacia do Guaíba, Rio Grande do Sul, Brasil. *Revista Brasileira de Zoologia*, Curitiba, 22(3): 702-708.
+ SILVA, M. C. P. da & VEITENHEIMER-MENDES, I. L. 2004. Nova espécie de *Heleobia* (Rissooidea, Hydrobiidae) da planície costeira do sul do Brasil. Iheringia, Série Zoologia, Porto Alegre, 94(1): 89-94.
+ SIMÕES, R. *et al*. 2002. *Chilina parva* Martens, 1868 no trecho médio da Bacia do Rio Jacuí, RS, BR: registro e conquiliologia. Itajaí, SC: Resumos XXIV Congresso Brasileiro de Zoologia, Mollusca: 6052.
+ SIMONE, L. R. L. de. 1994. Anatomical characters and systematics of *Anodontites trapesialis* (Lamarck, 1819) from South America (Mollusca, Bivalvia, Unionoida, Muteloidea). *Studies on Neotropical Fauna and Environment*, 29(3): 169-185.
+ SOCIEDADE SUL-BRASILEIRA DE ARROZ IRRIGADO. 2005. Moluscos gastrópodes em arroz irrigado, no sistema pré-germinado, pp. 92-93. *In*: Arroz Irrigado: recomendações técnicas da pesquisa para o Sul do Brasil. Santa Maria, RS: IV Congresso Brasileiro de Arroz Irrigado & XXVI Reunião da Cultura do Arroz Irrigado, Agosto 09 a 12 de 2005, 159p. http://www.sosbai.com.br/docs/recomendacoes2005.pdf
+ TELES, H. M. S. 1996. Distribuição de *Biomphalaria straminea* ao Sul da região Neotropical, Brasil. *Revista de Saúde Pública*, São Paulo, 30(4): 341-349.
+ TELES, H. M. S. *et al*. 1991. Distribuição de *Biomphalaria* (Gastropoda, Planorbidae) nos Estados do Rio Grande do Sul e Santa Catarina, Brasil. *Revista de Saúde Pública*, São Paulo, 25 (5): 350-352.
+ VANAGAS, L. *et al*. 2002. Asentamiento del mejillón dorado (*Limnoperna fortunei* Dunker, 1857) (Mytilidae) em Puerto Alegre, Brasil. São Paulo, SP: Resúmenes V Congreso Latinoamericano de Malacologia: 91.
+ VEITENHEIMER, I. L. 1973. Contribuição ao estudo do gênero *Leila* GRAY, 1840 (Mycetopodidae – Bivalvia). *Iheringia, Série Zoologia*, Porto Alegre, (42): 64-89.
+ VEITENHEIMER-MENDES, I. L. 1973. Anodontites BRUGUIÈRE, 1792 no Guaíba – RS (Bivalvia: Mycetopodidae). I – *Anodontites* trapesialis forbesianus (Lea, 1860). Iheringia, Série Zoologia, (44): 32-49.
+ VEITENHEIMER-MENDES, I. L. 1981. *Corbicula manilensis* (Philippi, 1844) molusco asiático, na bacia do Jacuí e do Guaíba, Rio Grande do Sul, Brasil (Bivalvia , Corbiculidae). Iheringia, Série Zoologia, Porto Alegre, (60): 63-74.
+ VEITENHEIMER, I. L. & MANSUR, M.C.D. 1975. Primeiras observações de bivalves dulceaquícolas como alimento de "Armado amarillo", Rhinodoras d'orbigny (KROYER, 1855) BLEEKER, 1862. Iheringia, Série Zoologia, Porto Alegre, (46): 25-31.
+ VEITENHEIMER, I. L. & MANSUR, M.C.D. 1978. Morfologia, histologia e ecologia de *Mycetopoda legumen* (MARTENS, 1888) – (Bivalvia, Micetopodidae). Iheringia, Série Zoologia, Porto Alegre, (52): 33-71.
+ VEITENHEIMER-MENDES, I. L. et al. 1992. Moluscos (Gastropoda e Bivalvia) ocorrentes nas nascentes do rio Gravataí, Rio Grande do Sul, Brasil. Iheringia, Série Zoologia, Porto Alegre, (73): 69-76.
+ WÄCHTLER, K. et al. Larval types and early postlarval biology in naiads (Unionoida). Cap. 6, pp. 93-125. In: BAUER, G. & WÄCHTLER, K. (Eds.). Ecology and evolution of freshwater mussels Unionoida. Springer-Verlag, Berlim, 2000, 394p.

## IV. CONTINENTAL TERRESTRIAL FORMS

+ AGUDO-PADRÓN, A.I. 2007. Malacofauna "urbana" do Bairro Vila Regina, Cachoeirinha, região Metropolitana de Porto Alegre, RS, Brasil, com especial ênfase no *Helix* (*Cornu*) *aspersa* Müller, 1774. *Informativo SBMa*, Rio de Janeiro: 38(162): 6-8.
+ ARRUDA, J. O. & THOMÉ, J. W. 2008. Synonymization of *Neohyalimax* Simroth, 1896, and *Omalonix* d'Orbigny, 1837, with a redescription of *Omalonix brasiliensis* (Simroth, 1896) (Gastropoda: Succineidae). *The Nautilus*, Sanibel Island, Florida, 122(2): 94-98.
+ ARRUDA, J. O. & THOMÉ, J. W. 2008. Revalidation of *Omalonyx convexus* and emendation of the type locality of *Omalonyx unguis* (Mollusca, Gastropoda, Succineidae). *Archives für Molluskenkunde der Senckenbergischen Naturforschenden* Gesellschaft, 137: 159-166.
+ BAIÃO, R. R. G. & PITONI, V. L. L. 1987. Escargot, Escaragol ou Caracol ?. *Natureza em Revista*, Fundação Zoobotânica do RS/Porto Alegre, (12): 8-12.
+ BRUSCHI-FIGUEIRÓ, G. & VEITENHEIMER-MENDES, I. L. 2002. Moluscos em áreas de horticultura no município de Porto Alegre, Rio Grande do Sul, Brasil. *Revista Brasileira de Zoologia*, São Paulo, 19(2): 31-37.
+ FONSECA, A. L. M. da & THOMÉ, J. W. 1995. Recaracterização do subgênero *Toltecia* Pilsbry com descrição da conquiliomorfologia e anatomia dos sistemas excretor e reprodutor de *Punctum* (*Toltecia*) *pilsbryi* (Scott), n. comb. (Gastropoda, Stylommatophora, Punctidae). *Revista Brasileira de Zoologia*, São Paulo, 12(2): 189-209.
+ FONSECA *et al*. 1997. Estudo preliminar da malacofauna de Passo Fundo e arredores (Endodontoidea, Stylommatophora,

Gastropoda). Florianópolis, SC: Resumos XV Encontro Brasileiro de Malacologia, 119: 77.
+ GALLON, M. S. *et al*. 2003. Malacofauna terrestre em duas trilhas ecológicas do Parque Estadual de Itapuã, Viamão, RS. Rio de Janeiro, RJ: Resumos XVIII Encontro Brasileiro de Malacologia: 209.
+ GOMES, S. R. *et al*. 2004. Ciclo biológico de *Simpulopsis ovata* (Gastropoda, Bulimulidae) em São Francisco de Paula, Rio Grande do Sul, Brasil. *Iheringia, Série Zoologia*, Porto Alegre, 94(3): 253-259.
+ HEYDRICH, I. Moluscos terrestres. Seção II – Diagnóstico, pp. 240-251. *In*: BECKER, F G.; RAMOS, R. A. & MOURA, L. de A. (Orgs.). Biodiversidade. Regiões da Lagoa do Casamento e dos Butiazais de Tapes, planície costeira do Rio Grande do Sul. Brasília, DF: MMA/FZB, 2007, 388 p.
+ JUNQUEIRA, F.O. & VEITENHEIMER-MENDES, I.L. 2005. Guia ilustrado da fauna de moluscos terrestres registradas em mata no Campus do Vale da Universidade Federal do Rio Grande do Sul, Porto Alegre, RS. Rio de Janeiro, RJ: Resumos XIX Encontro Brasileiro de Malacologia: 418.
+ MIQUEL, S.E. *et al*. 2004. Lista preliminar de los Punctoideos de Rio Grande do Sul, Brasil, con descripción de dos espécies nuevas (Mollusca, Gastropoda, Stylommatophora). *Revista Brasileira de Zoologia*, São Paulo, 21(4): 925-935.
+ RAMIREZ, R. *et al*. 2002. Avaliação preliminar da biodiversidade malacológica terrestre de Taquara, RS, Brasil. São Paulo, SP: Resúmenes V Congreso Latinoamericano de Malacologia: 155.
+ SALGADO, N.C. & COELHO, A.C. dos S. 2003. Moluscos terrestres do Brasil (Gastrópodes operculados ou não, exclusive Veronicellidae, Milacidae e Limacidae). *Revista de Biologia Tropical*, San José de Costa Rica, 51 (Suppl. 3): 149-189.
+ SANTOS, P.H. dos & THOMÉ, J.W. 1999. Chave ilustrada para determinação prática das cinco espécies de Veronicellidae com ocorrência no Rio Grande do Sul (Mollusca, Gastropoda, Soleolifera). Porto Alegre, RS: Cadernos EDIPUCRS 13, Série Zoologia, 3, 22 p.
+ SILVA, L.F. da & THOMÉ, J.W. 2005. Novo registro de *Simpulopsis* (*Eudioptus*) *citrinovitrea* (MOLLUSCA, GASTROPODA, BULIMULIDAE) para o sul do Brasil. *Biociências*, Porto Alegre, 13(2): 123-132.
+ SILVA, L.F. da & THOMÉ, J.W. 2006. Duas novas espécies de *Simpulopsis* (Gastropoda, Bulimulidae) para o Rio Grande do Sul, Brasil. *Iheringia, Série Zoologia*, Porto Alegre, 96(2):185-196.
+ THOMÉ, J.W. 1993. Estado atual da sistemática dos Veronicellidae (Mollusca; Gastropoda) americanos, com comentários sobre sua importância econômica, ambiental e na saúde. *Biociências*, Porto Alegre, 1(1): 61-75.
+ THOMÉ, J.W. *et al*. Os caracóis e as lesmas dos nossos bosques e jardins. Pelotas, RS: Editora USEB, 2006, 123p.
+ THOMÉ, J.W. *et al*. 2007. Moluscos terrestres no Cone Meridional da América do Sul, diversidade e distribuição. *Ciência & Ambiente*, Santa Maria, RS, (35): 9-28.

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## First confirmed record of amphibian slugs *Omalonyx* (Gastropoda: Pulmonata: Succineidae) for Santa Catarina's Island, Southern Brazil

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Santa Catarina's Island is the largest islander geographical territory of the Santa Catarina's State. Our malacological inventory, begun in March 1996 (Agudo 2002 a-b), includes a confirmed total of 253 species and subspecies, including 211 marine forms (Agudo & Bleicker 2009) and 42 continental representatives – 13 freshwater / limnic and 29 terrestrial (Agudo 2007; Agudo-Padrón 2008).

On March 30-31 2009, two lots of 18 specimens (7 and 11 animals) of *Omalonyx convexus* (Heynemann, 1868) were collected by us in a strait sandbank stream (drainage channel) close to human residences on "Campeche Beach" (Travessa Manoel Rafael Inácio), Florianópolis city, to the North of "Peri Lagoon" (Agudo 2007:10), coastal SE area of Santa Catarina Island, densely populated by riverside aquatic plants (predominancy of macrophytes *Eichornia azurea* and *Hydrocotyle ranunculoides*), with presence of flotation vegetable species *Pistia stratiotes* and *Spirodela intermedia*, the little limnic snail Planorbidae *Drepanotrema cimex* (Moricand, 1838) and abundant small native tropical fishes Poecilidae, characteristic of this type of aquatic environment in the island. Preserved in liquid by the searching malacologist Janine Oliveira Arruda, a specialist in Succineidae gastropods (Malacology Laboratory, Museum of Science and Technology - MCT, PUCRS, Porto Alegre, RS), on 09/04/2009.

In general, *Omalonyx convexus*, representative pulmonate gastropod species of the genus *Omalonyx* d'Orbigny, 1837 and family Succineidae Beck, 1837 (Thomé et al 2006: 46, 58; Arruda & Thomé 2008 a: 94; Arruda & Thomé 2008 b: 159), is a small Neotropical amphibian slug with an external reduced, flattened nail-shape shell (Simone 2006: 236-fig. 907) that lives on macrophytes and adjacent vegetation in swamps, marshes and floodplains (Arruda & Thomé 2008b:159), usually in polluted waters close to environments modified by humans, and can be found in artificial lakes, dams and even in parks and public squares of cities.

In southernmost Brazil it is present in the Santa Catarina and Rio Grande do Sul states (Thomé et al 2007:26; Agudo-Padrón 2008b). Already in the southern State of Paraná (Agudo 2008 a:10), the genus is represented by the species *Omalonyx matheroni* (Potiez & Michaud, 1835) (Agudo 2008b:12; Arruda et al 2009). In the Santa Catarina's State territory, it has been just listed for the following continental Municipal Districts: São João do Sul (high Mampituba River basin), Criciúma, Paulo Lopes (to the South), and Camboriú (to the North) (Agudo-Padrón 2008

Thus, the present report characterizes the first historical record of an amphibian slug in an islander territory of the Santa Catarina´s State, the smallest geographical portion of the Southern Brazil region (Agudo & Bleicker 2006:8). Elevating to 254 the general inventory of well-known species and subspecies (30 terrestrial) for Santa Catarina's Island.

References:

Agudo, A.I. 2002a. Malacofauna do Parque Municipal da Galheta, Ilha de Santa Catarina, Mesorregião da Grande Florianópolis, Santa Catarina, Brasil. São Paulo, SP: Resúmenes V Congreso Latinoamericano de Malacologia - V CLAMA: 103.
Agudo, A.I. 2002b. Malacofauna continental ocorrente na Mesorregião da Grande Florianópolis, Santa Catarina, Brasil.

São Paulo, SP: Resúmenes V Congreso Latinoamericano de Malacologia - V CLAMA: 101.

Agudo, A.I. 2007. Exotic isolated occurrence of the mussel naiad *Leila blainvilleana* (Lea, 1834) in a freshwater coastal Lagoon of the Santa Catarina Island, Southern Brazil. *FMCS Newsletter Ellipsaria*, 9(3): 10-12.

Agudo, A.I. 2008a. Non-marine mollusc diversity in Paraná State, Southern Brasil. *IUCN/SSC Newsletter TENTACLE*, (16):10-13. http://www.hawaii.edu/cowielab/Tentacle.htm.

Agudo, A.I. 2008b. Malacological news from Paraná State, Southern Brazil region: additional registrations. *FMCS Newsletter Ellipsaria*, 10(2): 11-13.

Agudo, A.I. & Bleicker, M.S. 2006. First general inventory of the malacological fauna of Santa Catarina State, Southern Brasil. *IUCN/SSC Internet Newsletter Tentacle*, (14):8-10. http://www.hawaii.edu/cowielab/Tentacle.htm

Agudo-Padrón, A.I. 2008. Listagem sistemática dos moluscos continentais ocorrentes no Estado de Santa Catarina, Brasil. *Comunicaciones de la Sociedad Malacológica del Uruguay*: ... in Press.

Agudo-Padrón, A.I., & Bleicker, M.S. 2009. Malacofauna marinha catarinense: uma aproximação ao estado atual do seu conhecimento. VI: Considerações históricas e zoogeográficas. *Informativo SBMa*: ... Submitted.

Arruda, J.O., & Thomé, J.W. 2008a. Synonymization of *Neohyalimax* Simroth, 1896, and *Omalonyx* d'Orbigny, 1837, with a redescription of *Omalonyx brasiliensis* (Simroth, 1896) (Gastropoda:Succineidae). *The Nautilus*, 122(2):94-98.

Arruda, J.O., & Thomé, J.W. 2008b. Revalidation of *Omalonyx convexus* (Heynemann, 1868) and emendation of the type locality of *Omalonyx unguis* (Orbigny, 1837) (Mollusca: Gastropoda:Pulmonata:Succineidae). *Arch. Molluskenkunde*, 137(2):159-166.

Arruda, J.O.; Pereira, D.; Bergonci, P.E.A.; Santos, C.P. & Mansur, M.C.D. 2009. Novos registros de *Omalonyx matheroni* (Potiez & Michaud, 1835) (Mollusca: Gastropoda: Succineidae) para os Estados de São Paulo e Paraná, Brasil. *Biotemas*: ... in Press.

Simone, L.R.L. 2006. Land and freshwater molluscs of Brazil. São Paulo, SP: FAPESP / MZUSP, 390 p.

Thomé, J.W.; Gomes, S.R. & Picanço, J.B. 2006. Os caracóis e as lesmas dos nossos bosques e jardins. Pelotas, RS: USEB, 123 p.

Thomé, J.W.; Arruda, J.O. & Silva, L.F. da. 2007. Moluscos terrestres no Cone Meridional da América do Sul, diversidade e distribuição. *Ciência & Ambiente*, (35): 9-28.

## Host Identifications or Confirmations

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All transformations at 20° C

| Mussel | Host | Average # juveniles/ fish | % Transformation | Days to Transformation | Starting month |
|---|---|---|---|---|---|
| *Lampsilis fasciola* | Longear Sunfish | 3 | 43% | 29 | August |
| *Ligumia recta* | Largemouth Bass | 64 | 38% | 25 | November |
| *Megalonaias nervosa* | Shovelnose Sturgeon | 20 | 24% | 28 | December |
| | Black Bullhead | 30 | 56% | 28 | December |
| | Black Bullhead | 5 | 12% | 20 | January |
| | Yellow Bullhead | 253 | 92% | 28 | December |
| | Northern Studfish | 174 | 64% | 28 | December |
| | Golden Shiner | 2 | 3% | 28 | December |
| | Largemouth Bass | 2 | 12% | 28 | December |
| | Green Sunfish | 79 | 54% | 28 | December |
| | Green Sunfish | 14 | 64% | 26 | October |
| *Ptychobranchus fasciolaris* | Fantail Darter | 3 | 6% | 35 | April |
| | Rainbow Darter | 27 | * | 30 | April |
| *Quadrula cylindrica cylindrica* | Rainbow Darter | 26 | 8% | 25 | May |
| | Striped Shiner | 20 | 3% | 25 | May |

* Not measured

# Mollusk Survey of Crystal Creek-Spring Creek Ranches, Blaine County, Idaho, USA

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The Crystal Creek-Spring Creek Ranches cover an area of about 16 $km^2$ and are located in the floodplain of the Big Wood River near the town of Bellvue in Blaine County, Idaho. We completed two mollusk surveys in the ground-water fed, irrigation supplemented, Willow, Spring, and Crystal creeks. The first was on 13 and 14 May, 2008 and the second completed on 18 and 19 July, 2008. For the May survey we used ocular inspection over approximately 16 kilometers of Willow Creek, Crystal Creek, and Spring Creek following the methods of Young et al. (2001). For the July survey we used an adaptive cluster design (Strayer and Smith 2003) at three locations in Willow Creek based on observations of *Margaritifera falcata* valve fragments from the May survey.

In May we visually inspected all spring creeks on both ranches with viewing buckets and counted a total of 248 *Margaritifera falcata* valve fragments but documented only a single live *M. falcata*. Although shells were found over much of the study area, they were concentrated at four locations; three in the upstream portion of the study area, approximately 2 km from the confluence with the Big Wood River and the fourth in the downstream portion of the study area only 450 meters from the confluence. The single live *M. falcata* was found at our most downstream site. It was positioned on its side on gravel/pebble substrate and measured approximately 6 cm in length.

During the July survey, we sampled a total of 30 1 $m^2$ quadrats by ocular inspection (i.e. 20% of 150 possible quadrats). From those quadrats, we excavated 30 0.25 $m^2$ quadrats to a depth of approximately 10 cm (ca. 0.75 $m^3$ of sediment). No live *Margaritifera falcata* were collected or observed. Molluscan species richness in Willow Creek, based on our collections, is eight species from six families (Table 1). Molluscan species richness was greatest at our most upstream site approximately 2 km above the confluence with the Big Wood River. We also used viewing buckets to survey an approximately 500 meter reach of the Big Wood River above and below the confluence with Willow Creek. No live *M. falcata* or sign of any mussel species was observed.

Table 1. Mollusks collected or observed during this survey from sampling sites on Willow Creek and the Big Wood River, Blaine County, Idaho; May - July, 2008.

| **Family** | **Genus** | **Species** | **Authority** | **Willow Cr. Status** |
|---|---|---|---|---|
| Ancylidae | *Ferrissia* | *rivularis* | Say, 1817 | Rare |
| Hydrobiidae | *Fluminicola* | *fuscus* | Haldeman, 1847 | Abundant |
| Hydrobiidae | *Potamopyrgus* | *antipodarum* | Gray, 1853 | Rare |
| Lymnaeidae | *Radix* | *auricularia* | Linnaeus, 1758 | Wood R. only |
| Lymnaeidae | *Stagnicola* | *hinkleyi* | Baker, 1906 | Wood R. only |
| Physidae | *Physa* | *gyrina* | Say, 1821 | Abundant |
| Planorbidae | *Gyraulus* | *parvus* | Say, 1817 | Rare |
| Planorbidae | *Planorbella* | *subcrenatum* | Carpenter, 1857 | Uncommon |
| Margaritiferidae | *Margaritifera* | *falcata* | Gould, 1850 | Rare |
| Sphaeriiddae | *Pisidium* | sp. | Pfeiffer, 1821 | Uncommon |

Numerically, two families, represented by one species each, dominated the molluscan community in Willow Creek; *Fluminicola fuscus* (Haldeman, 1847) (Hydrobiidae) and *Physa gyrina* (Say, 1821) (Physidae). Only one individual each of *Margaritifera falcata*, *Ferrissia rivularis* (Say, 1817), *Potamopyrgus antipodarum* (Gray, 1853) and *Gyraulus parvus* (Say, 1817) was collected. It is assumed that a small population of *F. rivularis* and *G. parvus* exist within the Willow Creek Complex as these species are considered habitat generalists and persist relatively well in degraded habitats. It is also assumed that there is a population of *P. antipodarum* in Willow Creek given the highly invasive potential of this species (Richards et al. 2001) and its presence in nearby Silver Creek (Richards and Lester, 2005). We had hoped to find additional buried or emergent *M. falcata* individuals in those areas with considerable evidence of past utilization (i.e. valve fragments) and/or nearby the collection site of the single live individual. Although we failed to find any additional mussels, we were surprised at the number of species observed and are optimistic with regard to their conservation in Willow Creek.

Richards, D.C. and G.T. Lester. 2005. Survey of the invasive New Zealand mudsnail, *Potamopyrgus antipodarum*, in the Silver Creek drainage in and around The Nature Conservancy's Silver Creek Preserve, Idaho, USA. Technical report submitted to: The Nature Conservancy, Idaho. 19 pp.

Richards, D.C., L.D. Cazier, and G.T. Lester. 2001. Spatial distribution of three snail species, including the invader *Potamopyrgus antipodarum*, in a freshwater spring. *Western North American Naturalist* 61: 375-380.

Strayer, D.L. and D.R. Smith. 2003. A guide to sampling freshwater mussel popuations. *American Fisheries Society, Monograph* 8, Bethesda, MD.

Young, M.R., P.J. Cosgrove, L.C. Hastie, and B. Nenniger. 2001. A standardized method for assessing the status of freshwater mussels in clear, shallow rivers. *The Malacological Society of London* 67: 395 – 396.

# An Updated Review of Attempts to Smuggle Freshwater Snails from Thailand into Israel

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Since 2005 inspectors of the Plant Protection and Inspection Services (PPIS) of the Ministry of Agriculture of Israel, stationed at the international Ben-Gurion Airport, have so far come across nine cases of attempts to smuggle life freshwater snails by temporary labourers arriving in Israel from Bangkok.

The first discovery of life snails among the personal belongings of these labourers took place on 17 March 2005, the most recent one on 27 February 2009. The quantity of intercepted snails ranged from less than ten specimens to almost 2 kg (about 500 specimens!) in a single batch and consisted of one to three different species. These snails are being confiscated because not only the whole phylum Mollusca is protected by law in Israel, but it is also prohibited to import molluscs alive or dead without a proper permit. So far seven different species have been discovered. They are enumerated here in systematic order.

GASTROPODA
Family VIVIPARIDAE
*Filopaludina (Filopaludina) sumatrensis polygramma* (von Martens, 1860)
*Filopaludina (Siamopaludina) martensi cambodjensis* (Mabille & Le Mesle, 1869)
*Filopaludina (Siamopaludina) martensi martensi* (von Frauenfeld, 1865)
Family AMPULLARIIDAE
*Pila ampullacea* (Linnaeus, 1758)
*Pila gracilis* (Lea, 1856)
**Pomacea canaliculata* (Lamarck, 1819)
**Pomacea insularum* (d'Orbigny, 1839)
*An invasive species from South America, which has become naturalized in Thailand.

All seven gastropods belong to relatively large species which are eaten all over Thailand. Since similar, edible species are not available in Israel, new or returning Thai workers try to smuggle them into Israel with the intention to grow them in aquatic habitats in the vicinity of the complexes were they are living.

The diversity of the snail species, which they try to smuggle into Israel, depends on the area where they live in Thailand. The different species combination of the various interceptions has been tabulated below.

| Date | 17.03 2005 | 16.11 2005 | 02.01 2006 | 09.04 2006 | 20.04 2006 | 04.12 2006 | 22.02 2007 | 20.02 2008 | 27.02 2009 |
|---|---|---|---|---|---|---|---|---|---|
| PPIS mollusc sample # | 199 | 205 | 210 | 214 | 213 | 218 | 222 | 244 | 259 |
| Species | | | | | | | | | |
| *Filopaludina sumatrensis polygramma* | - | - | - | - | - | - | - | - | + |
| *Filopaludina martensi cambodjensis* | - | - | + | - | - | - | - | - | - |
| *Filopaludina martensi martensi* | + | + | - | + | + | + | - | - | + |
| *Pila ampullacea* | - | - | - | + | + | + | + | + | + |
| *Pila gracilis* | - | - | - | - | - | - | - | + | - |
| *Pomacea canaliculata* | - | - | + | - | - | - | - | - | - |
| *Pomacea insularum* | - | - | + | - | - | - | - | - | - |
| Total | 1 | 1 | 3 | 2 | 2 | 2 | 1 | 2 | 3 |

The problem with these interceptions is not only that they have taken place already nine times, but more seriously is the fact that we have no idea how many times these workers succeeded in smuggling such snails into Israel. If these snails manage to get a foothold in Israel, then most likely they may have a negative effect on the whole aquatic biodiversity in general and the local mollusc fauna in particular. The latter is already suffering from pollution and a general lack in rainfall during the past 10 years.

Also a health risk is involved: all species of *Filopaludina* and *Pila* living in Thailand are well-known intermediate hosts of trematodes, which may cause among others Echinostomiasis in man, a snail-borne disease not known in Israel (Brandt, 1974).

Acknowledgements
I like to thank Dr. Shmuel Moran, who recently retired from the PPIS, Ministry of Agriculture, and Mrs. Svetlana Vaisman of the same institute for submitting at least part of the intercepted molluscs for identification and permanent storage in either the Mollusc Collection of the Tel Aviv University or the Hebrew University of Jerusalem.

References
Brandt, R.A.M., 1974. The non-marine aquatic Mollusca of Thailand. Archiv für Molluskenkunde, 105: I-IV + 1-423.
Mienis, H.K., 2006a. Failed attempts to smuggle live *Filopaludina martensi* into Israel, but…. Tentacle, 14: 15-16
Mienis, H.K., 2006b. Aquatic snails intercepted by inspectors of the Plant Protection and Inspection Services at Ben-Gurion Airport, Israel. Ellipsaria, 8 (2): 13-14.

---

## Spectaclecase (*Cumberlandia monodonta*) host studies produce more negative results

Mark C. Hove and Dan J. Hornbach, University of Minnesota and Macalester College
Bernard E. Sietman and Andrea K. Crownhart, Minnesota Department of Natural Resources (MN DNR)
Matthew S. Berg - Grantsburg High School – Biology Department
480 East James Avenue, Grantsburg, WI 54840 - (715) 463-5165 – mberg@grantsburg.k12.wi.us

Despite exhaustive trials by our laboratories and others (*e.g.*, Baird (2000)), no suitable hosts have been identified for spectaclecase (Watters, 2008).

We conducted spectaclecase glochidia host suitability trials using standard methods (Zale and Neves, 1982). Gravid spectaclecase and silver lamprey were collected from the St. Croix River and other in/vertebrates were collected from streams and rivers outside the watershed. Host suitability trials were conducted at the University of Minnesota Wet Laboratory and at the Grantsburg High School Biology Laboratory during 2007. Treated subjects were inoculated with at least 10-20 glochidia and transferred to clean aquaria. Inoculated subjects were held in aquaria at 19°C ± 2 °C and fed at least three times a week. Aquaria were generally siphoned and siphonate checked for presence of glochidia and juveniles three times a week. A suitable host was verified if we observed glochidia encapsulation and metamorphosis to the juvenile stage.

We exposed a variety of vertebrates and invertebrates to spectaclecase glochidia but did not observe metamorphosis. Seven fish species were tested at the University of Minnesota and fourteen additional species including an agnathan fish, two amphibians, two gastropods, two crayfish, two ephemeropterans, one plecopteran, and four odonates were tested at Grantsburg High School (Table 1, next page). Although each of the 14 non-fish test subjects remained in the infestation tank for at least a 30 minute period, glochidial attachment was minimal. Using a stereoscope, we observed that anisopteran odonates anal respiration resulted in the near continuous inspiration and expiration of the neutrally buoyant glochidia without any apparent attachment. Despite direct contact with zygopteran odonate, ephemeropteran and plecopteran external gills, we observed no attachment. Rather, glochidia attached only to tibial setae on the crayfish and odonates, antennae and caudal cerci on the plecopterans, and not at all on ephemeropterans or gastropods. We did not directly observe glochidia on the internal gills of either the lampreys or the tadpoles, but the number of sloughed glochidia recovered from each suggests some attachment did occur. Ultimately, no test subjects facilitated glochidia metamorphosis, nor did we observe growth of any sloughed glochidia.

Several people and organizations assisted with this project. We thank the MN DNR ‘mussel survey team’ (Ben Dickinson, Mike Davis, Paula Frank, and others) and Vanessa Kleiss, Mitchell Evenson, Nicole Davis, Lydia Benge-Briggs, Charlie Falk, Tyler Myers, Ingrid Ames, Vanessa McKinley, Kevin Johnson, and many others in the 2007 Biology 2 classes at Grantsburg High School. Thanks also to the USFWS for funding this study and Wisconsin DNR for administering the project.

Literature Cited
Baird, M.S. 2000. Life history of the spectaclecase, *Cumberlandia monodonta* Say, 1829 (Bivalvia, Unionoidea, Margaritiferidae). Unpublished master's thesis, Southwest Missouri State University, Springfield, Missouri. 108 pp.
Watters, G. T. 2008. Mussel/Host Database. http://128.146.250.235/MusselHost/
Zale, A.V. and R.J. Neves. 1982. Fish hosts of four species of Lampsiline mussels (Mollusca: Unionidae) in Big Moccasin Creek, Virginia. Canadian Journal of Zoology 60: 2535-2542.

Table 1: Spectaclecase host suitability trial results

| Test Host | Trial | No. of individuals inoculated | No. of survivors | Glochidia attachment period (days) |
|---|---|---|---|---|
| **Fish** | | | | |
| pallid sturgeon (*Scaphirhynchus albus*) | Trial 1 | 1 | 1 | 1-4 |
| | Trial 2 | 2 | 2 | 1-4 |
| lake sturgeon (*Acipenser fulvescens*) | Trial 1 | 2 | 2 | 1-4 |
| | Trial 2 | 3 | 3 | 1-4 |
| longnose gar (*Lepisosteus osseus*) | | 2 | 2 | 3-6 |
| shortnose gar (*Lepisosteus platostomus*) | | 3 | 3 | 3-6 |
| American eel (*Anguilla rostrata*) | | 3 | 3 | 4-13 |
| gizzard shad (*Dorosoma cepedianum*) | | 1 | 1 | 4-7 |
| mottled sculpin (*Cottus bairdii*) | | 5 | 5 | 4-7 |
| silver lamprey (*Ichthyomyzon unicuspis*) | | 2 | 2 | 1-8 |
| **Amphibians** | | | | |
| green frog tadpole (*Rana clamitans*) | | 20 | 16 | 1-7 |
| mudpuppy (*Necturus maculosus*) | | 1 | 1 | 1-7 |
| **Gastropods** | | | | |
| physa snail (*Physa* sp.) | | 10 | ** | ** |
| viviparus snail (*Viviparus* sp.) | | 5 | ** | ** |
| **Crustaceans** | | | | |
| rusty crayfish (*Orconectes rusticus*) | | 4 | 3 | 1-7 |
| native crayfish (*Orconectes* sp.) | | 2 | 2 | 1-4 |
| **Insects** | | | | |
| humpback mayfly (*Baetisca* sp.) | | 20 | ** | ** |
| "hex"mayfly (*Hexagenaia* sp.) | | 15 | ** | ** |
| stonefly (*Pteronarcys* sp.) | | 2 | 2 | 1-4 |
| bluet damselfly (*Enallagma* sp.) | | 2 | ** | ** |
| dancer damselfly (*Argia* sp.) | | 2 | ** | ** |
| stygian shadowdragon (*Neurocordulia yamaskanensis*) | | 25 | 15* | 1-8 |
| swift river cruiser (*Macromia illinoiensis*) | | 16 | 8* | 1-15 |

* Terminal instars emerged as flying adults before the end of study, no mortalities ** No glochidial attachment observed

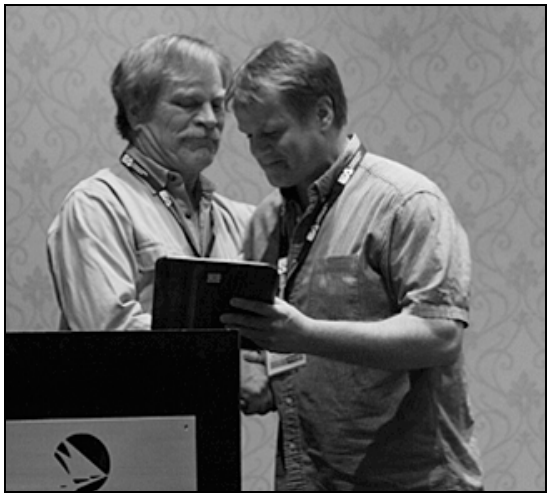
## Helpful Hints from Hoppy:

**Hoppy Says — my eternal message for dedicated shellheads…never give up digging. Farewell!**

*Submitted by Steve Ahlstedt*

# FMCS 2009 Awards

Photos from Mark Hove



Lifetime Achievement Award: James Layzer (on left)


Lifetime Achievement Award: Gerrie Mackie

Meritorious Service Award: Heidi Dunn

Best Student Platform Award: Jason Mays

Honorable Mention Student Platform Award: Dan Allen

Honorable Mention Student Poster Award: Nathan Johnson
Not pictured: Best Student Poster Award: Joe Daraio
Presenter is Teresa Newton, Awards Committee Co-Chair.

# Freshwater Mollusk Conservation Society
# Standing Committees and Chairs

*If you are interested in joining a committee, please contact one of the appropriate chairs.*

### Awards
W. Gregory Cope – North Carolina State, Dept. Environ. & Molecular Toxicology, Box 7633, Raleigh, NC 27695-7633
919-515-5296; greg_cope@ncsu.edu

Teresa Newton – Upper Midwest Environmental Science Center, 2630 Fanta Reed Rd., LaCrosse, WI 54603
608-781-6217; tnewton@usgs.gov

Emy Monroe – Miami University, Zoology Dept., Rm 212 Pearson Hall, Oxford, OH 45056
513-529-0272; monroeem@muohio.edu

### Environmental Quality and Affairs
Ryan Evans – Kentucky State Nature Preserves Commission, 801 Schenkel Lane, Frankfort, KY 40601
502-573-2886 x102; fax: 2355; Ryan.Evans@ky.gov

Steve McMurray – Missouri Department of Conservation, 1110 S. College Ave., Columbia, MO 65201
573-882-9909; stephen.mcmurray@mdc.mo.gov

### Gastropod Status and Distribution
Paul D. Johnson – Alabama Aquatic Biodiversity Center, Route 3, Box 86, Marion, AL 36756
334-683-5000; paul.johnson@dcnr.alabama.gov

Jeff Powell – USFWS, 1208 B Main St., Daphne, AL 36526
251-441-5181; jeff_powell@fws.gov

### Genetics
David J. Berg – Miami University, 546 Mosler, Oxford, OH 45069
513-785-3246; bergdj@MUOhio.edu

### Guidelines and Techniques
Chuck Howard – TVA, Natural Heritage Program, 400 W Summit Hill Dr., WT 11C-K, Knoxville, TN 37902
865-632-2092; cshowar1@tva.gov

Janet Clayton – West Virginia Division of Natural Resources, PO Box 67, Ward Road, Elkins, WV 26241
304-637-0245; janetclayton@wvdnr.gov

### Information Exchange
Al Buchanan – 1001 S. Johnmeyer Lane, Columbia, MO 65203
573-445-1521; gandalfpoint@yahoo.com

G. Thomas Watters – Museum of Biological Diversity, The Ohio State University, 1315 Kinnear Road, Columbus, OH 43212
614-292-6170; Watters.1@osu.edu

John Jenkinson – 305 Revere Ave., Clinton, TN 37716
865-457-0174; jjjenkinson@hotmail.com

### Mussel Status and Distribution
Arthur E. Bogan – North Carolina State Museum of Natural Sciences, 4301 Reedy Creek Road, Raleigh, NC 27607
919-733-7450 x 753; arthur.bogan@ncmail.net

James D. Williams – 4820 NW 15th Place, Gainesville, FL 32605
352-737-3743; fishwilliams@gmail.com

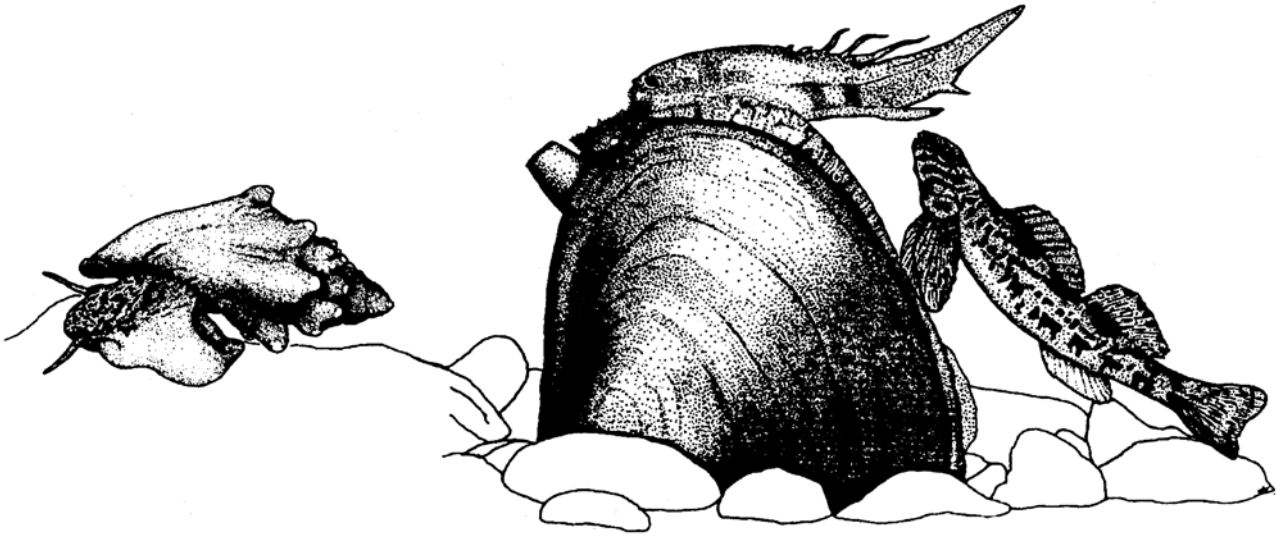
### Outreach
Andy Roberts – USFWS, 101 Park DeVille Drive, Suite A, Columbia, MO 65203
573-234-2132 x 110, andy_roberts@fws.gov

Tom Jones – Marshall University, 110 Heather Court, Scott Depot, WV 25560
304-389-5832; jonest@marshall.edu

### Propagation, Restoration, and Introduction
Tony Brady – Genoa Fish Hatchery, S 5689 State Road 35, Genoa, WI 54632
608-689-2605; tony_brady@fws.gov

Rachel Muir – U.S. Geological Survey, 2171 Cabots Point Lane, Reston, VA 20191
703-648-5114; rachel_muir@usgs.gov

# Freshwater Mollusk Conservation Society



*…dedicated to the advocacy and conservation science of freshwater molluscan resources*

## APC Harris Relicensing

**From:** Colin Dinken <Colin.Dinken@Kleinschmidtgroup.com>
**Sent:** Tuesday, January 19, 2021 11:29 AM
**To:** APC Harris Relicensing
**Subject:** FW: Harris Aquatic Resources sources

---

**From:** Fobian, Todd <Todd.Fobian@dcnr.alabama.gov>
**Sent:** Tuesday, January 19, 2021 10:46 AM
**To:** Colin Dinken <Colin.Dinken@Kleinschmidtgroup.com>
**Subject:** RE: Harris Aquatic Resources sources

No problem, in the comment text, it should be Johnson and DeVries 2002, not Johnson et al. 2002.

Paper is to large to send through email, but if you just search the below reference in google it should be the first available result.

Johnson, Judith A. and DeVries, Dennis R., 2002. The freshwater mussel and snail species of the Tallapoosa River Drainage, Alabama, U.S.A Walkerana 9(22):121-137

Todd Fobian
Environmental Affairs Supervisor
Alabama Wildlife and Freshwater Fisheries Division
64 N. Union Street, Suite 551
Montgomery, AL 36130
Office: 334-353-7484
Cell: 334-850-3798
Todd.Fobian@dcnr.alabama.gov

---

**From:** Colin Dinken <Colin.Dinken@Kleinschmidtgroup.com>
**Sent:** Friday, January 15, 2021 12:49 PM
**To:** Fobian, Todd <Todd.Fobian@dcnr.alabama.gov>
**Cc:** Anderegg, Angela Segars <ARSEGARS@southernco.com>
**Subject:** RE: Harris Aquatic Resources sources

Hey Todd,

Sorry to ask again, but there was one more source pertaining to Aquatic Resources. Would you mind sending info on Johnson et al. (2002) for the reference section? This source was mentioned in a comment regarding the distribution of Georgia Pigtoe.

Thanks,
Colin

---

**From:** Colin Dinken
**Sent:** Friday, January 15, 2021 9:16 AM

**To:** Fobian, Todd <Todd.Fobian@dcnr.alabama.gov>
**Subject:** RE: Harris T&E Species sources

Not a problem at all. Thanks for the info!

---

**From:** Fobian, Todd <Todd.Fobian@dcnr.alabama.gov>
**Sent:** Friday, January 15, 2021 9:14 AM
**To:** Colin Dinken <Colin.Dinken@Kleinschmidtgroup.com>
**Subject:** RE: Harris T&E Species sources

Hi Colin,

Attached are the two documents requested. One is a poster presentation from FMCS meeting and the other is from Ellipsaria 2009. I apologize there was an error in the 2005 citation included in the comments. Watters et al. completed a 2005 host fish update in Ellipsaria but also had one in 2009 as well. The 2009 note includes the Rabbitsfoot host fish information page 19. Please let me know if you have any additional questions.

Corrected citation:
Watters, G. T., T. Gibson, and B. Kelly. 2009. Host identifications or confirmations. Ellipsaria 11(1):19.

Thanks, Todd

Todd Fobian
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Alabama Wildlife and Freshwater Fisheries Division
64 N. Union Street, Suite 551
Montgomery, AL 36130
Office: 334-353-7484
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Todd.Fobian@dcnr.alabama.gov

---

**From:** Colin Dinken <Colin.Dinken@Kleinschmidtgroup.com>
**Sent:** Thursday, January 14, 2021 12:35 PM
**To:** Fobian, Todd <Todd.Fobian@dcnr.alabama.gov>
**Cc:** Anderegg, Angela Segars <ARSEGARS@southernco.com>
**Subject:** Harris T&E Species sources

Hey Todd,

During the comment period for the Draft T&E Species Desktop Assessment you recommended some literature to incorporate into the final report. I was able to find a couple of these sources, but was not able to locate Fobian et al. (2015), which describes host fish species for Pale Lilliput, or Watters et al. (2005) which describes some of the host fish species for Rabbitsfoot. Could you please send information on these sources for our reference section of the final report?

Thank you,

**Colin Dinken**
**Staff Scientist**
Kleinschmidt
**Office: 205-588-4613**
**www.KleinschmidtGroup.com**

## APC Harris Relicensing

**From:** Chandler, Keith Edward
**Sent:** Tuesday, January 26, 2021 1:33 PM
**To:** Anderegg, Angela Segars
**Subject:** FW: Notice of Opportunity for Technical Assistance to Support Hydropower Decision Making


**Keith Chandler, P.E.**
Alabama Power
Environmental Affairs
Office: 205-257-1091
Cell: 205-438-4165
kechandl@southernco.com


---

**From:** Jack West <jwest@alabamarivers.org>
**Sent:** Thursday, October 22, 2020 3:14 PM
**To:** Anderegg, Angela Segars <ARSEGARS@southernco.com>; Chandler, Keith Edward <KECHANDL@SOUTHERNCO.COM>
**Subject:** Fwd: Notice of Opportunity for Technical Assistance to Support Hydropower Decision Making



---

Hi Angie and Keith,

You may have seen this already, but I wanted to forward you this notice I got from DOE the other week. There is an opportunity for technical assistance to support hydropower decision-making for utilities, and one of the topic areas listed is Optimization of Hybrid Hydropower and Storage Systems. I'm not sure what all the application entails, but it may be useful to you as the battery storage study progresses, so I thought I would share.

Best,

---------- Forwarded message ---------
From: **DOE Office of Energy Efficiency and Renewable Energy** <eere@service.govdelivery.com>
Date: Tue, Oct 13, 2020 at 2:11 PM
Subject: Notice of Opportunity for Technical Assistance to Support Hydropower Decision Making
To: <jwest@alabamarivers.org>

ENERGY.GOV
Office of
ENERGY EFFICIENCY &
RENEWABLE ENERGY [lnks.gd]

# Water Power Technologies Office [lnks.gd]

**October 13, 2020**

## U.S. Department of Energy Announces Notice of Opportunity for Technical Assistance to Support Hydropower Decision Making [lnks.gd]

Today, the U.S. Department of Energy's Water Power Technologies Office (WPTO) announced a Notice of Opportunity for Technical Assistance (NOTA) [lnks.gd] for Improving Hydropower's Value Through Informed Decision-Making. Part of WPTO's HydroWIRES (Water Innovation for a Resilient Electricity System) Initiative [lnks.gd], this opportunity will provide hydropower decision makers—such as utilities and system operators—with National Lab expertise and capabilities to address current challenges and capture new opportunities for their systems.

[lnks.gd]

Topic areas for technical assistance include:

- Participation in Energy Imbalance Markets
- Value of Inflow Forecasting Tools and Practices
- Hydropower in Integrated Resource Planning
- Optimization of Hybrid Hydropower and Storage Systems
- Open Topic.

Interested applicants must submit initial concept papers by **December 18, 2020**. Full applications will be due **January 29, 2021**. A live webinar [lnks.gd] is scheduled for November 4, 2020, at 2:00 p.m. ET to provide information on the FOA to potential applicants.

More information about the NOTA can be found in the EERE announcement [lnks.gd].

To learn more about WPTO and the HydroWIRES Initiative, visit the WPTO website [lnks.gd].

DOE Facebook [lnks.gd]

DOE Twitter [lnks.gd]

EERE Facebook [lnks.gd]

EERE Twitter [lnks.gd]

Energy Saver Facebook [lnks.gd]

Daniel R Simmons' Twitter [lnks.gd]

DOE YouTube [lnks.gd]

DOE LinkedIn [lnks.gd]

EERE LinkedIn [lnks.gd]



--
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205-322-6395

www.alabamarivers.org [alabamarivers.org]

**Celebrating more than 20 years of protecting Alabama's 132,000 miles of rivers and streams!**

## APC Harris Relicensing

**From:** Jack West <jwest@alabamarivers.org>
**Sent:** Wednesday, January 27, 2021 11:23 AM
**To:** Anderegg, Angela Segars
**Cc:** Chandler, Keith Edward; Cindy Lowry
**Subject:** Re: Harris Relicensing - BESS Study Resource



---

Angie,

Thanks for your response. We'll look forward to seeing the BESS draft study report when it becomes available.

Take care,

On Tue, Jan 26, 2021 at 3:36 PM Anderegg, Angela Segars <ARSEGARS@southernco.com> wrote:

> Hi Jack,
>
> We are in the process of completing the BESS analysis using internal expertise and will file the results this spring. I don't think this is something Alabama Power will pursue at this time given where we are in the relicensing process. Thank you for passing it along though.
>
> I hope your 2021 is off to a great start as well!
>
> **Angie Anderegg**
>
> Hydro Services
>
> (205)257-2251
>
> arsegars@southernco.com
>
> ---
>
> **From:** Jack West <jwest@alabamarivers.org>
> **Sent:** Tuesday, January 26, 2021 9:38 AM
> **To:** Anderegg, Angela Segars <ARSEGARS@southernco.com>; Chandler, Keith Edward <KECHANDL@SOUTHERNCO.COM>

**Cc:** Cindy Lowry <clowry@alabamarivers.org>
**Subject:** Harris Relicensing - BESS Study Resource



---

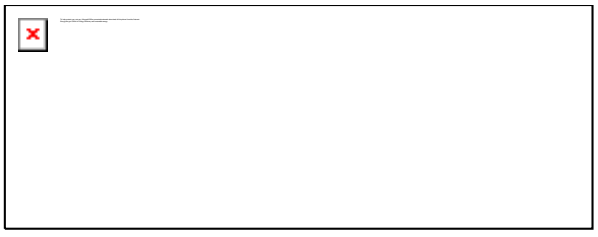
Hi Angie and Keith,

I hope your 2021 is off to a good start and that you're safe from the storms last night. The other week I saw an email from DOE (pasted below) about an extension on WPTO's notice of opportunity for technical assistance described below. I had forwarded you information about this towards the end of last year, but the new deadline is now February 17, 2021.

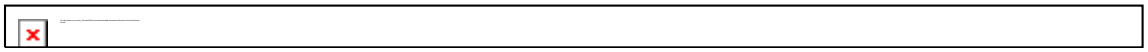
As I mentioned previously, since one of the categories in the NOTA is assistance on optimizing hydropower with energy storage systems, it seems like this could be an excellent and cost-effective resource for the BESS study. Do you think this is something APCo might pursue?

Best,

-Jack



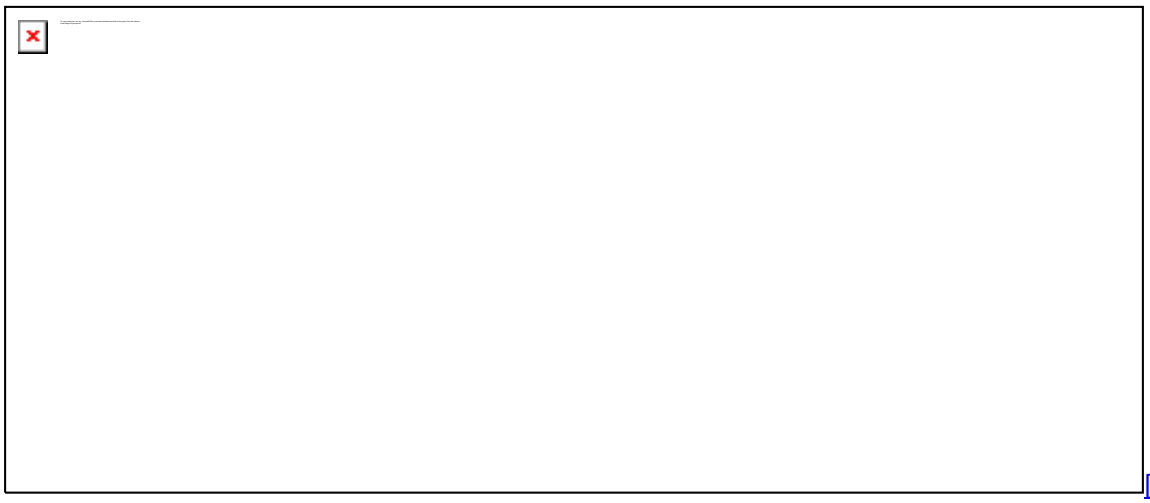
# Water Power Technologies Office [lnks.gd]



**January 6, 2021**

# Deadline Extended for HydroWIRES NOTA [lnks.gd]

WPTO recently announced a Notice of Opportunity for Technical Assistance (NOTA) for Improving Hydropower's Value through Informed Decision-Making [lnks.gd]. Part of WPTO's HydroWIRES [lnks.gd] (Water Innovation for a Resilient Electricity System) Initiative, this opportunity will provide hydropower decision makers—such as utilities and system operators—with National Lab expertise and capabilities to address current challenges and capture new opportunities for their systems.



[lnks.gd]

Additionally, the work under this NOTA can help to validate National Lab-led modeling, analysis, and tools developed under the HydroWIRES Initiative for the benefit of the broader hydropower community, as well as further our collective understanding of possible roles for hydropower in an evolving grid.

WPTO has extended the application period for this NOTA. Interested applicants must submit initial concept papers by **February 17, 2021. Apply through EERE Exchange today [lnks.gd].**

--

Jack West, Esq.

Policy and Advocacy Director

Alabama Rivers Alliance

2014 6th Ave N, Suite 200

Birmingham, AL 35203

205-322-6395

www.alabamarivers.org [alabamarivers.org]

**Celebrating more than 20 years of protecting Alabama's 132,000 miles of rivers and streams!**

--
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Birmingham, AL 35203
205-322-6395
www.alabamarivers.org [alabamarivers.org]

**Celebrating more than 20 years of protecting Alabama's 132,000 miles of rivers and streams!**

# HAT 3 - Final Threatened and Endangered Species Study Report

APC Harris Relicensing <g2apchr@southernco.com>

Fri 1/29/2021 11:03 PM

**To:** APC Harris Relicensing <harrisrelicensing@southernco.com>
**Bcc:** damon.abernethy@dcnr.alabama.gov <damon.abernethy@dcnr.alabama.gov>; lgallen@balch.com <lgallen@balch.com>; arsegars@southernco.com <arsegars@southernco.com>; dkanders@southernco.com <dkanders@southernco.com>; nathan.aycock@dcnr.alabama.gov <nathan.aycock@dcnr.alabama.gov>; jefbaker@southernco.com <jefbaker@southernco.com>; steve.bryant@dcnr.alabama.gov <steve.bryant@dcnr.alabama.gov>; wmcampbell218@gmail.com <wmcampbell218@gmail.com>; jcarlee@southernco.com <jcarlee@southernco.com>; kechandl@southernco.com <kechandl@southernco.com>; kmo0025@auburn.edu <kmo0025@auburn.edu>; evan_collins@fws.gov <evan_collins@fws.gov>; allan.creamer@ferc.gov <allan.creamer@ferc.gov>; robinwaldrep@yahoo.com <robinwaldrep@yahoo.com>; decker.chris@epa.gov <decker.chris@epa.gov>; devridr@auburn.edu <devridr@auburn.edu>; colin.dinken@kleinschmidtgroup.com <colin.dinken@kleinschmidtgroup.com>; jeff_duncan@nps.gov <jeff_duncan@nps.gov>; afleming@southernco.com <afleming@southernco.com>; todd.fobian@dcnr.alabama.gov <todd.fobian@dcnr.alabama.gov>

HAT 3,

Today, Alabama Power filed the Final Threatened and Endangered Species Study Report with FERC. This final report can be found on the Harris relicensing website in the HAT 3 folder.

Thanks,

**Angie Anderegg**
Hydro Services
(205)257-2251
arsegars@southernco.com

Alabama Power

600 North 18th Street
Hydro Services 16N-8180
Birmingham, AL 35203
205 257 2251 tel
arsegars@southernco.com

January 29, 2021

***VIA ELECTRONIC FILING***

Project No. 2628-065
R.L. Harris Hydroelectric Project
Transmittal of the Final Threatened and Endangered Species Report

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

Dear Secretary Bose,

Alabama Power Company (Alabama Power) is the Federal Energy Regulatory Commission (FERC or Commission) licensee for the R.L. Harris Hydroelectric Project (Harris Project) (FERC No. 2628-065). On April 12, 2019, FERC issued its Study Plan Determination[1] (SPD) for the Harris Project, approving Alabama Power's ten relicensing studies with FERC modifications. On May 13, 2019, Alabama Power filed Final Study Plans to incorporate FERC's modifications and posted the Final Study Plans on the Harris relicensing website at www.harrisrelicensing.com.

Consistent with FERC's April 12, 2019 SPD, Alabama Power filed the Draft Threatened and Endangered Species Desktop Assessment (Draft Desktop Assessment) on April 10, 2020[2]. The Draft Desktop Assessment was one portion of the Threatened and Endangered Species Study. Stakeholders were to submit their comments to Alabama Power on the Draft Desktop Assessment by June 11, 2020. The Alabama Department of Conservation and Natural Resources and FERC staff submitted comments on the Draft Desktop Assessment. In addition, the United States Fish and Wildlife Service, Alabama Rivers Alliance, the Alabama Glade Conservation Association, and one stakeholder submitted comments and questions regarding the Draft Desktop Assessment prior to the Initial Study Report Meeting on April 28, 2020.These comments are included in the updated consultation record (May 2019 through January 2021) for this study (Attachment 1) and responses to these comments are provided in Attachment 2. The Final Threatened and Endangered Species Report is contained in Attachment 3.[3]

[1] Accession No 20190412-3000.

[2] Accession No. 20200410-5094

[3] Please note that the style and format of the Harris Project relicensing study reports has changed since submittal of the Draft Desktop Assessment; however, the content of the report has not changed except for the edits made based on stakeholder comments and the results of field surveys for certain threatened and endangered species.

If there are any questions concerning this filing, please contact me at arsegars@southernco.com or 205-257-2251.

Sincerely,

Angie Anderegg
Harris Relicensing Project Manager

Attachment 1 – Threatened and Endangered Species Consultation Record (May 2019-January 2021)
Attachment 2 – Comments and Responses on the Draft Threatened and Endangered Species Desktop Assessment
Attachment 3 – Final Threatened and Endangered Species Report

cc: Harris Action Team 3 Stakeholder List

## APC Harris Relicensing

**From:** Anderegg, Angela Segars
**Sent:** Monday, February 8, 2021 8:19 AM
**To:** erin_padgett@fws.gov; 'Evan Collins'
**Cc:** Chandler, Keith Edward; Baker, Jeffery L.; Fleming, Amanda
**Subject:** Harris relicensing - WMP language
**Attachments:** 2021-1-22 FWS Harris Project Overview and GTK.pdf; 2021-1 DRAFT Harris WMP.docx

Good morning,

As discussed in our meeting on January 22, 2011 (meeting summary attached), the only listed species that may be impacted by Harris Project operations include endangered and threatened bat species that potentially inhabit the James D. Martin-Skyline Wildlife Management Area (WMA). However, Alabama Power's implementation of appropriate Best Management Practices (BMPs) for timber management and tree removal, as well as adherence to USFWS guidance concerning any future known hibernacula and maternity roost trees, should avoid impacts to any listed bats in the area. Our goal is that the implementation of the BMP's included in the attached draft Wildlife Management Plan will result in a not likely to adversely affect determination.

Please review the attached draft WMP (specifically Section 6.1.2) and send us comments or concurrence by **February 12**. If you'd like to discuss, please let me know and I can set up a call.

Thanks!

**Angie Anderegg**
Hydro Services
(205)257-2251
arsegars@southernco.com

**Meeting with USFWS – Harris Project Overview, T&E Report Review, Potential Wildlife Management Plan Effects on Listed Species**

January 22, 2021 9-10:30
Teams Meeting

**Participants:**

- Evan Collins (USFWS)
- Erin Padgett (USFWS)
- Angie Anderegg (APC)
- Jeff Baker (APC)
- Keith Chandler (APC)
- Amanda Fleming (APC)

**Action Items:**

Angie Anderegg will send Alabama Power's draft Harris Project Wildlife Management Plan (WMP), which includes timber management Best Management Practices (BMPs) that are protective of bat species, to the USFWS for their review.

**Meeting Summary:**

The meeting began with introductions among all the meeting attendees. Next, Angie Anderegg (APC) presented an overview of the Harris Project and the relicensing process to date. After the overview, the group discussed the Threatened and Endangered Species Study Report (T&E Report). The group noted that northern long-eared and Indiana bats at the Skyline portion of the Harris Project are the only T&E species that may potentially be affected within the Harris Project. Additionally, no critical habitat units are within the boundary. The group discussed that Alabama Power planned to protect the bat species through timber management practices that will be included in the WMP. Jeff Baker (APC) noted the Alabama Power forestry group was already voluntarily implementing best management practices (BMPs) to protect all bats and is working to formalize the description of these practices.

Erin Padgett and Evan Collins (USFWS) explained that Shannon Holbrook (USFWS) will also be involved in the consultation process. Finally, the group discussed sending a draft of the WMP to the USFWS for their review with a goal of developing timber management BMPs that would result in a "not likely to adversely affect" determination.

Angie concluded the meeting.

# R.L. Harris Dam Relicensing – FERC No. 2628

January 21, 2021

# Alabama Power Company's Hydroelectric Developments


## 14 Developments

Warrior River

Coosa River

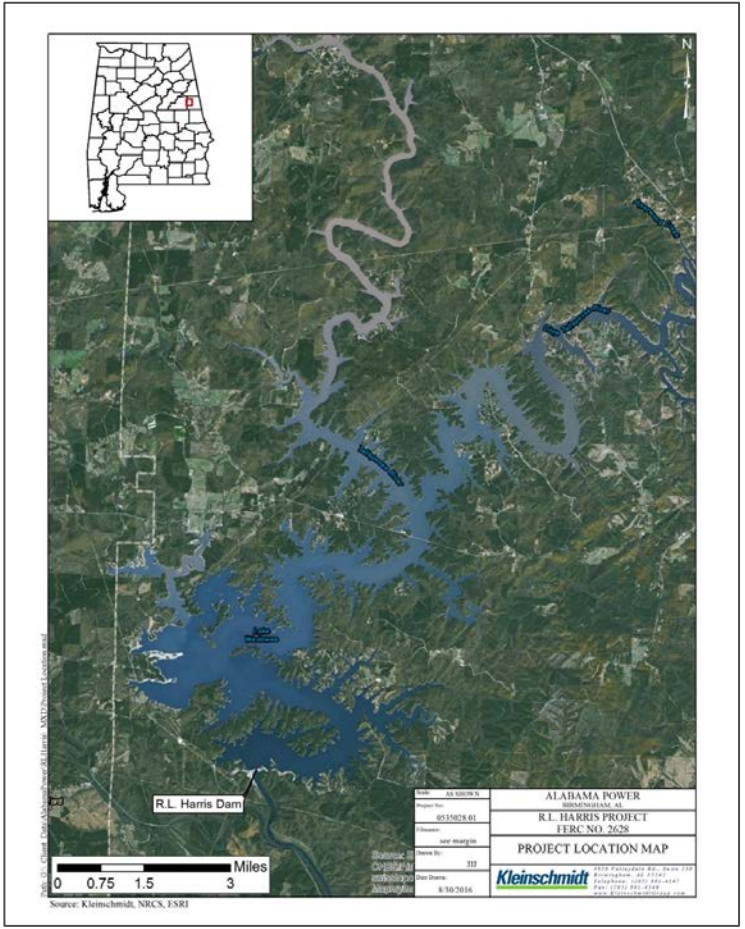
Tallapoosa River

Generation – 1,600 MW
Project Waters – 155,700 Acres
Project Lands – 119,500 Acres
Shoreline – 3,100 Miles
River Miles – 430 Miles
*All numbers approximate

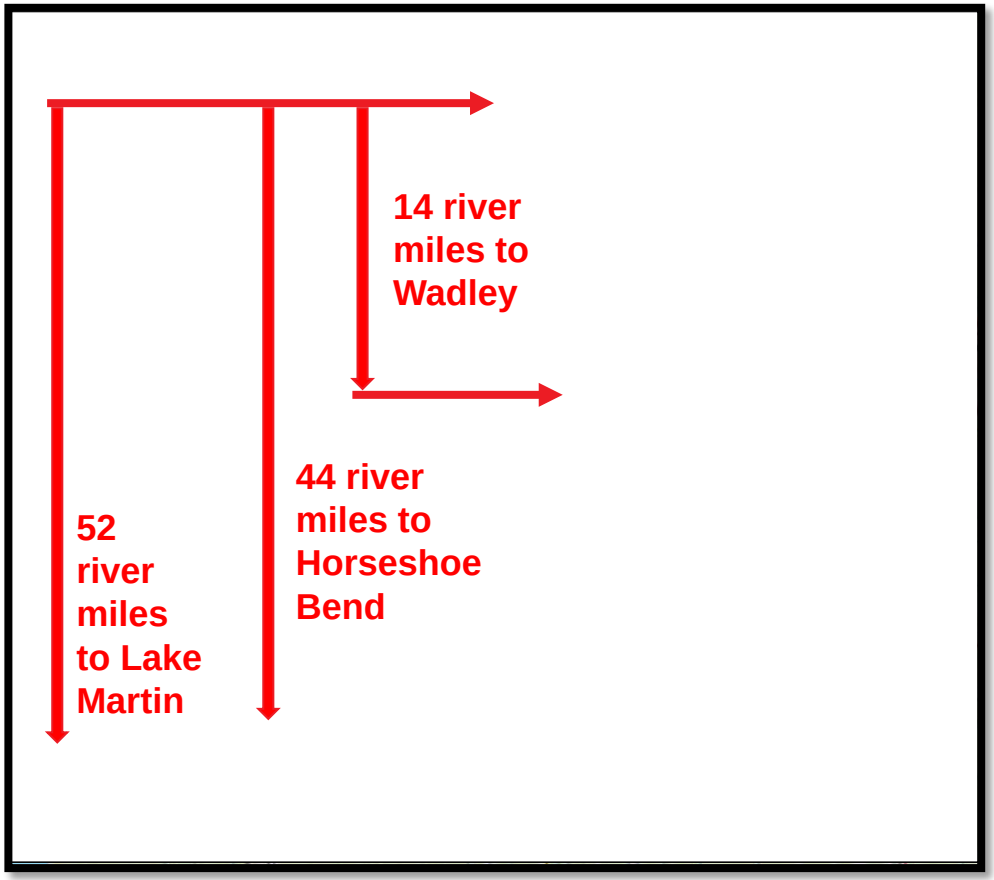
# Harris Project Overview

## Location

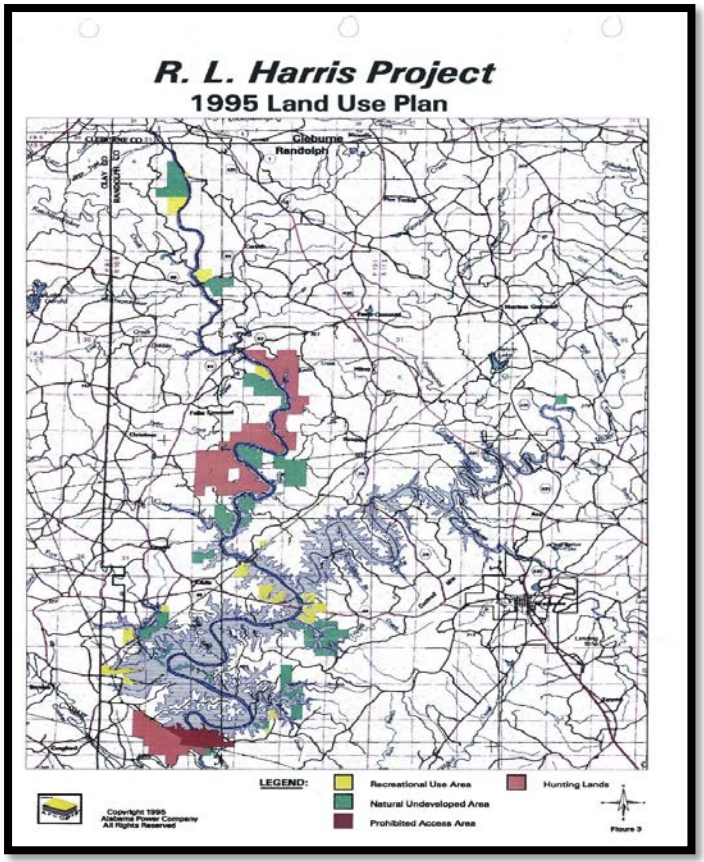
- Tallapoosa River
- Randolph County in east-central Alabama
- Dam is located 10 miles SW of Wedowee



# Tallapoosa River Downstream of Harris Dam



# Lake Harris Overview

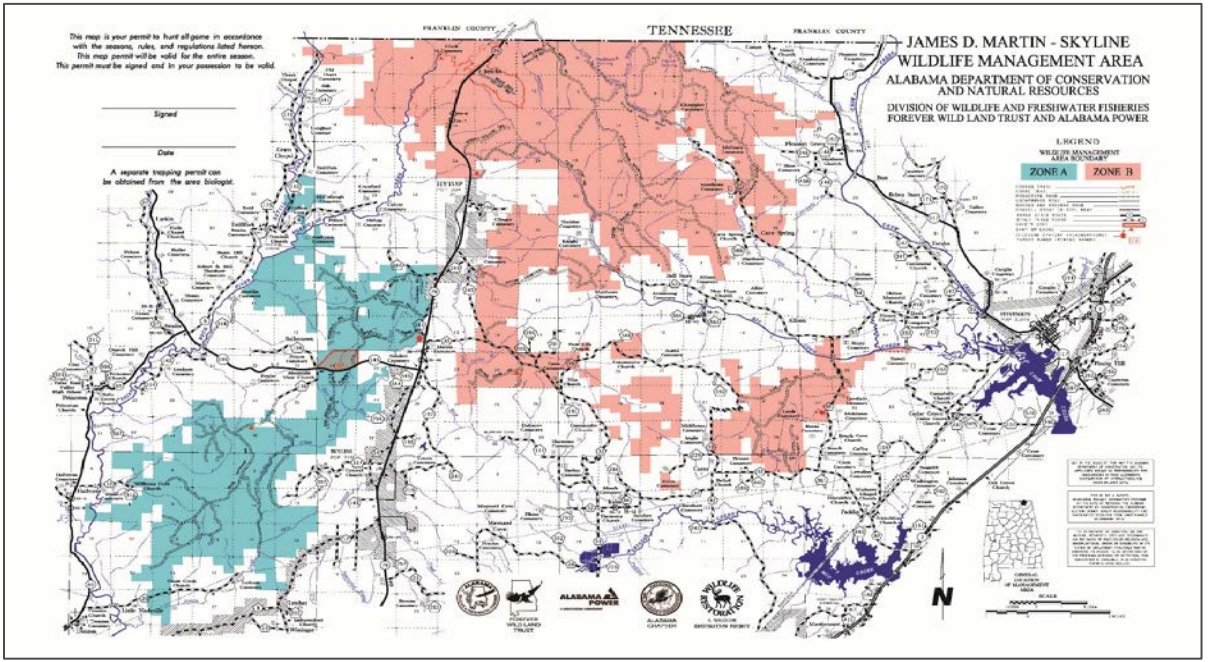



## CHARACTERISTICS

- 9,870-acre reservoir
- 367 miles of shoreline
- 7,411 acres of Project lands around Harris Reservoir
- Scenic easement

HARRIS DAM RELICENSING

# Skyline Overview




**CHARACTERISTICS**

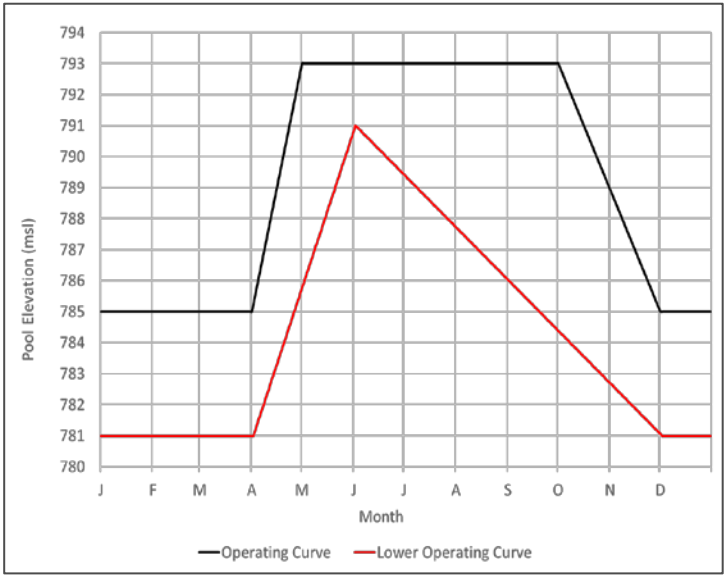
- 15,063 acres of Project lands in the Skyline Wildlife Management Area
- Located approximately 110 miles NW of Harris Reservoir
- Jackson County, AL
- Added to the project post-inundation as a mitigation measure for original impacts

# Harris Project Components

- powerhouse and its headworks
- the spillway structure
- 2 non-overflow gravity dam sections
- skimmer weir
- earth embankments at the east and west banks
- 2 vertical Francis turbines (95,000 hp each)
- 135 MW installed capacity

HARRIS DAM
RELICENSING

# Harris Project Operations




## RULE CURVE

- May 1st - October 1st: pool level at or near EL 793 feet
- October 1st to December 1st: pool level is gradually lowered to EL 785 feet
- Pool level remains at EL 785 feet until April 1st, at which point it is gradually raised back to full pool at EL 793 feet.

HARRIS DAM RELICENSING

# Harris Project Operations

There are 2 primary ways to pass water from the project:

1. Hydroelectric Generating Unit Operation
   - Electricity is generated
2. Spillway Gate Operation
   - No electricity is generated, only passing water

Under normal conditions, spill gates are not operated until all the available generating units are at full gate flow

# Harris Project Operations

- Hydraulic capacity is the flow, cubic feet per second (cfs), that a hydroelectric generating unit is designed to pass
  - Best Gate flow – amount of flow from the unit at the most efficient wicket gate position
    - Where the unit is operated under normal conditions
      - ~6500 cfs
      - ~60 MW
      - Optimum balance between power and flow
  - Full Gate flow – amount of flow from the unit with wicket gates in the 100% (wide open) position
    - ~8000 cfs
    - ~67.5 MW
    - Moves the most water but not most efficient generating point, less energy production
    - Operated when there is a greater need to move larger quantities of water
      - High flow situations

      - Harris is a peaking project

# The Green Plan – Daily Release Schedule

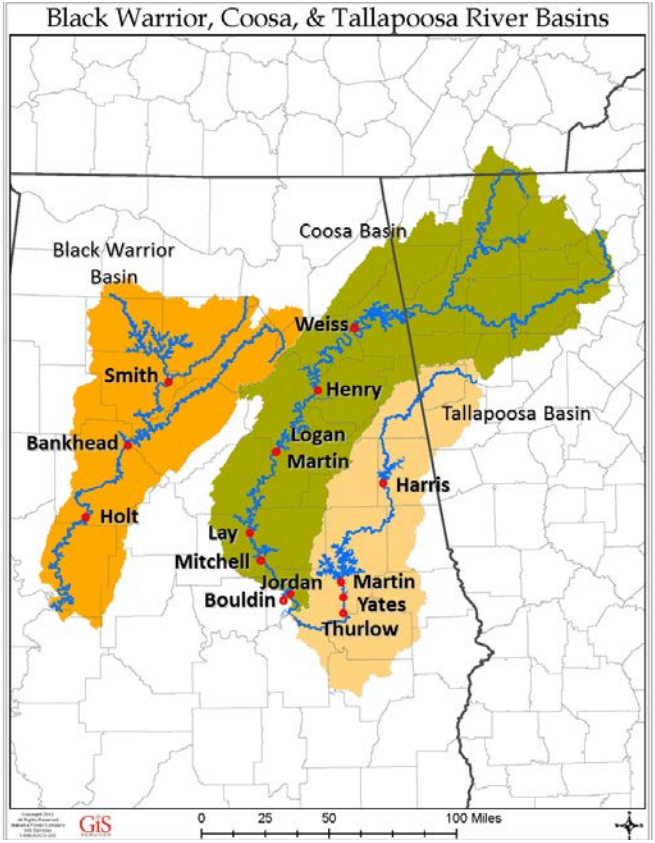
| Prior Day's Heflin Flow (DSF) | Generation @ 6 AM | Generation @ 12 PM | Generation as needed | Total Machine Time | Total Harris Discharge (DSF) |
|---|---|---|---|---|---|
| 0 – 150 | 10 min | 10 min | 10 min | 30 min | 133 |
| 150 – 300 | 15 min | 15 min | 30 min | 1 hr | 267 |
| 300 – 600 | 30 min | 30 min | 1 hr | 2 hrs | 533 |
| 600 – 900 | 30 min | 30 min | 2 hrs | 3 hrs | 800 |
| >900 | 30 min | 30 min | 3 hrs | 4 hrs | 1,067 |

**DSF = day second feet**

The **volume** of water represented by a flow of 1 cubic foot per second for 24 hours; equal to 86,400 cubic feet and approximately 2 acre feet.

# Coosa/Tallapoosa

- Lake level requirements
- Release requirements
  - Jordan
  - Thurlow
  - Navigation
- ADROP (drought operations)



# PROJECT HISTORY

| | |
|---|---|
| 1973 | License Issued |
| 1983 | Project Began Operating |
| 1998 | Discussions about mitigating effects of operations began |
| 2003 | First Adaptive Management Process Workshop |
| 2005 | Alabama Power Implements Green Plan |
| 2005-2017 | Alabama Power continues Green Plan implementation and funds Tallapoosa River research |
| 2017 | Issue Identification Workshop |
| 2018 | HAT formation and Study Plan Development |
| 2019 | Resource studies begin |

HARRIS DAM
RELICENSING

# 2018 – 2021: Relicensing Process

# THREATENED AND ENDANGERED SPECIES

- Study Goal – assess the probability of populations of currently listed T&E species or their CH occurring within the Harris Project Boundary or Project Area and determine if there are project related impacts
  - Lake fluctuations
  - Downstream flows
  - Recreation and shoreline management activities
  - Timber management

- April 2020 - Filed Draft T&E Desktop Assessment

- Conducted field surveys for:
  - Red-cockaded Woodpecker
  - Palezone Shiner
  - Finelined Pocketbook
  - White Fringeless Orchid
  - Price's Potato-bean

- By January 31, 2020 – file Final T&E Species Study Report

# WILDLIFE MANAGEMENT PLAN

## R.L. HARRIS HYDROELECTRIC PROJECT

FERC No. 2628

**DRAFT**

***Prepared by:***

Alabama Power

Birmingham, Alabama

January 2021

**WILDLIFE MANAGEMENT PLAN**

**R.L. HARRIS HYDROELECTRIC PROJECT**

**ALABAMA POWER COMPANY**
**BIRMINGHAM, ALABAMA**

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**R.L. HARRIS HYDROELECTRIC PROJECT**
**(FERC NO. 2628)**

**ALABAMA POWER COMPANY**
**BIRMINGHAM, ALABAMA**

# 1.0 INTRODUCTION

Alabama Power Company (Alabama Power) owns and operates the R.L. Harris Hydroelectric Project (Harris Project), FERC Project No. 2628, licensed by the Federal Energy Regulatory Commission (FERC). Alabama Power is relicensing the 135-megawatt (MW) Harris Project, and the existing license expires in 2023. This Wildlife Management Plan was developed as part of Alabama Power's efforts to acquire a new operating license. The relicensing process included a multi-year cooperative effort between Alabama Power, state and federal resource agencies, and interested stakeholders to address operational, recreational, and ecological concerns associated with hydroelectric project operations. During the initial (scoping) phase of the relicensing process, Alabama Power consulted a wide variety of stakeholders, including state and federal resource agencies, non-governmental organizations, and concerned citizens, for input on important relicensing issues. On November 13, 2018, Alabama Power filed ten proposed study plans for the Harris Project, including a study plan for an evaluation of Project lands and the development of a Shoreline Management Plan and a Wildlife Management Plan. FERC issued a Study Plan Determination on April 12, 2019[1], which included FERC staff recommendations. Alabama Power incorporated FERC's recommendations and filed the Final Study Plans with FERC on May 13, 2019. The Wildlife Management Plan described herein was developed in accordance with the Project Lands Evaluation Study Plan (Study Plan).

[1] Accession Number 20190412-3000

## 1.1 PROJECT DESCRIPTION

The Harris Project consists of a dam, spillway, powerhouse, and those lands and waters necessary for the operation of the hydroelectric project and enhancement and protection of environmental resources. These structures, lands, and water are enclosed within the FERC Project Boundary. Under the existing Harris Project license, the FERC Project Boundary encloses two distinct geographic areas, described below.

Harris Reservoir is the 9,870-acre reservoir (Harris Reservoir) created by the R.L. Harris Dam (Harris Dam). The lands adjoining the reservoir total approximately 7,392 acres and are included in the FERC Project Boundary (Figure **1-1**). This includes land to 795 feet mean sea level (msl)[2], as well as natural undeveloped areas, hunting lands, prohibited access areas, recreational areas, and all islands.

**Commented [TLM1]:** All acreages will be updated in the final version to reflect any changes included in the license proposal.


The Harris Project also contains 15,063 acres of land within the James D. Martin-Skyline Wildlife Management Area (Skyline WMA) located in Jackson County, Alabama (**Figure** 1-2). These lands are located approximately 110 miles north of Harris Reservoir and were acquired and incorporated into the FERC Project Boundary as part of the July 29, 1988 Harris Project Wildlife Mitigative Plan and the June 29, 1990 Wildlife Management Plan. These lands are leased to, and managed by, the State of Alabama for wildlife management and public hunting and are part of the Skyline WMA.

For the purposes of this Plan, "Lake Harris" refers to the 9,870-acre reservoir, adjacent 7,392 acres of Project land, and the dam, spillway, and powerhouse. "Skyline" refers to the 15,063 acres of Project land within the Skyline WMA in Jackson County. "Harris Project" refers to all the lands, waters, and structures enclosed within the FERC Project Boundary, which includes both Lake Harris and Skyline. Harris Reservoir refers to the 9,870-acre reservoir only; Harris

[2] Also includes a scenic easement (to 800 feet msl or 50 horizontal feet from 793 feet msl, whichever is less, but never less than 795 feet msl).

Dam refers to the dam, spillway, and powerhouse. The Project Area refers to the land and water in the Project Boundary and immediate geographic area adjacent to the Project Boundary.

Lake Harris and Skyline are located within two river basins: the Tallapoosa and Tennessee River Basins, respectively. The only waterbody managed by Alabama Power as part of their FERC license for the Harris Project is the Harris Reservoir.

Within Section 3.0 of this report, Alabama Power describes the Lake Harris resource first, followed by the Skyline resource. Specific references to the Harris Reservoir will be identified as Harris Reservoir; specific reference to the dam will be identified as Harris Dam. The “Project Area” refers to the land and water in the Project Boundary and immediate geographic area adjacent to the Project Boundary. The “Project Vicinity” refers to a larger geographic area near a hydroelectric project, such as a county.

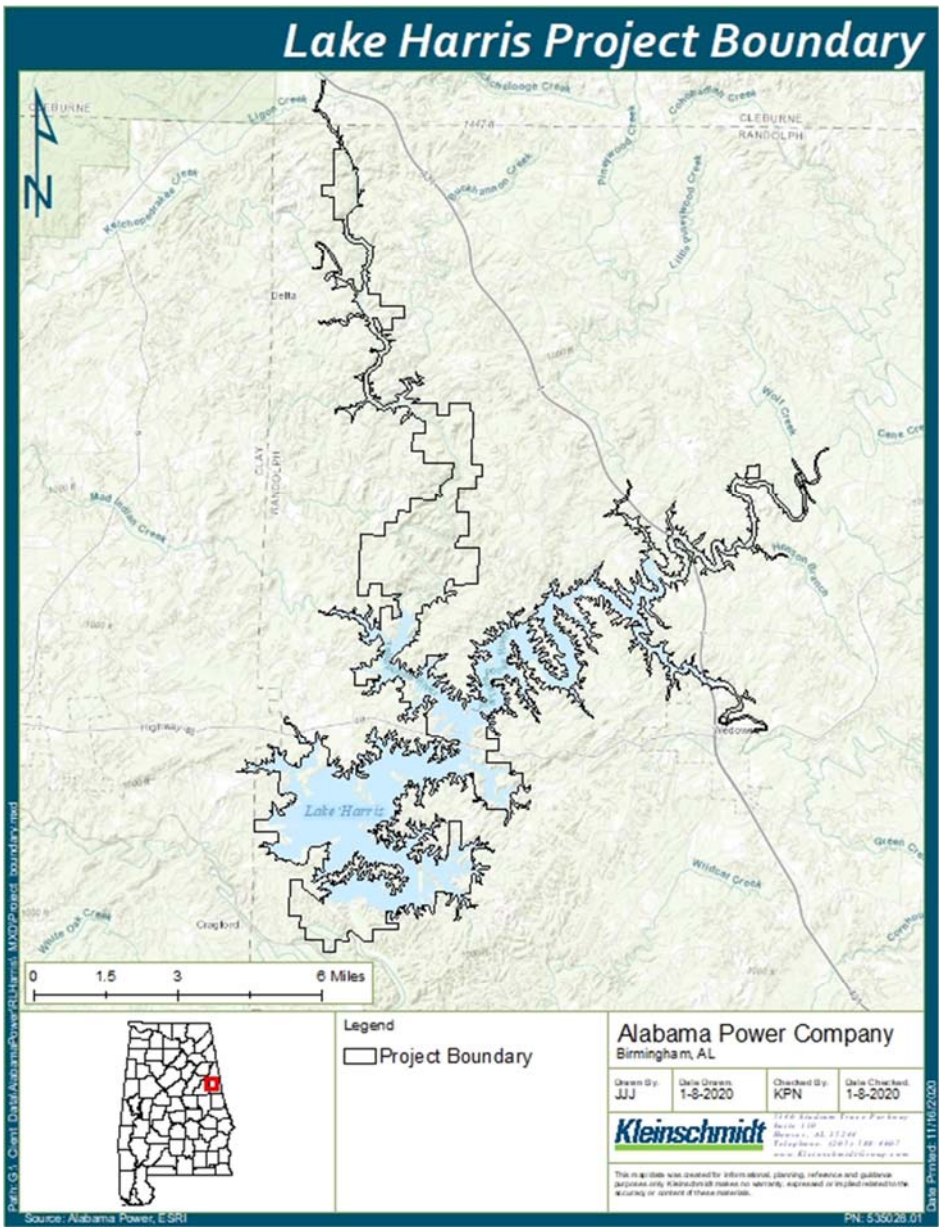


**FIGURE** 1-1 **LAKE HARRIS PROJECT BOUNDARY**

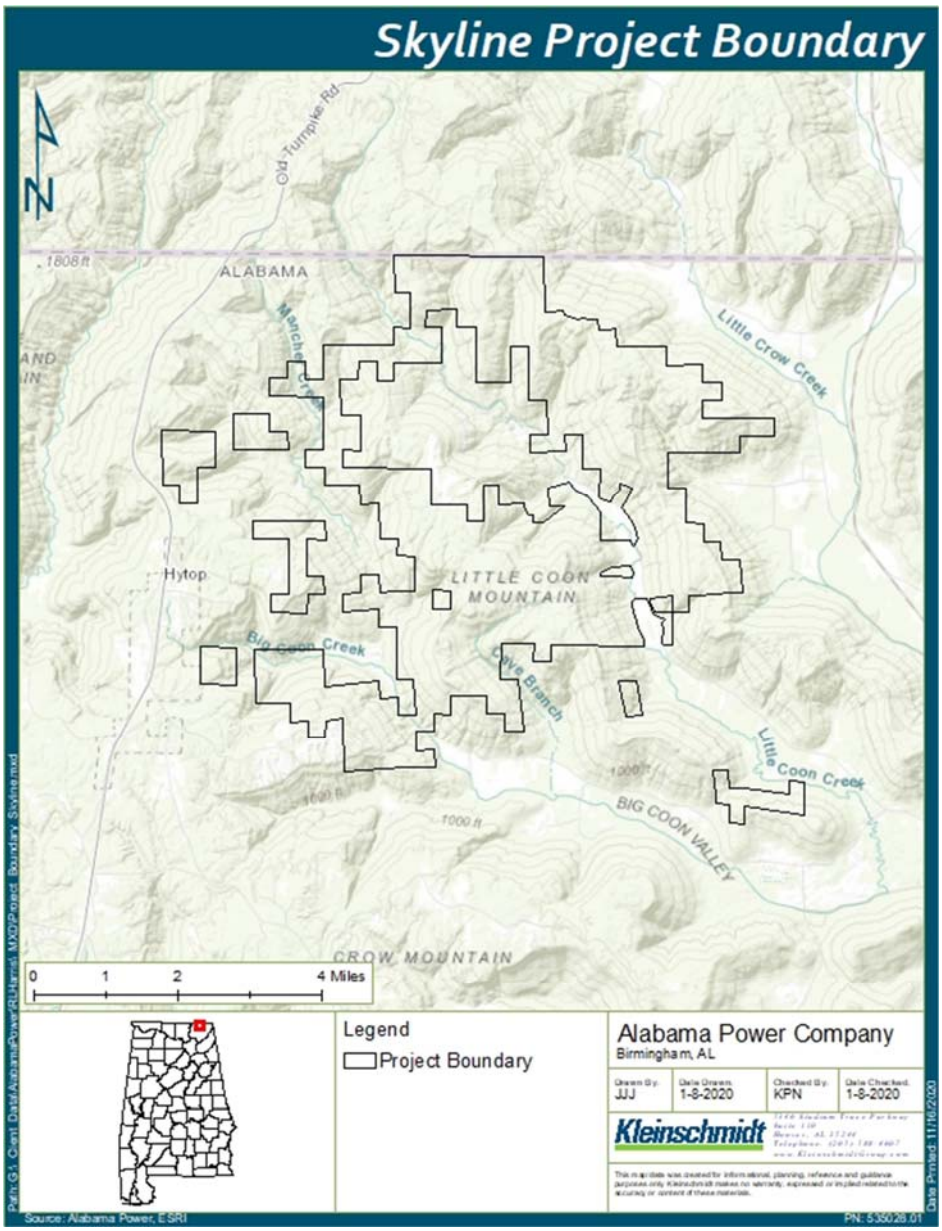


**Figure** 1-2 **Skyline Project Boundary**

## 2.0 PURPOSE OF THE PLAN

The overall purpose of this Wildlife Management Plan is to protect and enhance the available wildlife habitat within the Project boundaries of the Harris Project. The Plan consolidates numerous wildlife management activities into a single document and provides the additional technical information and management guidelines requested by resource agencies and other stakeholders during relicensing.

# 3.0 BACKGROUND AND EXISTING INFORMATION

## 3.1 BACKGROUND OF FERC-APPROVED PLANS

As part of the original license, Alabama Power developed a Wildlife Mitigation Plan (Alabama Power 1988) in consultation with Alabama Department of Conservation and Natural Resources (ADCNR) and U.S. Fish and Wildlife Service (USFWS) that FERC approved on July 29, 1988. The Wildlife Mitigation Plan outlined specific measures to mitigate for the impacts to wildlife and habitats caused by the development of the Harris Project. The Wildlife Mitigation Plan included provisions for the management of 5,900 acres of existing Project lands and acquisition of 779.5 additional acres of land in the vicinity of the Harris Reservoir. The Wildlife Mitigation Plan required Alabama Power to install Wood Duck (*Aix sponsa*) boxes, install Osprey (*Pandion haliaetus*) nesting platforms, develop and implement a Canada Goose (*Branta canadensis*) restoration project, manage wildlife openings, and create artificial nesting structures. In addition, the Wildlife Mitigation Plan included provisions for Alabama Power to purchase and subsequently lease to ADCNR, over 15,000 acres of land adjacent to the already established Skyline Wildlife Management Area. A Skyline Wildlife Management Plan (Skyline WMP) (Alabama Power 1989) was developed to guide the development and maintenance of wildlife habitat, timber management, and recreational access. The Skyline WMP was approved by FERC on June 29, 1990.

As part of the management activities conducted under the 1988 Wildlife Management Plan, Alabama Power identified 263 acres of suitable Wood Duck habitat and installed over 100 Wood Duck boxes. Alabama Power also released Canada Geese to establish a population in and around Lake Harris. Additionally, Alabama Power constructed Osprey nesting platforms along the reservoir shoreline. Finally, Alabama Power managed forest lands within the Lake Harris Project Area and established 105 acres of permanent openings to provide diverse habitat that benefits both game and nongame species.

Alabama Power conducts annual monitoring and maintenance of 104 Wood Duck boxes installed around Lake Harris. Maintenance activities include repair and replacement of broken boxes, as well as the relocation of underutilized boxes. Double boxes were installed in higher use areas. Since 2000, an average of 33 Wood Ducks have been hatched from the Wood Duck boxes per

year. Annual Wood Duck hatchlings ranged from 17 hatchings in 2000 to 47 hatchlings in 2017. Although Wood Ducks have utilized the artificial boxes, these structures were installed as a mitigative measure for lost habitat associated with the initial impoundment of Harris Reservoir. Wood Ducks using the area have had time to adapt to the surrounding habitat, and likely have demonstrated tolerance, or the ability to habituate, to existing human presence, activities, and infrastructure at Lake Harris. Therefore, Alabama Power will not continue monitoring and maintenance of the Wood Duck box program under this WMP. Wood Duck boxes will be left in place until they are no longer usable. This will allow wildlife using the structures to transition to the surrounding suitable habitat.

Alabama Power installed Osprey platforms around Lake Harris. The platforms are constructed of concrete poles with a galvanized steel ring at the top to serve as a nesting platform. Due to construction materials, the platforms require minimal maintenance. While many of the platforms have been used by Osprey, they are not included in a monitoring program. Further, no additional platforms are planned for construction as the currently installed platforms are adequate for the Osprey population at Lake Harris and will last for years to come.

## 3.2 LAND USE AND EXISTING HABITAT – LAKE HARRIS

### 3.2.1 WILDLIFE RESOURCES

Harris Reservoir lies within the Northern Piedmont Upland district of the Piedmont Upland Physiographic Section. Harris Reservoir and surrounding woodland, agricultural, and residential areas provide high quality habitat for a variety of upland and semi-aquatic wildlife species. In addition to typical southeastern species, such as Gray Fox (*Urocyon cinereoargenteus*), White-tailed Deer (*Odocoileus virginianus*), Virginia Opossum (*Didelphis virginiana*), and Gray Squirrel (*Sciurus carolinensis*), the area supports species characteristic of the Piedmont region, such as the Wood Frog (*Lithobates sylvatica*) and Copperhead (*Agkistrodon contortrix*) (Alabama Power 2018). Birdlife typical of the Lake Harris Project Area uplands includes game species such as Northern Bobwhite (*Colinus virginianus*), Eastern Wild Turkey (*Meleagris gallapavo silvestris*), and Mourning Dove (*Zenaida macroura*); resident songbirds include Downy Woodpecker (*Picoides pubescens*), American Robin (*Turdus migratorius*), Eastern Bluebird (*Sialia sialis*), and Eastern Meadowlark (*Sturnella magna*), and an abundance of

neotropical migrants, including numerous warblers (Parulidae), vireos (Vireonidae), and hummingbirds (Trochilidae) (Alabama Power 2018). A number of raptors are known to occur in the Lake Harris Project Vicinity including Osprey, American Kestrel (*Falco sparverius*), Broad-winged Hawk (*Buteo platypterus*), Red-tailed Hawk (*Buteo jamaicensis*), Bald Eagle (*Haliaeetus leucocephalus*), Barred Owl (*Strix varia*), Great Horned Owl (*Bubo virginianus*), and Eastern Screech Owl. Typical small mammals of uplands include North American Least Shrew (*Cryptotis parva*), Southern Flying Squirrel (*Glaucomys volans*), Eastern Woodrat (*Neotoma floridana*), Eastern Red Bat (*Lasiurus borealis*), and Big Brown Bat (*Eptesicus fuscus*). Reptiles and amphibians found in the Lake Harris Project Area uplands include Eastern Spadefoot Toad (*Scaphiopus holbrooki holbrooki*); Marbled Salamander (*Ambystoma opacum*) and Northern Slimy Salamander (*Plethodon glutinosus*); Green Anole (*Anolis carolinensis*) and Eastern Fence Lizard (*Sceloporus undulatus*); Five-lined Skink (*Plestiodon fasciatus*) and Broad-headed Skink (*Plestiodon laticeps*); Black Racer (*Coluber constrictor*), and Gray Ratsnake (*Pantherophis spiloides*); and Eastern Box Turtle (*Terrapene carolina carolina*) (Alabama Power 2018).

Although limited, Harris Reservoir's littoral zone provides habitat for North American River Otter (*Lontra canadensis*), American Mink (*Neovison vison*), Muskrat (*Ondatra zibethicus*), and Beaver (*Castor canadensis*), as well as seasonal and year-round habitat for waterfowl and wading birds including Mallard (*Anas platyrhynchos*), Gadwall (*Mareca strepera*), Wood Duck, Hooded Merganser (*Lophodytes cucullatus*), Great Blue Heron (*Ardea herodias*), Green Heron (*Butorides virescens*), and Great Egret (*Ardea alba*). Birds such as Ring-billed Gull (*Larus delawarensis*), Osprey, Purple Martin (*Progne subis*), and Belted Kingfisher (*Megaceryle alcyon*) are also common in areas of open water. Littoral areas provide potential breeding habitat for aquatic and semi-aquatic amphibian species including Red-spotted Newt (*Notophthalmus viridescens viridescens*) and Central Newt (*Notophthalmus viridescens louisianensis*); Northern Red Salamander (*Pseudotriton ruber ruber*) and Northern Dusky Salamander (*Desmognathus fuscus*); and American Bullfrog (*Lithobates catesbeiana*), Northern Spring Peeper (*Pseudacris crucifer crucifer*), and Southern Leopard Frog (*Lithobates sphenocephala*) (Alabama Power 2018). Reptile species typical of the littoral zone include Cottonmouth (*Agkistrodon piscivorus*), Red-bellied Water Snake (*Nerodia erythrogaster erythrogaster*), and Yellow-bellied Water Snake (*Nerodia erythrogaster flavigaster*); Alabama Map Turtle (*Graptemys pulchra*), River Cooter (*Pseudemys concinna*), and Red-eared slider (*Trachemys scripta elegans*). Currently, no invasive wildlife species are being managed within the Lake Harris Project Area.

### 3.2.2 BOTANICAL RESOURCES

The Lake Harris Project Area is comprised of an impounded portion of the Tallapoosa River and includes mainly open water, deciduous, and evergreen forests with only small areas of agricultural and residential development.

The Southern Piedmont Dry Oak forest occurs in upland ridges and mid-slopes and is typically comprised of upland oaks; pines may be a significant component, especially in the southern part of the range. Overstory vegetation commonly found within this forest type includes upland oaks (*Quercus* spp.) such as White Oak (*Quercus alba*), Northern Red Oak (*Quercus rubra*), Black Oak (*Quercus velutina*), Post Oak (*Quercus stellata*), Scarlet Oak (*Quercus coccinea*), and Southern Red Oak (*Quercus falcata*) as well as hickory species (*Carya* spp.) such as Pignut Hickory (*Carya glabra*) and Mockernut Hickory (*Carya alba*). Other common species include Loblolly Pine (*Pinus taeda*), Shortleaf Pine (*Pinus echinata*), Virginia Pine (*Pinus virginiana*), Red Maple (*Acer rubrum*), American Sweetgum (*Liquidambar styraciflua*), and Tulip Tree (*Liriodendron tulipifera*). Generally, there is a well-developed shrub layer, and species vary with soil chemistry. Shrub species may include Mountain Laurel (*Kalmia latifolia*), Common Sweetleaf (*Symplocos tinctoria*), Flowering Dogwood (*Cornus florida*), Deerberry (*Vaccinium stamineum*), and Farkleberry (*Vaccinium arboretum*). The herb layer is typically sparse (NatureServe 2009).

### 3.2.3 RIPARIAN AND LITTORAL HABITAT

Riparian habitat is the vegetated zone that serves as a buffer between the upland vegetation community and the riverine environment. This zone provides streambank stability and sediment filtration. Based on the ecological systems classification developed by NatureServe (2009), much of the riparian areas for the streams within the Lake Harris Project Boundary are classified as Southern Piedmont Small Floodplain and Riparian Forest (Section 5.5.1). This habitat type is often dominated by Tulip Tree, American Sweetgum, and Red Maple along with representative alluvial and bottomland species such as American Sycamore (*Platanus occidentalis*), River Birch (*Betula nigra*), Box Elder (*Acer negundo*), Sugarberry (*Celtis laevigata*), Green Ash (*Fraxinus pennsylvanica*), Swamp Chestnut Oak (*Quercus michauxii*), and Cherrybark Oak (*Quercus*

*pagoda*). American Beech (*Fagus grandifolia*) may be present in drier areas. Loblolly Pine, Virginia Pine, American Sweetgum, and Tulip Tree are dominant in successional areas. The shrub layer is typically dominated by Mountain Laurel, American Witch-hazel (*Hamamelis virginiana*), Possumhaw (*Ilex decidua*), Spicebush (*Lindera benzoin*), and Yaupon Holly (*Ilex vomitoria*). Wandflower (*Galax urceolata*), Jack-in-the-pulpit (*Arisaema triphyllum*), Sensitive Fern (*Onoclea sensibilis*), and Fringed Sedge (*Carex crinita*) may be dominant in the herb layer (NatureServe 2009).

## 3.3 LAND USE AND EXISTING HABITAT – SKYLINE

### 3.3.1 WILDLIFE RESOURCES

Skyline provides quality habitat for a variety of wildlife species. Alabama Power leases Skyline lands to ADCNR and provides funding for the wildlife management activities on Skyline lands. ADCNR is responsible for the wildlife management activities (Alabama Power 1988). In addition to typical southeastern species, such as Gray Fox, White-tailed Deer, Virginia Opossum, and Gray Squirrel, the area supports species characteristic of the Cumberland Plateau Region of Alabama such as the American Toad (*Bufo americanus*), Green Anole, and Timber Rattlesnake (*Crotalus horridus*) (Alabama Power 2018). Birdlife typical of the Skyline Area includes game species such as Eastern Wild Turkey, Northern Bobwhite (*Colinus virginianus*), and Mourning Dove; resident songbirds include Downy Woodpecker, Blue Jay (*Cyanocitta cristata*), and Eastern Bluebird. Other common bird species include American Crow *(Corvus brachyrhynchos)* and Pileated Woodpecker (*Dryocopus pileatus*) (Alabama Power 2018). Raptors known to occur in or near the Skyline area include American Kestrel, Broad-winged Hawk and Red-tailed Hawk, Barred Owl, Great Horned Owl, and Eastern Screech Owl (Alabama Power 2018). Small mammals common in or near Skyline include Southern Flying Squirrel, Big Brown Bat, Eastern Cottontail (*Sylvilagus floridanus*), Eastern Chipmunk (*Tamias striatus*), and Raccoon (*Procyon lotor*) (Alabama Power 2018). Reptiles and amphibians found in the Skyline area include Marbled Salamander and Northern Slimy Salamander; Eastern Fence Lizard; Five-lined Skink and Broad-headed Skink; Copperhead, Black Racer, and Gray Ratsnake; and Eastern Box Turtle (Alabama Power 2018).

### 3.3.2 BOTANICAL RESOURCES

Skyline is located in Jackson County, in the Cumberland Plateau Region of Alabama. This area is underlain by sandstones along with siltstones, shales, and coal. The landscape consists of flat-topped, high-elevation plateaus separated by deep, steep-sided valleys. The plateaus slope gently from the northeast to the southwest. Most of the area is forested, with Southern Ridge and Valley/Cumberland Dry Calcareous Forest and South-Central Interior Mesophytic Forest types. The Southern Ridge and Valley/Cumberland Dry Calcareous forest is comprised of dry-to-dry mesic calcareous forests in a variety of landscape positions, including ridge tops and upper and mid-slopes. They dominate vegetation type under natural conditions. High quality examples are characteristically dominated by White Oak, Chinkapin Oak (*Quercus muehlenbergii*), Post Oak, and Shumard's Oak (*Quercus shumardii*), with varying amounts of hickory, Sugar Maple (*Acer saccharum*), Southern Sugar Maple (*Acer floridanum*), Chalk Maple (*Acer leucoderme*), Red Maple, and other species. This system also includes successional communities resulting from logging or agriculture and are dominated by Tulip Tree, pine (Pinaceae), Eastern Red Cedar (*Juniperus virginiana*), and Black Locust (*Robinia pseudoacacia*) (NatureServe 2009).

The South-Central Interior Mesophytic forest is primarily deciduous forests that typically occur in deep, enriched soils in protected landscape settings such as covers or lower slopes. This forest is generally highly diverse and is dominated by Sugar Maple, American Beech, Tulip Tree, American Basswood (*Tilia americana*), Northern Red Oak, Cucumber Tree (*Magnolia acuminata*), and Eastern Black Walnut (*Juglans nigra*). Eastern Hemlock (*Tsuga canadensis*) may be present in some stands. Common shrubs include Coralberry (*Symphoricarpos orbiculatus*), Bladdernut (*Staphylea trifolia*), American Strawberry Bush (*Euonymus americanus*), and Flowering Dogwood. The herb layer is often very plentiful and may include Licorice Bedstraw (*Galium circaezans*), Black Cohosh (*Actaea racemosa*), Southern Lady Fern (*Athyrium filix-femina* ssp. *asplenioides*), and Crownbeard (*Verbesina alternifolia*).

The Allegheny-Cumberland Dry Oak forest and woodland consists of dry hardwood forests found in nutrient-poor or acidic substrates on plateaus or ridges. Typical dominants include White Oak, Southern Red Oak, Chestnut Oak (*Quercus prinus*), Scarlet Oak, with lesser amounts of Red Maple, Pignut Hickory, and Mockernut Hickory. Shortleaf Pine and/or Virginia Pine may occur in smaller amounts, particularly adjacent to steep cliffs or slopes or in area impacted by

fire. White Pine (*Pinus strobus*) may be prominent in some stands in the absence of fire. American Chestnut (*Castanea dentata*) saplings may be found where it was once a common tree. The shrub layer may include Lowbush Blueberry (*Vaccinium angustifolium*), Bear Huckleberry (*Gaylussacia ursina*), Deerberry (*Vaccinium stamineum*), Hillside Blueberry (*Vaccinium pallidum*), Oakleaf Hydrangea (*Hydrangea quercifolia*), and Mapleleaf Viburnum (*Viburnum acerifolium*). Common herbs include Boott's Sedge (*Carex picta*), Black Seed Speargrass (*Piptochaetium avenaceum*), Nakedflower Tick Trefoil (*Desmodium nudiflorum*), Longleaf Woodoats (*Chasmanthium sessiliflorum*), and Dwarf Violet Iris (*Iris verna* var. *smalliana*).

### 3.3.3 RIPARIAN AND LITTORAL HABITAT

Cahaba Consulting described the stream riparian zone as consisting of primarily mature forest vegetation. Riparian habitat is the vegetated zone that serves as a buffer between the upland vegetation community and the riverine environment. This zone provides streambank stability and sediment filtration. Based on the ecological systems classification developed by NatureServe (2009), much of the riparian areas for the streams within the Skyline Project Boundary are classified as Allegheny-Cumberland Dry Oak Forest and Woodland, South-Central Interior Mesophytic Forest, and Southern Ridge and Valley/Cumberland Dry Calcareous Forest (Section 5.5.1). The Southern Ridge and Valley is dominated by White Oak, Chinkapin Oak, Post Oak, and Shumard's Oak, with varying amounts of hickory, Sugar Maple, Southern Sugar Maple, Chalk Maple, Red Maple, and other species. The South-Central Interior is dominated by Sugar Maple, American Beech, Tulip Tree, American Basswood, Northern Red Oak, Cucumber Tree, and Eastern Black Walnut. The Allegheny-Cumberland is dominated by White Oak, Southern Red Oak, Chestnut Oak, Scarlet Oak, with lesser amounts of Red Maple, Pignut Hickory, and Mockernut Hickory (NatureServe 2009).

## 4.0 WILDLIFE MANAGEMENT OBJECTIVES

Specific wildlife management objectives for the Harris Project lands were initially identified during the scoping phase of the relicensing process. These objectives were further refined through subsequent meetings with ADCNR and USFWS and include:

1) Management of shoreline areas for native vegetative communities and enhanced value as wildlife habitat;
2) Implementation of timber management methods that result in enhanced value of Project lands as wildlife habitat;
3) Management of public hunting areas, including areas for the physically disabled.

# 5.0 SHORELINE MANAGEMENT

Protection and enhancement of available shoreline habitat for wildlife will be accomplished through implementation of the proposed Shoreline Management Plan (SMP). Pending approval by FERC, the SMP will be implemented for the 367 miles of shoreline within the Lake Harris Project Boundary.

## 5.1 MANAGEMENT ACTIONS

### 5.1.1 SHORELINE CLASSIFICATION SYSTEM AND SENSITIVE RESOURCES DESIGNATION

As part of the proposed SMP, Alabama Power developed a shoreline classification system to guide management and permitting activities within the Project Boundary and to protect natural resources such as, including wildlife habitat and wetlands. The shoreline classifications are based on an evaluation of existing and potential land use. While not solely designed for protection of wildlife habitat, the Sensitive Resources designation and the Natural/Undeveloped and Hunting shoreline management classifications often include valuable wildlife habitats. Best management practices (BMPs), associated designations, and classifications can be found within the SMP.

### 5.1.2 SHORELINE BUFFERS

As specified in the SMP, Alabama Power provides for preservation or establishment of a naturally managed vegetative filter strip along the shoreline to keep clearing of native trees and vegetation to a minimum[3]. Unmanaged vegetation associated with these buffers enhances available food and cover for wildlife species, provides corridors that enhance linkages between larger habitat patches, and protects nearshore environments. Nearshore environments provide important breeding and nursery areas for numerous fish and amphibian species and are utilized for feeding and cover by species such as North American River Otter, Beaver, and various wading birds and waterfowl. At a microhabitat level, accumulated leaf litter, pine needle duff, and coarse, woody debris (fallen logs, etc.) in these vegetated buffers will provide much needed

[3] The BMP recommended here does not in any way supersede or replace the requirements of the scenic easement. Scenic easements include covenants running with the land for the project purpose of protecting scenic and environmental values and, as such, are requirements and not recommendations.

refugia for reptiles and amphibians. Specific management actions associated with shoreline buffers can be found in the SMP.

### 5.1.3 PLANTING OF NATIVE SPECIES

The SMP recommends, and in some instances requires, planting of native trees, shrubs, and plant species for landscaping and for purposes of shoreline stabilization. Plants native to the soils and climate of a particular area typically provide the best overall food sources for wildlife, while generally requiring less fertilizer, less water, and less effort in controlling pests. Planting of native species will be required on all lands within the SMP Recreation and Commercial Recreation classifications and recommended as a BMP on all other Project lands. Specific management actions associated with native plantings can be found in the SMP.

## 6.0 TIMBER MANAGEMENT

Alabama Power has had an active forest management program since World War II. Shortly after World War II, timber stands were inventoried, and long-range timber management plans were developed. These plans directed an all-aged, sustained-yield management scheme with the forest rotation age of 60 years. Under this management strategy, trees would be grown to an average age of 60 years and would produce forest products on a continuous basis. Saw timber would be harvested on 16 year cutting cycles and pulpwood would be thinned as a secondary product at interim periods of 10 years.

In the early 1970s, the cutting cycle for saw timber was lengthened to 20 years because power skidders were then being used. As a result, more volume was being cut per acre and more reseeding was occurring (from the additional exposure of mineral soil caused by the skidders). The extended cutting cycle allowed for per acre volumes to recover and the young seedlings to put on additional volume. This all or uneven-aged management scheme has produced a notably diverse forest both in terms of species composition and in forest products. The result is not only the production of valuable high-quality products but the production of diverse quality habitat for both game and non-game wildlife species. These planned and controlled forest management practices have, over the years, aided in the protection of the watersheds of the associated reservoirs that indirectly have enhanced the fisheries habitat of these lakes, rivers, and streams. These practices have also produced habitats that have promoted and sustained several rare and endangered species of plants and animals.

Alabama Power continues to manage Project forest lands according to the existing all or uneven-aged management schemes, with a saw timber cycle of 20 years and an overall forest rotation of 60 years. Prescribed burning and/or use of herbicides are considered on stands within Project forest lands; such use is based on conditions and characteristics of the individual stands. Although not specifically designed to benefit rare species, this practice has potential to benefit potentially occurring Red-cockaded Woodpeckers (*Picoides borealis*) by reducing hardwood mid-story, which can block access to cavity and foraging trees in Longleaf Pine (*Pinus palustris*) ecosystems.

Alabama Power continues to utilize selective cutting as the primary means of timber harvest on

Project lands, with those trees that are mature or of poor quality being removed. Natural regeneration is the primary means by which harvested forests are replaced. However, if a particular timber stand cannot be regenerated naturally, or if a stand is destroyed by some catastrophic event, any residual trees are harvested, the site prepared, and the stand planted with genetically improved seedling stock.

Contemporary timber stands on Project lands at Lake Harris are dominated by Mixed Pine-Hardwood. Timber stand composition on the 6,269 acres within the Harris Project Boundary at Lake Harris is summarized in Table 6-1. Contemporary timber stands on Project lands at Skyline are dominated by Upland Hardwood. Most of the timber stands are mature to over-mature mixed hardwood forest, made up primarily of various upland species of red and white oak, yellow poplar, hard and soft maple, and hickory. There is a small component of shortleaf, loblolly, and Virginia pine. Historically, past harvesting practices have focused on removing higher value red and white oak timber, resulting in many stands that are dominated by maple, hickory, yellow poplar and chestnut oak. Most stands have closed canopies resulting in little or no desirable understory species to provide the potential for future stands. Timber stand composition on the 15,188 acres within the Harris Project Boundary at Skyline is summarized in Table 6-2.

**TABLE 6-1 TIMBER STAND COMPOSITION ON HARRIS PROJECT LANDS AT LAKE HARRIS**
(Source: Alabama Power Timber Stand Data)

| Stand Type | Percent Cover | Acreage |
|---|---|---|
| Mixed Pine-Hardwood | 47 | 2938 |
| Natural Longleaf Pine | 0 | 0 |
| Natural Pine | 18 | 1109 |
| Upland Hardwood | 21 | 1343 |
| Planted Pines | 8 | 476 |
| Other | 6 | 403 |
| **Total** | 100 | 6269 |

**TABLE 6-2 TIMBER STAND COMPOSITION ON HARRIS PROJECT LANDS AT SKYLINE**
(Source: Alabama Power Timber Stand Data)

| Stand Type | Percent Cover | Acreage |
|---|---|---|
| Mixed Pine-Hardwood | 0.15 | 23 |
| Natural Longleaf Pine | 0 | 0 |
| Natural Pine | 0 | 0 |
| Upland Hardwood | 99 | 14,922 |
| Planted Pines | 0 | 0 |
| Other | 0.85 | 118 |
| **Total** | 100 | 15,063 |

Forest lands located within the Project Boundary of the Harris Project will be managed according to the actions described below.

## 6.1 MANAGEMENT ACTIONS

### 6.1.1 LAKE HARRIS

Alabama Power will continue to manage Project forest lands according to the existing all or uneven-aged management schemes, with a sawtimber cycle of 20 years and an overall forest rotation of 60 years (see above description). Prescribed burning and/or use of herbicides will be considered on stands within the Project forest lands, and such use will be based on conditions and characteristics of the individual stands.

Alabama Power will continue to utilize selective cutting as the primary means of timber harvest on Project lands, with those trees that are mature or of poor quality being removed. Natural regeneration will continue to be the primary means by which harvested forests are replaced. However, if a particular timber stand cannot be regenerated naturally, or if a stand is destroyed by some catastrophic event, any residual trees will be harvested, the site prepared, and the stand planted with genetically improved seedling stock.

To avoid and minimize potential impacts to federally listed summer roosting bats, Alabama Power will continue to utilize BMPs associated with timber management and tree removal, including retention of snags, 10 inches diameter at breast height (dbh) and greater, where

possible. Although rare in timber stands at Lake Harris, high quality live roost trees, specifically all shag bark hickory and white oak 12-inch dbh and less, will be retained. In addition, live trees with basal openings or hollowing of the bole, when detected, will be left where possible. Occasionally streamside management zones (SMZ) are selectively harvested. Harvest within these SMZs is comprised of mature pine and the occasional white oak with other high-quality roost trees such as shag bark hickory being retained. Although potential roost trees selected for retention may occasionally be inadvertently damaged, every attempt is made to avoid these trees during harvest. Particular emphasis is placed on avoiding high quality snags (10-inch dbh and greater) during the pupping season (June 1-July 31).

Additionally, Alabama Power will adhere to current USFWS guidance concerning known hibernacula and maternity roost trees. However, there are no known Northern Long-eared Bat (*Myotis septentrionalis*) or Indiana Bat (*Myotis grisescens*) hibernacula or maternity roost trees occurring within the Lake Harris Project Boundary, no known hibernacula occur within 0.25 miles of the Lake Harris Project Boundary, and no known maternity roosts occur within 150 feet of the Project Boundary (collectively, "areas within or adjacent to the Project Boundary"). Alabama Power will continue consulting the Alabama Natural Heritage Program and USFWS's Alabama Ecological Services Field Office regarding locations of any known maternity roost trees and hibernacula. If Northern Long-eared Bat or Indiana Bat hibernacula or maternity roost trees are identified in areas within or adjacent to the Lake Harris Project Boundary, Alabama Power will adhere to the most up-to-date USFWS guidance and BMPs, which currently include limiting the cutting, trimming or destruction of trees on Project land within 0.25 miles of known hibernacula and 150 feet of known maternity roosts, to the period of October 15 through March 31 with the exception of removal of hazardous or fallen trees for protection of human life.

### 6.1.2 SKYLINE

The objective of timber management at Skyline is to ensure long-term health and sustainability of the forest, while enhancing wildlife management through ecological diversity and habitat improvement. Increasing the oak component of the forest through selective harvesting and natural regeneration is a primary goal.

The active management of the timber on Skyline WMA represents responsible stewardship of the land. Prudent timber management ensures the long-term health and sustainability of the forest while increasing the oak component over time. The management of the timber not only works in concert with but also enhances the primary objectives of sound wildlife management, habitat improvement, and aesthetics. At least two harvest unit will be targeted annually for harvest, and Alabama Power will be responsible for administering the timber sale.

Because of myriad past disturbances to these timber stands, many are a complicated mix of species, ages, and diameter distributions. Stands will be treated in a manner conducive to promoting natural advance oak regeneration, while ensuring vertical canopy composition and facilitating species biodiversity. Harvesting will follow a shelterwood prescription (regeneration method), as well as addressing intermediate management objectives of thinning. For the regeneration harvests, less desirable species across all size classes will be targeted for removal, and over-mature oak timber (≥ 19" dbh) will also be removed. This type of harvesting will allow for at least two age classes to become established in treated stands, increasing options for future management. It will also change the light levels reaching the forest floor, in an attempt to favor the intermediately shade tolerant oak over less shade tolerant species such as red maple and yellow-poplar. By carefully selecting residual trees, growth will be concentrated on desirable species and choices can be made to retain trees that will contribute to other objectives (wildlife, aesthetics, biodiversity).

A follow-up harvest of the residual stand after 5 to 10 years may be necessary to release the young oak seedlings and saplings. In some instances, narrow strips or small patch clear cuts (no larger than 1 acre each) would be recommended across a targeted area to promote natural oak regeneration by creating light conditions on the perimeter of the cut areas that are conducive to regenerating oak. This type of harvesting would also create a mosaic of habitats across the landscape.

In stands where there is little or no oak in the pre-merchantable understory, a vegetative clear-cut is recommended. No more than five of these clear-cuts are proposed, and they should be scattered across the entire landscape. (This would not prevent clear cutting on the tops of the plateaus to facilitate wildlife openings requested by the ADCNR).

Where practical, no adjacent harvest units be targeted for at least 2 years, providing adequate time for stand recovery. Exceptions to this would be to allow for salvage operations that may be necessary due to wind, fire, or insect damage, or to facilitate natural regeneration of oak species.

Following these management actions will ensure a sustainable, healthy, mature forest, and will serve to maintain or increase the oak component. These prescriptions would also provide and maintain optimal ecological diversity and improved wildlife habitat. It is intended that the management actions at Skyline be a cooperative effort between the APC Forestry Team and the ADCNR, with coordination and communication between the two groups. These management actions are based on general guidelines developed through research and on-site observations by the U. S. Forest Service for the management of upland hardwood systems in the Cumberland Plateau region.

To avoid and minimize potential impacts to federally listed summer roosting bats, Alabama Power will continue to utilize BMPs associated with timber management and tree removal, including retention of snags, 10 inches dbh and greater, where possible. Harvest units at Skyline are comprised of upland hardwoods, including white oak and shag bark hickory. However, regarding oak harvest specifically, only oak trees ≥ 19 inches dbh are harvested, and most shag bark hickories are retained resulting in a residual stand of high-quality potential roost trees. In addition, live trees with basal openings or hollowing of the bole, when detected, will be left where possible. Clear cuts at Skyline occur infrequently, rarely exceed 1 acre in size, and would only occur to achieve the timber management goals as described above. Although potential roost trees selected for retention may occasionally be inadvertently damaged, every attempt is made to avoid these trees during harvest. Particular emphasis is placed on avoiding high quality snags (10-inch DBH and greater) during the pupping season (June 1-July 31).

Additionally, Alabama Power will adhere to current USFWS guidance concerning known hibernacula and maternity roost trees. However, there are no known Northern Long-eared Bat (*Myotis septentrionalis*) or Indiana Bat (*Myotis grisescens*) hibernacula or maternity roost trees occurring within the Skyline Project Boundary, no known hibernacula occur within 0.25 miles of the Skyline Project Boundary, and no known maternity roosts occur within 150 feet of the Skyline Project Boundary (collectively, “areas within or adjacent to the Skyline Project Boundary”). Alabama Power will continue consulting the Alabama Natural Heritage Program

and USFWS's Alabama Ecological Services Field Office regarding locations of any known maternity roost trees and hibernacula. If Northern Long-eared Bat or Indiana Bat hibernacula or maternity roost trees are identified in areas within or adjacent to the Skyline Project Boundary, Alabama Power will adhere to the most up-to-date USFWS guidance and BMPs, which currently include limiting the cutting, trimming or destruction of trees on Project land within 0.25 miles of known hibernacula and 150 feet of known maternity roosts, to the period of October 15 through March 31 with the exception of removal of hazardous or fallen trees for protection of human life.

## 7.0 HARRIS HUNTING AREAS

As part of the original license, Alabama Power developed a Land Use Plan for the Project that FERC approved on September 21, 1984 (1984 Land Use Plan). Following the construction of the Project, site evaluations and use patterns indicated that uses under the 1984 Land Use Plan were dated, and Alabama Power determined that changes to the Land Use Plan were needed. Therefore, Alabama Power developed in agency consultation a Revised Land Use Plan (1995 Land Use Plan) that FERC approved on September 22, 1998. The 1995 Land Use Plan was further revised in 2008 (2008 Land Use Plan) and approved by FERC on May 26, 2010. The 2008 Land Use Plan differs from the 1995 Land Use Plan only in that it was revised to reflect a land swap at Skyline that resulted in the modification of the project boundary and associated land uses of the parcels affected. The 2008 Land Use Plan (and the preceding 1995 Land Use Plan) included provisions for lands dedicated for hunting at both Lake Harris and Skyline as well as the addition of physically disabled hunting areas. Additionally, as part of the original license, Alabama Power developed the 1988 WMP and the 1990 Skyline WMP (discussed in Section 3.0 above), both which included provisions pertaining to lands dedicated for hunting.

Lands located at Lake Harris provide hunting opportunities through either hunting leases or individual permits. Additionally, in consultation with ADCNR, Alabama Power developed the Harris physically disabled hunting area, including the construction of four shooting houses specifically designed to accommodate disabled hunters, access roads, and greenfields.

Hunting opportunities provided at Skyline are managed by ADCNR as outlined in the 1990 Skyline WMP, including the issuance of permits and maps as well as the determination of regulations such as hunting seasons and bag limits.

## 7.1 MANAGEMENT ACTIONS

### 7.1.1 LAKE HARRIS

Alabama Power will continue to provide hunting opportunities on lands located at Lake Harris through either hunting leases or individual permit.

### 7.1.2 SKYLINE

Hunting opportunities provided at Skyline will continue to be managed by ADCNR, including the issuance of permits and maps as well as the determination of regulations such as hunting seasons and bag limits.

### 7.1.3 HARRIS PHYSICALLY DISABLED HUNTING AREAS

Alabama Power will continue to plant and maintain greenfields and/or other wildlife openings in the vicinity of the shooting houses annually. Shooting houses, specifically designed to accommodate disabled hunters, as well as road access to the shooting houses will be maintained.

## 8.0 REFERENCES


Alabama Department of Conservation and Natural Resources. 2016. Wildlife Management Areas. Available at: http://www.outdooralabama.com/wildlife-management-areas. Accessed November 2016.

Alabama Power Company. 1988. R.L. Harris Project FERC Project No. 2628 Wildlife Mitigation Plan. April 15, 1988.

Alabama Power Company. 1989. R.L. Harris Project FERC Project No. 2628 Wildlife Management Plan for the Skyline Tract. July 1989.

Alabama Power Company. 2018. Pre-Application Document for the Harris Hydroelectric Project (FERC No. 2628). Alabama Power Company, Birmingham, AL.

DeGraff, R.M., and D.D. Rudis. 1986. New England Wildlife: habitat, natural history, and distribution. Gen. Tech. Report NE-108. U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station, Broomall, Pennsylvania.

NatureServe. 2009. International Ecological Classification Standard: Terrestrial Ecological Classifications. NatureServe Central Databases. Arlington, VA, U.S.A. Data current as of 06 February 2009. Available at: http://downloads.natureserve.org/get_data/data_sets/veg_data/nsDescriptions.pdf. Accessed November 11, 2016.

## APC Harris Relicensing

**From:** Fobian, Todd <Todd.Fobian@dcnr.alabama.gov>
**Sent:** Friday, February 12, 2021 11:55 AM
**To:** Anderegg, Angela Segars
**Cc:** McVicar, Ashley M; Carlee, Jason; Greene, Chris; Marshall, Matthew; Holley, Mike
**Subject:** RE: Harris relicensing meeting



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Good morning Angie,

The 4th or 5th of March would work best for ADCNR for a 2-3 hr meeting to review the results of the bioenergetics study.

Thanks, Todd

Todd Fobian
Environmental Affairs Supervisor
Alabama Wildlife and Freshwater Fisheries Division
64 N. Union Street, Suite 551
Montgomery, AL 36130
Office: 334-353-7484
Cell: 334-850-3798
Todd.Fobian@dcnr.alabama.gov

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**From:** Anderegg, Angela Segars <ARSEGARS@southernco.com>
**Sent:** Thursday, February 11, 2021 8:56 AM
**To:** Greene, Chris <Chris.Greene@dcnr.alabama.gov>; Marshall, Matthew <Matthew.Marshall@dcnr.alabama.gov>; Fobian, Todd <Todd.Fobian@dcnr.alabama.gov>
**Cc:** McVicar, Ashley M <AMMcVica@southernco.com>; Carlee, Jason <JCARLEE@southernco.com>
**Subject:** Harris relicensing meeting

Good morning,

We would like to schedule a meeting with you guys and Auburn to review the results of the bioenergetics study. Could you let me know your availability on March 1-5 and March 8-10 for 2-3 hr meeting in Auburn at the Shell Fisheries Center? Auburn has let us know we're okay to have it there – we just have to limit the meeting participants to around 20. Also, we are going to get you their final report prior to the meeting so you have a chance to read through it.

Thanks!

**Angie Anderegg**
Hydro Services
(205)257-2251
arsegars@southernco.com

## APC Harris Relicensing

**From:** Anderegg, Angela Segars
**Sent:** Tuesday, February 16, 2021 10:08 AM
**To:** erin_padgett@fws.gov; 'Evan Collins'
**Cc:** Chandler, Keith Edward; Baker, Jeffery L.; Fleming, Amanda
**Subject:** FW: Harris relicensing - WMP language
**Attachments:** 2021-1-22 FWS Harris Project Overview and GTK.pdf; 2021-1 DRAFT Harris WMP.docx

Just checking in to see if you have had the opportunity to review the attached WMP language. Please let me know if you have any question or would like to discuss.

Thanks!

**Angie Anderegg**
Hydro Services
(205)257-2251
arsegars@southernco.com

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**From:** Anderegg, Angela Segars
**Sent:** Monday, February 8, 2021 8:19 AM
**To:** erin_padgett@fws.gov; 'Evan Collins' <evan_collins@fws.gov>
**Cc:** Chandler Keith <KECHANDL@SOUTHERNCO.COM>; Baker, Jeffery L. <JEFBAKER@southernco.com>; Fleming, Amanda <afleming@southernco.COM>
**Subject:** Harris relicensing - WMP language

Good morning,

As discussed in our meeting on January 22, 2011 (meeting summary attached), the only listed species that may be impacted by Harris Project operations include endangered and threatened bat species that potentially inhabit the James D. Martin-Skyline Wildlife Management Area (WMA). However, Alabama Power's implementation of appropriate Best Management Practices (BMPs) for timber management and tree removal, as well as adherence to USFWS guidance concerning any future known hibernacula and maternity roost trees, should avoid impacts to any listed bats in the area. Our goal is that the implementation of the BMP's included in the attached draft Wildlife Management Plan will result in a not likely to adversely affect determination.

Please review the attached draft WMP (specifically Section 6.1.2) and send us comments or concurrence by **February 12**. If you'd like to discuss, please let me know and I can set up a call.

Thanks!

**Angie Anderegg**
Hydro Services
(205)257-2251
arsegars@southernco.com

## APC Harris Relicensing

**From:** Moore, David <djmoore@adem.alabama.gov>
**Sent:** Tuesday, February 16, 2021 7:36 AM
**To:** Chandler, Keith Edward
**Cc:** Fleming, Amanda; Anderegg, Angela Segars; Haslbauer, Jennifer
**Subject:** RE: Harris Data
**Attachments:** 2020 Harris Data - Profile & WQ Data.xls; Malone Data 041620-111720.xlsx



---

Keith,

Attached are the 2020 datasets for Harris and Malone. The Profile/WQ dataset includes several stations on Harris and one station immediately downstream of the dam. Also, the Malone dataset contains a small data gap (7/14 – 7/22) due to equipment issues, which is noted in the comments.

Let us know if you all have any questions.

David

---

**From:** Chandler, Keith Edward <KECHANDL@SOUTHERNCO.COM>
**Sent:** Thursday, January 14, 2021 1:36 PM
**To:** Moore, David <djmoore@adem.alabama.gov>
**Cc:** Fleming, Amanda <afleming@southernco.COM>; Anderegg, Angela Segars <ARSEGARS@southernco.com>
**Subject:** Harris Data

Hey David,

As we discussed we are working on the study report updates for the Harris project. I wanted to follow back up to see if your field folks had collected forebay profiles or anything else around Harris or downstream? I know you said the one site (Malone) was definitely out but were going to check on anything else. If you could let me know and send any data over as soon as you can get it pulled together we would appreciate it.

Thanks,
Keith

**Keith Chandler, P.E.**
Alabama Power
Environmental Affairs
Office: 205-257-1091
Cell: 205-438-4165
kechandl@southernco.com

## APC Harris Relicensing

**From:** Chandler, Keith Edward
**Sent:** Tuesday, February 16, 2021 7:43 AM
**To:** Moore, David
**Cc:** Fleming, Amanda; Anderegg, Angela Segars; Haslbauer, Jennifer
**Subject:** RE: Harris Data

Thanks, David! We really appreciate you getting this for us.


**Keith Chandler, P.E.**
Alabama Power
Environmental Affairs
Office: 205-257-1091
Cell: 205-438-4165
kechandl@southernco.com


---

**From:** Moore, David <djmoore@adem.alabama.gov>
**Sent:** Tuesday, February 16, 2021 7:36 AM
**To:** Chandler, Keith Edward <KECHANDL@SOUTHERNCO.COM>
**Cc:** Fleming, Amanda <afleming@southernco.COM>; Anderegg, Angela Segars <ARSEGARS@southernco.com>; Haslbauer, Jennifer <jhaslbauer@adem.alabama.gov>
**Subject:** RE: Harris Data



---

Keith,

Attached are the 2020 datasets for Harris and Malone. The Profile/WQ dataset includes several stations on Harris and one station immediately downstream of the dam. Also, the Malone dataset contains a small data gap (7/14 – 7/22) due to equipment issues, which is noted in the comments.

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David

---

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**Sent:** Thursday, January 14, 2021 1:36 PM
**To:** Moore, David <djmoore@adem.alabama.gov>
**Cc:** Fleming, Amanda <afleming@southernco.COM>; Anderegg, Angela Segars <ARSEGARS@southernco.com>
**Subject:** Harris Data

Hey David,

As we discussed we are working on the study report updates for the Harris project. I wanted to follow back up to see if your field folks had collected forebay profiles or anything else around Harris or downstream? I know you said the one site (Malone) was definitely out but were going to check on anything else. If you could let me know and send any data over as soon as you can get it pulled together we would appreciate it.

Thanks,
Keith

**Keith Chandler, P.E.**
Alabama Power
Environmental Affairs
Office: 205-257-1091
Cell: 205-438-4165
kechandl@southernco.com

## APC Harris Relicensing

**From:** Collins, Evan R <evan_collins@fws.gov>
**Sent:** Wednesday, February 17, 2021 3:55 PM
**To:** Anderegg, Angela Segars; Padgett, Erin R
**Cc:** Chandler, Keith Edward; Baker, Jeffery L.; Fleming, Amanda
**Subject:** Re: [EXTERNAL] FW: Harris relicensing - WMP language
**Attachments:** 2021-1 DRAFT Harris WMP_erc_erp.docx



Hi, Angie. Attached is your draft WMP with our comments. In general, we recommend that proposed tree clearing that involves suitable roost trees be conducted between October 15 and March 31 to avoid impacts to bats while they are in summer roost and maternity habitats. If it is not possible to clear during that period, we would then recommend habitat or acoustic/mist net surveys to document species presence. Emergence counts may also be utilized when feasible. While the management described in the draft seems to address the northern long-eared bats, the impacts to Indiana bats seems uncertain. Let us know if you'd like to schedule a meeting to discuss the comments further!

Best,
Evan

--
Evan Collins
Fish and Wildlife Biologist
U.S. Fish and Wildlife Service
Alabama Ecological Services Field Office
1208-B Main Street
Daphne, AL 36526
251-441-5837 (phone)
251-441-6222 (fax)
evan_collins@fws.gov



**From:** Anderegg, Angela Segars <ARSEGARS@southernco.com>
**Sent:** Tuesday, February 16, 2021 10:08 AM
**To:** Padgett, Erin R <erin_padgett@fws.gov>; Collins, Evan R <evan_collins@fws.gov>
**Cc:** Chandler, Keith Edward <KECHANDL@SOUTHERNCO.COM>; Baker, Jeffery L. <JEFBAKER@southernco.com>; Fleming, Amanda <afleming@southernco.COM>
**Subject:** [EXTERNAL] FW: Harris relicensing - WMP language

Just checking in to see if you have had the opportunity to review the attached WMP language. Please let me know if you have any question or would like to discuss.

Thanks!

**Angie Anderegg**
Hydro Services
(205)257-2251
arsegars@southernco.com

---

**From:** Anderegg, Angela Segars
**Sent:** Monday, February 8, 2021 8:19 AM
**To:** erin_padgett@fws.gov; 'Evan Collins' <evan_collins@fws.gov>
**Cc:** Chandler Keith <KECHANDL@SOUTHERNCO.COM>; Baker, Jeffery L. <JEFBAKER@southernco.com>; Fleming, Amanda <afleming@southernco.COM>
**Subject:** Harris relicensing - WMP language

Good morning,

As discussed in our meeting on January 22, 2011 (meeting summary attached), the only listed species that may be impacted by Harris Project operations include endangered and threatened bat species that potentially inhabit the James D. Martin-Skyline Wildlife Management Area (WMA). However, Alabama Power's implementation of appropriate Best Management Practices (BMPs) for timber management and tree removal, as well as adherence to USFWS guidance concerning any future known hibernacula and maternity roost trees, should avoid impacts to any listed bats in the area. Our goal is that the implementation of the BMP's included in the attached draft Wildlife Management Plan will result in a not likely to adversely affect determination.

Please review the attached draft WMP (specifically Section 6.1.2) and send us comments or concurrence by **February 12**. If you'd like to discuss, please let me know and I can set up a call.

Thanks!

**Angie Anderegg**
Hydro Services
(205)257-2251
arsegars@southernco.com

Style Definition: Heading 3: Indent: Left: 1", First line: 0"

# WILDLIFE MANAGEMENT PLAN

## R.L. HARRIS HYDROELECTRIC PROJECT

FERC No. 2628

**DRAFT**

***Prepared by:***

Alabama Power

Birmingham, Alabama

January 2021

**WILDLIFE MANAGEMENT PLAN**

**R.L. HARRIS HYDROELECTRIC PROJECT**

**ALABAMA POWER COMPANY**
**BIRMINGHAM, ALABAMA**

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**R.L. HARRIS HYDROELECTRIC PROJECT**
**(FERC NO. 2628)**

**ALABAMA POWER COMPANY**
**BIRMINGHAM, ALABAMA**

# 1.0 INTRODUCTION

Alabama Power Company (Alabama Power) owns and operates the R.L. Harris Hydroelectric Project (Harris Project), FERC Project No. 2628, licensed by the Federal Energy Regulatory Commission (FERC). Alabama Power is relicensing the 135-megawatt (MW) Harris Project, and the existing license expires in 2023. This Wildlife Management Plan was developed as part of Alabama Power's efforts to acquire a new operating license. The relicensing process included a multi-year cooperative effort between Alabama Power, state and federal resource agencies, and interested stakeholders to address operational, recreational, and ecological concerns associated with hydroelectric project operations. During the initial (scoping) phase of the relicensing process, Alabama Power consulted a wide variety of stakeholders, including state and federal resource agencies, non-governmental organizations, and concerned citizens, for input on important relicensing issues. On November 13, 2018, Alabama Power filed ten proposed study plans for the Harris Project, including a study plan for an evaluation of Project lands and the development of a Shoreline Management Plan and a Wildlife Management Plan. FERC issued a Study Plan Determination on April 12, 2019[1], which included FERC staff recommendations. Alabama Power incorporated FERC's recommendations and filed the Final Study Plans with FERC on May 13, 2019. The Wildlife Management Plan described herein was developed in accordance with the Project Lands Evaluation Study Plan (Study Plan).

[1] Accession Number 20190412-3000

## 1.1 PROJECT DESCRIPTION

The Harris Project consists of a dam, spillway, powerhouse, and those lands and waters necessary for the operation of the hydroelectric project and enhancement and protection of environmental resources. These structures, lands, and water are enclosed within the FERC Project Boundary. Under the existing Harris Project license, the FERC Project Boundary encloses two distinct geographic areas, described below.

Harris Reservoir is the 9,870-acre reservoir (Harris Reservoir) created by the R.L. Harris Dam (Harris Dam). The lands adjoining the reservoir total approximately 7,392 acres and are included in the FERC Project Boundary (Figure **1-1**~~Figure 1-1~~). This includes land to 795 feet mean sea level (msl)[2], as well as natural undeveloped areas, hunting lands, prohibited access areas, recreational areas, and all islands.

**Commented [TLM1]:** All acreages will be updated in the final version to reflect any changes included in the license proposal.


The Harris Project also contains 15,063 acres of land within the James D. Martin-Skyline Wildlife Management Area (Skyline WMA) located in Jackson County, Alabama (**Figure** 1-2~~Figure 1-2~~). These lands are located approximately 110 miles north of Harris Reservoir and were acquired and incorporated into the FERC Project Boundary as part of the July 29, 1988 Harris Project Wildlife Mitigative Plan and the June 29, 1990 Wildlife Management Plan. These lands are leased to, and managed by, the State of Alabama for wildlife management and public hunting and are part of the Skyline WMA.

For the purposes of this Plan, "Lake Harris" refers to the 9,870-acre reservoir, adjacent 7,392 acres of Project land, and the dam, spillway, and powerhouse. "Skyline" refers to the 15,063 acres of Project land within the Skyline WMA in Jackson County. "Harris Project" refers to all the lands, waters, and structures enclosed within the FERC Project Boundary, which includes both Lake Harris and Skyline. Harris Reservoir refers to the 9,870-acre reservoir only; Harris

[2] Also includes a scenic easement (to 800 feet msl or 50 horizontal feet from 793 feet msl, whichever is less, but never less than 795 feet msl).

Dam refers to the dam, spillway, and powerhouse. The Project Area refers to the land and water in the Project Boundary and immediate geographic area adjacent to the Project Boundary.

Lake Harris and Skyline are located within two river basins: the Tallapoosa and Tennessee River Basins, respectively. The only waterbody managed by Alabama Power as part of their FERC license for the Harris Project is the Harris Reservoir.

Within Section 3.0 of this report, Alabama Power describes the Lake Harris resource first, followed by the Skyline resource. Specific references to the Harris Reservoir will be identified as Harris Reservoir; specific reference to the dam will be identified as Harris Dam. The “Project Area” refers to the land and water in the Project Boundary and immediate geographic area adjacent to the Project Boundary. The “Project Vicinity” refers to a larger geographic area near a hydroelectric project, such as a county.

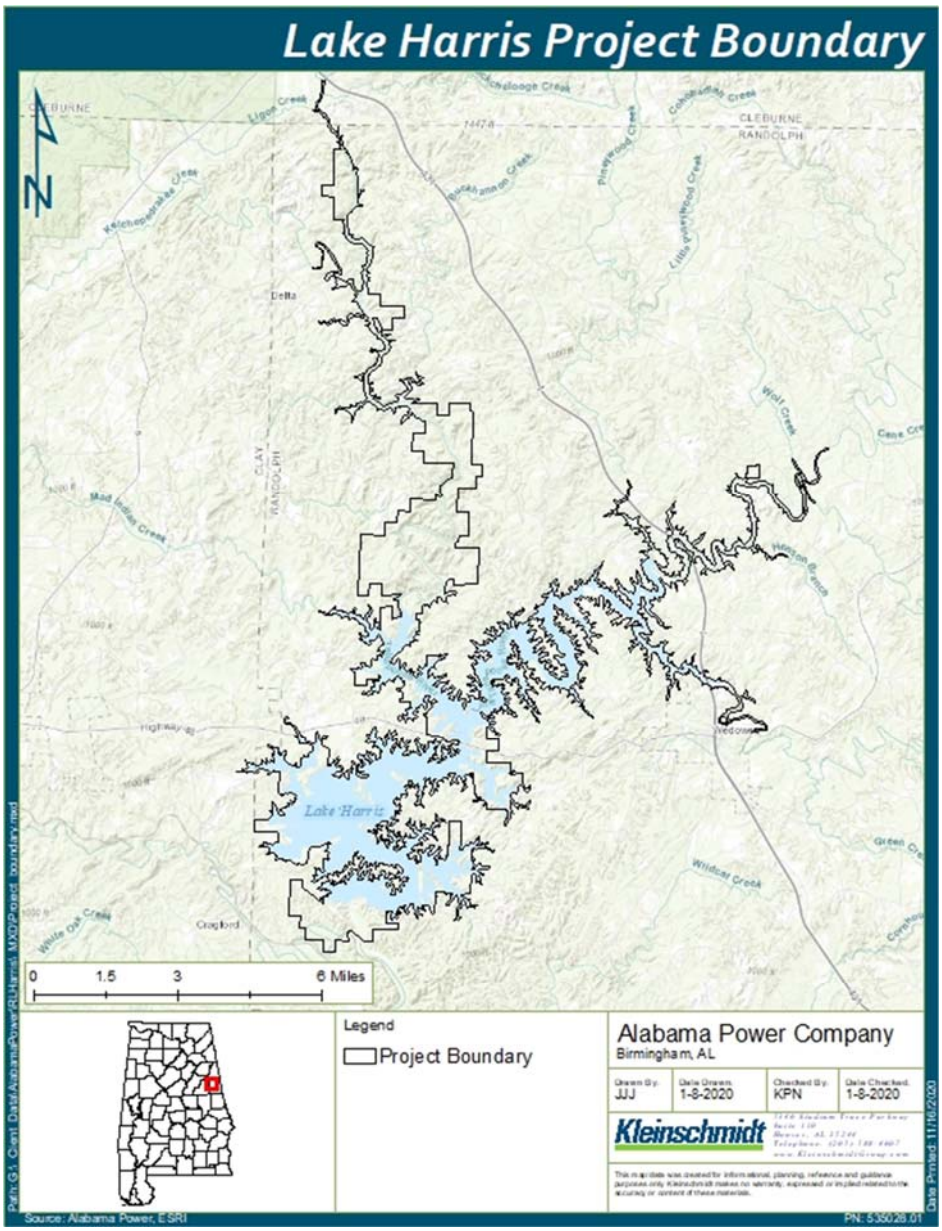


**FIGURE** 1-~~1~~1 **LAKE HARRIS PROJECT BOUNDARY**

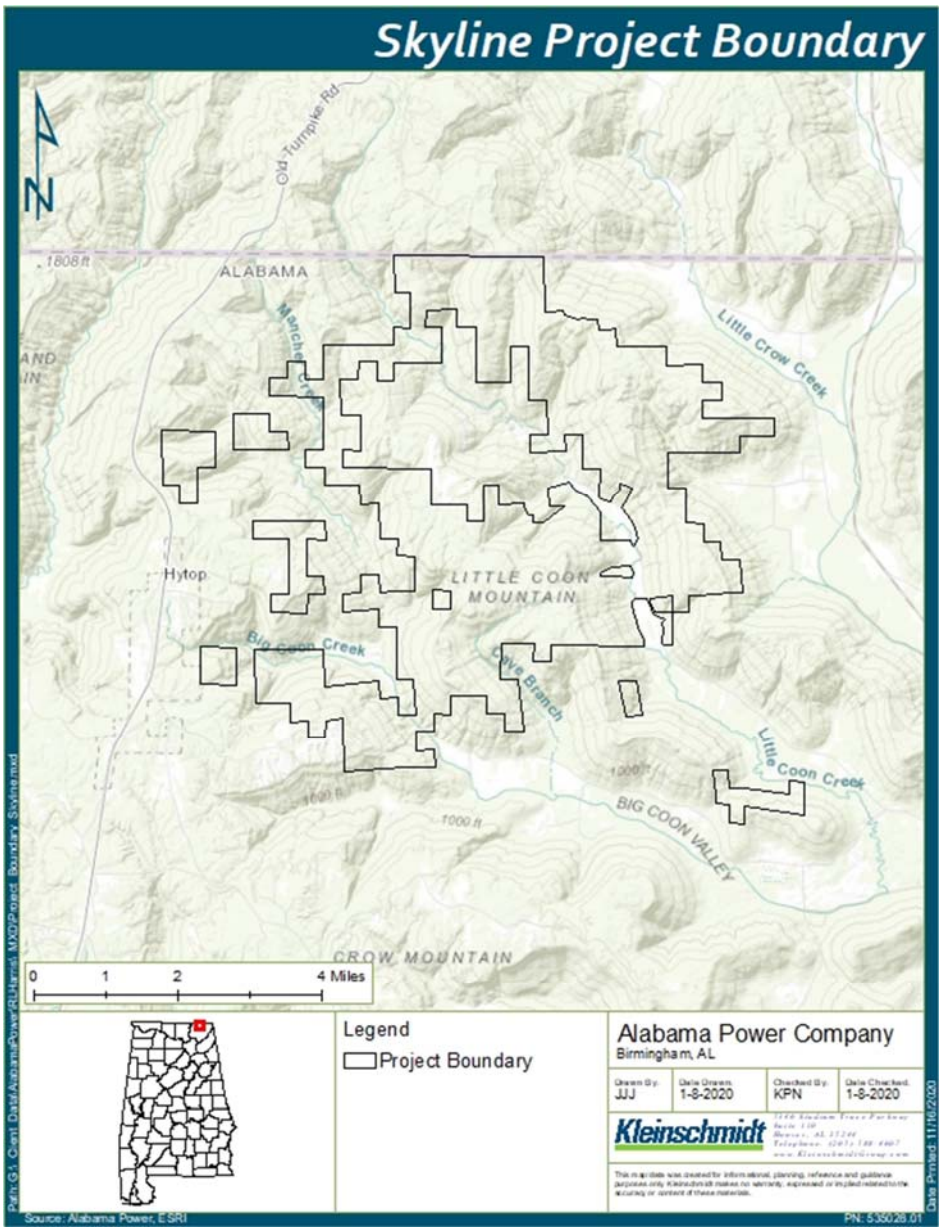


**Figure** 1-2 **Skyline Project Boundary**

## 2.0 PURPOSE OF THE PLAN

The overall purpose of this Wildlife Management Plan is to protect and enhance the available wildlife habitat within the Project boundaries of the Harris Project. The Plan consolidates numerous wildlife management activities into a single document and provides the additional technical information and management guidelines requested by resource agencies and other stakeholders during relicensing.

# 3.0 BACKGROUND AND EXISTING INFORMATION

## 3.1 BACKGROUND OF FERC-APPROVED PLANS

As part of the original license, Alabama Power developed a Wildlife Mitigation Plan (Alabama Power 1988) in consultation with Alabama Department of Conservation and Natural Resources (ADCNR) and U.S. Fish and Wildlife Service (USFWS) that FERC approved on July 29, 1988. The Wildlife Mitigation Plan outlined specific measures to mitigate for the impacts to wildlife and habitats caused by the development of the Harris Project. The Wildlife Mitigation Plan included provisions for the management of 5,900 acres of existing Project lands and acquisition of 779.5 additional acres of land in the vicinity of the Harris Reservoir. The Wildlife Mitigation Plan required Alabama Power to install Wood Duck (*Aix sponsa*) boxes, install Osprey (*Pandion haliaetus*) nesting platforms, develop and implement a Canada Goose (*Branta canadensis*) restoration project, manage wildlife openings, and create artificial nesting structures. In addition, the Wildlife Mitigation Plan included provisions for Alabama Power to purchase and subsequently lease to ADCNR, over 15,000 acres of land adjacent to the already established Skyline Wildlife Management Area. A Skyline Wildlife Management Plan (Skyline WMP) (Alabama Power 1989) was developed to guide the development and maintenance of wildlife habitat, timber management, and recreational access. The Skyline WMP was approved by FERC on June 29, 1990.

As part of the management activities conducted under the 1988 Wildlife Management Plan, Alabama Power identified 263 acres of suitable Wood Duck habitat and installed over 100 Wood Duck boxes. Alabama Power also released Canada Geese to establish a population in and around Lake Harris. Additionally, Alabama Power constructed Osprey nesting platforms along the reservoir shoreline. Finally, Alabama Power managed forest lands within the Lake Harris Project Area and established 105 acres of permanent openings to provide diverse habitat that benefits both game and nongame species.

Alabama Power conducts annual monitoring and maintenance of 104 Wood Duck boxes installed around Lake Harris. Maintenance activities include repair and replacement of broken boxes, as well as the relocation of underutilized boxes. Double boxes were installed in higher use areas. Since 2000, an average of 33 Wood Ducks have been hatched from the Wood Duck boxes per

year. Annual Wood Duck hatchlings ranged from 17 hatchings in 2000 to 47 hatchlings in 2017. Although Wood Ducks have utilized the artificial boxes, these structures were installed as a mitigative measure for lost habitat associated with the initial impoundment of Harris Reservoir. Wood Ducks using the area have had time to adapt to the surrounding habitat, and likely have demonstrated tolerance, or the ability to habituate, to existing human presence, activities, and infrastructure at Lake Harris. Therefore, Alabama Power will not continue monitoring and maintenance of the Wood Duck box program under this WMP. Wood Duck boxes will be left in place until they are no longer usable. This will allow wildlife using the structures to transition to the surrounding suitable habitat.

**Commented [CER2]:** What was ADCNR's opinion of this proposal? Are natural nesting sites available?

Alabama Power installed Osprey platforms around Lake Harris. The platforms are constructed of concrete poles with a galvanized steel ring at the top to serve as a nesting platform. Due to construction materials, the platforms require minimal maintenance. While many of the platforms have been used by Osprey, they are not included in a monitoring program. Further, no additional platforms are planned for construction as the currently installed platforms are adequate for the Osprey population at Lake Harris and will last for years to come.

## 3.2 Land Use and Existing Habitat – Lake Harris

### 3.2.1 Wildlife Resources

Harris Reservoir lies within the Northern Piedmont Upland district of the Piedmont Upland Physiographic Section. Harris Reservoir and surrounding woodland, agricultural, and residential areas provide high quality habitat for a variety of upland and semi-aquatic wildlife species. In addition to typical southeastern species, such as Gray Fox (*Urocyon cinereoargenteus*), White-tailed Deer (*Odocoileus virginianus*), Virginia Opossum (*Didelphis virginiana*), and Gray Squirrel (*Sciurus carolinensis*), the area supports species characteristic of the Piedmont region, such as the Wood Frog (*Lithobates sylvatica*) and Copperhead (*Agkistrodon contortrix*) (Alabama Power 2018). Birdlife typical of the Lake Harris Project Area uplands includes game species such as Northern Bobwhite (*Colinus virginianus*), Eastern Wild Turkey (*Meleagris gallapavo silvestris*), and Mourning Dove (*Zenaida macroura*); resident songbirds include Downy Woodpecker (*Picoides pubescens*), American Robin (*Turdus migratorius*), Eastern Bluebird (*Sialia sialis*), and Eastern Meadowlark (*Sturnella magna*), and an abundance of

neotropical migrants, including numerous warblers (Parulidae), vireos (Vireonidae), and hummingbirds (Trochilidae) (Alabama Power 2018). A number of raptors are known to occur in the Lake Harris Project Vicinity including Osprey, American Kestrel (*Falco sparverius*), Broad-winged Hawk (*Buteo platypterus*), Red-tailed Hawk (*Buteo jamaicensis*), Bald Eagle (*Haliaeetus leucocephalus*), Barred Owl (*Strix varia*), Great Horned Owl (*Bubo virginianus*), and Eastern Screech Owl. Typical small mammals of uplands include North American Least Shrew (*Cryptotis parva*), Southern Flying Squirrel (*Glaucomys volans*), Eastern Woodrat (*Neotoma floridana*), Eastern Red Bat (*Lasiurus borealis*), and Big Brown Bat (*Eptesicus fuscus*). Reptiles and amphibians found in the Lake Harris Project Area uplands include Eastern Spadefoot Toad (*Scaphiopus holbrooki holbrooki*); Marbled Salamander (*Ambystoma opacum*) and Northern Slimy Salamander (*Plethodon glutinosus*); Green Anole (*Anolis carolinensis*) and Eastern Fence Lizard (*Sceloporus undulatus*); Five-lined Skink (*Plestiodon fasciatus*) and Broad-headed Skink (*Plestiodon laticeps*); Black Racer (*Coluber constrictor*), and Gray Ratsnake (*Pantherophis spiloides*); and Eastern Box Turtle (*Terrapene carolina carolina*) (Alabama Power 2018).

Although limited, Harris Reservoir's littoral zone provides habitat for North American River Otter (*Lontra canadensis*), American Mink (*Neovison vison*), Muskrat (*Ondatra zibethicus*), and Beaver (*Castor canadensis*), as well as seasonal and year-round habitat for waterfowl and wading birds including Mallard (*Anas platyrhynchos*), Gadwall (*Mareca strepera*), Wood Duck, Hooded Merganser (*Lophodytes cucullatus*), Great Blue Heron (*Ardea herodias*), Green Heron (*Butorides virescens*), and Great Egret (*Ardea alba*). Birds such as Ring-billed Gull (*Larus delawarensis*), Osprey, Purple Martin (*Progne subis*), and Belted Kingfisher (*Megaceryle alcyon*) are also common in areas of open water. Littoral areas provide potential breeding habitat for aquatic and semi-aquatic amphibian species including Red-spotted Newt (*Notophthalmus viridescens viridescens*) and Central Newt (*Notophthalmus viridescens louisianensis*); Northern Red Salamander (*Pseudotriton ruber ruber*) and Northern Dusky Salamander (*Desmognathus fuscus*); and American Bullfrog (*Lithobates catesbeiana*), Northern Spring Peeper (*Pseudacris crucifer crucifer*), and Southern Leopard Frog (*Lithobates sphenocephala*) (Alabama Power 2018). Reptile species typical of the littoral zone include Cottonmouth (*Agkistrodon piscivorus*), Red-bellied Water Snake (*Nerodia erythrogaster erythrogaster*), and Yellow-bellied Water Snake (*Nerodia erythrogaster flavigaster*); Alabama Map Turtle (*Graptemys pulchra*), River Cooter (*Pseudemys concinna*), and Red-eared slider (*Trachemys scripta elegans*). Currently, no invasive wildlife species are being managed within the Lake Harris Project Area.

### 3.2.2 BOTANICAL RESOURCES

The Lake Harris Project Area is comprised of an impounded portion of the Tallapoosa River and includes mainly open water, deciduous, and evergreen forests with only small areas of agricultural and residential development.

The Southern Piedmont Dry Oak forest occurs in upland ridges and mid-slopes and is typically comprised of upland oaks; pines may be a significant component, especially in the southern part of the range. Overstory vegetation commonly found within this forest type includes upland oaks (*Quercus* spp.) such as White Oak (*Quercus alba*), Northern Red Oak (*Quercus rubra*), Black Oak (*Quercus velutina*), Post Oak (*Quercus stellata*), Scarlet Oak (*Quercus coccinea*), and Southern Red Oak (*Quercus falcata*) as well as hickory species (*Carya* spp.) such as Pignut Hickory (*Carya glabra*) and Mockernut Hickory (*Carya alba*). Other common species include Loblolly Pine (*Pinus taeda*), Shortleaf Pine (*Pinus echinata*), Virginia Pine (*Pinus virginiana*), Red Maple (*Acer rubrum*), American Sweetgum (*Liquidambar styraciflua*), and Tulip Tree (*Liriodendron tulipifera*). Generally, there is a well-developed shrub layer, and species vary with soil chemistry. Shrub species may include Mountain Laurel (*Kalmia latifolia*), Common Sweetleaf (*Symplocos tinctoria*), Flowering Dogwood (*Cornus florida*), Deerberry (*Vaccinium stamineum*), and Farkleberry (*Vaccinium arboretum*). The herb layer is typically sparse (NatureServe 2009).

### 3.2.3 RIPARIAN AND LITTORAL HABITAT

Riparian habitat is the vegetated zone that serves as a buffer between the upland vegetation community and the riverine environment. This zone provides streambank stability and sediment filtration. Based on the ecological systems classification developed by NatureServe (2009), much of the riparian areas for the streams within the Lake Harris Project Boundary are classified as Southern Piedmont Small Floodplain and Riparian Forest (Section 5.5.1). This habitat type is often dominated by Tulip Tree, American Sweetgum, and Red Maple along with representative alluvial and bottomland species such as American Sycamore (*Platanus occidentalis*), River Birch (*Betula nigra*), Box Elder (*Acer negundo*), Sugarberry (*Celtis laevigata*), Green Ash (*Fraxinus pennsylvanica*), Swamp Chestnut Oak (*Quercus michauxii*), and Cherrybark Oak (*Quercus*

*pagoda*). American Beech (*Fagus grandifolia*) may be present in drier areas. Loblolly Pine, Virginia Pine, American Sweetgum, and Tulip Tree are dominant in successional areas. The shrub layer is typically dominated by Mountain Laurel, American Witch-hazel (*Hamamelis virginiana*), Possumhaw (*Ilex decidua*), Spicebush (*Lindera benzoin*), and Yaupon Holly (*Ilex vomitoria*). Wandflower (*Galax urceolata*), Jack-in-the-pulpit (*Arisaema triphyllum*), Sensitive Fern (*Onoclea sensibilis*), and Fringed Sedge (*Carex crinita*) may be dominant in the herb layer (NatureServe 2009).

## 3.3 LAND USE AND EXISTING HABITAT – SKYLINE

### 3.3.1 WILDLIFE RESOURCES

Skyline provides quality habitat for a variety of wildlife species. Alabama Power leases Skyline lands to ADCNR and provides funding for the wildlife management activities on Skyline lands. ADCNR is responsible for the wildlife management activities (Alabama Power 1988). In addition to typical southeastern species, such as Gray Fox, White-tailed Deer, Virginia Opossum, and Gray Squirrel, the area supports species characteristic of the Cumberland Plateau Region of Alabama such as the American Toad (*Bufo americanus*), Green Anole, and Timber Rattlesnake (*Crotalus horridus*) (Alabama Power 2018). Birdlife typical of the Skyline Area includes game species such as Eastern Wild Turkey, Northern Bobwhite (*Colinus virginianus*), and Mourning Dove; resident songbirds include Downy Woodpecker, Blue Jay (*Cyanocitta cristata*), and Eastern Bluebird. Other common bird species include American Crow *(Corvus brachyrhynchos)* and Pileated Woodpecker (*Dryocopus pileatus*) (Alabama Power 2018). Raptors known to occur in or near the Skyline area include American Kestrel, Broad-winged Hawk and Red-tailed Hawk, Barred Owl, Great Horned Owl, and Eastern Screech Owl (Alabama Power 2018). Small mammals common in or near Skyline include Southern Flying Squirrel, Big Brown Bat, Eastern Cottontail (*Sylvilagus floridanus*), Eastern Chipmunk (*Tamias striatus*), and Raccoon (*Procyon lotor*) (Alabama Power 2018). Reptiles and amphibians found in the Skyline area include Marbled Salamander and Northern Slimy Salamander; Eastern Fence Lizard; Five-lined Skink and Broad-headed Skink; Copperhead, Black Racer, and Gray Ratsnake; and Eastern Box Turtle (Alabama Power 2018).

### 3.3.2 BOTANICAL RESOURCES

Skyline is located in Jackson County, in the Cumberland Plateau Region of Alabama. This area is underlain by sandstones along with siltstones, shales, and coal. The landscape consists of flat-topped, high-elevation plateaus separated by deep, steep-sided valleys. The plateaus slope gently from the northeast to the southwest. Most of the area is forested, with Southern Ridge and Valley/Cumberland Dry Calcareous Forest and South-Central Interior Mesophytic Forest types. The Southern Ridge and Valley/Cumberland Dry Calcareous forest is comprised of dry-to-dry mesic calcareous forests in a variety of landscape positions, including ridge tops and upper and mid-slopes. They dominate vegetation type under natural conditions. High quality examples are characteristically dominated by White Oak, Chinkapin Oak (*Quercus muehlenbergii*), Post Oak, and Shumard's Oak (*Quercus shumardii*), with varying amounts of hickory, Sugar Maple (*Acer saccharum*), Southern Sugar Maple (*Acer floridanum*), Chalk Maple (*Acer leucoderme*), Red Maple, and other species. This system also includes successional communities resulting from logging or agriculture and are dominated by Tulip Tree, pine (Pinaceae), Eastern Red Cedar (*Juniperus virginiana*), and Black Locust (*Robinia pseudoacacia*) (NatureServe 2009).

The South-Central Interior Mesophytic forest is primarily deciduous forests that typically occur in deep, enriched soils in protected landscape settings such as covers or lower slopes. This forest is generally highly diverse and is dominated by Sugar Maple, American Beech, Tulip Tree, American Basswood (*Tilia americana*), Northern Red Oak, Cucumber Tree (*Magnolia acuminata*), and Eastern Black Walnut (*Juglans nigra*). Eastern Hemlock (*Tsuga canadensis*) may be present in some stands. Common shrubs include Coralberry (*Symphoricarpos orbiculatus*), Bladdernut (*Staphylea trifolia*), American Strawberry Bush (*Euonymus americanus*), and Flowering Dogwood. The herb layer is often very plentiful and may include Licorice Bedstraw (*Galium circaezans*), Black Cohosh (*Actaea racemosa*), Southern Lady Fern (*Athyrium filix-femina* ssp. *asplenioides*), and Crownbeard (*Verbesina alternifolia*).

The Allegheny-Cumberland Dry Oak forest and woodland consists of dry hardwood forests found in nutrient-poor or acidic substrates on plateaus or ridges. Typical dominants include White Oak, Southern Red Oak, Chestnut Oak (*Quercus prinus*), Scarlet Oak, with lesser amounts of Red Maple, Pignut Hickory, and Mockernut Hickory. Shortleaf Pine and/or Virginia Pine may occur in smaller amounts, particularly adjacent to steep cliffs or slopes or in area impacted by

fire. White Pine (*Pinus strobus*) may be prominent in some stands in the absence of fire. American Chestnut (*Castanea dentata*) saplings may be found where it was once a common tree. The shrub layer may include Lowbush Blueberry (*Vaccinium angustifolium*), Bear Huckleberry (*Gaylussacia ursina*), Deerberry (*Vaccinium stamineum*), Hillside Blueberry (*Vaccinium pallidum*), Oakleaf Hydrangea (*Hydrangea quercifolia*), and Mapleleaf Viburnum (*Viburnum acerifolium*). Common herbs include Boott's Sedge (*Carex picta*), Black Seed Speargrass (*Piptochaetium avenaceum*), Nakedflower Tick Trefoil (*Desmodium nudiflorum*), Longleaf Woodoats (*Chasmanthium sessiliflorum*), and Dwarf Violet Iris (*Iris verna* var. *smalliana*).

### 3.3.3 RIPARIAN AND LITTORAL HABITAT

Cahaba Consulting described the stream riparian zone as consisting of primarily mature forest vegetation. Riparian habitat is the vegetated zone that serves as a buffer between the upland vegetation community and the riverine environment. This zone provides streambank stability and sediment filtration. Based on the ecological systems classification developed by NatureServe (2009), much of the riparian areas for the streams within the Skyline Project Boundary are classified as Allegheny-Cumberland Dry Oak Forest and Woodland, South-Central Interior Mesophytic Forest, and Southern Ridge and Valley/Cumberland Dry Calcareous Forest (Section 5.5.1). The Southern Ridge and Valley is dominated by White Oak, Chinkapin Oak, Post Oak, and Shumard's Oak, with varying amounts of hickory, Sugar Maple, Southern Sugar Maple, Chalk Maple, Red Maple, and other species. The South-Central Interior is dominated by Sugar Maple, American Beech, Tulip Tree, American Basswood, Northern Red Oak, Cucumber Tree, and Eastern Black Walnut. The Allegheny-Cumberland is dominated by White Oak, Southern Red Oak, Chestnut Oak, Scarlet Oak, with lesser amounts of Red Maple, Pignut Hickory, and Mockernut Hickory (NatureServe 2009).

## 4.0 WILDLIFE MANAGEMENT OBJECTIVES

Specific wildlife management objectives for the Harris Project lands were initially identified during the scoping phase of the relicensing process. These objectives were further refined through subsequent meetings with ADCNR and USFWS and include:

1) Management of shoreline areas for native vegetative communities and enhanced value as wildlife habitat;
2) Implementation of timber management methods that result in enhanced value of Project lands as wildlife habitat;
3) Management of public hunting areas, including areas for the physically disabled.

# 5.0 SHORELINE MANAGEMENT

Protection and enhancement of available shoreline habitat for wildlife will be accomplished through implementation of the proposed Shoreline Management Plan (SMP). Pending approval by FERC, the SMP will be implemented for the 367 miles of shoreline within the Lake Harris Project Boundary.

## 5.1 MANAGEMENT ACTIONS

### 5.1.1 SHORELINE CLASSIFICATION SYSTEM AND SENSITIVE RESOURCES DESIGNATION

As part of the proposed SMP, Alabama Power developed a shoreline classification system to guide management and permitting activities within the Project Boundary and to protect natural resources such as, including wildlife habitat and wetlands. The shoreline classifications are based on an evaluation of existing and potential land use. While not solely designed for protection of wildlife habitat, the Sensitive Resources designation and the Natural/Undeveloped and Hunting shoreline management classifications often include valuable wildlife habitats. Best management practices (BMPs), associated designations, and classifications can be found within the SMP.

### 5.1.2 SHORELINE BUFFERS

As specified in the SMP, Alabama Power provides for preservation or establishment of a naturally managed vegetative filter strip along the shoreline to keep clearing of native trees and vegetation to a minimum[3]. Unmanaged vegetation associated with these buffers enhances available food and cover for wildlife species, provides corridors that enhance linkages between larger habitat patches, and protects nearshore environments. Nearshore environments provide important breeding and nursery areas for numerous fish and amphibian species and are utilized for feeding and cover by species such as North American River Otter, Beaver, and various wading birds and waterfowl. At a microhabitat level, accumulated leaf litter, pine needle duff,

[3] The BMP recommended here does not in any way supersede or replace the requirements of the scenic easement. Scenic easements include covenants running with the land for the project purpose of protecting scenic and environmental values and, as such, are requirements and not recommendations.

and coarse, woody debris (fallen logs, etc.) in these vegetated buffers will provide much needed refugia for reptiles and amphibians. Specific management actions associated with shoreline buffers can be found in the SMP.

### 5.1.3 PLANTING OF NATIVE SPECIES

The SMP recommends, and in some instances requires, planting of native trees, shrubs, and plant species for landscaping and for purposes of shoreline stabilization. Plants native to the soils and climate of a particular area typically provide the best overall food sources for wildlife, while generally requiring less fertilizer, less water, and less effort in controlling pests. Planting of native species will be required on all lands within the SMP Recreation and Commercial Recreation classifications and recommended as a BMP on all other Project lands. Specific management actions associated with native plantings can be found in the SMP.

**Commented [CER3]:** Recommend emphasizing native flowering plants that would provide nectar and/or host resources for pollinators (e.g., *Asclepius spp.*)

## 6.0 TIMBER MANAGEMENT

Alabama Power has had an active forest management program since World War II. Shortly after World War II, timber stands were inventoried, and long-range timber management plans were developed. These plans directed an all-aged, sustained-yield management scheme with the forest rotation age of 60 years. Under this management strategy, trees would be grown to an average age of 60 years and would produce forest products on a continuous basis. Saw timber would be harvested on 16 year cutting cycles and pulpwood would be thinned as a secondary product at interim periods of 10 years.

In the early 1970s, the cutting cycle for saw timber was lengthened to 20 years because power skidders were then being used. As a result, more volume was being cut per acre and more reseeding was occurring (from the additional exposure of mineral soil caused by the skidders). The extended cutting cycle allowed for per acre volumes to recover and the young seedlings to put on additional volume. This all or uneven-aged management scheme has produced a notably diverse forest both in terms of species composition and in forest products. The result is not only the production of valuable high-quality products but the production of diverse quality habitat for both game and non-game wildlife species. These planned and controlled forest management practices have, over the years, aided in the protection of the watersheds of the associated reservoirs that indirectly have enhanced the fisheries habitat of these lakes, rivers, and streams. These practices have also produced habitats that have promoted and sustained several rare and endangered species of plants and animals.

Alabama Power continues to manage Project forest lands according to the existing all or uneven-aged management schemes, with a saw timber cycle of 20 years and an overall forest rotation of 60 years. Prescribed burning and/or use of herbicides are considered on stands within Project forest lands; such use is based on conditions and characteristics of the individual stands. Although not specifically designed to benefit rare species, this practice has potential to benefit potentially occurring Red-cockaded Woodpeckers (*Picoides borealis*) by reducing hardwood mid-story, which can block access to cavity and foraging trees in Longleaf Pine (*Pinus palustris*) ecosystems.

Alabama Power continues to utilize selective cutting as the primary means of timber harvest on

Project lands, with those trees that are mature or of poor quality being removed. Natural regeneration is the primary means by which harvested forests are replaced. However, if a particular timber stand cannot be regenerated naturally, or if a stand is destroyed by some catastrophic event, any residual trees are harvested, the site prepared, and the stand planted with genetically improved seedling stock.

Contemporary timber stands on Project lands at Lake Harris are dominated by Mixed Pine-Hardwood. Timber stand composition on the 6,269 acres within the Harris Project Boundary at Lake Harris is summarized in Table 6-1~~Table 3-1~~. Contemporary timber stands on Project lands at Skyline are dominated by Upland Hardwood. Most of the timber stands are mature to over-mature mixed hardwood forest, made up primarily of various upland species of red and white oak, yellow poplar, hard and soft maple, and hickory. There is a small component of shortleaf, loblolly, and Virginia pine. Historically, past harvesting practices have focused on removing higher value red and white oak timber, resulting in many stands that are dominated by maple, hickory, yellow poplar and chestnut oak. Most stands have closed canopies resulting in little or no desirable understory species to provide the potential for future stands. Timber stand composition on the 15,188 acres within the Harris Project Boundary at Skyline is summarized in Table 6-2~~Table 3-2~~.

**TABLE 6-1 TIMBER STAND COMPOSITION ON HARRIS PROJECT LANDS AT LAKE HARRIS**
(Source: Alabama Power Timber Stand Data)

| Stand Type | Percent Cover | Acreage |
|---|---|---|
| Mixed Pine-Hardwood | 47 | 2938 |
| Natural Longleaf Pine | 0 | 0 |
| Natural Pine | 18 | 1109 |
| Upland Hardwood | 21 | 1343 |
| Planted Pines | 8 | 476 |
| Other | 6 | 403 |
| **Total** | 100 | 6269 |

**TABLE 6-2 TIMBER STAND COMPOSITION ON HARRIS PROJECT LANDS AT SKYLINE**
(Source: Alabama Power Timber Stand Data)

| Stand Type | Percent Cover | Acreage |
|---|---|---|
| Mixed Pine-Hardwood | 0.15 | 23 |
| Natural Longleaf Pine | 0 | 0 |
| Natural Pine | 0 | 0 |
| Upland Hardwood | 99 | 14,922 |
| Planted Pines | 0 | 0 |
| Other | 0.85 | 118 |
| **Total** | 100 | 15,063 |

Forest lands located within the Project Boundary of the Harris Project will be managed according to the actions described below.

## 6.1 MANAGEMENT ACTIONS

### 6.1.1 LAKE HARRIS

Alabama Power will continue to manage Project forest lands according to the existing all or uneven-aged management schemes, with a sawtimber cycle of 20 years and an overall forest rotation of 60 years (see above description). Prescribed burning and/or use of herbicides will be considered on stands within the Project forest lands, and such use will be based on conditions and characteristics of the individual stands.

Alabama Power will continue to utilize selective cutting as the primary means of timber harvest on Project lands, with those trees that are mature or of poor quality being removed. Natural regeneration will continue to be the primary means by which harvested forests are replaced. However, if a particular timber stand cannot be regenerated naturally, or if a stand is destroyed by some catastrophic event, any residual trees will be harvested, the site prepared, and the stand planted with genetically improved seedling stock.

To avoid and minimize potential impacts to federally listed summer roosting bats, Alabama Power will continue to utilize BMPs associated with timber management and tree removal,

**Commented [CER4]:** For your consideration: installation of artificial roost structures could improve habitat quality within the project area and increase bat populations.

https://copperheadconsulting.com/brandenbark/

**Commented [CER5]:** Recommend adding language that would provide for an adaptive management component to better address new information and recommendations.

including retention of snags, 10 inches diameter at breast height (dbh) and greater, where possible. Although rare in timber stands at Lake Harris, high quality live roost trees, specifically all shag bark hickory and white oak 12-inch dbh and less, will be retained. In addition, live trees with basal openings or hollowing of the bole, when detected, will be left where possible. Occasionally streamside management zones (SMZ) are selectively harvested. Harvest within these SMZs is comprised of mature pine and the occasional white oak with other high-quality roost trees such as shag bark hickory being retained. Although potential roost trees selected for retention may occasionally be inadvertently damaged, every attempt is made to avoid these trees during harvest. Particular emphasis is placed on avoiding high quality snags (10-inch dbh and greater) during the pupping season (June 1-July 31)).

Additionally, Alabama Power will adhere to current USFWS guidance concerning known hibernacula and maternity roost trees. However, there are no known Northern Long-eared Bat (*Myotis septentrionalis*) or Indiana Bat (*Myotis ~~grisescens~~sodalis*) hibernacula or maternity roost trees occurring within the Lake Harris Project Boundary, no known hibernacula occur within 0.25 miles of the Lake Harris Project Boundary, and no known maternity roosts occur within 150 feet of the Project Boundary (collectively, "areas within or adjacent to the Project Boundary"). Alabama Power will continue consulting the Alabama Natural Heritage Program and USFWS's Alabama Ecological Services Field Office regarding locations of any known maternity roost trees and hibernacula. If Northern Long-eared Bat or Indiana Bat hibernacula or maternity roost trees are identified in areas within or adjacent to the Lake Harris Project Boundary, Alabama Power will adhere to the most up-to-date USFWS guidance and BMPs, which currently include limiting the cutting, trimming or destruction of trees on Project land within 0.25 miles of known hibernacula and 150 feet of known maternity roosts, to the period of October 15 through March 31 with the exception of removal of hazardous or fallen trees for protection of human life.

### 6.1.2 SKYLINE

The objective of timber management at Skyline is to ensure long-term health and sustainability of the forest, while enhancing wildlife management through ecological diversity and habitat improvement. Increasing the oak component of the forest through selective harvesting and natural regeneration is a primary goal.

**Commented [CER6]:** May need more explanation of how you define a "snag". It is important to consider "trees with suitable habitat characteristics". That would include dead and dying trees, hollow trees, and trees with limb breaks, etc.

**Commented [PER7]:** Suitable roosting habitat is defined as forest patches with trees of 5 inch dbh or larger (this includes live trees and snags).

**Commented [CER8]:** This size limit is more associated with maternity trees. Recommend using the 5-in dbh threshold.

**Commented [PER9]:** Suitable summer habitat for the Indiana bat includes forests and woodlots containing potential roosts compromised of live trees and/or snags 5 inches dbh and greater that have exfoliating bark, cracks, crevices, and/or hollows.

**Commented [CER10]:** These species are important. However, in AL dead and damaged pine trees are found as roost trees. Similar to my above comment, physical characteristics of the tree are as important as the species.

**Commented [PER11]:** Unclear as to where this measurement came from.

**Commented [CER12]:** Is this threshold only for white oak? Also, individuals of either species > 12 in dbh have the potential to be important roosts. I don't think there is enough justification for why these large trees can be removed but the smaller ones left.

**Commented [CER13]:** If trees of these characteristics are to be removed, I would recommend an emergence count before removal

**Commented [CER14]:** Before larger-scale harvesting that includes trees >5 in dbh, recommend conducting a habitat or bat survey prior to work or conducting work during the October 15-March 31 time frame.

**Commented [PER15]:** And other trees exhibiting the preferred roosting structure

**Commented [PER16]:** Potential roost trees and high quality snags will be avoided; however, if a potential roost tree is inadvertently damaged, please contact the Daphne USFWS Field Office for additional consultation.

**Commented [CER17]:** Recommend rephrasing to clarify that these trees will be avoided during the pupping season should they be mistakenly removed of significantly damaged, our office will be notified.

**Commented [PER18]:** 5 inches and greater

**Commented [PER19]:** The pupping season for Alabama is being observed from May-July

**Commented [CER20]:** Data from northern states informed these dates. In AL, bats appear to begin the pupping season earlier. Can this be redefined to May, June, July?

The active management of the timber on Skyline WMA represents responsible stewardship of the land. Prudent timber management ensures the long-term health and sustainability of the forest while increasing the oak component over time. The management of the timber not only works in concert with but also enhances the primary objectives of sound wildlife management, habitat improvement, and aesthetics. At least two harvest ~~unit~~units will be targeted annually for harvest, and Alabama Power will be responsible for administering the timber sale.

Because of myriad past disturbances to these timber stands, many are a ~~complicated~~ complex mix of species, ages, and diameter distributions. Stands will be treated in a manner conducive to promoting natural advance oak regeneration, while ensuring vertical canopy composition and facilitating species biodiversity. Harvesting will follow a shelterwood prescription (regeneration method), as well as addressing intermediate management objectives of thinning. For the regeneration harvests, less desirable species across all size classes will be targeted for removal, and over-mature oak timber (≥ 19" dbh) will also be removed. This type of harvesting will allow for at least two age classes to become established in treated stands, increasing options for future management. It will also change the light levels reaching the forest floor, in an attempt to favor the intermediately shade tolerant oak over less shade tolerant species such as red maple and yellow-poplar. By carefully selecting residual trees, growth will be concentrated on desirable species and choices can be made to retain trees that will contribute to other objectives (wildlife, aesthetics, biodiversity).

**Commented [CER21]:** These trees could be important maternity and roost trees. Recommend conducting a thorough habitat or bat survey prior to clearing them.

A follow-up harvest of the residual stand after 5 to 10 years may be necessary to release the young oak seedlings and saplings. In some instances, narrow strips or small patch clear cuts (no larger than 1 acre each) would be recommended across a targeted area to promote natural oak regeneration by creating light conditions on the perimeter of the cut areas that are conducive to regenerating oak. This type of harvesting would also create a mosaic of habitats across the landscape.

**Commented [CER22]:** Recommend habitat or bat surveys prior to large cuts or conducting these activities from October 15- March 31

In stands where there is little or no oak in the pre-merchantable understory, a vegetative clear-cut is recommended. No more than five of these clear-cuts are proposed, and they should be scattered across the entire landscape. (This would not prevent clear cutting on the tops of the plateaus to facilitate wildlife openings requested by the ADCNR).

**Commented [PER23]:** If suitable roost trees or snags are present within the targeted clear-cut area, then we recommend that all tree removal be carried out between October 15 and March 31. If this timing is not achievable and no other measures to avoid adverse effects are possible, then we recommend acoustic or/or mist-netting surveys to determine presence or probably absence of Indiana bats at the clear cut site.

**Commented [CER24]:** Same comment as above

**Commented [CER25]:** During what period of time? The entire license period, a year?

Where practical, no adjacent harvest units be targeted for at least 2 years, providing adequate time for stand recovery. Exceptions to this would be to allow for salvage operations that may be necessary due to wind, fire, or insect damage, or to facilitate natural regeneration of oak species.

Following these management actions will ensure a sustainable, healthy, mature forest, and will serve to maintain or increase the oak component. These prescriptions would also provide and maintain optimal ecological diversity and improved wildlife habitat. It is intended that the management actions at Skyline be a cooperative effort between the APC Forestry Team and the ADCNR, with coordination and communication between the two groups. These management actions are based on general guidelines developed through research and on-site observations by the U. S. Forest Service for the management of upland hardwood systems in the Cumberland Plateau region.

**Commented [CER26]:** Is there a citation for this?

To avoid and minimize potential impacts to federally listed summer roosting bats, Alabama Power will continue to utilize BMPs associated with timber management and tree removal, including retention of snags, 10 inches dbh and greater, where possible. Harvest units at Skyline are comprised of upland hardwoods, including white oak and shag bark hickory. However, regarding oak harvest specifically, only oak trees ≥ 19 inches dbh are harvested, and most shag bark hickories are retained resulting in a residual stand of high-quality potential roost trees. In addition, live trees with basal openings or hollowing of the bole, when detected, will be left where possible. Clear cuts at Skyline occur infrequently, rarely exceed 1 acre in size, and would only occur to achieve the timber management goals as described above. Although potential roost trees selected for retention may occasionally be inadvertently damaged, every attempt is made to avoid these trees during harvest. Particular emphasis is placed on avoiding high quality snags (10-inch DBH and greater) during the pupping season (June 1-July 31). ).

**Commented [PER27]:** 5 inches dbh

**Commented [CER28]:** Summer roosting would include trees with suitable habitat >= 5 inches dbh

**Commented [CER29]:** Recommend surveys or emergence counts where impacts to these trees are unavoidable

**Commented [CER30]:** If impacts to these trees are unavoidable, we recommend emergence counts or surveys to establish presence/absence

**Commented [CER31]:** Winter time cuts or conduct a habitat survey prior to the cut.

**Commented [PER32]:** See above comments

**Commented [CER33]:** Similar to comment above, pupping season in AL is likely earlier than these dates.

Additionally, Alabama Power will adhere to current USFWS guidance concerning known hibernacula and maternity roost trees. However, there are no known Northern Long-eared Bat (*Myotis septentrionalis*) or Indiana Bat (*Myotis ~~grisescens~~sodalis*) hibernacula or maternity roost trees occurring within the Skyline Project Boundary, no known hibernacula occur within 0.25 miles of the Skyline Project Boundary, and no known maternity roosts occur within 150 feet of the Skyline Project Boundary (collectively, "areas within or adjacent to the Skyline Project Boundary"). Alabama Power will continue consulting the Alabama Natural Heritage Program

and USFWS's Alabama Ecological Services Field Office regarding locations of any known maternity roost trees and hibernacula. If Northern Long-eared Bat or Indiana Bat hibernacula or maternity roost trees are identified in areas within or adjacent to the Skyline Project Boundary, Alabama Power will adhere to the most up-to-date USFWS guidance and BMPs, which currently include limiting the cutting, trimming or destruction of trees on Project land within 0.25 miles of known hibernacula and 150 feet of known maternity roosts, to the period of October 15 through March 31 with the exception of removal of hazardous or fallen trees for protection of human life.

## 7.0 HARRIS HUNTING AREAS

As part of the original license, Alabama Power developed a Land Use Plan for the Project that FERC approved on September 21, 1984 (1984 Land Use Plan). Following the construction of the Project, site evaluations and use patterns indicated that uses under the 1984 Land Use Plan were dated, and Alabama Power determined that changes to the Land Use Plan were needed. Therefore, Alabama Power developed in agency consultation a Revised Land Use Plan (1995 Land Use Plan) that FERC approved on September 22, 1998. The 1995 Land Use Plan was further revised in 2008 (2008 Land Use Plan) and approved by FERC on May 26, 2010. The 2008 Land Use Plan differs from the 1995 Land Use Plan only in that it was revised to reflect a land swap at Skyline that resulted in the modification of the project boundary and associated land uses of the parcels affected. The 2008 Land Use Plan (and the preceding 1995 Land Use Plan) included provisions for lands dedicated for hunting at both Lake Harris and Skyline as well as the addition of physically disabled hunting areas. Additionally, as part of the original license, Alabama Power developed the 1988 WMP and the 1990 Skyline WMP (discussed in Section 3.0 above), both which included provisions pertaining to lands dedicated for hunting.

Lands located at Lake Harris provide hunting opportunities through either hunting leases or individual permits. Additionally, in consultation with ADCNR, Alabama Power developed the Harris physically disabled hunting area, including the construction of four shooting houses specifically designed to accommodate disabled hunters, access roads, and greenfields.

Hunting opportunities provided at Skyline are managed by ADCNR as outlined in the 1990 Skyline WMP, including the issuance of permits and maps as well as the determination of regulations such as hunting seasons and bag limits.

## 7.1 MANAGEMENT ACTIONS

### 7.1.1 LAKE HARRIS

Alabama Power will continue to provide hunting opportunities on lands located at Lake Harris through either hunting leases or individual permit.

### 7.1.2 SKYLINE

Hunting opportunities provided at Skyline will continue to be managed by ADCNR, including the issuance of permits and maps as well as the determination of regulations such as hunting seasons and bag limits.

### 7.1.3 HARRIS PHYSICALLY DISABLED HUNTING AREAS

Alabama Power will continue to plant and maintain greenfields and/or other wildlife openings in the vicinity of the shooting houses annually. Shooting houses, specifically designed to accommodate disabled hunters, as well as road access to the shooting houses will be maintained.

## 8.0 REFERENCES


Alabama Department of Conservation and Natural Resources. 2016. Wildlife Management Areas. Available at: http://www.outdooralabama.com/wildlife-management-areas. Accessed November 2016.

Alabama Power Company. 1988. R.L. Harris Project FERC Project No. 2628 Wildlife Mitigation Plan. April 15, 1988.

Alabama Power Company. 1989. R.L. Harris Project FERC Project No. 2628 Wildlife Management Plan for the Skyline Tract. July 1989.

Alabama Power Company. 2018. Pre-Application Document for the Harris Hydroelectric Project (FERC No. 2628). Alabama Power Company, Birmingham, AL.

DeGraff, R.M., and D.D. Rudis. 1986. New England Wildlife: habitat, natural history, and distribution. Gen. Tech. Report NE-108. U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station, Broomall, Pennsylvania.

NatureServe. 2009. International Ecological Classification Standard: Terrestrial Ecological Classifications. NatureServe Central Databases. Arlington, VA, U.S.A. Data current as of 06 February 2009. Available at: http://downloads.natureserve.org/get_data/data_sets/veg_data/nsDescriptions.pdf. Accessed November 11, 2016.

## APC Harris Relicensing

**From:** Anderegg, Angela Segars
**Sent:** Friday, February 19, 2021 3:26 PM
**To:** Padgett, Erin R; Collins, Evan R
**Cc:** Chandler, Keith Edward; Baker, Jeffery L.; Fleming, Amanda
**Subject:** RE: [EXTERNAL] FW: Harris relicensing - WMP language

Fantastic! I'll send out a meeting notice. Have a great weekend!

**Angie Anderegg**
Hydro Services
(205)257-2251
arsegars@southernco.com

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**From:** Padgett, Erin R <erin_padgett@fws.gov>
**Sent:** Friday, February 19, 2021 2:41 PM
**To:** Anderegg, Angela Segars <ARSEGARS@southernco.com>; Collins, Evan R <evan_collins@fws.gov>
**Cc:** Chandler, Keith Edward <KECHANDL@SOUTHERNCO.COM>; Baker, Jeffery L. <JEFBAKER@southernco.com>; Fleming, Amanda <afleming@southernco.COM>
**Subject:** Re: [EXTERNAL] FW: Harris relicensing - WMP language



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Yes! I am available anytime prior to noon on March 1st.

Erin Padgett
Fish and Wildlife Biologist
US Fish and Wildlife Service
Alabama Ecological Services Field Office
1208 Main Street - Daphne, AL - 36526
(251) 441-5181 Phone | (251) 441-6222 Fax

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**From:** Anderegg, Angela Segars <ARSEGARS@southernco.com>
**Sent:** Friday, February 19, 2021 2:31 PM
**To:** Collins, Evan R <evan_collins@fws.gov>; Padgett, Erin R <erin_padgett@fws.gov>
**Cc:** Chandler, Keith Edward <KECHANDL@SOUTHERNCO.COM>; Baker, Jeffery L. <JEFBAKER@southernco.com>; Fleming, Amanda <afleming@southernco.COM>
**Subject:** RE: [EXTERNAL] FW: Harris relicensing - WMP language

Thanks, Evan! We do have a few follow up questions. Any chance y'all are available on March 1st?

**Angie Anderegg**
Hydro Services
(205)257-2251
arsegars@southernco.com

**From:** Collins, Evan R <evan_collins@fws.gov>
**Sent:** Wednesday, February 17, 2021 3:55 PM
**To:** Anderegg, Angela Segars <ARSEGARS@southernco.com>; Padgett, Erin R <erin_padgett@fws.gov>
**Cc:** Chandler, Keith Edward <KECHANDL@SOUTHERNCO.COM>; Baker, Jeffery L. <JEFBAKER@southernco.com>; Fleming, Amanda <afleming@southernco.COM>
**Subject:** Re: [EXTERNAL] FW: Harris relicensing - WMP language



Hi, Angie. Attached is your draft WMP with our comments. In general, we recommend that proposed tree clearing that involves suitable roost trees be conducted between October 15 and March 31 to avoid impacts to bats while they are in summer roost and maternity habitats. If it is not possible to clear during that period, we would then recommend habitat or acoustic/mist net surveys to document species presence. Emergence counts may also be utilized when feasible. While the management described in the draft seems to address the northern long-eared bats, the impacts to Indiana bats seems uncertain. Let us know if you'd like to schedule a meeting to discuss the comments further!

Best,
Evan

--
Evan Collins
Fish and Wildlife Biologist
U.S. Fish and Wildlife Service
Alabama Ecological Services Field Office
1208-B Main Street
Daphne, AL 36526
251-441-5837 (phone)
251-441-6222 (fax)
evan_collins@fws.gov



**From:** Anderegg, Angela Segars <ARSEGARS@southernco.com>
**Sent:** Tuesday, February 16, 2021 10:08 AM
**To:** Padgett, Erin R <erin_padgett@fws.gov>; Collins, Evan R <evan_collins@fws.gov>
**Cc:** Chandler, Keith Edward <KECHANDL@SOUTHERNCO.COM>; Baker, Jeffery L. <JEFBAKER@southernco.com>; Fleming, Amanda <afleming@southernco.COM>
**Subject:** [EXTERNAL] FW: Harris relicensing - WMP language

Just checking in to see if you have had the opportunity to review the attached WMP language. Please let me know if you have any question or would like to discuss.

Thanks!

**Angie Anderegg**
Hydro Services
(205)257-2251
arsegars@southernco.com

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**From:** Anderegg, Angela Segars
**Sent:** Monday, February 8, 2021 8:19 AM
**To:** erin_padgett@fws.gov; 'Evan Collins' <evan_collins@fws.gov>
**Cc:** Chandler Keith <KECHANDL@SOUTHERNCO.COM>; Baker, Jeffery L. <JEFBAKER@southernco.com>; Fleming, Amanda <afleming@southernco.COM>
**Subject:** Harris relicensing - WMP language

Good morning,

As discussed in our meeting on January 22, 2011 (meeting summary attached), the only listed species that may be impacted by Harris Project operations include endangered and threatened bat species that potentially inhabit the James D. Martin-Skyline Wildlife Management Area (WMA). However, Alabama Power's implementation of appropriate Best Management Practices (BMPs) for timber management and tree removal, as well as adherence to USFWS guidance concerning any future known hibernacula and maternity roost trees, should avoid impacts to any listed bats in the area. Our goal is that the implementation of the BMP's included in the attached draft Wildlife Management Plan will result in a not likely to adversely affect determination.

Please review the attached draft WMP (specifically Section 6.1.2) and send us comments or concurrence by **February 12**. If you'd like to discuss, please let me know and I can set up a call.

Thanks!

**Angie Anderegg**
Hydro Services
(205)257-2251
arsegars@southernco.com

## APC Harris Relicensing

**From:** Anderegg, Angela Segars
**Sent:** Monday, February 22, 2021 3:38 PM
**To:** 'Keith Henderson'; todd.fobian@dcnr.alabama.gov
**Cc:** Anderson, Dave; Chandler, Keith Edward; Fleming, Amanda; Mills, Tina L.; Smith, Sheila C.; Sandra Wash
**Subject:** 2/16 Harris Relicensing Meeting Summary
**Attachments:** 2021-2-16 APC_ADCNR Meeting Summary.pdf

Good afternoon,

Attached is a summary of our 2/16 discussion on the Harris Project Lands Proposal, along with the presentation we walked through.

Thanks,

**Angie Anderegg**
Hydro Services
(205)257-2251
arsegars@southernco.com

**Meeting Summary**
**ADCNR- Harris Project Lands Proposal Review**
February 16, 2021
9 am -10 am
Microsoft Teams Meeting

**Participants:**

- Angie Anderegg – Alabama Power
- Dave Anderson – Alabama Power
- Keith Chandler – Alabama Power
- Amanda Fleming – Alabama Power
- Todd Fobian – Alabama Department of Conservation and Natural Resources (ADCNR)
- Keith Henderson – ADCNR
- Tina Mills – Alabama Power
- Sheila Smith – Alabama Power
- Sandra Wash – Kleinschmidt Associates

*NOTE: A copy of the February 16, 2021 ADCNR Project Lands Proposal presentation is attached.*

**Meeting Summary:**

Angie Anderegg (Alabama Power) opened the meeting with a brief safety moment, and Tina Mills (Alabama Power) reviewed the meeting agenda and stated the meeting purpose was to review the Harris Project Lands Proposal with ADCNR as it pertains to recreation. Tina noted the Lake Harris Project Recreation Sites and displayed a map of the sites. Sheila Smith (Alabama Power) provided a brief description of each of the sites.

- Lees Bridge Boat Ramp –-seasonal, upper reaches, Big Tallapoosa River
- Fosters Bridge Boat Ramp – ADCNR lease, Big Tallapoosa River
- Swagg Boat Ramp – ADCNR lease, seasonal, potential for future upgrades, Little Tallapoosa River, well used, good access for users visiting from the north (Anniston area)
- Lonnie White Boat Ramp – ADCNR lease, currently under construction for modifications and ADA upgrades, Little Tallapoosa River
- Crescent Crest Boat Ramp – not leased to ADCNR, medium sized ramp
- Highway 48 Boat Ramp – most traffic on reservoir, Alabama Power looking at possible relocation in the future
- Wedowee Marine South – adjacent to Highway 48 Boat Ramp, commercial operation on Project lands, has public boat ramp (fee ramp), also has wet slips, dry storage, and marine store with restaurant
- Little Fox Creek Boat Ramp – ADCNR lease, recently upgraded including ADA parking and pathways, seasonal ramp, heavy use
- Big Fox Creek Boat Ramp – (Road End) – ADCNR lease, medium size ramp

- Flat Rock Park Day Use Park – currently the only day-use park on reservoir, 25-acre outcropping of solid granite, recreation includes picnicking and swimming, playground and restrooms on site, open seasonally from May-September (estimated 30,000 guests per season), staffed with park attendants
- R.L. Harris Management Area – partnership with ADCNR, four shooting houses and green fields, ADA hunting, Alabama Power coordinates reservations and maintains property
- Harris Tailrace Fishing Pier – located below Harris Dam and maintained by Alabama Power (Hydro plant employees)

Sheila added that Alabama Power maintains all of the aforementioned sites, with contract personnel visiting once per month for maintenance and in the process of updating piers to be barrier-free. Todd Fobian (ADCNR) inquired about the location of the Little Fox Creek trails, and Sheila noted it was adjacent to Little Fox Creek Boat Ramp. Sheila explained it was almost five miles of trails, beginning behind the boat ramp following the peninsula.

Next, Tina provided the purpose of the shoreline classification system and defined the Natural/Undeveloped and Recreation land use classifications. Lands classified as Recreation are those Project lands managed by Alabama Power for existing or potential future recreational activities. Natural/undeveloped areas will remain undeveloped to protect environmentally sensitive areas, preserve natural aesthetic qualities, serve as buffer zones, and prevent overcrowding on the shoreline. In addition, this classification allows for public hiking trails, nature studies, primitive camping, wildlife management (excluding hunting), and normal forestry practices. Tina explained that recreation lands that are reclassified to Natural/undeveloped will still be available for undeveloped recreation purposes such as hiking and primitive camping. Alabama Power plans to include a commercial recreation definition in the Shoreline Management Plan (SMP) for lands designated for concessionaire-operated public marinas and recreational areas that provide a variety of recreation services to the public.

Tina reviewed each land proposal related to recreation, beginning with parcels to be reclassified.

- RC1 – proposing to reclassify approximately 105 acres from Recreation to Natural/Undeveloped; site is not heavily used, riverine, poor access on west side of river, will provide consistency of land use to adjacent parcels, small parcel on east side of river with better access will remain Recreation
- RC2 – proposing to reclassify approximately 65 acres from Recreation to Natural/Undeveloped; poor access, existing Recreation site with better access directly upstream
- RC3 – proposing to reclassify approximately 61 acres from Recreation to Natural/Undeveloped; added to Project in 1995, existing Recreation site with better access directly upstream
- RC4 – original proposal to reclassify approximately 148 acres from Recreation to Commercial Recreation; property is near Highway 48 and stakeholders have since expressed interest in developing an additional day use park and boat ramp (which would remain classified Recreation).
    - Keith Henderson (ADCNR) asked for confirmation on what piece of the 148-acre parcel would be reclassified to Commercial Recreation.
    - Tina confirmed the area with the marina would be reclassified.

    - Sheila added that the upon driving into the property, everything on the right side of the road up to the slough would be Commercial Recreation with the property beyond the curve remaining Recreation. In addition, Commercial Recreation is being considered for the property on the left side of the peninsula beyond the slough.
- RC5 – proposing to reclassify approximately 69 acres from Recreation to Natural/Undeveloped; property has steep terrain with subpar access and nearby recreation sites (RC4 is across the bridge, additional recreation site north of property as well as public boat ramp at the Highway 48 bridge)
- RC6 – proposing to reclassify approximately 5 acres from Prohibited Access to Recreation; property is located at the existing tailrace fishing recreation site
- RC7 – proposing to reclassify approximately 57 acres from Recreation to Natural/Undeveloped; property is adjacent to Flat Rock Park, reclassifying remaining acreage to the west of the Flat Rock Botanical Inventory area to provide continuity of land use and aid in protection of adjacent Natural/Undeveloped lands
- RC8 – proposing to reclassify approximately 50 acres from Recreation to Natural/Undeveloped; parcel is directly upstream of Big Fox Creek Boat Ramp that is adequate acreage for current and future recreation needs
    - Keith H. asked for confirmation if felling trees for habitat improvements would be allowed under the Natural/Undeveloped classification.
    - Sheila confirmed it would be permitted.
    - Tina pointed out the Little Fox Creek hiking trails relative to this property.
    - Todd asked if visitors typically access the hiking trails via boat or road.
    - Sheila stated both, noting there is a gravel parking lot adjacent to the boat ramp as well as a small pier at the end of the peninsula.

Tina noted that changing land classifications (RC parcels above) would not result in a loss of Project lands, but that Alabama Power is proposing to remove four parcels of Recreation lands from the Project.

- R2 – proposing to remove approximately 3 acres of Recreation; small parcel located at the end of an old road end with poor access to lake, nearby recreation sites exist with better access
- R3 – proposing to remove approximately 20 acres of Recreation; parcel was added to Project in 1995 with the intention of being used by the Boy Scouts, limited access and recreation demand, nearby recreation sites with better access
- R5 – proposing to remove approximately 19 acres of Recreation; nearby private development resulting in landowners needing access through Project lands, limited demand for recreation in area
- R7 – proposing to remove approximately 9 acres of Recreation; similar to R5 in its proximity to private development
    - Keith H. asked if there will be any Recreation classified lands in this area of the lake.
    - Tina stated that Alabama Power is not proposing to add access in this area, as the area consists of large subdivisions that includes boat ramps for the residents.
    - Sheila added that the area is mainly used by residents not the general public.

- Sheila also stated that this general area of the lake is more difficult to access in comparison to others as it only has one county road in and out, which is a further drive from population centers.

Tina stated that Alabama Power is proposing to add one parcel to Project lands.

- A3 – proposing to add approximately 2 acres of Commercial Recreation; parcel is adjacent to large tract currently classified as Recreation, adding this tract provides consistency of land use with adjacent property to be reclassified to Commercial Recreation (portion of RC4)

Keith H. asked if there were enough lands classified as Recreation to sustain increases in recreation use through the license term. Tina noted specific recreation lands near existing boat ramps that have the potential to expand when necessary. Sheila explained that Alabama Power focused on ease of access and expanding existing ramps, rather than building new sites that may not be easy to access. Sheila noted the locations of the existing ramps are well distributed throughout Lake Harris. Sheila continued to describe sites that will be large enough for 100 truck/trailers. Keith H. agreed about focusing on expanding existing facilities, noting that many areas may not be suitable for development. Sheila added that several of the original areas considered for recreation were designated before inundation, and this lands proposal is based on current knowledge.

Todd inquired on the terrain of parcel RC5 as well as the Project Lands classified as Recreation north of RC5 and east of RC4 (which are not identified for reclassification or removal and will remain recreation project lands), specifically if the property is suitable for development. Sheila responded that the parcel is steep on the main channel, but flatter in the coves. She added that the old state highway 48 crossed that property, offering road access.

Angie noted the goal was to create a Project lands proposal that works for all stakeholders and takes in account future recreation demands.

Angie concluded the meeting and encouraged participants to reach out with any follow-up questions. Keith H. noted that he found the additional details on the parcels helpful. Todd agreed, stating the additional background information provided on the properties along with the reasoning behind the reclassifications was helpful.

The meeting adjourned.

Attachment A - Presentation from February 16, 2021
ADCNR Project Lands Proposal Meeting

# R.L. Harris Project Relicensing

# Review of Project Lands Proposal with ADCNR

**February 16, 2021**

HARRIS DAM
RELICENSING

# Meeting Agenda

- Roll Call

- Review existing Project recreation sites at Harris

- Review Natural/Undeveloped and Recreation land classification definitions and uses

- Review Harris Project Lands Proposal

HARRIS DAM
RELICENSING

# Existing Project Recreation Sites at Harris

# Harris Project Recreation Sites

| Recreation Site Name | Type of Facility |
|---|---|
| **Big Fox Creek Boat Ramp** | Boat Launch |
| **Crescent Crest Boat Ramp** | Boat Launch |
| **Flat Rock Park** | Day Use Park |
| **Foster's Bridge Boat Ramp** | Boat Launch |
| **Harris Tailrace Fishing Pier** | Fishing Access |
| **Highway 48 Bridge Boat Ramp** | Boat Launch |
| **Lee's Bridge Boat Ramp** | Boat Launch |
| **Little Fox Creek Boat Ramp** | Boat Launch |
| **Lonnie White Boat Ramp** | Boat Launch |
| **Swagg Boat Ramp** | Boat Launch |
| **Wedowee Marine South[3]** | Marina |
| **R. L. Harris Management Area** | Hunting |

HARRIS DAM
RELICENSING

[3] Wedowee Marine South is a private facility, but it is within the Harris Project Boundary and parts of it are considered a Project recreation site.

# Natural/Undeveloped and Recreation land classification definitions and uses

# Shoreline Management Classifications

…shoreline classification system to guide management and permitting activities within the Project Boundary.

…based on an evaluation of existing and potential land use.

HARRIS DAM
RELICENSING

# Shoreline Management Classifications

## Recreation

…Project lands managed by Alabama Power for existing or potential future recreational activities. This includes land

- developed for public recreation,
- open space,
- water access, and
- future recreational development.

HARRIS DAM
RELICENSING

# Shoreline Management Classifications

## Commercial Recreation

These lands contain or are designated for concessionaire-operated public marinas and recreational areas that provide a wide variety of recreational services to the public on a fee basis.

HARRIS DAM
RELICENSING

# Shoreline Management Classifications

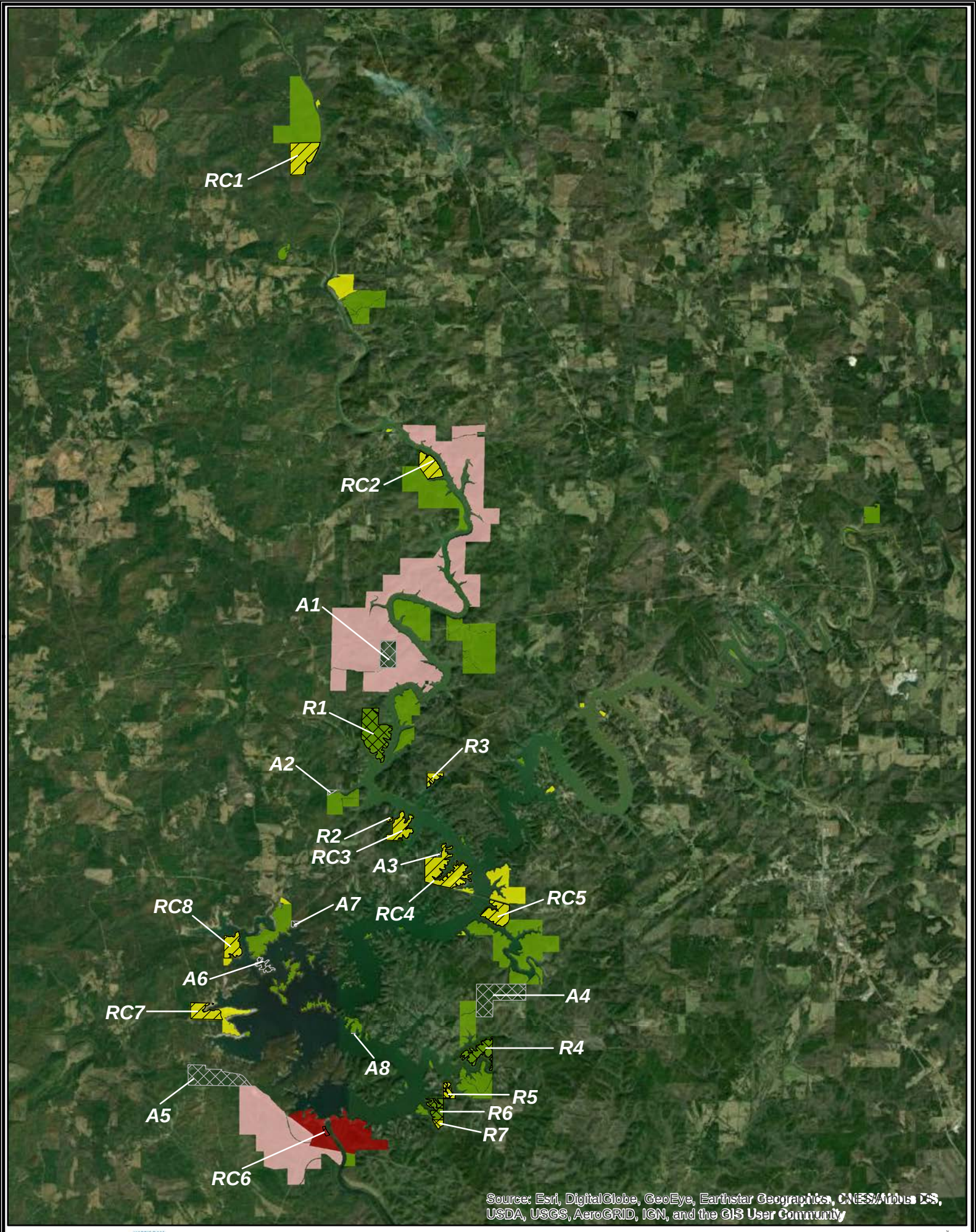
## Natural/Undeveloped

…will remain undeveloped for the following specific Project purposes:

- protecting environmentally sensitive areas;
- preserving natural aesthetic qualities;
- serving as buffer zones around public recreation areas; and
- preventing overcrowding of partially developed shoreline.

…allows for public hiking trails, nature studies, primitive camping, wildlife management (excluding hunting), and normal forestry practices…

# Harris Project Lands Proposal



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Date Created: 12/11/2019
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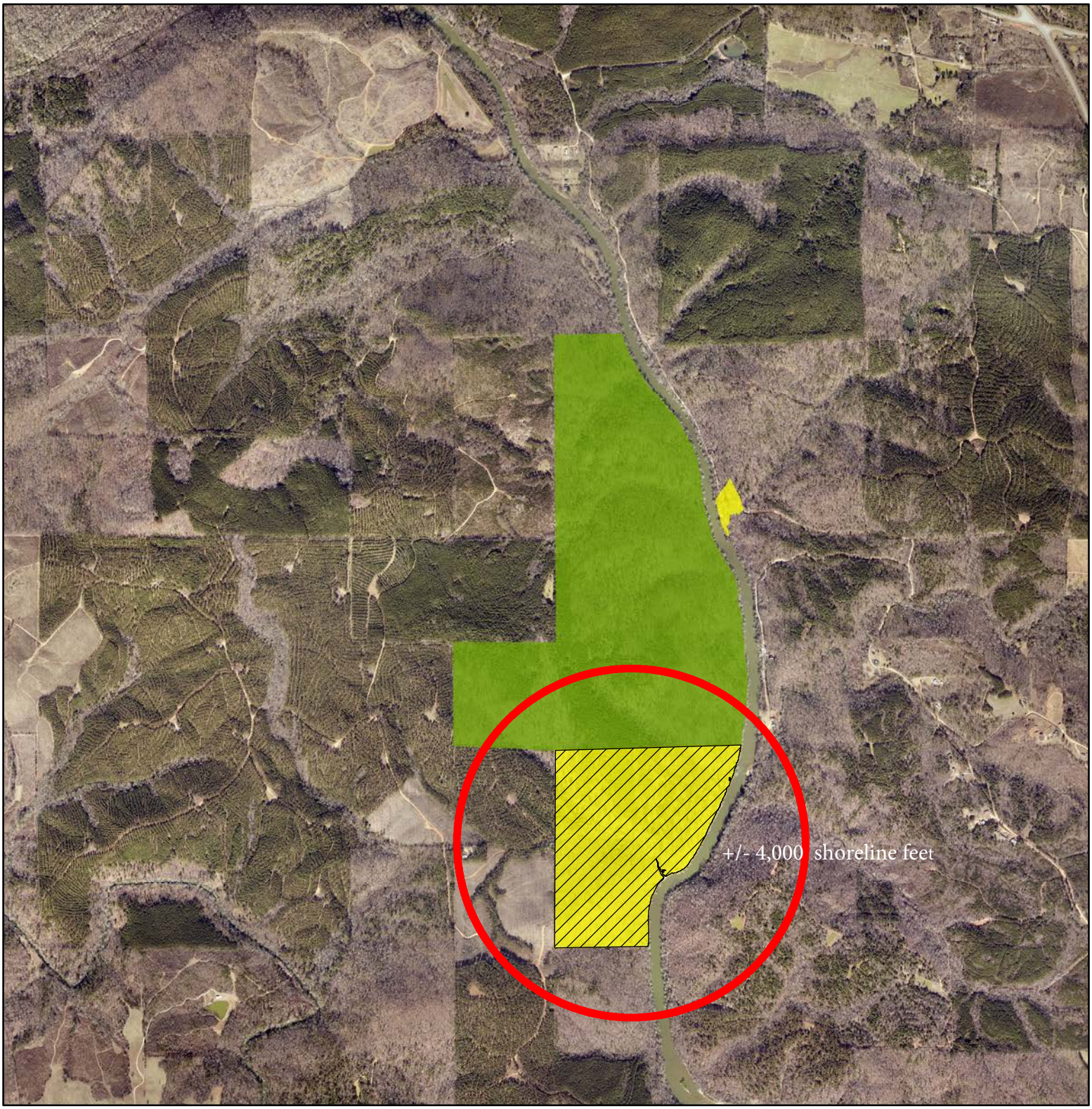




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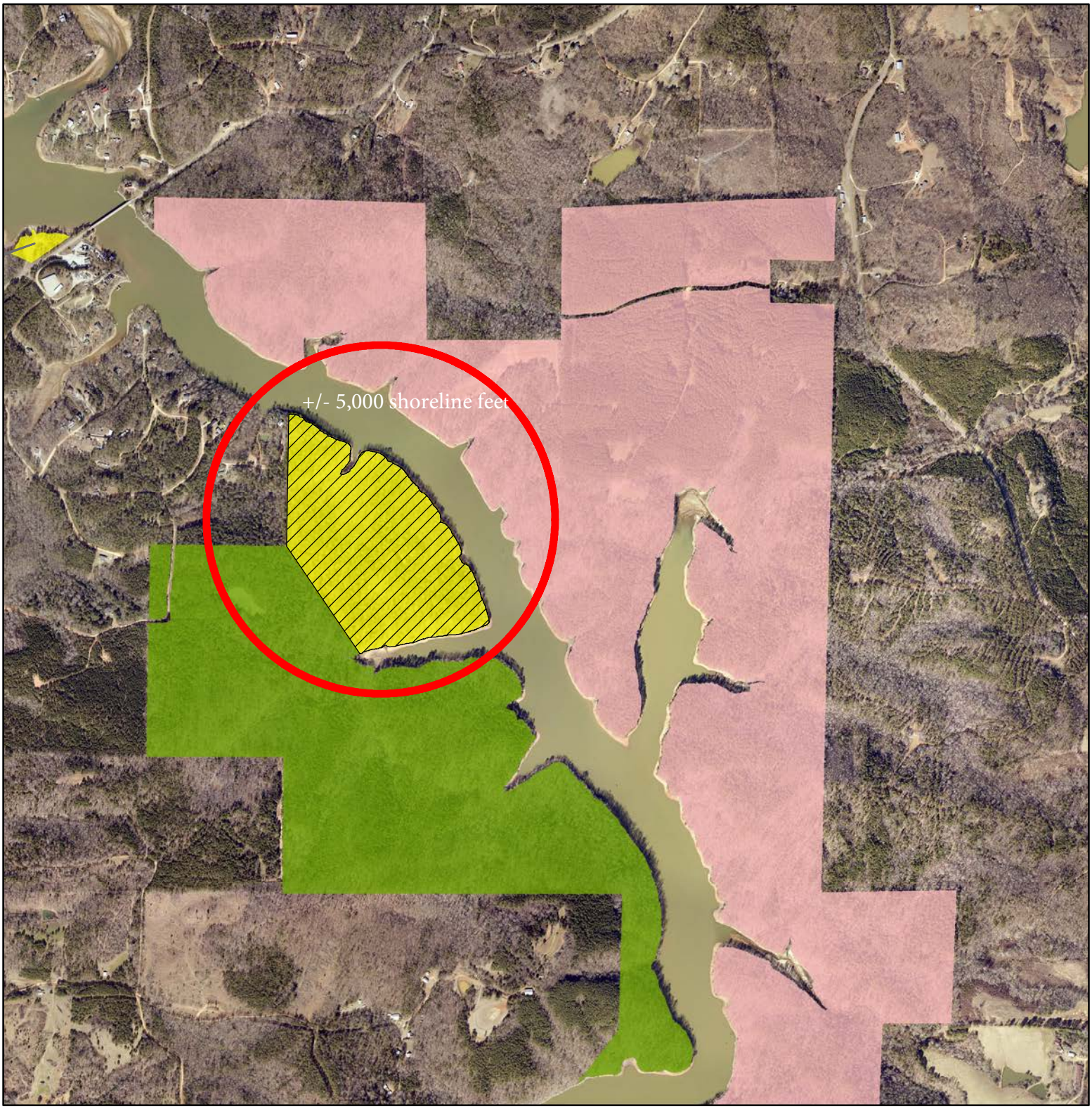
# *RC1 – Reclassify from Recreation to Natural/Undeveloped + /- 105 acres*

- Currently classified as Recreation for the purpose of developing a future park site.
- Analysis revealed that this property is difficult to access and located within area of lake with limited demand for public recreation opportunities.
- Reclassification to Natural/Undeveloped provides consistency of land use and will aid in the protection of the adjacent Natural/Undeveloped Project lands

***Legend***

**Baseline Classifications**
- Natural Undeveloped
- Hunting Lands
- Prohibited Access
- Recreation

**Proposed Changes**
- Proposed Reclassifications
- Proposed Removals
- Proposed Additions






Miles
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# *RC2 – Reclassify from Recreation to Natural/ Undeveloped + /- 63 acres*

- Currently classified as Recreation for the purpose of developing a future park site.
- Analysis revealed that this property is difficult to access and located within area of lake with limited demand for public recreation opportunities.
- Reclassification to Natural/Undeveloped provides consistency of land use and will aid in the protection of the adjacent Natural/Undeveloped Project lands

***Legend***

**Baseline Classifications**
- Natural Undeveloped
- Hunting Lands
- Prohibited Access
- Recreation

**Proposed Changes**
- Proposed Reclassifications
- Proposed Removals
- Proposed Additions




0 0.05 0.1 0.2 0.3 0.4 Miles

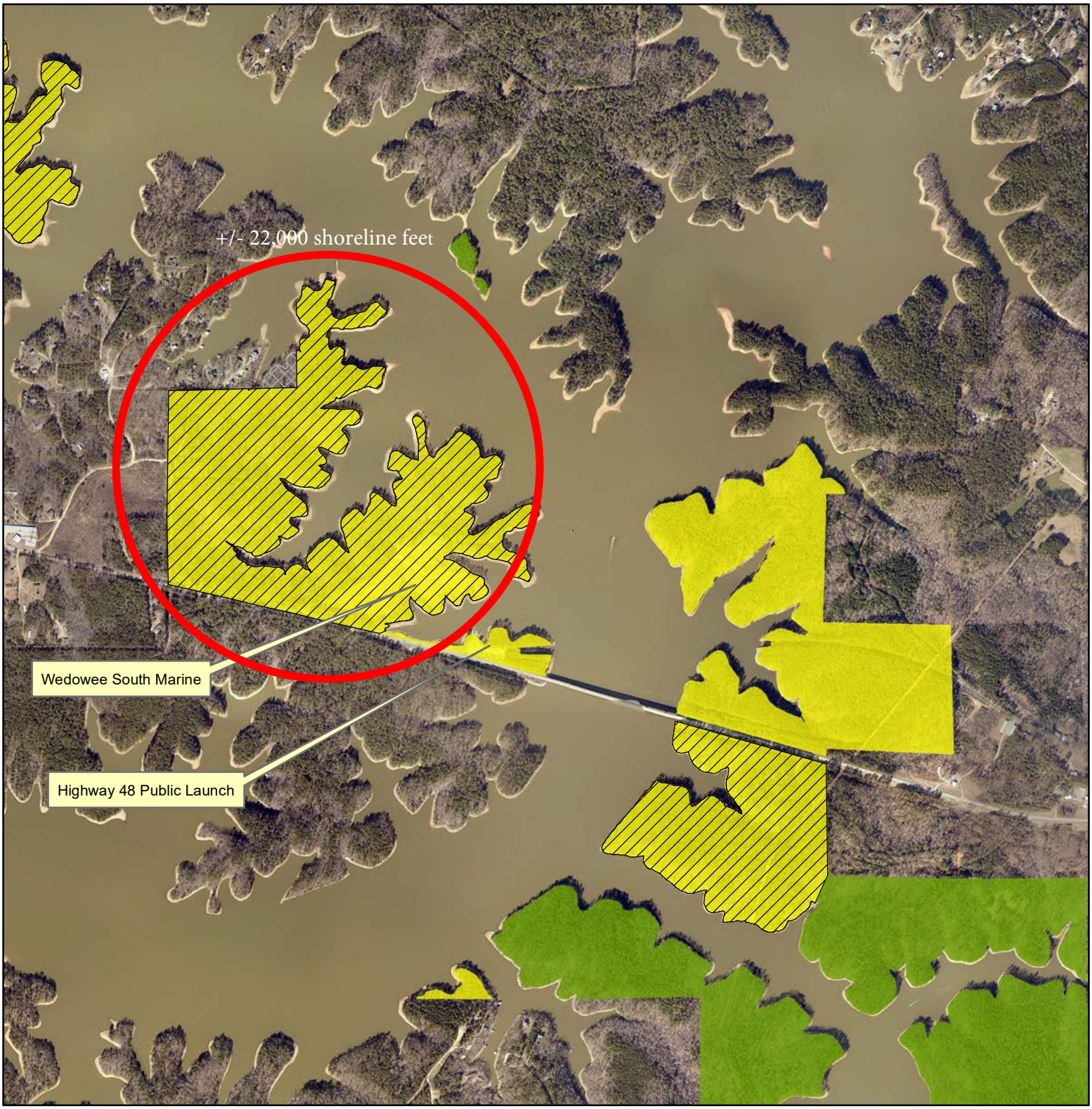
# *RC3 – Reclassify from Recreation to Natural/ Undeveloped + /- 61 acres*

- Added to the Project as Recreation during the 1995 Land Use Plan update
- Analysis revealed that this property is located just upstream of existing Recreation lands that are better located for public access
- Reclassification to Natural/Undeveloped will aid in the maintenance of the natural aesthetics of the area

***Legend***

**Baseline Classifications**
- Natural Undeveloped
- Hunting Lands
- Prohibited Access
- Recreation

**Proposed Changes**
- Proposed Reclassifications
- Proposed Removals
- Proposed Additions



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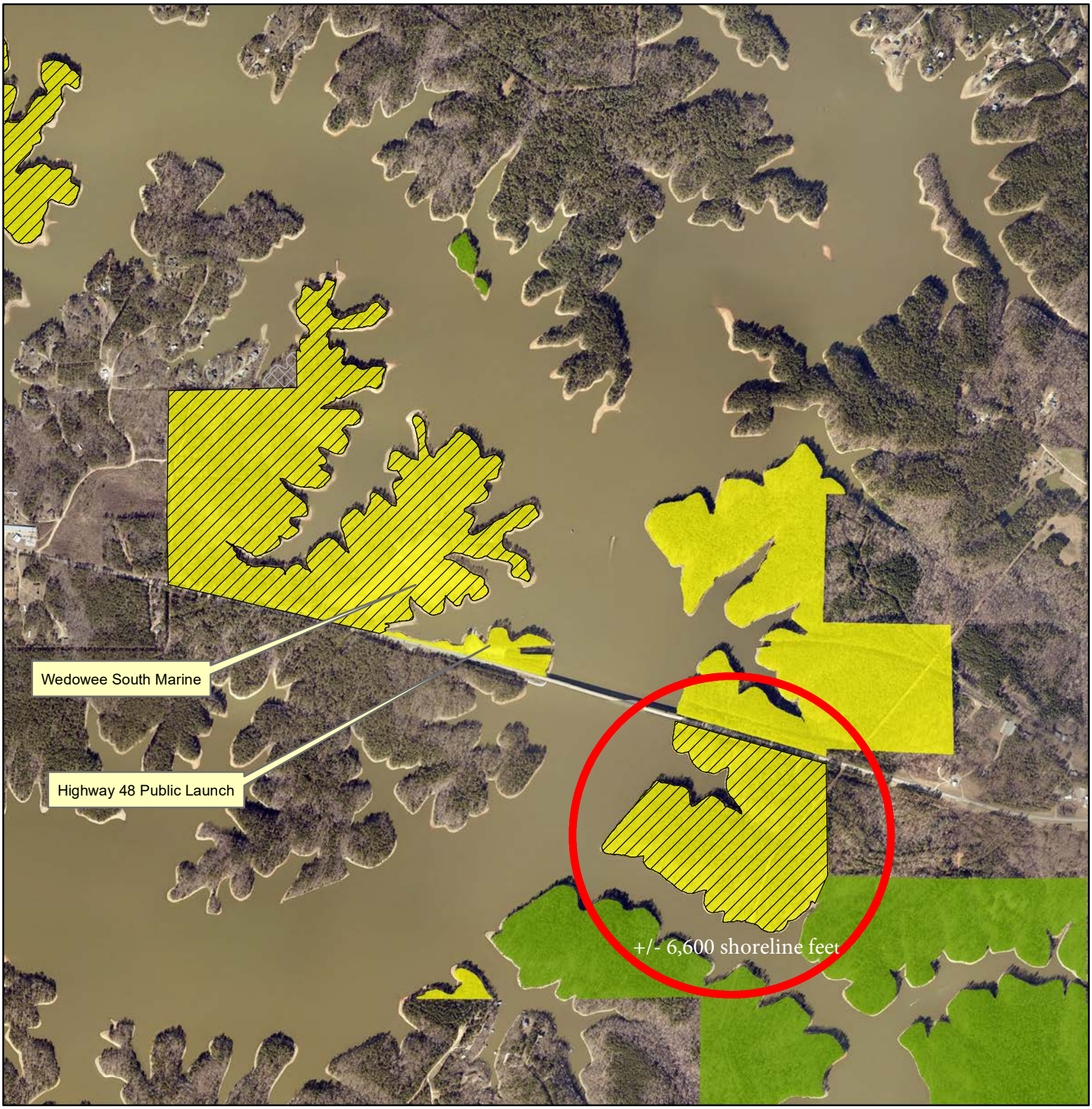
# *RC4 – Reclassify from Recreation to Commercial Recreation + /- 148 acres*

- During relicensing meetings, stakeholders have expressed interest in additional recreation sites similar to Flat Rock Park that are located "closer to town" (i.e., Wedowee) and, thus, easier to access.
- Alabama Power's shoreline office is located on this tract; a portion of this tract is currently leased to Wedowee Marine South.
- Alabama Power has received previous inquiries regarding a campground in this area.

***Legend***

**Baseline Classifications**
- Natural Undeveloped
- Hunting Lands
- Prohibited Access
- Recreation

**Proposed Changes**
- Proposed Reclassifications
- Proposed Removals
- Proposed Additions



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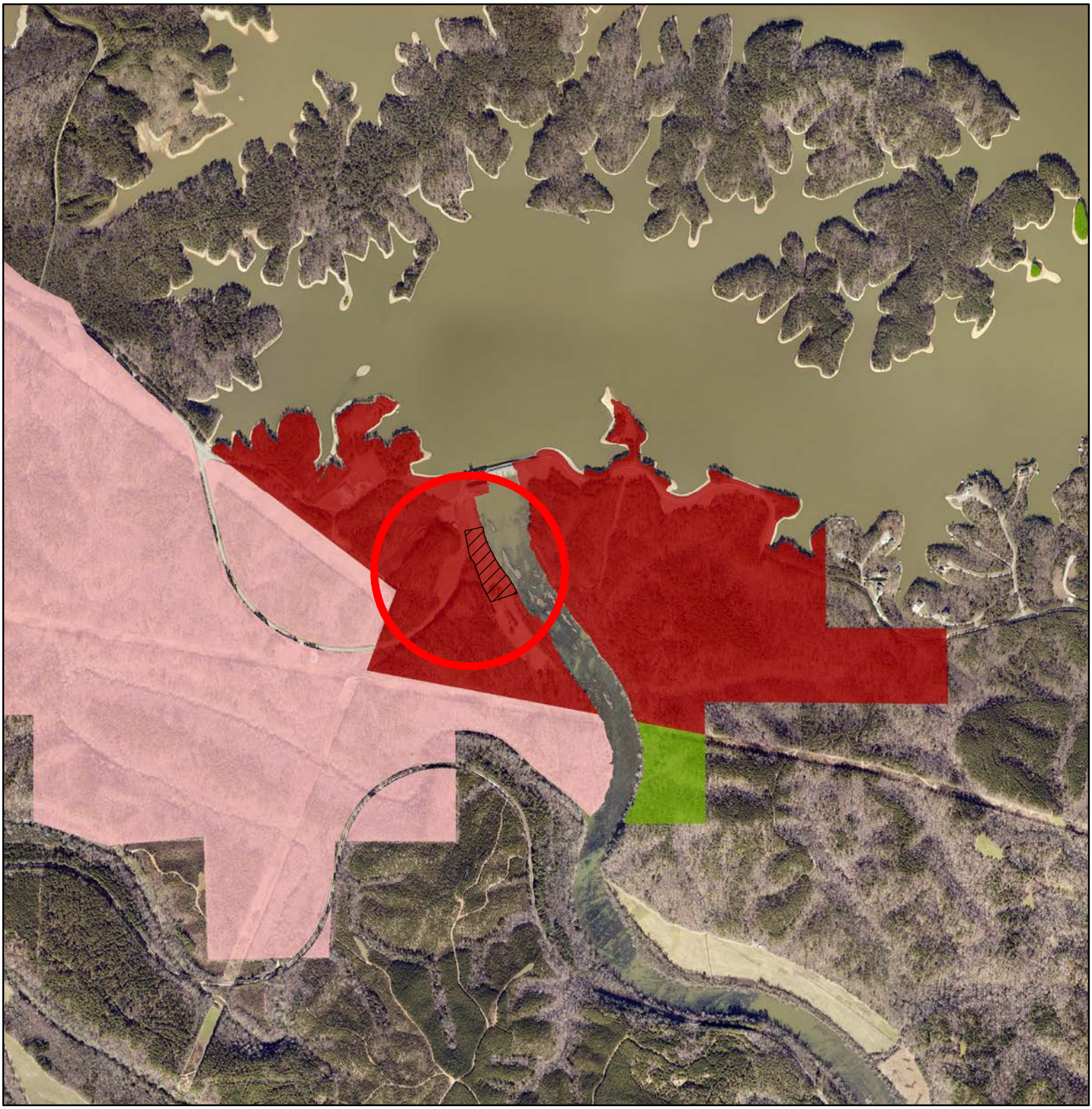
# *RC5 – Reclassify from Recreation to Natural/Undeveloped + /- 69 acres*

- Added to the Project as Recreation during the 1995 Land Use Plan update
- Analysis revealed that this property is not suitable for public recreation due to steep terrain of tract causing difficulty accessing the water
- Reclassification to Natural/Undeveloped provides consistency of land use and will aid in the protection of the adjacent Natural/Undeveloped Project lands

***Legend***

**Baseline Classifications**
- Natural Undeveloped
- Hunting Lands
- Prohibited Access
- Recreation

**Proposed Changes**
- Proposed Reclassifications
- Proposed Removals
- Proposed Additions





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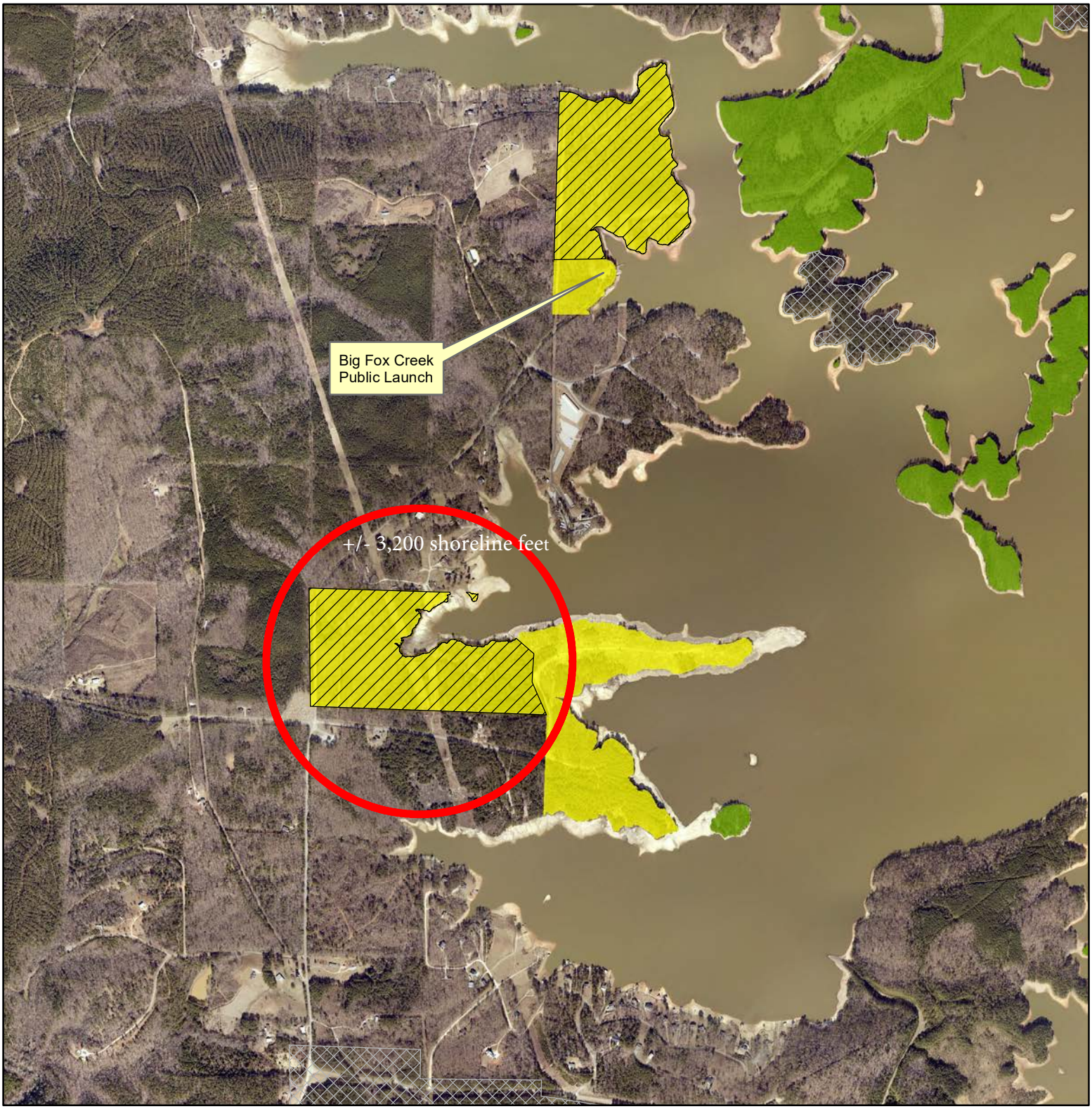
# *RC6 – Reclassify to Recreation + /- 5 acres*

- Location of existing tailrace fishing recreation site

***Legend***

**Baseline Classifications**
- Natural Undeveloped
- Hunting Lands
- Prohibited Access
- Recreation

**Proposed Changes**
- Proposed Reclassifications
- Proposed Removals
- Proposed Additions






Miles
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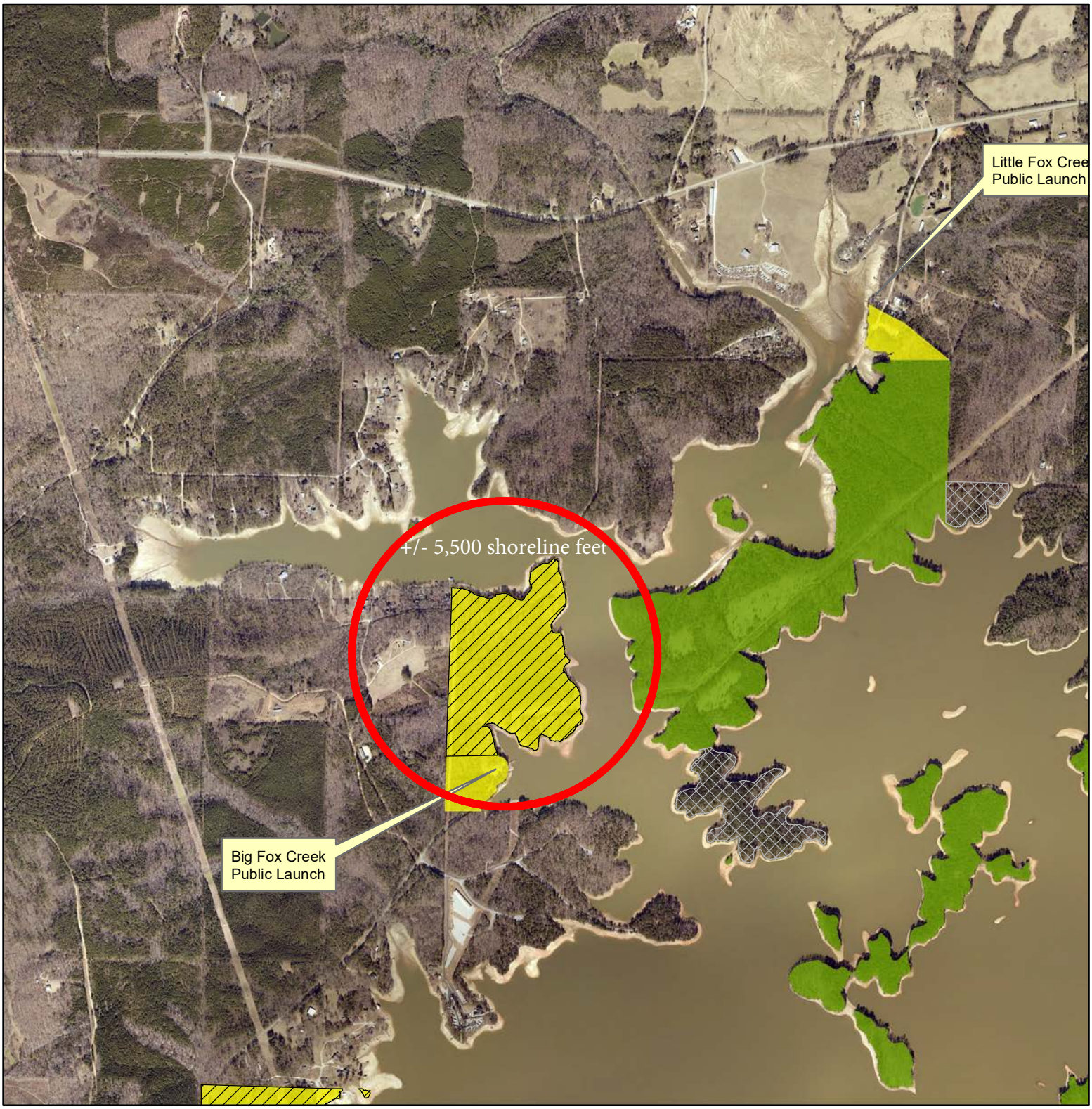
# *RC7* – Reclassify from Recreation to Natural/Undeveloped + /- 57 acres*

- Area is not currently used for recreation purposes and is separated by forested land; not designated for future expansion due to proximity of the transmission line corridor and adjacent private development
- Reclassify based upon results of the Flat Rock Botanical Inventory discussed in Section 6.0 of the Phase 1 Project Lands Study Report.
- Reclassify remaining acreage located to the west of the Flat Rock Botanical Inventory area to provide continuity of land use and aid in the protection of the adjacent Natural/Undeveloped Project lands

**Legend**

| Baseline Classifications | Proposed Changes |
|---|---|
| Natural Undeveloped | Proposed Reclassifications |
| Hunting Lands | Proposed Removals |
| Prohibited Access | Proposed Additions |
| Recreation | |

*The information presented at the September 11, 2019 HAT 4 meeting stated this reclassification totaled 40 acres. However, following the meeting, a mapping error of the area included within the botanical survey was discovered. Therefore, the acreage and map provided in this report does not match the information presented at the HAT 4 meeting but rather correctly states the proposed reclassification.






Miles
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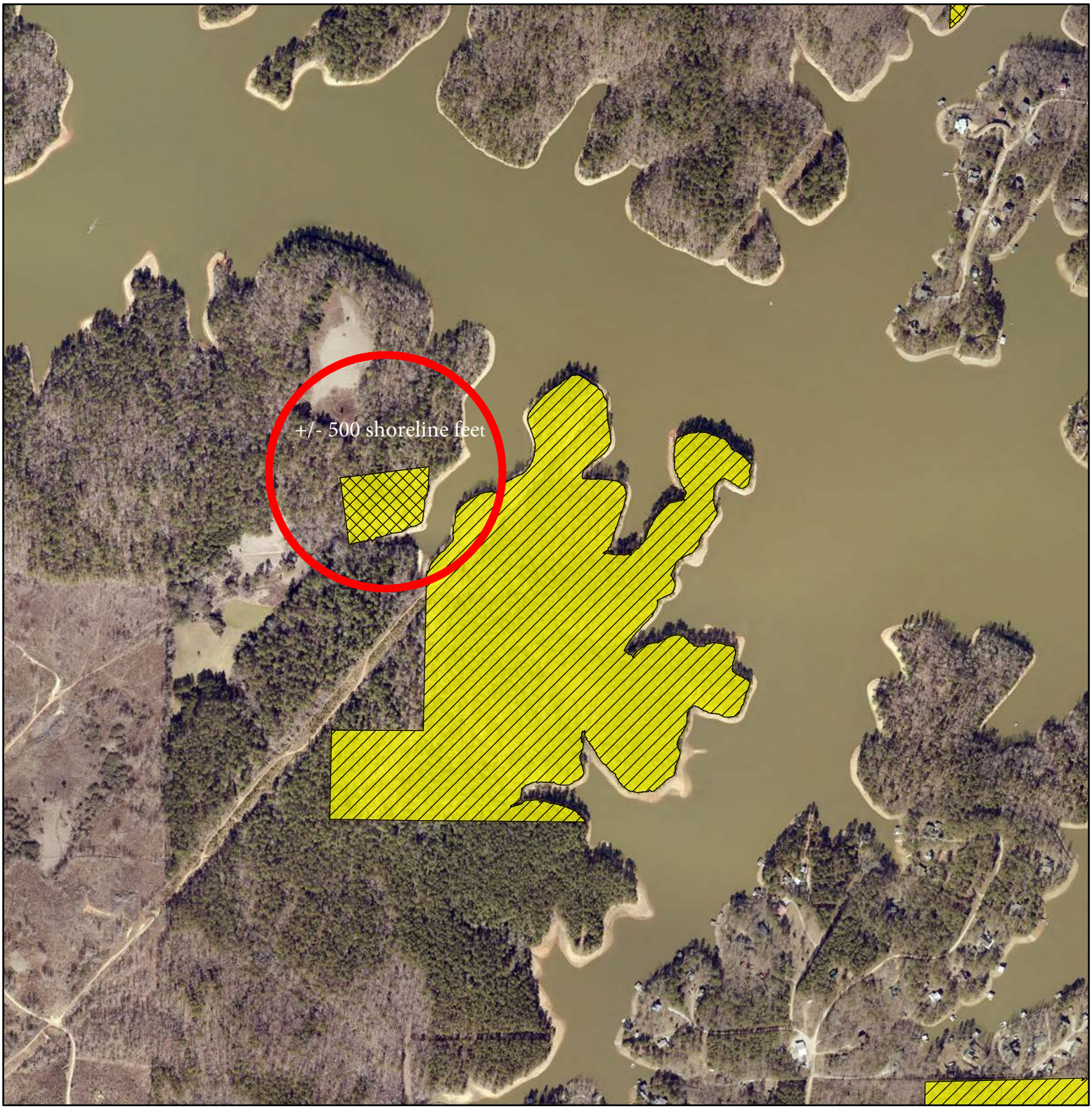
# *RC8 – Reclassify from Recreation to Natural/ Undeveloped + /- 50 acres*

- Large tract of land was included within the original Project Boundary for the purpose of constructing a public recreation site within this area; location of the existing Big Fox Creek Public Launch was determined to be the best location for the now constructed public launch; southern portion of the large, which encompasses Big Fox Creek Public Launch, will remain classified as Recreation and includes adequate acreage for current and future needs; remainder of the tract was determined no longer needed for Recreation purposes
- Reclassification to Natural/Undeveloped will aid in the maintenance of natural aesthetics and will serve as a buffer zone around the existing public recreation area

***Legend***

**Baseline Classifications**
- Natural Undeveloped
- Hunting Lands
- Prohibited Access
- Recreation

**Proposed Changes**
- Proposed Reclassifications
- Proposed Removals
- Proposed Additions



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# *R2 – Remove + /- 3 acres of Recreation*

- Included as part of the original Project Boundary as Recreation because located at an old road end
- Small tract; not adjacent to existing Project lands or proposed additions to Project lands
- Not suitable for hunting lands due to its small size
- Not suitable for recreation due location within a slough and location within area of lake with limited demand for public recreation opportunities
- Not suitable for natural/undeveloped due to proximity to proposed future developments

***Legend***

**Baseline Classifications**
- Natural Undeveloped
- Hunting Lands
- Prohibited Access
- Recreation

**Proposed Changes**
- Proposed Reclassifications
- Proposed Removals
- Proposed Additions




0 0.05 0.1 0.2 0.3 0.4 Miles

# *R3 – Remove + /- 20 acres of Recreation*

- Added to the Project Boundary as Natural Undeveloped during 1995 Land Use Plan update for use by the Boy Scouts; use never transpired due to limited access
- Not suitable for recreation due to its location within area of lake with limited demand for public recreation opportunities
- Not suitable for hunting due to small size and not located adjacent to existing Project lands
- Not suitable for natural/undeveloped due to proximity to proposed future developments

***Legend***

**Baseline Classifications**
- Natural Undeveloped
- Hunting Lands
- Prohibited Access
- Recreation

**Proposed Changes**
- Proposed Reclassifications
- Proposed Removals
- Proposed Additions




Miles
0 0.05 0.1 0.2 0.3 0.4

# *R5 – Remove + /- 19 acres of Recreation*

- Land locks privately-owned tracts with Project Boundary; history of issues concerning granted access for private development
- Not suitable for natural/undeveloped due to proximity to private development of peninsula, which has (and will continue to) result in the need to cross Project lands with access roads and utilities
- Not suitable for recreation due to its location within area of lake with limited demand for public recreation opportunities
- Not suitable for hunting due to due to its small size and proximity to private development

***Legend***

**Baseline Classifications**
- Natural Undeveloped
- Hunting Lands
- Prohibited Access
- Recreation

**Proposed Changes**
- Proposed Reclassifications
- Proposed Removals
- Proposed Additions


# *R7 – Remove + /- 9 acres of Recreation*

- Part of the original Project Boundary as recreation for future development of an overlook
- Adjacent to another Project lands tract that land locks privately-owned tracts with Project Boundary; proposing to also remove adjacent project lands
- Not suitable for natural/undeveloped due to proximity to private development
- Not suitable for recreation due to its location within area of lake with limited demand for public recreation opportunities; property is not located on shoreline
- Not suitable for hunting due to due to its small size and proximity to private development

***Legend***

**Baseline Classifications**
- Natural Undeveloped
- Hunting Lands
- Prohibited Access
- Recreation

**Proposed Changes**
- Proposed Reclassifications
- Proposed Removals
- Proposed Additions




0 0.1 0.2 0.4 0.6 0.8 Miles

# *A3 – Add + /- 2 acres as Commercial Recreation lands*

- Small tract adjacent to large tract currently classified as Recreation; adjacent tract is large tract on which the shoreline office and Wedowee Marine South are located
- Adjacent 147.94-acre tract is proposed to be reclassified to Commercial Recreation
- Adding tract provides consistency of land use and additional acreage (with shoreline) to be used as commercial recreation

***Legend***

**Baseline Classifications**
- Natural Undeveloped
- Hunting Lands
- Prohibited Access
- Recreation

**Proposed Changes**
- Proposed Reclassifications
- Proposed Removals
- Proposed Additions

## APC Harris Relicensing

**From:** Anderegg, Angela Segars
**Sent:** Thursday, February 25, 2021 1:10 PM
**To:** 'Chris Greene'; Marshall, Matthew; todd.fobian@dcnr.alabama.gov; 'Mike Holley'
**Cc:** devridr@auburn.edu; Carlee, Jason; Baker, Jeffery L.; McVicar, Ashley M; Chandler, Keith Edward; Jason Moak; Colin Dinken; Rusty Wright; Ehlana Stell; Elijah Lamb; Kelly Schaeffer
**Subject:** Auburn Final Report
**Attachments:** Auburn Univ report to Alabama Power-Harris bioenergetics - revised_FINAL.pdf

Good afternoon,

Attached is the Auburn's final report for the Aquatic Resources Study. I wanted to get this to you prior to next Friday's meeting so you have the chance to read through it.

Look forward to meeting with everyone next week!

**Angie Anderegg**
Hydro Services
(205)257-2251
arsegars@southernco.com

## APC Harris Relicensing

**From:** Anderegg, Angela Segars
**Sent:** Wednesday, March 3, 2021 8:09 AM
**To:** Jack West; Chandler, Keith Edward
**Subject:** RE: NHA VIRTUAL EVENT: Pairing Batteries & Hydropower: Clean Energy's Untapped Solution

Hi Jack,

Thanks for forwarding! I saw that come across from NHA a few days ago and I am going to try to attend.

I am beyond ready to meet in-person again. Hopefully we can do that safely sooner than later.

Thanks!

**Angie Anderegg**
Hydro Services
(205)257-2251
arsegars@southernco.com

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**From:** Jack West <jwest@alabamarivers.org>
**Sent:** Tuesday, March 2, 2021 3:05 PM
**To:** Anderegg, Angela Segars <ARSEGARS@southernco.com>; Chandler, Keith Edward <KECHANDL@SOUTHERNCO.COM>
**Subject:** NHA VIRTUAL EVENT: Pairing Batteries & Hydropower: Clean Energy's Untapped Solution



---

Hi Angie and Keith,

I hope you're both doing well. This upcoming virtual event sponsored by the National Hydropower Association and the Energy Storage Association just popped up in my inbox, and I thought I would forward it since it could be helpful to your folks working on the battery storage study.

I know we've got lots of reports and HAT meetings and comment periods heading our way this spring with the Harris relicensing, and I hope we begin to safely meet in-person later in the year.

Take care,

Jack


[r20.rs6.net]

## NEW VIRTUAL EVENT

# Path to Clean Energy

## Pairing Batteries & Hydropower:

## Clean Energy's Untapped Solution

## Thursday, March 11 at 2:00-3:00pm ET

**REGISTER TODAY!** [r20.rs6.net]

Join us on March 11th at 2:00 pm EDT for the National Hydropower Association's Path to Clean Energy Virtual Event, **"Pairing Batteries & Hydropower: Clean Energy's Untapped Solution"**, hosted in partnership with the Energy Storage Association.

At this virtual event, panelists will explore the value streams of collocating batteries and hydropower. Pairing these technologies together has the potential to enhance grid reliability services, environment performance, and O&M costs.

Panelists will also discuss new market services that could be established, as well as examine the findings of a current project that has successfully paired hydropower and batteries together.

Energy storage technologies are poised to form the foundation of tomorrow's carbon-free electricity. Storage technologies like batteries and thermal are growing exponentially year-over-year, while pumped storage hydropower represents 93 percent of utility-scale storage in America. Separately, these technologies are helping to integrate variable renewables like wind and solar onto the gird, and accelerating the nation's efforts to decarbonize.

## Panelists

**Moderator:** Malcolm Woolf, President & CEO, National Hydropower Association

**Panel 1:**

- Marc Chupka, Vice President, Research & Programs, Energy Storage Association

- Dr. Thomas Mosier, Energy Systems Group Lead, Idaho National Laboratory

**Panel 2:**

- Asa Hopkins, Vice President, Synapse Energy Economics

- Jens Paeutz, Marketing Director, Andritz Hydro Corp.

- Darron Scott, President &CEO, Kodiak Electric Association

**REGISTER TODAY!** [r20.rs6.net]


[r20.rs6.net]

*Path to Clean Energy is a program of the National Hydropower Association.*
*For more information on waterpower, please visit www.hydro.org [hydro.org].*


[r20.rs6.net]

--
Jack West, Esq.
Policy and Advocacy Director
Alabama Rivers Alliance
2014 6th Ave N, Suite 200
Birmingham, AL 35203
205-322-6395
www.alabamarivers.org [alabamarivers.org]

**Celebrating more than 20 years of protecting Alabama's 132,000 miles of rivers and streams!**

# HAT 1 Meeting - March 18th

APC Harris Relicensing <g2apchr@southernco.com>

Wed 3/3/2021 9:19 PM

**To:** APC Harris Relicensing <harrisrelicensing@southernco.com>
**Bcc:** damon.abernethy@dcnr.alabama.gov <damon.abernethy@dcnr.alabama.gov>; nathan.aycock@dcnr.alabama.gov <nathan.aycock@dcnr.alabama.gov>; steve.bryant@dcnr.alabama.gov <steve.bryant@dcnr.alabama.gov>; todd.fobian@dcnr.alabama.gov <todd.fobian@dcnr.alabama.gov>; chris.greene@dcnr.alabama.gov <chris.greene@dcnr.alabama.gov>; keith.henderson@dcnr.alabama.gov <keith.henderson@dcnr.alabama.gov>; mike.holley@dcnr.alabama.gov <mike.holley@dcnr.alabama.gov>; evan.lawrence@dcnr.alabama.gov <evan.lawrence@dcnr.alabama.gov>; matthew.marshall@dcnr.alabama.gov <matthew.marshall@dcnr.alabama.gov>; brian.atkins@adeca.alabama.gov <brian.atkins@adeca.alabama.gov>; tom.littlepage@adeca.alabama.gov <tom.littlepage@adeca.alabama.gov>; jhaslbauer@adem.alabama.gov <jhaslbauer@adem.alabama.gov>; cljohnson@adem.alabama.gov <cljohnson@adem.alabama.gov>; mlen@adem.alabama.gov <mlen@adem.alabama.gov>; fal@adem.alabama.gov <fal@adem.alabama.gov>; djmoore@adem.alabama.gov <djmoore@adem.alabama.gov>; arsegars@southernco.com <arsegars@southernco.com>; dkanders@southernco.com <dkanders@southernco.com>; wtanders@southernco.com <wtanders@southernco.com>; jefbaker@southernco.com <jefbaker@southernco.com>

HAT 1,

We will have a HAT 1 meeting on **March 18th** from 9:00-3:00 (Central Time) in order to review the results of the Phase 2 analyses of both the Operating Curve Change Feasibility and Downstream Release Alternatives Studies. The agenda and Teams meeting information is below. Let me know if you have any questions.

Thanks,

**Angie Anderegg**
Hydro Services
(205)257-2251
arsegars@southernco.com

**Agenda**

9:00-11:00 Review results of Downstream Release Alternatives Phase 2 analysis

11:00-1:00 Break for lunch

1:00-3:00 Review results of Operating Curve Change Feasibility Phase 2 analysis

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## Microsoft Teams meeting

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Phone Conference ID: 740 663 097#
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Southern Company

## APC Harris Relicensing

**From:** Anderegg, Angela Segars
**Sent:** Friday, March 12, 2021 12:28 PM
**To:** 'Chris Greene'; Marshall, Matthew; todd.fobian@dcnr.alabama.gov; 'Mike Holley'
**Cc:** Carlee, Jason; Baker, Jeffery L.; McVicar, Ashley M; Chandler, Keith Edward
**Subject:** RE: Harris meeting
**Attachments:** 2021-03-05 Aquatic Resources - Auburn Study Results Meeting Summary.docx

Good afternoon,

Attached is a meeting summary from our March 5th meeting at Auburn. I know this is a very busy time of year, but have you had a chance to look at calendars to see if you're available for a follow up meeting (conference call)? I think we would need 1.5 hr. If 3/25 (afternoon) or 3/26 (anytime) do not work for y'all, we could also do the morning of 3/22 or the afternoon of 3/23. Just let us know what works best for you.

Thanks!

**Angie Anderegg**
Hydro Services
(205)257-2251
arsegars@southernco.com

---

**From:** Anderegg, Angela Segars
**Sent:** Monday, March 8, 2021 3:27 PM
**To:** 'Chris Greene' <chris.greene@dcnr.alabama.gov>; Marshall, Matthew <Matthew.Marshall@dcnr.alabama.gov>; todd.fobian@dcnr.alabama.gov; 'Mike Holley' <mike.holley@dcnr.alabama.gov>
**Cc:** Carlee, Jason <JCARLEE@southernco.com>; Baker, Jeffery L. <JEFBAKER@southernco.com>; McVicar, Ashley M <AMMcVica@southernco.com>; Chandler Keith <KECHANDL@SOUTHERNCO.COM>
**Subject:** Harris meeting

Good afternoon,

I'd like to set up another Harris meeting for us to discuss next steps and answer any additional question you may have about the Auburn report. Could you let me know your availability on 3/25 (afternoon) and 3/26?

Thanks!

**Angie Anderegg**
Hydro Services
(205)257-2251
arsegars@southernco.com

**Meeting Summary**
**Harris Relicensing Meeting**
**March 5, 2021**
**9am-12:00pm**
**E.W. Shell Fisheries Center at Auburn University**
**And Microsoft Teams Meeting**

**Participants:**
Angie Anderegg – Alabama Power
Jeff Baker – Alabama Power
Keith Chandler – Alabama Power
Dennis Devries – Auburn University
Colin Dinken – Kleinschmidt Associates
Todd Fobian – Alabama Department of Conservation and Natural Resources (ADCNR)
Elijah Lamb – Auburn University
Matt Marshall – ADCNR
Jason Moak – Kleinschmidt Associates
Kelly Schaeffer – Kleinschmidt Associates
Ehlana Stell – Auburn University
Rusty Wright – Auburn University

**By Phone**
Jason Carlee – Alabama Power
Ashley McVicar – Alabama Power
Sandra Wash – Kleinschmidt Associates

**Action Items:**
- Angie Anderegg (Alabama Power) to schedule follow-up meeting to further discuss Auburn University's results and next steps in the relicensing process.

**Meeting Summary:**
Angie Anderegg (Alabama Power) opened the meeting with a safety moment and stated the meeting purpose, discussing Auburn University's study results with the Alabama Department of Conservation and Natural Resources (ADCNR). Angie noted that ADCNR initially requested this study in the beginning of the relicensing process for the R.L. Harris Project (Project). Angie provided an overview of the upcoming relicensing schedule as it pertains to stakeholder participation.

Dennis Devries (Auburn University) provided the objectives of the study: performing a literature review on temperature requirements of target species, summarizing existing water temperature data, performing a fish community study, and bioenergetics modeling.

Dennis presented the results of the literature review regarding temperature requirements of the target species, noting no information regarding the Tallapoosa Bass and very little for Alabama Bass.

Ehlana Stell (Auburn University) summarized the existing water temperature data from years 2000-2018. Ashley McVicar (Alabama Power) asked for clarification on the seasonal 24-hour heat maps of the river, specifically whether the maps represented a single 24-hour day or hourly averages over entire three-month seasons. Ehlana confirmed the latter. Keith Chandler (Alabama Power) asked if the results aligned with Kleinschmidt's findings. Jason Moak (Kleinschmidt Associates) confirmed they did, noting that steep areas of the river dewater quickly and are more subject to thermal affects. Todd Fobian (ADCNR) questioned why data from the Newell gauge was not included in the study as it was one of the control sites mentioned in the Aquatic Resources Study Plan and had data available from 2017. Angie recalled that Federal Energy Regulatory Commission (FERC) had questions on the Initial Study Report (ISR) regarding why Green Plan pulses were based off the Heflin gauge only and did not include the Newell gage. She added that Alabama Power would revisit the study plan on the Newell gage temperature data analysis. Jason M. added that there should not be much difference between Newell and Heflin, except that sediment inputs are higher at Newell and may contribute to some temperature differences between the two sites. Ehlana reiterated the limitations of comparing upstream sites to downstream sites.

Elijah Lamb (Auburn University) presented fish community and telemetry results. Todd inquired on the reasoning behind specific months being chosen regarding the telemetry study. Elijah responded late summer was chosen due to higher flows and temperatures, adding this was the same justification for the bioenergetics model. Todd asked if the number of peak flows that occurred were considered. Eli responded that they were not. Todd asked why there were detections early in the study that were not detected later. Elijah stated that the fish were likely in the two-mile gap between the acoustic receivers. In addition, Elijah noted one Tallapoosa Bass tag had a shorter battery life (30 days versus 165 days). Keith asked for clarification that the fish were likely in between the two acoustic receivers. Elijah confirmed, adding that the objective was to see if fish were moving dramatically upstream to downstream. Elijah noted that if fish were further downstream, detections would have been present at Malone and Wadley.

Todd asked if the total species numbers regarding fish collection included hybrids. Elijah confirmed they did. Todd confirmed with Elijah that six striped bass were found near Lee's Bridge, adding that ADCNR does not stock in that location. Elijah noted that none of the striped bass weighed above two pounds, adding that white bass were also captured in 2019. Todd asked if all sampling areas were considered deep water habitats. Elijah noted that a diverse range of depths were covered, but shallow habitat is dominant in the river. Todd asked for clarification if the total catch numbers were by season, one collection, or multiple collections. Elijah responded that spring and fall were sampled bimonthly, with one sample collection in summer and winter. In addition, Auburn University was developing sampling protocols in Spring 2019 so there was a higher sampling effort during that time.

Ehlana presented the results of the respirometry trials. Keith confirmed the methodology behind calculating the critical swimming speed (Ucrit). Todd inquired on why the impacts of cold to warm temperatures were not analyzed. Ehlana noted that the dam does not typically release warmer water into the river, so the analysis focused on warm to cold water transitions.

Rusty Wright (Auburn University) presented the methodology and results of the bioenergetic modeling. Keith asked if the p-value was incorporated into the model from outside sources. Rusty explained that the model predicts the p-value. Keith inquired if the pulses from generation were causing warmer temperatures during times of the year. Dennis responded not generally but

there were different seasonal effects and that releases could cause warmer than ambient temperatures in colder conditions. Jason M. added that the velocities provided to Auburn University for the model were during one-unit generation, and with a pulse those higher velocities would be seen for a maximum of 15 minutes and would be less other hours. Ehlana added that fish could burst at those speeds if needed. Rusty added that fish may seek refuge instead. Colin Dinken (Kleinschmidt Associates) stated that he assisted on a study where he recalled anecdotal examples of black bass individuals traveling into tributaries to find refuge during generation. Jason Carlee (Alabama Power) added that based on the telemetry data, the flow is not displacing fish downstream and they are likely finding refuge.

Jason M. asked if the crustaceans found in the tailrace were of higher nutritional value. Rusty responded that it was mostly arthropods, providing higher caloric value than zooplankton but not as high as insects or fish. Jeff Baker asked if there was any evidence that prey types were being selectively preyed upon. Elijah responded that additional investigation would be required to ascertain that. Post meeting review of the Auburn report, Alabama Bass in the tailrace proportionally ate insects more than any other species.

Ashley McVicar (Alabama Power) noted that a temperature swing of 5 degrees Celsius (°C) was used in the model, but existing temperature data showed that approximately 98 or 99 percent of the time the swing was less than 2 °C. Ehlana reiterated the importance of the number of hours in the data set and that a 4 °C temperature swing 1 percent of the time may still have an effect.

Todd asked for additional information on why a substitute was not identified for the Lee's Bridge site. Elijah noted that other sites were considered but they were either logistically challenging, similar in habitat to Lee's, or would require different sampling techniques. Auburn emphasized that Lee's Bridge is an acceptable control site for use in comparison to the downstream fish community. Todd asked to clarify how shallow water habitats were sampled and if data from Alabama Department of Environmental Management (ADEM) and Geological Survey of Alabama (GSA) was incorporated. Dr. Devries reiterated the importance of sampling consistency between the tailrace and further downstream, adding that shallow areas were sampled with the boat. Keith noted that there is additional information in the Harris Pre-Application Document (PAD) that helped supplement fishery information. Jason M. added that shallow water habitat has been well-studied, so deep water habitat results are valuable. He added that if sampling was based on shallow water habitat, there would be less catfish documented. Jason C. mentioned that a few new species were collected versus Elise Irwin's (USGS) work.

Todd confirmed the upcoming stakeholder participation schedule with Angie and Ashley and requested additional time to review Auburn's results. The meeting concluded.

## APC Harris Relicensing

**From:** Greene, Chris <Chris.Greene@dcnr.alabama.gov>
**Sent:** Friday, March 12, 2021 4:52 PM
**To:** Anderegg, Angela Segars
**Cc:** Carlee, Jason; Baker, Jeffery L.; McVicar, Ashley M; Chandler, Keith Edward; Marshall, Matthew; Fobian, Todd; Holley, Mike
**Subject:** RE: Harris meeting



---

Angie,

Ashley and I are scheduled to talk on the phone next week. After our conversation, we can provide input on a potential meeting date, if necessary.

Thanks,

J. Chris Greene
Chief of Fisheries
Alabama Wildlife & Freshwater Fisheries Division
64 North Union Street, Suite 551
Montgomery, Alabama 36104
334-242-3471

Available at your local tag office

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**From:** Anderegg, Angela Segars <ARSEGARS@southernco.com>
**Sent:** Friday, March 12, 2021 12:28 PM
**To:** Greene, Chris <Chris.Greene@dcnr.alabama.gov>; Marshall, Matthew <Matthew.Marshall@dcnr.alabama.gov>; Fobian, Todd <Todd.Fobian@dcnr.alabama.gov>; Holley, Mike <Mike.Holley@dcnr.alabama.gov>
**Cc:** Carlee, Jason <JCARLEE@southernco.com>; Jeff Baker <jefbaker@southernco.com>; McVicar, Ashley M <AMMcVica@southernco.com>; Chandler, Keith Edward <KECHANDL@SOUTHERNCO.COM>
**Subject:** RE: Harris meeting

Good afternoon,

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Thanks!

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---

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**Sent:** Monday, March 8, 2021 3:27 PM
**To:** 'Chris Greene' <chris.greene@dcnr.alabama.gov>; Marshall, Matthew <Matthew.Marshall@dcnr.alabama.gov>; todd.fobian@dcnr.alabama.gov; 'Mike Holley' <mike.holley@dcnr.alabama.gov>
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Thanks!

**Angie Anderegg**
Hydro Services
(205)257-2251
arsegars@southernco.com

**From:** Collins, Evan R <evan_collins@fws.gov>
**Sent:** Tuesday, March 16, 2021 2:40 PM
**To:** Baker, Jeffery L. <JEFBAKER@southernco.com>
**Subject:** Informal programmatic for Bats



Hi, Jeff. I've attached the bat portion of our SLOPES agreement with the Corps and a copy of the matrix NRCS uses for their informal programmatic. Let me know if you'd like to discuss these further.

-Evan

--
Evan Collins
Fish and Wildlife Biologist
U.S. Fish and Wildlife Service
Alabama Ecological Services Field Office
1208-B Main Street
Daphne, AL 36526
251-441-5837 (phone)
251-441-6222 (fax)
evan_collins@fws.gov

Log I/AF

Typ

**United States Department of Agriculture**

NRCS

2010-I-0698

Natural Resources Conservation Service
P.O. Box 311
Auburn, Alabama 36831-0311


August 16, 2010

Mr. William Pearson
Field Supervisor
US Fish and Wildlife Service
Alabama Ecological Services Field Station
1208-B Main Street
Daphne, Alabama 36526

Dear Mr. Pearson:

The Natural Resources Conservation Service (NRCS) in Alabama provides technical and financial assistance in assisting private landowners to improve soil, water, air, plant, and animal (including wildlife) resources on their land. In providing this assistance, NRCS relies on standardized conservation practices and specifications to ensure proper establishment, management and maintenance of all structural practices and management measures. Our conservation practices are periodically updated in order to keep pace with technological advancements or to address management issues.

Currently, there are 132 NRCS conservation practices utilized in Alabama to promote conservation of natural resources. Starting in December 2009, NRCS staff, Alabama Department of Conservation and Natural Resources (ALDCNR) biologists, and U. S. Fish and Wildlife Service (USFWS) biologists representing the Daphne Ecological Services Field Office consulted informally on the effects of 132 practice standards, making determinations of the effects on federally listed species and developing a process to streamline the procedure for compliance with Section 7 of the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.). The product of this programmatic ESA consultation effort is a document called, "**NRCS Conservation Practice Effects on Threatened and Endangered Species**". This document includes a decision matrix listing the 132 conservation practices and indicates when those practices: (1) are not anticipated to have an effect upon listed species ("no effect"), (2) are not likely to adversely affect federally listed species (NLAA), (3) have the potential to have adverse impacts, but impacts can be reduced to the level of "not likely to adversely affect" (NLAA) through the utilization of agreed-upon minimization measures, and (4) may adversely affect federally listed species and require additional consultation on a case-by-case basis. The matrix further identifies practices that would be considered

beneficial to federally listed species. The matrix is ordered alphabetically by conservation practice name and the effects of each practice are shown accordingly.

Current NRCS policy on ESA (General Manual Title 190 Subpart B 410.22) states that when NRCS provides technical assistance in developing, updating, or revising conservation plans for clients, NRCS staffs are to conduct an Environmental Evaluation (EE), paying particular attention to ESA compliance. If the proposed action may affect listed species, NRCS shall provide alternatives that avoid any adverse effects, based on an evaluation of the proposed action using current information such as that found in the document "**NRCS Conservation Practice Effects on Threatened and Endangered Species**." If no alternatives that avoid the effect can be identified, or the client chooses to pursue an alternative that may adversely affect listed/proposed species, NRCS shall terminate technical assistance and inform the client of their potential liabilities for violation of Section 9 (take provision) of the ESA. NRCS will also direct the client to contact the appropriate Service (USFWS or National Marine Fisheries Service) for resolution. Please note that any formal or informal consultation with the USFWS that may identify a client, a species presence or a species habitat location requires written permission from the client. Adverse effects on known state species of concern and candidate species and are to be reduced to the extent practicable and in compliance with State and Federal law. The results of the EE are documented on form CPA-52 Environmental Evaluation Worksheet, and maintained in the NRCS case file.

NRCS conservation programs and technical assistance efforts represent an outstanding opportunity to provide high quality habitat benefits for fish and wildlife and to contribute towards the recovery of many at-risk species. Implementation of conservation measures utilizing the contents of the document "**NRCS Conservation Practice Effects on Threatened and Endangered Species**", as described above, efficiently and effectively provides compliance with the ESA and ensures that considerations for threatened, endangered, and candidate species and their habitats are incorporated into NRCS's conservation planning, technical assistance, and program implementation efforts by utilizing the pre-screening efforts of the (aforementioned) agencies under programmatic ESA consultation. This effort also assists NRCS in meeting its responsibilities under Section 7(a)(1) of the ESA to further the purposes of the ESA by carrying out programs for the conservation of threatened and endangered species. In addition, it is anticipated that the utilization of this matrix will protect and benefit those State listed species that occupy the same or similar habitats as federally listed species.

Key to using the document "**NRCS Conservation Practice Effects on Threatened and Endangered Species**" are several tools that provide detailed species information,

species locations, conservation practice effects on said species, and courses of action for NRCS personnel to ensure ESA compliance. These tools are briefly outlined below.

1) **"Alabama Threatened and Endangered Species Data Set By County"** – This data set provides information on the species that are known to exist or *where suitable habitat exists* within each 12 digit hydrologic unit based on current and/or historical observational or collection records. This data set will be updated on an annual basis or more frequently as needed.

2) **"NRCS Conservation Practice Effects on Threatened and Endangered Species"** – This list provides information on whether a NRCS practice could potentially affect a listed species or its habitat. It also provides a course of action that NRCS personnel must take when an adverse or beneficial effect is indicated. This information will be updated as needed.

3) **"U. S. Fish and Wildlife Service Threatened and Endangered Species Fact Sheets"** – These documents, developed by the USFWS, provide detailed information concerning T & E species life histories, species descriptions, map ranges, and additional information concerning NRCS practices and their potential effects on listed species. Recommendations associated with these fact sheets should be used to determine specific threats to species, the location of particular listed species, and any positive effects that NRCS conservation practices could have on the particular species that would benefit the recovery of the species. Positive recovery efforts could lead to the removal of a species from the Endangered Species List. These fact sheets are currently being developed and will be updated according to changes in USFWS recovery plans, species status, new biological information or other pertinent information.

4) **"Alabama Wildlife, Volumes 1-4"** – This Alabama Department of Conservation and Natural Resources (ALDCNR) publication provides detailed species descriptions, ranges, habitat types, life histories, cause of declines, and conservation management recommendations. This publication should be used to help identify species and their habitat requirements.

We have determined that all 132 of the conservation practices listed in the document "**NRCS Conservation Practice Effects on Threatened and Endangered Species**" will have no effect on 12 federally listed species or their critical habitats, except where wetland restoration may have a beneficial effect on the wood stork and where water quality

practices may improve the recharge area for the Alabama cave fish. For those two specific situations, NLAA-BE would be the correct designation, rather than no effect.

Of the 132 conservation practices mentioned above, we have determined that 33 conservation practices will have no effect on any listed species, while another 14 practices will have either no effect or a beneficial effect, depending upon site specific conditions. With the exception of 14 practices where potential adverse effects and the need for additional consultation have been identified, the remainder of the practices may affect, but are not likely to adversely affect, listed species. Eventually we believe that additional minimization measures can be developed for the 14 practices that may adversely affect listed species or that authorized incidental take may be requested under certain conditions. Of the 132 conservation practices, at least 54 have potential to have beneficial effects upon listed species. This includes 40 practices which are beneficial to listed aquatic species.

Because NRCS provides technical and financial assistance for many conservation measures each year in Alabama, we plan to meet annually with the USFWS and ALDCNR to review and discuss the types of practices funded, any conservation practice updates, the issues encountered while implementing the decision matrix and to verify that the intent of the matrix is being achieved and to identify needs for improvements. At the time of the annual meeting, funded projects for the year will be discussed (particularly water withdrawal projects and stream crossings located in listed aquatic species watersheds). Also at this time, USFWS and ALDCNR will be asked provide information regarding changes to species listings and updates to the GIS dataset for federally listed species and their habitat descriptions, and ALDCNR will be asked to provide updated information on State species of concern.

I believe that we have developed a solid process to ensure the protection, enhancement, and recovery of listed species and ESA compliance for our agency. Therefore, I respectfully request that USFWS concur with the NRCS determination that the conservation practices listed in the document "**NRCS Conservation Practice Effects on Threatened and Endangered Species**" will not affect 12 federally listed species (as described in that document). As to the remaining federally listed species in Alabama (as described in the decision matrix), I request concurrence that 33 conservation practices (as described in that document) will have no effect on listed species, and that the remainder of the conservation practices, as indicated in the matrix, may affect, but are not likely to adversely affect listed species. As described in the document, NRCS will seek additional consultation for implementation any of the 14 practice shown in the matrix to have a "May Affect" determination, as well as any situations where minimization measures to achieve an NLAA determination cannot be applied on a case-

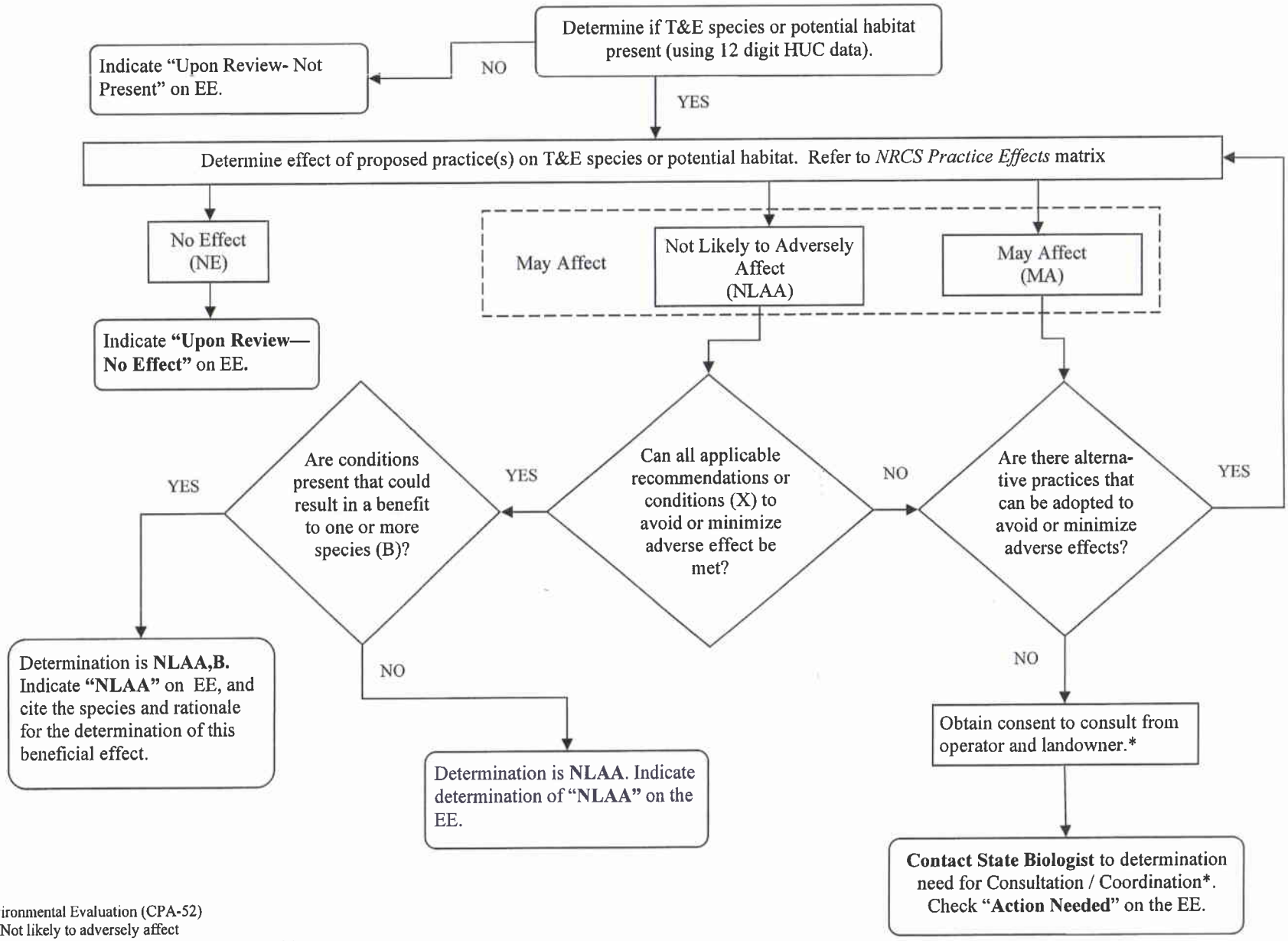
by-case basis. Thank you for your cooperation and partnership with this priority resource endeavor.

WILLIAM E. PUCKETT
State Conservationist

Enclosures

cc:
Corky Pugh, Director, Wildlife and Freshwater Fisheries Division, ALDCNR
Steve Cauthen, Executive Director, Soil & Water Conservation Committee
Leonard Jordan, Regional Conservationist – East Region, Washington, DC
Judy Hill, ASTC FO (North), NRCS, Decatur, AL
Charlie Ramsey, ASTC FO (West), NRCS, Grove Hill, AL
Ben Malone, ASTC FO (Central), NRCS, Bessemer, AL
Richard Collier, ASTC FO (East), NRCS, Troy, AL

# Decision Diagram for Alabama NRCS Practice Effects on Threatened and Endangered Species




Notes
EE - Environmental Evaluation (CPA-52)
NLAA - Not likely to adversely affect
* If operator or landowner refuses to consent to consult/ coordinate, or refuses to follow consultation guidance, discontinue planning.

Alabama NRCS - August 2010

# NRCS Conservation Practice Effects on Federal Threatened & Endangered Species

## USFWS-NRCS Interagency Consultation Matrix

Practice Effect Designations:

NE - No Effect

NLAA - Not Likely to Adversely Affect T&E Species

NLAA,B - Not Likely to Adversely Affect T&E Species (Beneficial Effect)

MA - May Affect T&E Species (**Requires informal or formal consultation with USFWS when T&E species are potentially present or may be impacted**)

Symbol Designations:

N No effect; proceed with practice implementation.

X Refer to the qualifier list for guidance. If implementation of practice avoids all applicable defined condition(s), proceed with practice implementation. If defined condition(s) can not be avoided, contact NRCS Biologist.

B Refer to the qualifier list for guidance. If implementation of practice meets defined condition(s), practice implementation should produce a benefit to T&E Species and their habitat.

C Consult; refer to NRCS Biologist. NRCS Biologist will work with D.C. to conduct habitat assessment. NRCS Biologist will contact USFWS if formal or informal consultation is required. DO NOT proceed with practice implementation without concurrence of NRCS Biologist.

This matrix will be used to assist in making planning decisions regarding federally listed threatened and endangered species. Refer to Section IV of the eFOTG for detailed standards and specifications for the practices listed within the table. Some practices have the potential to Adversely Affect or have a Beneficial Effect dependent upon where, when and how practice installation occurs. In the event that a practice has a C (MA) and a B (NLAA,B) designation, the C designation takes precedence. Practice implementation should not begin until consultation has occurred. Similarly, if a practice has both an X (NLAA) and a B (NLAA,B) designation, the X takes precedence. Practice implementation should not begin unless the condition defined by the X designation is avoided or the NRCS Biologist authorizes implementation.

Review the practice conditions established for each practice as well as the practice standard in the eFOTG carefully before making a decision to proceed with installation.

***Note: Any formal or informal consultation with USFWS that may identify a client and/or the specific location of a species or a species habitat requires written permission from the client to release confidential information. This can be accomplished by having the client provide a signed letter or by submitting the Authorization for Release of Records document.***

# NRCS Conservation Practice Effects on Federal Threatened Endangered Species - **8-05-2010**

| Code | Practice | Unit | Practice Effects | | | | Comments |
|---|---|---|---|---|---|---|---|
| | | | NE | NLAA | MA | NLAA,B | |
| 472 | Access Control | ac | | $X^{Gen}$,$X^{AQ2}$,$X^{GT2}$,$X^{Bat}$ | | $B^{AQ1}$ | |
| 560 | Access Road | ft | | $X^{Gen}$, $X^{Plant}$,$X^{GT1}$,$X^{AQ1}$ | | | |
| 702 | Agrichemical Handling Facility | no | N | | | | |
| 591 | Amendments for the Treatment of Agricultural Waste | ani unt | N | | | | |
| 365 | Anaerobic Digester - Ambient Temperature | no | N | | | | |
| 366 | Anaerobic Digester - Controlled Temperature | no | N | | | | |
| 316 | Animal Mortality Facility | no | | $X^{Gen}$,$X^{Plant}$ | | | |
| 575 | Animal Trails and Walkways | ft | | $X^{Gen}$,$X^{Plant}$ | | $B^{AQ2}$ | |
| 450 | Anionic Polyacrylamide (PAM) Erosion Control | ac | | $X^{Gen}$ | | | |
| 397 | Aquaculture Ponds | ac | | | C | | |
| 310 | Bedding | ac | N | $X^{Gen}$,$X^{Plant}$ | | | No effect on cropland. NLAA on other land uses. If practice increases runoff or erosion to streams, also see $X^{AQ2}$ and insure adequate outlets and filtering protect aquatic resources. |
| 314 | Brush Management | ac | | $X^{Gen}$,$X^{Plant}$,$X^{AQ2}$,$X^{AQ3}$,$X^{GT2}$,$X^{Bat}$,$X^{RCW1}$,$X^{RHS}$ | | | |
| 584 | Channel Stabilization | ft | | | C | | |
| 326 | Clearing and Snagging | ft | | | C | | |
| 360 | Closure of Waste Impoundment | no | N | | | | |
| 317 | Composting Facility | no | N | | | | |
| 327 | Conservation Cover | ac | N | | | $B^{Gen}$, $B^{AQ2}$ | Beneficial if improves habitat for any listed species or if adjacent to stream, otherwise NE. |
| 328 | Conservation Crop Rotation | ac | N | | | | |

NRCS Conservation Practice Effects on Federal Threatened Endangered Species - **8-05-2010**

| Code | Practice | Unit | Practice Effects | | | | Comments |
|---|---|---|---|---|---|---|---|
| | | | NE | NLAA | MA | NLAA,B | |
| 656 | Constructed Wetland | ac | | $X^{Gen}, X^{Plant}$ | | $B^{AQ2}$ | |
| 332 | Contour Buffer Strips | ac | N | | | $B^{AQ2}$ | Beneficial to water quality (thus aquatic species), otherwise NE |
| 330 | Contour Farming | ac | N | | | $B^{AQ2}$ | Beneficial if installed on existing cropland or grazingland adjacent to stream, otherwise NE. |
| 331 | Contour Orchard and Other Fruit Area | ac | N | | | | |
| 340 | Cover Crop | ac | N | | | | |
| 342 | Critical Area Planting | ac | N | | | $B^{AQ1}$ | Beneficial to aquatics if reduces sedimentation, otherwise NE. |
| 402 | Dam | ac-ft | | | C | | |
| 348 | Dam, Diversion | no | | | C | | |
| 324 | Deep Tillage | ac | N | $X^{Gen}, X^{Plant}$ | | | NE on previously disturbed land, otherwise NLAA |
| 356 | Dike | ft | | $X^{Gen}, X^{Plant}, X^{SWD}$ | | $B^{AQ2}$ | Beneficial if installed on existing cropland or grazingland adjacent to stream, otherwise NLAA. |
| 362 | Diversion | ft | | $X^{Gen}, X^{Plant}$ | | $B^{AQ2}$ | Beneficial if installed on existing cropland or grazingland adjacent to stream, otherwise NLAA. |
| 554 | Drainage Water Management | ac | N | | | $B^{AQ2}$ | Beneficial if improves water quality or quantity for aquatic species, otherwise NE. |
| 432 | Dry Hydrant | no | | $X^{Gen}, X^{Plant}, X^{AQ3}$ | | | |
| 647 | Early Successional Habitat Development/Management | ac | N | | | $B^{GT}$ | Beneficial for gopher tortoise (where listed), otherwise NE. |
| 382 | Fence | ft | | $X^{Gen}, X^{AQ2}, X^{AQ3}, X^{GT2}$ | | | If mechanized clearing is involved, also see $X^{Plant}$ and $X^{Bat.}$ |
| 386 | Field Border | ac | | $X^{Gen}, X^{Plant}$ | | $B^{AQ2}$ | Beneficial if directly adjacent to streams |
| 393 | Filter Strip | ac | | $X^{Gen}, X^{Plant}$ | | $B^{AQ2}$ | Beneficial if directly adjacent to streams |
| 394 | Firebreak | ft | | $X^{Gen}, X^{Plant}, X^{AQ2}, X^{AQ3}, X^{GT2}, X^{Bat}$ | | | |
| 398 | Fish Raceway or Tank | ft | | | C | | |

# NRCS Conservation Practice Effects on Federal Threatened Endangered Species - **8-05-2010**

| Code | Practice | Unit | Practice Effects | | | | Comments |
|---|---|---|---|---|---|---|---|
| | | | NE | NLAA | MA | NLAA,B | |
| 399 | Fishpond Management | no | N | | | | |
| 511 | Forage Harvest Management | ac | N | | | | |
| 384 | Forest Slash Treatment | ac | | $X^{Gen}, X^{Plant}, X^{AQ2}, X^{AQ3}, X^{GT2}, X^{Bat}$ | | | |
| 666 | Forest Stand Improvement | ac | | $X^{Gen}, X^{Plant}, X^{AQ2}, X^{AQ3}, X^{GT2}, X^{Bat}, X^{RCW1}, X^{RHS}$ | | $B^{Chaff}$ | |
| 655 | Forest Trails and Landings | ac | N | $X^{Gen}, X^{Plant}, X^{GT1}, X^{AQ1}$ | | | NE if improvements are made to address resource concerns on existing trails and landings (e.g., installation of erosion and sediment control measures) AND not in GT or listed plant habitat. |
| 383 | Fuel Break | ac | | $X^{Gen}, X^{Plant}, X^{AQ2}, X^{AQ3}, X^{GT2}, X^{Bat}$ | | | |
| 410 | Grade Stabilization Structure | no | | $X^{Gen}, X^{Plant}$ | | $B^{AQ1}$ | |
| 412 | Grassed Waterway | ac | N | | | $B^{AQ1}$ | Beneficial to aquatics if reduces runoff and/or sedimentation, otherwise NE. |
| 561 | Heavy Use Area Protection | ac | | $X^{Gen}, X^{Plant}$ | | | If adjacent to a stream, see effects listed for Stream Crossing. |
| 422 | Hedgerow Planting | ft | | $X^{Gen}$ | | | If within SMZ, see effects listed for Forest Stand Improvement. |
| 320 | Irrigation Canal or Lateral | ft | | | C | | |
| 388 | Irrigation Field Ditch | ft | | | C | | |
| 464 | Irrigation Land Leveling | ac | | $X^{Gen}, X^{Plant}$ | | | |
| 552 | Irrigation or Regulating Reservoir | no | | $X^{Gen}, X^{AQ1}, X^{GT1}, X^{SWD}$ | | | |
| 436 | Irrigation Storage Reservoir | ac-ft | | $X^{Gen}, X^{AQ1}, X^{GT1}, X^{SWD}$ | | | |
| 441 | Irrigation System, Microirrigation | ac | N | | | | |
| 442 | Irrigation System, Sprinkler | ac | N | | | | |
| 443 | Irrigation System, Surface and Subsurface | ac | N | | | | |

NRCS Conservation Practice Effects on Federal Threatened Endangered Species - **8-05-2010**

| Code | Practice | Unit | Practice Effects | | | | Comments |
|---|---|---|---|---|---|---|---|
| | | | NE | NLAA | MA | NLAA,B | |
| 447 | Irrigation System, Tailwater Recovery | no | N | | | | |
| 428 | Irrigation Water Conveyance, Ditch & Canal Lining | ft | N | | | | |
| 430 | Irrigation Water Conveyance, Pipeline | ft | | $X^{AQ4}$ | | | If pipeline crosses a stream, contact NRCS Biologist to determine if consultation is necessary. |
| 449 | Irrigation Water Management | ac | N | | | | |
| 460 | Land Clearing | ac | | $X^{Gen}$,$X^{Plant}$,$X^{GT1}$,$X^{AQ2}$ | | $B^{Gen}$ | Beneficial if results in rehabilitation of a glade or other sensitive habitats. |
| 453 | Land Reclamation, Landslide Treatment | ac | | | C | | |
| 455 | Land Reclamation, Toxic Discharge Control | no | | $X^{Gen}$,$X^{Plant}$ | | $B^{AQ2}$ | |
| 543 | Land Reconstruction, Abandoned Mined Land | ac | | $X^{Gen}$,$X^{Plant}$ | | $B^{AQ2}$ | |
| 544 | Land Reconstruction, Currently Mined Land | ac | | $X^{Gen}$,$X^{Plant}$ | | $B^{AQ2}$ | |
| 466 | Land Smoothing | ac | N | | | | |
| 468 | Lined Waterway or Outlet | ft | | $X^{Gen}$,$X^{Plant}$ | | $B^{AQ1}$ | |
| 717 | Livestock Shade Structure | no | N | | | | |
| 634 | Manure Transfer | no | N | | | | |
| 457 | Mine Shaft and Adit Closing | no | | | C | | |
| 353 | Monitoring Well | no | N | | | | |
| 484 | Mulching | ac | N | | | | |
| 590 | Nutrient Management | ac | | $X^{Gen}$ | | $B^{AQ2}$ | |
| 500 | Obstruction Removal | ac | | $X^{Gen}$ | | | |
| 582 | Open Channel | ft | | | C | | |
| 512 | Pasture and Hay Planting | ac | N | | | $B^{AQ1}$ | Beneficial to aquatics if reduces runoff and/or sedimentation, otherwise NE. |

NRCS Conservation Practice Effects on Federal Threatened Endangered Species - **8-05-2010**

| Code | Practice | Unit | Practice Effects | | | | Comments |
|---|---|---|---|---|---|---|---|
| | | | NE | NLAA | MA | NLAA,B | |
| 595 | Pest Management (also includes Herbaceous Weed Control Conservation Practice) | ac | | $X^{Gen}, X^{Plant}, X^{AQ1}, X^{FWS}, X^{RHS}, X^{Bat}$ | | $B^{Inv}$ | Contact the NRCS Biologist if Windows Pesticide Screening Tool (WIN-PST) results are Intermediate or High. Application within 50 feet of a stream with listed T&E will be hand applied by spot treatment. |
| 516 | Pipeline | ft | | $X^{Gen}, X^{Plant}, X^{AQ4}$ | | | If pipeline crosses a stream, contact NRCS Biologist to determine if consultation is necessary. |
| 378 | Pond | no | | $X^{Gen}, X^{AQ1}, X^{GT1}, X^{SWD}$ | | $B^{AQ2}$ | Benefits to aquatics apply if pond use results in stream exclusion. |
| 379 | Pond Sealing or Lining | no | N | | | | |
| 462 | Precision Land Forming | ac | N | | | | |
| 338 | Prescribed Burning | ac | | $X^{RCW2}, X^{RT}$ | | $B^{Gen}, B^{GT}$ | Beneficial due to improved habitat. For Relict Trillium, avoid spring burns. |
| 528 | Prescribed Grazing | ac | N | | | $B^{AQ2}$ | Beneficial to aquatics if improved water quality, otherwise, NE |
| 533 | Pumping Plant | no | | $X^{AQ1}, X^{Plant}$ | | $B^{AQ2}$ | Contact State Biologist to determine if consultation is necessary. Can be beneficial to aquatics if replacing a surface water withdrawal at critical times. |
| 562 | Recreation Area Improvement | ac | N | | | | |
| 566 | Recreation Land Grading and Shaping | ac | | $X^{Gen}, X^{Plant}$ | | | |
| 568 | Recreation Trail and Walkway | ft | | $X^{Gen}, X^{Plant}$ | | $B^{Gen}$ | Beneficial if control of traffic improves habitat. |
| 345 | Residue and Tillage Management, Mulch Till | ac | N | | | $B^{AQ2}$ | Beneficial to aquatics if improved water quality, otherwise NE. |
| 329 | Residue and Tillage Management, No-Till/Strip Till/Direct Seed | ac | N | | | $B^{AQ2}$ | Beneficial to aquatics if improved water quality, otherwise NE. |
| 346 | Residue and Tillage Management, Ridge Till | ac | N | | | $B^{AQ2}$ | Beneficial to aquatics if improved water quality, otherwise NE. |

NRCS Conservation Practice Effects on Federal Threatened Endangered Species - **8-05-2010**

| Code | Practice | Unit | Practice Effects | | | | Comments |
|---|---|---|---|---|---|---|---|
| | | | NE | NLAA | MA | NLAA,B | |
| 344 | Residue Management, Seasonal | ac | N | | | $B^{AQ2}$ | Beneficial to aquatics if improved water quality, otherwise NE. |
| 643 | Restoration and Management of Declining Habitats | ac | | $X^{Gen}$,$X^{Plant}$ | | $B^{Gen}$ | Avoid heavy equipment operation in known occupied habitats - use hand planting. Beneficial if avoiding known plant locations and creating new forested habitats on previously disturbed agricultural lands. |
| 391 | Riparian Forest Buffer | ac | | | | $B^{Gen}$ | Beneficial for aquatics (water quality, habitat) and bats (foraging habitat) |
| 558 | Roof Runoff Structure | no | N | | | | |
| 557 | Row Arrangement | ac | N | | | | |
| 570 | Runoff Management System | ac | N | | | $B^{AQ2}$ | Beneficial to aquatics if improved water quality, otherwise NE. |
| 798 | Seasonal High Tunnel System for Crops, Interim | no | N | $X^{Gen}$,$X^{Plant}$ | | | No effect on existing crop land. NLAA on other land uses. |
| 350 | Sediment Basin | no | | $X^{Gen}$,$X^{Plant}$ | | $B^{AQ2}$ | |
| 646 | Shallow Water Management for Wildlife | ac | | $X^{SWD}$ | | | |
| 381 | Silvopasture Establishment | ac | N | $X^{Gen}$,$X^{Plant}$,$X^{AQ3}$,$X^{GT1}$ | | | NE if cropland conversion to silvopasture, otherwise NLAA |
| 632 | Solid/Liquid Waste Separation Facility | no | N | | | | |
| 572 | Spoil Spreading | ac | | $X^{Gen}$,$X^{Plant}$ | | | |
| 574 | Spring Development | no | | $X^{Gen}$,$X^{Plant}$ | | $B^{AQ2}$ | Benefits to aquatics apply if this practice results in stream exclusion. |
| 578 | Stream Crossing | no | | | C | $B^{AQ2}$ | Benefits to aquatics apply if this practice results in stream exclusion. |
| 395 | Stream Habitat Improvement and Management | ac | | | C | $B^{Gen}$ | Benefits wetland dependent species in addition to aquatics. |
| 580 | Streambank and Shoreline Protection | ft | | | C | $B^{AQ1}$ | |
| 585 | Stripcropping | ac | N | | | | |
| 587 | Structure for Water Control | no | | $X^{Gen}$,$X^{Plant}$ | | $B^{Bird}$ | |

NRCS Conservation Practice Effects on Federal Threatened Endangered Species - **8-05-2010**

| Code | Practice | Unit | Practice Effects | | | | Comments |
|---|---|---|---|---|---|---|---|
| | | | NE | NLAA | MA | NLAA,B | |
| 606 | Subsurface Drain | ft | | $X^{Gen}, X^{Plant}$ | | | |
| 607 | Surface Drainage, Field Ditch | ft | | $X^{Gen}, X^{Plant}$ | | | |
| 608 | Surface Drainage, Main or Lateral | ft | | $X^{Gen}, X^{Plant}$ | | | |
| 600 | Terrace | ft | | $X^{Gen}, X^{Plant}$ | | $B^{AQ1}$ | |
| 612 | Tree/Shrub Establishment | ac | N | $X^{Gen}, X^{Plant}, X^{AQ2}, X^{AQ3}, X^{GT2}$ | | $B^{Plant}$ | No effect on existing crop or pasture land, otherwise, NLAA. |
| 660 | Tree/Shrub Pruning | ac | N | | | | |
| 490 | Tree/Shrub Site Preparation | ac | N | $X^{Gen}, X^{Plant}, X^{AQ2}, X^{AQ3}, X^{GT2}, X^{Bat}$ | | | No effect on existing crop or pasture land, otherwise, NLAA. |
| 620 | Underground Outlet | ft | | $X^{Gen}, X^{Plant}$ | | | |
| 645 | Upland Wildlife Habitat Management | ac | | $X^{Gen}, X^{AQ2}, X^{Bat}, X^{RCW1}$ | | $B^{Inv}$ | |
| 367 | Waste Facility Cover | no | N | | | | |
| 749 | Waste Field Storage Area | no | N | | | | |
| 313 | Waste Storage Facility | no | | $X^{Gen}, X^{Plant}$ | | $B^{AQ2}$ | |
| 629 | Waste Treatment | no | | $X^{Gen}, X^{Plant}$ | | $B^{AQ2}$ | |
| 359 | Waste Treatment Lagoon | no | | $X^{Gen}, X^{Plant}$ | | $B^{AQ2}$ | |
| 633 | Waste Utilization | ac | | $X^{Gen}, X^{Plant}$ | | | |
| 635 | Wastewater Treatment Strip | ac | | $X^{Gen}, X^{Plant}$ | | $B^{AQ1}$ | |
| 638 | Water and Sediment Control Basin | no | | $X^{Gen}, X^{Plant}$ | | $B^{AQ1}$ | |
| 642 | Water Well | no | | $X^{Gen}, X^{Plant}$ | | $B^{AQ2}$ | Benefits to aquatics apply if this practice results in stream exclusion. |
| 614 | Watering Facility | no | | $X^{Gen}, X^{Plant}$ | | $B^{AQ2}$ | Benefits to aquatics apply if this practice results in stream exclusion. |
| 351 | Well Decommissioning | no | N | | | | |
| 658 | Wetland Creation | ac | | $X^{Gen}, X^{Plant}$ | | $B^{Gen}$ | |
| 659 | Wetland Enhancement | ac | | $X^{Gen}, X^{Plant}$ | | $B^{Gen}$ | |
| 657 | Wetland Restoration | ac | | $X^{Gen}, X^{Plant}$ | | $B^{Gen}$ | |

NRCS Conservation Practice Effects on Federal Threatened Endangered Species - **8-05-2010**

| Code | Practice | Unit | Practice Effects | | | | Comments |
|---|---|---|---|---|---|---|---|
| | | | NE | NLAA | MA | NLAA,B | |
| 644 | Wetland Wildlife Habitat Management | ac | | $X^{Gen}$,$X^{Plant}$ | | $B^{Gen}$ | |

Practice Effect Designations:

**NE** – No Effect

**NLAA** – Not Likely to Adversely Affect T&E Species

**MA** – May Affect T&E Species **(Requires informal or formal consultation with USFWS when T&E species are potentially present or may be impacted)**

**NLAA,B** – Not Likely to Adversely Affect T&E Species (Beneficial Effect)

**Exceptions:**

- Species not affected by installation of the above conservation practices ( **No Effect**): Alabama beach mouse, Alabama streak-sorus fern, American hart's tongue fern, Florida Manatee, Green sea turtle, Kemp's ridley sea turtle, Loggerhead sea turtle, Perdido Key beach mouse, Piping plover, and Pygmy sculpin.
- Species either not affected by or beneficial effect from installation of the above conservation practices : Alabama cave fish - **No Effect**, except where conservation practices improve water quality in the recharge area, then **NLAA,B**; Wood stork - **No Effect**, except where Wetland Restoration is implemented, then **NLAA,B.**

**In General, practices are not likely to adversely affect (NLAA) threatened and endangered species WHEN:**

- planned for:
  > mines,
  > cropland already or "recently" producing an agricultural commodity
  > existing confined animal operations
  >existing orchards, nurseries and groves
  > actively managed pastureland or hayland planted to introduced forage species
- land already developed for commercial or residential purposes
- repair of recently damaged existing facilities/structures
- planned area is isolated from existing water bodies and wetlands, AND there are no off-site or indirect effects, including no measurable change in hydrology as a result of practice implementation.

| NLAA Practice Implementation Qualifiers (Where an adverse effect can not be avoided or minimized, contact NRCS Biologist.) | |
|---|---|
| $X^{Gen}$ | If the practice will be placed in a habitat type where a threatened or endangered species may reside, further investigation is required . Review the Sensitive Habitat Fact Sheet, then make a visual observation of the area to determine if the species or habitat for the species exists. **Examples include**: Avoid ground disturbing activities within Red Hills Salamander habitat. Avoid altering hydrology of ephemeral drains (avoid logging during wet weather) within the FWS habitat. |
| $X^{Plant}$ | If the practice will be placed in a habitat type where a threatened or endangered species may reside AND if disturbance of native vegetation (changing landuse, herbicide application, earthmoving, soil disturbance, etc.) is involved in the installation of this practice, further investigation is required . Review the Sensitive Habitat Fact Sheet and plant fact sheets. Make a visual observation of the area to determine if the species or habitat for the species exists. |
| $X^{AQ1}$ | If the practice will be placed within 50 feet of a stream within a 12-digit HUC containing T&E aquatic species, further investigation is required. Increase buffer distance as needed to maintain the ecological and structural integrity of the riparian buffer and stream bank. |
| $X^{AQ2}$ | No mechanized clearing within 50 feet of streams. Hand clearing, hand rake, hack and squirt, etc., are allowed. Increase buffer distance as needed to maintain the ecological and structural integrity of the riparian buffer and stream bank. |
| $X^{AQ3}$ | Aquatics - Avoid conditions causing erosion and sedimentation into streams. |
| $X^{AQ4}$ | Avoid crossing streams with this practice. |
| $X^{Bat}$ | Avoid disturbance of foraging areas near caves by adhering to an activity buffer distance of 200 feet radius from the cave entrance (for example, use of machinery, building of roads, application of pesticides, etc.). Maintain snags within 1/2 mile radius of cave entrances. |
| $X^{FWS}$ | Apply herbicides only during dry periods. |
| $X^{GT1}$ | Where the use of heavy equipment can not be avoided, use a 25 foot buffer around each gopher tortoise burrow. Site staging areas away from burrows. |
| $X^{GT2}$ | The practice should allow dispersal and movement to at least 2.5 acres of GT foraging habitat per burrow. When fencing is used for large animals, typical fencing = minimum 30 cm (11.81 inches) clearance from ground, electric fencing = 40 cm (15.75 inches) clearance from the ground, woven fencing = 30 cm x 30 cm hole every 100 ft. When fencing for *small animals* , e.g., goats, avoid fencing in GT burrows. |
| $X^{RCW1}$ | Do not remove southern yellow pine tree species greater than or equal to 10" DBH in a pine-dominated stand located where there exists a current populations of Red-Cockaded woodpeckers or RCW cavity trees. |
| $X^{RCW2}$ | RCW cavity trees will be protected by a variety of methods, including employing small preparation burns around cavity trees, raking fuels away from the base of the tree, mowing, weed whipping (use of a "weed whacker" as a low impact alternative) and the use of wet lines (a temporary fireguard created created by wetting vegetation adjacent to the fuel to be ignited). Be aware that heavy machinery can compact soils and damage tree roots; therefore, avoid repeated mowing and use of heavy equipment. |
| $X^{RHS}$ | In Red Hills Salamander habitat, use hand treatments such as hack and squirt, for herbicide applications. |
| $X^{RT}$ | In Relict Trillium habitat, avoid burning in spring. |
| $X^{SWD}$ | Avoid low-lying areas directly adjacent to flowing waterbodies. This includes areas in Madsion, Limestone, and Lauderdale counties that contain shallow sink holes, wide-shallow depressions (including fields and open pasture) that are seasonly wet or may only receive water during high flow events, and perenially wet seeps. During the winter/early spring, slack water darter's migrate up small 1st and 2nd order streams and spawn directly in these areas over vegetation such as, Juncus, Eleocharis, fescue, and water-star-wort. These spawning areas can range from relatively small areas (<1/4 acre) to several acres. |

| NLAA Practice Implementation Qualifiers<br>(If the conditions of the scenarios are met, a benefit to T&E species and their habitat will result.) | |
|---|---|
| $B^{Gen}$ | Beneficial if T&E species are present within the planning unit and practice provides and/or improves habitat for listed species. **Examples include:** Wood Stork benefited by creation/restoration of wetlands. |
| $B^{Plant}$ | Beneficial if avoiding known plant locations and/or creating new forested habitats on previously disturbed agricultural lands. |
| $B^{AQ1}$ | If practice implementation minimizes runoff and/or sedimentation into a stream within a 12-digit HUC containing T&E aquatic species. |
| $B^{AQ2}$ | If this practice improves water quality and/or quantity, then this practice is Beneficial for aquatic species. |
| $B^{Bird}$ | Beneficial if managed to facilitate use by listed birds. |
| $B^{Chaff}$ | American chaffseed - beneficial effect from opening canopy. |
| $B^{GT}$ | Beneficial for gopher tortoise due to improved forage when ag lands converted to native species or other management activities that improve gopher tortoise habitat. |
| $B^{Inv}$ | Beneficial when improving habitat through treatment of invasive species. Includes plants and animals (such as feral hogs). |

**Summary of Abbreviations**

**AQ** Aquatic species - fish, mussels, snails
**Bat** Listed Bats
**Bird** Listed Birds
**Chaff** American Cahffseed
**FWS** Flatwoods Salamander
**Gen** General - refers to any species that is likely to occur in a sensitive habitat area
**GT** Gopher Tortoise
**Inv** Invasive plants and animals
**Plant** Listed plants
**RHS** Red Hills Salamander
**RT** Relict Trillium
**SWD** Slack Water Darter

**Sensitive Habitat Fact Sheet**

# Bogs & seepage

Seeps in Ridge & Valley and Appalachians, bogs in Coastal Plain. Maintained by seeps and/or perched water tables. Wetland plants, saturated soil, shallow water.

**Avoid:**

- Construction in native ground cover
- Heavy equipment without large tracks
- Drainage
- Fire suppression
- Grazing
- Conversion to ponds

**Beneficial activities:**

- Burning
- Hydrologic restoration
- Woody and invasive control

**Species:**

- Green pitcher plant
- Alabama canebrake pitcher plant
- Flatwoods salamander
- Tennessee yellow-eyed grass
- White fringeless orchid
- Pondberry
- Alabama leather flower

# Caves

**Avoid:**

- Contamination of groundwater source
- Tree clearing near cave opening

**Beneficial activities:**

- Restore vegetative buffer near cave
- Install gates if trespass is an issue and bats are known to inhabit cave

**T & E species**

- Gray bat
- Indiana bat
- Alabama cave shrimp
- Alabama cavefish

**Sensitive Habitat Fact Sheet**

# Isolated wetlands

Permanently or intermittently wet areas not drained by streams. Can be abandoned floodplains or shallow depressions fed by precipitation. Generally dry at some point, and do not support fish.

**Avoid:**

- Filling
- Draining
- Deepening to hold fish
- Excessive machinery

**Beneficial activities:**

- Restore vegetative buffers
- Fill ditches draining wetlands
- Dig out formerly shallow water areas

**T & E species**

- Wood stork
- Flatwoods salamander
- Eastern indigo snake
- Pondberry

# Glades & prairies

Glades and prairies are treeless. Glades, or barrens, have thin soils and are commonly found on rocky outcrops. Prairies have deeper black soil, warm season grasses and forbs, and are mainly in the Blackbelt region

**Avoid**

- Fragmentation
- Conversion of native cover to cool season pasture

**Beneficial**

- Eliminate exotic vegetation
- Burn
- Plant native vegetation

**T & E species**

- Leafy prairie-clover
- Mohr's Barbara's buttons
- Georgia aster
- Whorled sunflower
- Lyrate bladder-pod
- Fleshyfruit gladecress
- Georgia rockcress

# Gray Bat

*Myotis grisescens*

## I. Species Summary

The gray bat is federally listed as 'endangered' (USFWS 1976). It can be found throughout 15 states in the central and eastern United States (USFWS 2016). Habitat destruction, modification, or curtailment of its habitat or range are the primary causes of the decline of the species. Anthropogenic disturbances also include cave flooding and commercial gates (KDFW 2014). However, white-nose syndrome, which is caused by the fungus *Pseudogymnoascus destructans* has greatly impacted populations in the Northeast United State and continues to be detected east of the Mississippi River (USFWS 2016). The U.S. Fish and Wildlife Service (USFWS) species profile for the gray bat can be found at https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=A04J. A summary of the ecology of this species can be found in the USFWS gray bat recovery plan (USFWS 1982) and the most recent 5-year review (USFWS 2009).

## II. Biological Information

The gray bat is a medium-sized species with a forearm length of 1.5 to 1.8 inches (4 to 4.7 centimeters) and a wingspan approximately 10 to 11 inches (27.5 to 30 centimeters) that weighs 0.24 to 0.56 ounces (7 to 16 grams). The gray bat can be distinguished from other *Myotis* spp. by the uniform color of its dorsal fur, in which hair shafts are gray from base to tip; dark ears that are usually black and longer than in any other *Myotis* spp.; a wing membrane that attaches at the ankle of the foot instead of at the base of the toes; and a notch in the claws of its hind feet (Photos 1 and 2) (USFWS 1982, USFWS 2009).

***Photos 1 and 2.*** *Gray bat (Ann Froschauer, USFWS; Adam Mann, Environmental Solutions and Innovations)*

Breeding begins in the fall when the male gray bats arrive at hibernacula. Females enter hibernation first, immediately following copulation (typically in September or October). They do not become pregnant until emergence from hibernation in late March or early April; this is termed *delayed fertilization*. Males may remain active until mid-November before entering hibernation (USFWS 1982, USFWS 2009).

In late May or early June pregnant females give birth to a single pup that is capable of flight within 20 to 25 days (USFWS 2014). Newborn young weigh approximately one-third of their mother's weight. In summer, female gray bats form maternity colonies of a few hundred to many thousands of individuals. Nursery colonies typically form on domed ceilings of caves that are capable of trapping the combined body heat from clustered individuals and where the temperature ranges between 57 and 77 degrees Fahrenheit (°F) (USFWS 2009). Females typically do not give birth until their second year of growth (USFWS 1982, USFWS 2009). The maximum life span of this species is approximately 14 to 15 years (USFWS 2014).

Gray bats emerge at night to forage in forested areas along banks of streams and lakes; they are highly dependent on aquatic insects, especially mayflies, caddisflies, stoneflies beetles, and moths (USFWS 2009).

**III. Suitable Habitat**

With rare exceptions, gray bats live in caves year-round. In winter, gray bats hibernate in deep vertical caves that trap large volumes of cold air (Photo 3). The species typically forms large clusters with some in the hundreds of thousands of individuals. The caves the species chooses as hibernaculum often have multiple entrances, good air flow, and temperatures of approximately 41 to 48 °F (USFWS 2009).

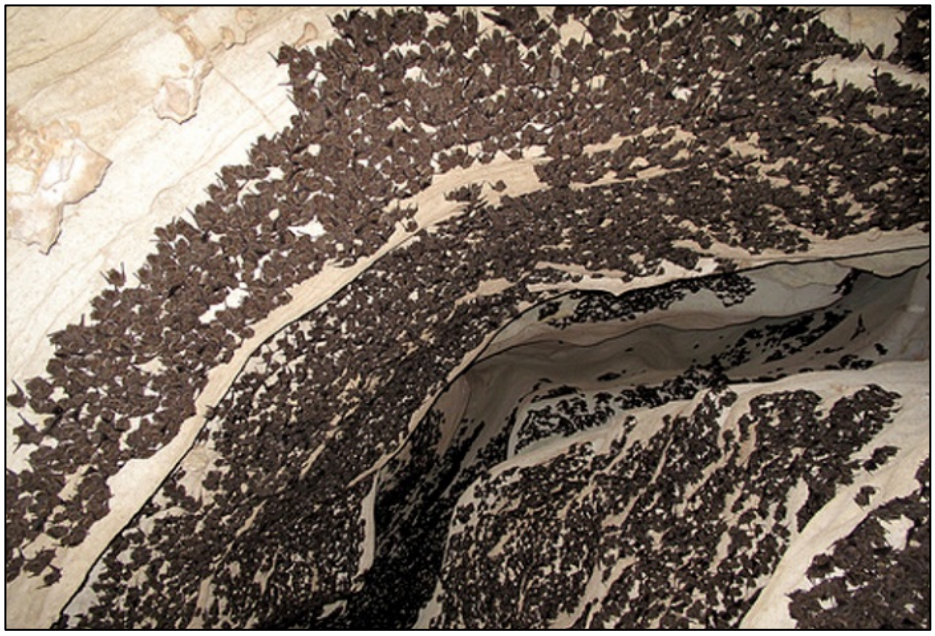


***Photo 3.*** *Gray bats are summer and winter cave dwellers (USFWS)*

In the summer, gray bats roost in limestone karst caves scattered along rivers. Foraging areas are strongly correlated with the open water of rivers, streams, lakes, or reservoirs. Gray bats have been documented living in bridges and culverts as well as using them for maternity roosts (Keeley and Tuttle 1999). Although the species might travel up to 21 miles between prime feeding areas over lakes or rivers, most maternity colonies are usually located 0.6 to 2.5 miles from foraging locations. Newly volant gray bats travel up to 4 miles between roost caves and foraging areas. Gray bats generally return to the same summering and wintering sites; however, males and yearling females seem less restricted to specific cave and roost locations (USFWS 1982, 2009).

Transportation projects that include bridges and culverts could be suitable roosting habitat (refer to Appendix D).

The gray bat is known to or believed to occur in 31 counties in Alabama (Table 1). In the Florida Panhandle the gray bat is currently only known or believed to occur in Jackson County.

***Table 1**. Alabama Counties in which the gray bat is known to or believed to occur (USFWS 2018). See consultation zones for full details (Appendix A).*

| | | | | |
|---|---|---|---|---|
| Bibb | Colbert | Etowah | Limestone | Talladega |
| Blount | Conecuh | Franklin | Madison | Tuscaloosa |
| Calhoun | Coosa | Hale | Marion | Winston |
| Cherokee | Covington | Jackson | Marshall | |
| Chilton | Cullman | Jefferson | Morgan | |
| Clay | DeKalb | Lauderdale | St. Clair | |
| Cleburne | Escambia | Lawrence | Shelby | |

Table A-1 in Appendix A provides a list of subwatersheds (HUC12) included in the gray bat consultation zone in Alabama. Table A-2 in Appendix A provides a list of subwatersheds (HUC12) included in the gray bat consultation zone in the Florida Panhandle.

No critical habitat has been designated for this species.

**IV. Determination**

For species occurring in Alabama, reference the 12-digit HUC layer in KML format provided on an annual basis by FWS Daphne Field Office.

For Florida species, refer to the "Resources at Risk" file provided by the FWS Panama City Field Office.

See Appendix A for the gray bats' consultation zone maps in Alabama and the Florida Panhandle.

See Appendix B for the gray bats' Effects Determination Key.

**V. Conservation Recommendations**

Conservation recommendations for the gray bat can be found in Appendix C. These recommendations are optional and if implemented would support the agency's goals toward recovery. These recommendations are to be used at the discretion of the permittee.

**VI. Geographic Information System Data**

The USFWS Daphne Field Office maintains geographic information system (GIS) data for the gray bat in Alabama. GIS data for the gray bat in the Florida Panhandle are maintained at the USFWS Panama City Field Office.

## LITERATURE CITED

KDFW (Kentucky Department of Fish and Wildlife Resources). 2014. Gray Bat (*Myotis grisescens*). Kentucky Department of Fish and Wildlife Resources, Frankfort, KY. http://fw.ky.gov/Wildlife/Pages/Gray-Bat.aspx.

Keeley, Brian M. and Merlin D. Tuttle. 1999. Bats in American Bridges. Bat Conservation International, Inc. Resource Publication No. 4, Austin, TX.

MMNS (Mississippi Museum of Natural Science). 2014. Endangered Species of Mississippi. Mississippi Department of Wildlife, Fisheries, and Parks and Mississippi Museum of Natural Science, Jackson, MS.

MSU (Mississippi State University Extension) 2015. Bats enjoy the night life in Mississippi. MSU Forest and Wildlife Research Center, Mississippi State University, Starkville, Mississippi. Accessed February 2017. http://extension.msstate.edu/news/extension-outdoors/2015/bats-enjoy-the-night-life-mississippi.

USFWS. 1976. Determination that Two Species of Butterflies are Threatened Species and Two Species of Mammals are Endangered Species. *Federal Register Volume 41, Number 83, pages 17736–17740, April 28, 1976.*

USFWS. 1982. Gray Bat (*Myotis grisescens*) Recovery Plan. U.S. Fish and Wildlife Service, Denver, CO. https://ecos.fws.gov/docs/recovery_plan/820701.pdf.

USFWS. 2009. Gray Bat (*Myotis grisescens*) 5-Year Review: Summary and Evaluation. U.S. Fish and Wildlife Service, Midwest Region, Missouri Ecological Services Field Office, Columbia, MO.

USFWS. 2014. Fern Cave National Wildlife Refuge, Decatur, AL. https://www.fws.gov/refuge/Fern_Cave/wildlife_and_habitat/index.html.

USFWS. 2016. USFWS ECOS: Species Profile for the Gray Bat (*Myotis grisescens*) U.S. Fish and Wildlife Service. https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=A04J.

**Appendix A – Gray Bat Consultation Zone – Alabama and Florida Panhandle**


*Source: USFWS 2018*

***Table A-1.*** *Gray Bat Subwatersheds (HUC12) Consultation Zone - Alabama*

| HUC 12 | Subwatershed Name | HUC 12 | Subwatershed Name |
|---|---|---|---|
| 031403030604 | Mancil Mill Creek | 031501050906 | Upper Terrapin Creek |
| 031403030701 | Simmons Creek | 031501050907 | Frog Creek-Hurricane Creek |
| 031403030702 | Bottle Creek | 031501050908 | Middle Terrapin Creek |
| 031403030703 | Robinson Mill Creek | 031501050909 | Lower Terrapin Creek |
| 031403030704 | Amos Mill Creek | 031501051001 | Jones Branch-Yellow Creek |
| 031403040106 | Sandy Creek-Mill Creek | 031501051002 | Weiss Lake |
| 031403040201 | Little Cedar Creek-Cedar Creek | 031501051003 | Weiss Lake-Coosa River |
| 031403040402 | Jordan Creek | 031501060101 | Headwaters Big Wills Creek |
| 031403040403 | Long Branch-Murder Creek | 031501060102 | Upper Big Wills Creek |
| 031403040501 | Smith Creek | 031501060103 | Little Sand Valley Creek |
| 031403040502 | East Prong Silas Creek | 031501060104 | Fisher Creek |
| 031403040503 | Clear Creek-Conecuh River | 031501060105 | Line Creek-Clear Creek |
| 031501050101 | Pumpkin Pile Creek-McCurry Creek | 031501060106 | Little Wills Creek |
| 031501050106 | Little Cedar Creek | 031501060107 | Black Creek |
| 031501050204 | Kings Creek | 031501060108 | Horton Creek |
| 031501050206 | Ballplay Creek-Coosa River | 031501060201 | Ball Play Creek |
| 031501050207 | Coosa River-Weiss Lake | 031501060202 | Thorton Lakes-Dry Creek |
| 031501050301 | Forney Branch-Spring Creek | 031501060203 | Big Cove Creek |
| 031501050302 | Locust Branch-Sandy Creek | 031501060204 | Turkey Town Creek |
| 031501050303 | Cowan Creek | 031501060301 | Little Canoe Creek |
| 031501050304 | Three Mile Creek-Spring Creek | 031501060302 | Headwaters Big Canoe Creek |
| 031501050501 | Alpine Creek-Mills Creek | 031501060303 | Upper Big Canoe Creek |
| 031501050502 | Panther Creek-Mills Creek | 031501060304 | Lake Sumatanga-Little Canoe Creek |
| 031501050604 | Hinton Creek-Chattooga River | 031501060305 | Middle Big Canoe Creek |
| 031501050605 | Chattooga River-Upper Weiss Lake | 031501060306 | Lower Big Canoe Creek |
| 031501050701 | East Fork Little River | 031501060307 | Laymans Pond-Beaver Creek |
| 031501050702 | Middle Fork Little River | 031501060308 | Shoal Creek-Coosa River |
| 031501050703 | East Fork West Fork Little River-West Fork Little River | 031501060309 | H. Neely Henry Lake-Coosa River |
| 031501050704 | Straight Creek-West Fork Little River | 031501060401 | Little Tallasseehatchee Creek |
| 031501050705 | Gilbert Branch-Laurel Creek | 031501060402 | Flat Tire Creek-Tallasseehatchee Creek |
| 031501050801 | Yellow Creek | 031501060403 | Rabes Branch-Tallasseehatchee Creek |
| 031501050802 | Upper Little River | 031501060404 | Upper Ohatchee Creek |
| 031501050803 | Hicks Creek-Bear Creek | 031501060405 | Lower Ohatchee Creek |
| 031501050804 | Johnnies Creek | 031501060406 | Ohatchee Creek-Tallasseehatchee Creek |
| 031501050805 | Wolf Creek-Little River | 031501060407 | Upper Cane Creek |
| 031501050806 | Lower Little River | 031501060408 | Lower Cane Creek |
| 031501050807 | Mud Creek-Spring Creek | 031501060409 | Woods Island-Coosa River |
| 031501050901 | South Fork Terrapin Creek | 031501060501 | Chinch Creek-Shoal Creek |
| 031501050904 | Little Terrapin Creek | 031501060502 | Cottaquila Creek |
| 031501050905 | Nances Creek | 031501060503 | Hillabee Creek |

*Source: USFWS 2018*

***Table A-1. (continued)*** *Gray Bat Subwatersheds (HUC12) Consultation Zone - Alabama*

| HUC 12 | Subwatershed Name | HUC 12 | Subwatershed Name |
|---|---|---|---|
| 031501060504 | Willis Branch | 031501070302 | Beeswax Creek |
| 031501060505 | City of Anniston | 031501070303 | Cohabie Creek-Cedar Creek |
| 031501060506 | Coldwater Springs | 031501070304 | Hay Spring Branch |
| 031501060507 | Tuskehadky Branch-Choccolocco Creek | 031501070401 | Big Creek-Waxahatchee Creek |
| 031501060508 | Dry Creek-Salt Creek | 031501070402 | Camp Branch |
| 031501060509 | Upper Cheaha Creek | 031501070403 | Upper Waxahatchee Creek |
| 031501060510 | Kelly Creek | 031501070404 | Watson Creek |
| 031501060511 | Lower Cheaha Creek | 031501070405 | Buxahatchee Creek |
| 031501060512 | Emorai Church-Choccolocco Creek | 031501070406 | Lower Waxahatchee Creek |
| 031501060513 | Eastaboga Creek | 031501070501 | Peckerwood Creek |
| 031501060514 | Jackson Shoals-Choccolocco Creek | 031501070503 | Spring Creek-Lay Lake |
| 031501060601 | Trout Creek | 031501070801 | Yellow Leaf Creek |
| 031501060602 | Leather Creek-Broken Arrow Creek | 031502020101 | Upper Cahaba River |
| 031501060603 | Embry Bend-Coosa River | 031502020102 | Big Black Creek |
| 031501060604 | Blue Eye Creek | 031502020103 | Little Cahaba River |
| 031501060605 | Broken Arrow Shoals-Coosa River | 031502020104 | Lower Cahaba River |
| 031501060701 | Upper Talladega Creek | 031502020201 | Peavine Creek |
| 031501060702 | Middle Talladega Creek | 031502020202 | Cahaba Valley Creek |
| 031501060703 | Lower Talladega Creek | 031502020203 | Prairie Brook-Buck Creek |
| 031501060801 | Poorhouse Branch | 031502020204 | Patton Creek-Cahaba River |
| 031501060802 | Haw Branch-Clear Creek | 031502020205 | Murry Creek-Piney Woods Creek |
| 031501060803 | Rabbit Branch | 031502020206 | Beaverdam Creek-Cahaba River |
| 031501060804 | Jess Branch-Shoal Creek | 031502020301 | Upper Shades Creek |
| 031501060805 | Upper Kelly Creek | 031502020302 | Cooley Creek-Mud Creek |
| 031501060806 | Hearthstone Creek-Wolf Creek | 031502020303 | Lower Shades Creek |
| 031501060807 | Buckhorn Branch-Bear Creek | 031502020401 | Walker Branch |
| 031501060808 | Lower Kelly Creek | 031502020402 | Mahan Creek |
| 031501060809 | Fanning Branch | 031502020403 | Mayberry Creek-Shoal Creek |
| 031501060810 | Spring Creek-Coosa River | 031502020404 | Sixmile Creek-Little Cahaba River |
| 031501070101 | Emauhee Creek | 031502020405 | Alligator Creek-Little Cahaba River |
| 031501070102 | Upper Tallaseehatchee Creek | 031502020406 | Caffee Creek |
| 031501070103 | Weewoka Creek | 031502020407 | Cahaba River |
| 031501070104 | Shirtee Creek | 031502020501 | Hill Creek |
| 031501070105 | Fourmile Creek | 031502020502 | Shultz Creek |
| 031501070106 | Lower Tallaseehatchee Creek | 031502020503 | Sandy Creek-Cahaba River |
| 031501070201 | North Fork Yellowleaf Creek | 031502020504 | Haysop Creek |
| 031501070202 | South Fork Yellowleaf Creek | 031502020505 | Affonee Creek |
| 031501070203 | Muddy Prong | 031601090101 | Roswell Creek-Mulberry Fork |
| 031501070204 | Upper Yellowleaf Creek | 031601090103 | Lower Duck River |
| 031501070205 | Lower Yellowleaf Creek | 031601090106 | Broglen River |
| 031501070301 | Kahatchee Creek | 031601090107 | Blue Springs Creek |

*Source: USFWS 2018*

***Table A-1. (continued)*** *Gray Bat Subwatersheds (HUC12) Consultation Zone - Alabama*

| HUC 12 | Subwatershed Name | HUC 12 | Subwatershed Name |
|---|---|---|---|
| 031601090108 | Mud Creek-Mulberry Fork | 031601130101 | Lye Branch |
| 031601090109 | Pan Creek | 031601130102 | Bear Creek |
| 031601090203 | Murphy Creek-Mill Creek | 031601130103 | South Sandy Creek |
| 031601100101 | Borden Creek | 031601130104 | Long Branch-Upper Big Sandy Creek |
| 031601100202 | Brushy Creek-Capsey Creek | 060200011101 | West Fork Lookout Creek-Dry Creek |
| 031601100401 | Belevens Creek | 060200011204 | Running Water Creek-Nickajack Lake |
| 031601100402 | Long Branch-Upper Rock Creek | 060300010201 | Jones Creek-Tennessee River |
| 031601100405 | Upper Crooked Creek | 060300010202 | Long Creek-Miller Creek |
| 031601110101 | Bristow Creek | 060300010203 | Guest Creek-Long Island Creek |
| 031601110102 | Samuels Chapel Creek | 060300010204 | Widows Creek |
| 031601110103 | Carroll Branch-Clear Creek | 060300010205 | Marshall Branch-Tennessee River |
| 031601110104 | Big Mud Creek | 060300010302 | Middle Crow Creek |
| 031601110105 | Upper Slab Creek | 060300010303 | Little Crow Creek |
| 031601110106 | Lower Slab Creek | 060300010304 | Lower Crow Creek |
| 031601110107 | Locust Fork-Little Cove Creek | 060300010305 | Upper Big Coon Creek |
| 031601110201 | Whippoorwill Creek | 060300010306 | Little Coon Creek |
| 031601110202 | Graves Creek | 060300010307 | Lower Big Coon Creek |
| 031601110203 | Andy Branch-Dry Creek | 060300010402 | Flat Rock Creek |
| 031601110204 | Upper Blackburn Fork-Little Warrior River | 060300010403 | Lower Coon Creek |
| 031601110205 | Upper Calvert Prong | 060300010404 | Upper Mud Creek |
| 031601110206 | Lower Calvert Prong | 060300010405 | Lower Mud Creek |
| 031601110207 | Lower Blackburn Fork-Little Warrior River | 060300010407 | Rorex Creek-Jones Creek |
| 031601110208 | Big Scirum Creek | 060300010408 | Town Creek-Guntersville Lake |
| 031601110301 | Sugar Creek-Locust Fork | 060300010502 | Kirby Creek |
| 031601110302 | Longs Branch | 060300010504 | Mink Branch-Dry Creek |
| 031601110303 | Gurley Creek | 060300010505 | Lower South Sauty Creek |
| 031601110304 | Self Creek | 060300010601 | Evans Creek |
| 031601110305 | Neeley Creek | 060300010602 | Riley Cove-Dry Creek |
| 031601110306 | North Creek-Turkey Creek | 060300010603 | Roseberry Creek |
| 031601110307 | Cunningham Creek | 060300010604 | Upper North Sauty Creek |
| 031601110406 | Upper Fivemile Creek | 060300010605 | Lower North Sauty Creek |
| 031601110408 | Upper Village Creek | 060300010606 | Upper Guntersville Lake |
| 031601120101 | Headwaters Valley Creek | 060300010704 | Black Oak Creek |
| 031601120102 | Five Mile Creek-Valley Creek | 060300010705 | Minky Creek-Town Creek |
| 031601120104 | Lick Creek-Valley Creek | 060300010801 | Cross Creek |
| 031601120302 | Rockcastle Creek | 060300010802 | Upper Short Creek |
| 031601120303 | Whiteoak Creek-Davis Creek | 060300010805 | Drum Creek-Short Creek |
| 031601120502 | Coal Creek-Upper Hurricane Creek | 060300010806 | Lower Short Creek |
| 031601120503 | Cottondale Creek | 060300010901 | Lower Guntersville Lake |
| 031601120504 | Bee Branch-Lower Hurricane Creek | 060300010902 | Hog Creek |

*Source: USFWS 2018*

***Table A-1. (continued)*** *Gray Bat Subwatersheds (HUC12) Consultation Zone - Alabama*

| HUC 12 | Subwatershed Name | HUC 12 | Subwatershed Name |
|---|---|---|---|
| 060300010903 | Big Spring Creek | 060300020801 | Upper Piney Creek |
| 060300010904 | Browns Creek | 060300020802 | Middle Piney Creek |
| 060300010905 | Honey Comb Creek | 060300020803 | Lower Piney Creek |
| 060300010906 | Dripping Spring Branch-Tennessee River | 060300020901 | Peachtree Creek-Shoal Creek |
| 060300020101 | Hurricane Creek | 060300020902 | Pigeon Roost Creek-Tennessee River |
| 060300020102 | Larkin Fork | 060300020903 | Aldridge Creek |
| 060300020103 | Estill Fork | 060300020904 | Bartee Branch-Hambrick Slough |
| 060300020104 | Lick Fork | 060300020905 | Oakland Spring Branch-Beaverdam Creek |
| 060300020105 | Williams Creek-Dry Creek | 060300020906 | Matney Branch-Tennessee River |
| 060300020106 | Guess Creek | 060300021001 | East Fork Flint Creek |
| 060300020107 | Williams Cove-Paint Rock River | 060300021002 | Dry Creek-Mill Creek |
| 060300020201 | Little Dry Creek-Clear Creek | 060300021003 | Upper Flint Creek |
| 060300020202 | Little Paint Creek | 060300021004 | Robertson Branch-Cedar Creek |
| 060300020203 | Cole Spring Branch | 060300021005 | Sleighton Branch-Shoal Creek |
| 060300020204 | Tremble Creek | 060300021006 | Crowdabout Creek |
| 060300020301 | State Rock Branch-Flint River | 060300021007 | Middle Flint Creek |
| 060300020302 | West Fork-Flint River | 060300021008 | No Business Creek |
| 060300020303 | Mountain Fork | 060300021009 | Elam Creek |
| 060300020304 | Upper Brier Fork | 060300021010 | Upper West Flint Creek |
| 060300020305 | Banyon Creek-Beaverdam Creek | 060300021011 | Big Shoal Creek |
| 060300020306 | Lower Brier Fork | 060300021012 | Middle West Flint Creek |
| 060300020307 | Pigrum Branch-Flint River | 060300021013 | Lower West Flint Creek |
| 060300020401 | Upper Hurricane Creek | 060300021014 | Lower Flint Creek |
| 060300020402 | Lower Hurricane Creek | 060300021101 | Swan Creek |
| 060300020403 | Acuff Spring-Flint River | 060300021102 | Bakers Creek-Tennessee River |
| 060300020404 | Goose Creek-Flint River | 060300021103 | Briley Creek |
| 060300020405 | Yellow Bank Creek-Flint River | 060300021104 | Fox Creek |
| 060300020501 | Upper Indian Creek | 060300021105 | Spring Creek-Mud Creek |
| 060300020502 | Upper Huntsville Spring Branch | 060300021106 | Dry Creek-Mallard Creek |
| 060300020503 | Lower Huntsville Spring Branch | 060300021107 | Coxey Creek-Tennessee River |
| 060300020504 | Barren Fork Creek | 060300021201 | Red Branch-Spring Creek |
| 060300020505 | Lower Indian Creek | 060300021202 | First Creek |
| 060300020601 | Winton Branch-Hughes Creek | 060300021203 | Upper Second Creek |
| 060300020602 | West Fork-Cottaco Creek | 060300021204 | Lower Second Creek |
| 060300020603 | Upper Cotaco Creek | 060300021205 | Page Branch-Tennessee River |
| 060300020604 | Gill Creek-Town Creek | 060300030601 | Larkin Springs Branch |
| 060300020605 | Middle Cotaco Creek | 060300040303 | Sugar Creek |
| 060300020606 | Lower Cottage Creek | 060300040401 | Shoal Creek |
| 060300020701 | Upper Limestone Creek | 060300040402 | Ragsdale Creek-Elk River |
| 060300020702 | Middle Limestone Creek | 060300040403 | Elk River-Sulphur Creek |
| 060300020703 | Lower Limestone Creek | 060300040404 | Anderson Creek |

*Source: USFWS 2018*

***Table A-1. (continued)*** *Gray Bat Subwatersheds (HUC12) Consultation Zone - Alabama*

| HUC 12 | Subwatershed Name | HUC 12 | Subwatershed Name |
|---|---|---|---|
| 060300040405 | Big Creek-Elk River | 060300050802 | Abernathy Bottom-Pond Creek |
| 060300050101 | Rutherford Creek | 060300050803 | Sweetwater Creek-Tennessee River |
| 060300050102 | Upper Big Nance Creek-Muddy Fork | 060300050804 | Hargett Creek |
| 060300050103 | Big Nance Creek-Clear Fork | 060300050805 | Little Bear Creek |
| 060300050104 | Middle Big Nance Creek | 060300050806 | Sinking Creek |
| 060300050105 | Lower Big Nance Creek | 060300050807 | Tanyard Branch-Cane Creek |
| 060300050301 | Rock Creek-Mud Creek | 060300050808 | Coffee Slough-Tennessee River |
| 060300050302 | Upper Town Creek | 060300051002 | Colbert Creek-Pickwick Lake |
| 060300050303 | Middle Town Creek | 060300060101 | LittleTurkey Creek |
| 060300050304 | Lower Town Creek | 060300060102 | Headwaters Bear Creek |
| 060300050507 | Butler Creek | 060300060103 | Bear Creek-Bluff Creek |
| 060300050508 | Upper Shoal Creek | 060300060104 | Holcomb Branch-Bear Creek |
| 060300050509 | Lower Shoal Creek | 060300060201 | Cedar Creek-Harris Creek |
| 060300050601 | Greenbrier Branch | 060300060202 | Dunkin Creek-Cedar Creek |
| 060300050602 | Threet Creek | 060300060203 | Tollison Creek-Cedar Creek |
| 060300050603 | Burcham Creek | 060300060204 | Cody Branch-Cedar Creek |
| 060300050604 | Little Cypress Creek | 060300060205 | Upper Little Bear Creek |
| 060300050605 | Cox Creek | 060300060206 | Lower Little Bear Creek |
| 060300050701 | Foxtrap Creek-Upper Spring Creek | 060300060301 | Chandelower Creek-Rock Creek |
| 060300050702 | Sink Pond-Dry Creek | 060300060302 | Cripple Deer Creek |
| 060300050703 | Lower Spring Creek | 060300060304 | Rock Creek-Bear Creek |
| 060300050801 | McKieman Creek-Tennessee River | 060300060305 | Buzzard Roost Creek |

*Source: USFWS 2018*

***Table A-2.*** *Gray Bat Subwatersheds (HUC12) Consultation Zone – Florida Panhandle*

| HUC 12 | Subwatershed Name | HUC 12 | Subwatershed Name |
|---|---|---|---|
| 031300040802 | Brenson Pond | 031300120301 | Hayes Spring Run |
| 031300040804 | Bateau Pond | 031300120302 | Waddells Mill Creek |
| 031300040805 | Race Pond | 031300120303 | Muddy Branch-Chipola River |
| 031300040806 | West Lake Seminole | 031300120304 | Carters Mill Branch |
| 031300110201 | Ham Pond | 031300120305 | Merritts Millpond |
| 031300110301 | Ocheesee Pond | 031300120402 | Sapp Bay |
| 031300110302 | Ocheesee Creek | 031300120404 | Upper Dry Creek-Chipola River |
| 031300120105 | Spring Creek-Marshall Creek | 031300120405 | Lower Dry Creek-Chipola River |
| 031300120106 | Buck Creek-Marshall Creek | 031300120406 | Douglas Pond |
| 031300120107 | Marshall Creek | 031300120407 | Rocky Creek-Chipola River |
| 031300120203 | Middle Cowarts Creek | 031300120408 | Mill Creek-Chipola River |
| 031300120204 | Lower Cowarts Creek | | |

*Source: USFWS 2018*

## Appendix B – Gray Bat Effects Determination Key

ORM2 Number _____ Date _____
Reference File: _____

1) Is the action area located within the gray bat consultation zone (see Appendix A)?
   a) Yes……go to 2
   b) No……No effect[1]

2) Will the project affect caves or mines where gray bat could hibernate (i.e., hibernaculum) or could it alter the entrance or the environment of a hibernaculum? Or will the project involve the removal of trees within 150 feet of caves/mines?
   a) Yes……Consultation required[2]
   b) No……go to 3

3) Does the project include the repair or replacement of bridges and/or culverts that are potential bat roosting sites (see Appendix D)?
   a) Yes……Consultation required[2]
   b) No……No effect[1]

[1]No effect - The proposed project would result in no effect to this species and/or its federally designated critical habitat (if applicable). Further consultation with the Daphne, Alabama or Panama City, Florida Ecological Services Office is not necessary for the project as described.

[2]Consultation required - Further consultation with the Daphne, Alabama or Panama City, Florida Ecological Services Office is necessary to discern if the activity would result in a "no effect", "not likely to adversely affect", or "likely to adversely affect" determination.

Additional Information _____
_____
_____
_____

## Appendix C – Conservation Recommendations

*These recommendations are optional and if implemented would support the agency's goals toward recovery. These recommendations are to be used at the discretion of the permittee.*

Currently, the greatest threat to the survival and recovery of federally listed gray bat in Alabama and Florida is destruction of caves and foraging habitats. Below are measures that should be considered to minimize impacts.

1. Protect caves and foraging habitats near known or potential roosting caves.
2. Maintain a 150-foot wooded/vegetated buffer around cave and mine entrances.
3. Maintain a 150-foot wooded/vegetated buffer around streams, ponds, and reservoirs near cave and mine entrances.

**Appendix D – Bat Guidance for Bridge/Culvert Replacement Projects**

If uncertain whether or not a structure would be considered a suitable day or night roost for federally listed bats, refer to *Bats in American Bridges* (http://www.batcon.org/pdfs/bridges/BatsBridges2.pdf), or contact the USFWS Ecological Services Office bat biologist Shannon Holbrook in Daphne, AL at 251-441-5871. Day and night roosts for bat species differ. Day roosts are used for extended rest periods and rearing young, while night roosts are used briefly for resting during foraging. Over the course of a night, bats may rest more than once at different roosting locations. The biggest concern regarding bridges and listed bats is disturbance of potential day roosts. If a potential night roost structure is part of a proposed project, but would not be considered a day roost (i.e., it lacks cracks or crevices), conduct all construction activities during daylight hours only to avoid any impacts to listed bats.


Characteristics of Unsuitable Artificial Roosting Structures



Characteristics of Suitable Artificial Roosting Structures

Characteristics of Unsuitable Artificial Roosting Structures

- Corrugated metal and small concrete culverts are the least preferred artificial roost structures. These structures are prone to flooding, and they do not exhibit cracks or crevices. All corrugated metal culverts and concrete culverts under 5 feet tall can be excluded from further analysis.
- Concrete box culverts that are frequently inundated/flooded are generally considered unsuitable for both day and night roosting sites.
- Flat slab bridges would not be considered suitable day or night roosting structures.
- Crevices must be sealed at the top. Evidence of storm-water staining along the length of the crevice indicates that it is not sealed properly and should not be considered an ideal roost.
- During the summer months, sun-exposed bridges act as thermal sinks. Therefore, bridges receiving no sun have been shown to have little or no bat use.

Characteristics of Suitable Artificial Roosting Structures

- Ideal day roosting structures be constructed of concrete, with vertical crevices (0.5 to 1.25 inches wide) at least 12 inches deep and protected from weather. Structures must must be located 10

feet or more above the ground. Ideal night roosting structures include concrete structures with protection from wind. Parallel box beam bridges offer ideal day and night roost conditions. Pre-stressed concrete girder bridges could also offer ideal day and night roosting locations.

- Old buildings may offer several areas that could have ideal roosting areas. However, if a building is to be removed, but is not within close proximity (1.5 miles) to wooded areas, then the structure would not be considered a suitable roost site due to a lack of nearby foraging areas and alternative roosting locations.
- Concrete box culverts that are 5 to 10 feet tall, have openings protected from high winds, and are not susceptible to flooding may be suitable day or night roosting sites, especieally if they are older and contain cracks, crevices, or imperfections.

# Indiana Bat and Northern Long-Eared Bat

*Myotis sodalis and Myotis septentrionalis*

## I. Species Summary

Because of the similarity in ecological characteristics the Indiana bat and northern long-eared bat occurring in Alabama have been combined into one Standard Local Operating Procedures for Endangered Species. Neither one of these listed species are known to or believed to occur in the Florida Panhandle. The primary cause of the decline in the two bat populations is from white-nose syndrome caused by the fungus *Pseudogymnoascus destructans.* The U.S. Fish and Wildlife Service (USFWS) species profiles and ecological summary for each of the bats discussed in this document can be found by accessing the links provided below.

Indiana Bat

The Indiana bat (*Myotis sodalis)* is federally listed as 'endangered' (USFWS 1967). Habitat modification, including destruction, and curtailment of the species' range, are the primary causes of the decline of the Indiana bat (USFWS 2007). However, white-nose syndrome, which is caused by the fungus *Pseudogymnoascus destructans*, also has greatly impacted populations in the Northeast and continues to be detected in populations east of the Mississippi River. The U.S. Fish and Wildlife Service (USFWS) species profile for the Indiana bat can be found at http://ecos.fws.gov/ecp0/profile/speciesProfile?sId=5949. A summary of the ecology of this species can be found in the USFWS 2007 *Indiana Bat Recovery Plan* (USFWS 2007) and the most recent 5-year review (USFWS 2016a).

Northern Long-Eared Bat

The northern long-eared bat (NLEB) (*Myotis septentrionalis*) is federally listed as 'threatened' throughout its entire range (USFWS 2015). The NLEB is found across much of the eastern and north central United States and in all Canadian provinces from the Atlantic coast west to the southern Northwest Territories and eastern British Columbia. The species' range includes 37 states. White-nose syndrome, caused by the fungus *Pseudogymnoascus destructans*, is known to affect NLEBs. This disease is currently the predominant threat to this species, especially throughout the Northeast where the species has declined by up to 99 percent from pre-white-nose syndrome levels at many hibernation sites. Although the disease has not yet spread throughout the NLEB's entire range (white-nose syndrome is currently found in at least 25 of 37 states where the species occurs), it continues to spread. Experts expect that where it spreads, it will have the same impact as seen in the Northeast. Because of the severe population reductions related to white-nose syndrome throughout most of the species range, species resilience is now considered to be threatened also by natural and anthropogenic activities that adversely affect suitable overwintering habitat (e.g., caves, bridges, tunnels) and/or adversely affect suitable foraging and roosting habitat used by bats during the non-overwintering months. The USFWS species profile for the NLEB can be found at https://ecos.fws.gov/ecp0/profile/speciesProfile.action?spcode=A0JE. No recovery plan has been developed for this species.

## II. Biological Information

Indiana Bat

The Indiana bat is a medium-sized species that has dull grayish chestnut fur; the basal portion of the hair on the back is a dull-lead color (Photo 1). The bat's underparts are pinkish to cinnamon, and its hind feet are small and delicate. The calcar (heel of the foot) is strongly keeled.

*Photo 1. Indiana bat (Adam Mann)*

The Indiana bat is a migratory species that hibernates in caves and abandoned mines in the winter, then migrates to wooded areas (roost sites) in the spring to bear and raise its young over the summer. This temperate, insectivorous, migratory bat hibernates colonially in caves and mines in the winter. Hibernation typically lasts from October through April. The non-hibernation season—during which spring emergence, migration, reproductive activities, and fall swarming occur—can vary depending on the weather, but typically occurs March through September. In spring, reproductive females migrate and form maternity colonies in wooded areas where they bear and raise their young.

Indiana bats typically forage in semi-open to closed forested habitats (open understory), forest edges, and riparian areas. They are "selective opportunist" feeders, eating most flying insects, including beetles, flies, butterflies and moths, and caddisflies. Therefore, suitable and sufficient foraging habitats may be located outside the immediate roosting areas.

Northern Long-Eared Bat

The NLEB is a medium-sized species about 3 to 3.7 inches (7.6 to 9.4 centimeters) long with a wingspan of approximately 10 inches (25.4 centimeters) (Photo 2) (USFWS 2016b). They are light brown and weigh about 0.3 ounces and are distinguished by their long ears as the name suggests (USFWS 2016b).

Breeding begins in late summer or early fall when males begin swarming near the hibernacula. After copulation, females store the sperm during hibernation. When they emerge from their hibernacula, they ovulate and the egg is fertilized; this is termed *delayed fertilization*. Pregnant females then migrate to summer areas where they roost in small colonies and give birth to a single pup, which can fly approximately 21 days after birth. Maximum lifespan for northern long-eared bats is estimated to be up to 18.5 years (USFWS 2016b).

NLEBs emerge at dusk to fly through the understory of forested terrain to feed on moths, flies, leafhoppers, caddisflies, and beetles. They use their echolocation to catch these insects, capturing flying insects as well as gleaning prey from plants and the forest floor (NatureServe 2015).

Photo 2. Northern *long-eared bat (USFWS)*

**III. Suitable Habitat**

Indiana Bat

Suitable summer habitat for Indiana bats generally consists of a wide variety of forested/wooded habitats where they can roost, forage, and travel, including riparian zones, bottomland and floodplain areas, wooded wetlands, and upland communities. This includes forests and woodlots that contain potential roosts—live trees and/or snags greater than 5 inches (12.7 centimeter) diameter breast height that have exfoliating bark, cracks, crevices, and/or hollows—as well as linear features such as fencerows, riparian forests, and other wooded corridors. It also might include adjacent and interspersed non-forested areas such as emergent wetlands, adjacent edges of agricultural fields, old fields, and pastures (Photo 3). The wooded areas preferred by the Indiana bat can be dense or loose aggregates of trees with variable amounts of canopy closure.

Reproductive females occupy roost sites under the exfoliating bark of dead trees that retain large, thick slabs of peeling bark or in tree cavities (USFWS 2007). Primary roosts usually receive direct sunlight for more than half the day. Roost trees are typically located within canopy gaps in a forest, in a fence line, or along a wooded edge. Individual trees that exhibit the characteristics of a potential roost tree and are located within 1,000 feet (305 meters) of other forested/wooded habitat might be considered suitable habitat.

*Photo 3. Indiana bat summer roost site in Benton County, Mississippi (USFWS, David Felder)*

Indiana bats hibernate during the winter in caves or, occasionally, in abandoned mines. For hibernation, they require cool, humid caves with stable temperatures under 50 degrees Fahrenheit but above freezing (USFWS 2007).

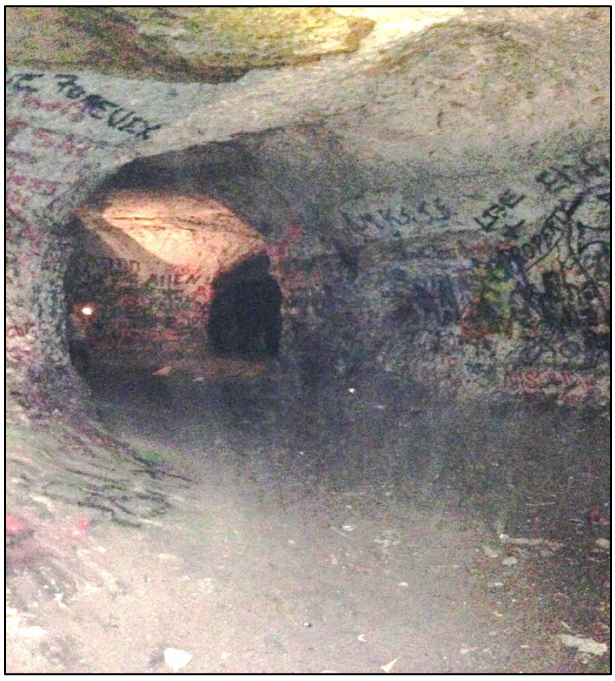
This species is known to occur in numerous Alabama counties (Table 1). It is not known to occur in the Florida Panhandle.

*Table 1. Alabama counties in which the Indiana bat is known or believed to occur (USFWS 2018). See consultation zones for full details (Appendix A).*

| | | | | | |
|---|---|---|---|---|---|
| Bibb | Cleburne | Franklin | Lawrence | Pickens | Tuscaloosa |
| Blount | Colbert | Greene | Limestone | Randolph | Walker |
| Calhoun | Coosa | Hale | Madison | St. Clair | Winston |
| Chambers | Cullman | Jackson | Marion | Shelby | |
| Cherokee | DeKalb | Jefferson | Marshall | Sumter | |
| Chilton | Etowah | Lamar | Morgan | Talladega | |
| Clay | Fayette | Lauderdale | Perry | Tallapoosa | |

Northern Long-Eared Bat

The NLEB hibernates during the winter in caves, railroad tunnels, or abandoned mines with large openings (Photos 4 and 5) (USFWS 2014; USFS 2014). For hibernation, the species requires stable temperatures, under 50 degrees Fahrenheit but above freezing. Location information for hibernacula and maternity roost sites is maintained in the Alabama Natural Heritage Inventory database.

*Photos 4 and 5. Tripoli chalk mine, Tishomingo County, Mississippi (David Felder)*

During the summer, NLEBs roost either singly or in colonies in cavities, underneath bark, or in crevices or hollows of both live trees and snags that are typically larger than 5 inches in diameter at breast height. Males and nonreproductive females also might roost in cooler places like caves and mines. The species is opportunistic in selecting roosts, using tree species based on the presence of cavities or crevices or the presence of peeling bark. This species also has been found occasionally roosting in structures like barns and sheds (USFWS 2016b).

*Section 4(d) Rule*
A final 4(d) rule (Appendix D) was published in 2016 prohibiting incidental take of NLEB within a hibernation site or tree removal activities within a quarter-mile of a hibernaculum or from activities that cut down or destroy known occupied maternity roost trees, or any other trees within 150 feet of that maternity roost tree, during the pup-rearing season (June 1 to July 31).

This species is known to occur in numerous Alabama counties (Table 2). It is not known to occur in the Florida Panhandle.

*Table 2. Alabama counties in which the northern long-eared bat is known or believed to occur (USFWS 2018). See consultation zones for full details (Appendix A).*

| | | | | | |
|---|---|---|---|---|---|
| Bibb | Clay | Fayette | Lauderdale | Morgan | Talladega |
| Blount | Cleburne | Franklin | Lawrence | Perry | Tallapoosa |
| Calhoun | Colbert | Greene | Limestone | Pickens | Tuscaloosa |
| Chambers | Coosa | Hale | Madison | Randolph | Walker |
| Cherokee | Cullman | Jackson | Marengo | St. Clair | Winston |
| Chilton | DeKalb | Jefferson | Marion | Shelby | |
| Choctaw | Etowah | Lamar | Marshall | Sumter | |

Table A-1 in Appendix A provides a list of subwatersheds (HUC12) included in the Indiana bat and NLEB consultation zones.

No critical habitat has been designated for these species.

**IV. Determination**

For species occurring in Alabama, reference the 12-digit HUC layer in KML format provided on an annual basis by FWS Daphne Field Office.

See Appendix A for the Indiana bat and NLEBs' consultation zone maps in Alabama.

See Appendix B for the Indiana bat and NLEBs' Effects Determination Key.

**V. Conservation Recommendations**

Conservation recommendations for the Indiana bat and the NLEB can be found in Appendix C. These recommendations are optional and if implemented would support the agency's goals toward recovery. These recommendations are to be used at the discretion of the permittee.

**VI. Geographic Information System Data**

The USFWS Daphne Field Office maintains geographic information system (GIS) data for the Indiana bat and NLEB in Alabama.

## LITERATURE CITED

NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, VA. http://explorer.natureserve.org/servlet/NatureServe?searchName=Myotis+septentrionalis+.

USFWS. 1967. Office of the Secretary, Native Fish and Wildlife, Endangered Species. *Federal Register Volume 32, Number 48, page 6, March 11, 1967*.

USFWS. 2007. Indiana Bat (*Myotis sodalis*) Draft Recovery Plan: First Revision. U.S. Fish and Wildlife Service, Fort Snelling, MN.

USFWS. 2014. Northern Long-Eared Bat Interim Conference and Planning Guidance. U.S. Fish and Wildlife Service. https://www.fws.gov/northeast/virginiafield/pdf/NLEBinterimGuidance6Jan2014.pdf.

USFWS. 2015. Endangered and Threatened Wildlife and Plants; Threatened Species Status for the Northern Long-Eared Bat With 4(d) Rule. *Federal Register Volume 80, Number 63, pages 17974–18033, April 2, 2015*.

USFWS. 2016a. ECOS *Species Profile for Indiana bat (Myotis sodalist)*. U.S. Fish and Wildlife Service. https://ecos.fws.gov/ecp0/profile/speciesProfile?sId=5949.

USFWS. 2016b. USFWS ECOS: Species Profile for the Northern Long-Eared Bat (*Myotis septentrionalis*). U.S. Fish and Wildlife Service. https://ecos.fws.gov/ecp0/profile/speciesProfile.action?spcode=A0JE.

USFWS. 2016c. Threatened and Endangered Wildlife and Plants; Final 4(d) Rule for the Northern Long-Eared Bat. *Federal Register Volume 81, Number 9, pages 1900–1922, January 14, 2016*.

USFWS. 2016d. Threatened and Endangered Wildlife and Plants; Determination That Designation of Critical Habitat Is Not Prudent for the Northern Long-Eared Bat. *Federal Register Volume 81, Number 81, pages 24707–24714, April 27, 2016.*

USFS (U.S. Forest Service). 2014. Biological Assessment for Activities Affecting Northern Long-Eared Bats on Southern Region National Forests. U.S. Department of Agriculture, Forest Service – Southern Region. http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd492463.pdf.

**Appendix A – Indiana Bat Consultation Zone - Alabama**


*Source: USFWS 2018*

**Northern Long-Eared Bat Consultation Zone – Alabama**


*Source: USFWS 2018*

*Table A-1. Indiana Bat and NLEB Subwatersheds (HUC12) Consultation Zone – Alabama*
Table Key: [1]Indiana Bat Species Only [2]NLEB Species Only

| HUC 12 | Subwatershed Names | HUC 12 | Subwatershed Names |
|---|---|---|---|
| 031300020601 | Hillabahatchee Creek | 031501050903 | [1]Elkahatchee Creek |
| 031300020602 | Town Creek-Hillabahatchee Creek | 031501050904 | [1]Benson Creek |
| 031300020603 | Town of Mason-Cedar Creek | 031501050905 | [1]Upper Mulberry Creek |
| 031300020802 | Upper Wehadkee Creek | 031501050906 | [1]Walker Branch |
| 031300020803 | Little Wehadkee Creek | 031501050907 | Frog Creek-Hurricane Creek |
| 031300020804 | Meacham Creek-Cuss Creek | 031501050908 | Middle Terrapin Creek |
| 031300020805 | [1]Veasey Creek-West Point Lake | 031501050909 | Lower Terrapin Creek |
| 031300020806 | [1]Lower Wehadkee Creek | 031501051001 | Jones Branch-Yellow Creek |
| 031300020808 | [1]Lower West Point Lake | 031501051002 | Weiss Lake |
| 031300020901 | [1]Wells Creek | 031501051003 | Weiss Lake-Coosa River |
| 031300020902 | [1]Oseligee Creek | 031501060101 | Headwaters Big Wills Creek |
| 031300020903 | [1]Barrow Creek-Chattahoochee River | 031501060102 | Upper Big Wills Creek |
| 031501050101 | [1]Watson Creek | 031501060103 | Little Sand Valley Creek |
| 031501050106 | [1]Peckerwood Creek | 031501060104 | Fisher Creek |
| 031501050204 | [1]Paint Creek | 031501060105 | Line Creek-Clear Creek |
| 031501050206 | [1]Middle Weogufka Creek | 031501060106 | Little Wills Creek |
| 031501050207 | [1]Lower Weogufka Creek | 031501060107 | Black Creek |
| 031501050301 | [1]Baker Creek | 031501060108 | Horton Creek |
| 031501050302 | [1]Jacks Creek | 031501060201 | Ball Play Creek |
| 031501050303 | [1]Socapatoy Creek | 031501060202 | Thorton Lakes-Dry Creek |
| 031501050304 | [1]Middle Hatchet Creek | 031501060203 | Big Cove Creek |
| 031501050501 | [1]Lower Hatchet Creek | 031501060204 | Turkey Town Creek |
| 031501050502 | [1]Noneless Creek | 031501060301 | Little Canoe Creek |
| 031501050604 | [1]Yellow Leaf Creek | 031501060302 | Headwaters Big Canoe Creek |
| 031501050605 | [1]Walnut Creek | 031501060303 | Upper Big Canoe Creek |
| 031501050701 | [1]Cargle Creek | 031501060304 | Lake Sumatanga-Little Canoe Creek |
| 031501050702 | [1]Finley Creek-Mill Creek | 031501060305 | Middle Big Canoe Creek |
| 031501050703 | [1]Little Chatahospee Creek | 031501060306 | Lower Big Canoe Creek |
| 031501050704 | [1]Allen Creek | 031501060307 | Laymans Pond-Beaver Creek |
| 031501050705 | [1]Upper Chatahospee Creek | 031501060308 | Shoal Creek-Coosa River |
| 031501050801 | [1]Lower Chatahospee Creek | 031501060309 | H. Neely Henry Lake-Coosa River |
| 031501050802 | [1]Chikasanoxee Creek | 031501060401 | Little Tallasseehatchee Creek |
| 031501050803 | [1]Laney Creek | 031501060402 | Flat Tire Creek-Tallasseehatchee Creek |
| 031501050804 | [1]Countyline Creek | 031501060403 | Rabes Branch-Tallasseehatchee Creek |
| 031501050805 | [1]Eagle Creek | 031501060404 | Upper Ohatchee Creek |
| 031501050806 | [1]Upper Hillabee Creek | 031501060405 | Lower Ohatchee Creek |
| 031501050807 | [1]Lower Hillabee Creek | 031501060406 | Ohatchee Creek-Tallasseehatchee Creek |
| 031501050901 | [1]Timbergut Creek | 031501060407 | Upper Cane Creek |
| 031501050902 | [1]Jay Bird Creek | 031501060408 | Lower Cane Creek |

*Source: USFWS 2018*

*Table A-1 (continued). Indiana Bat and NLEB Subwatersheds (HUC12) Consultation Zone – Alabama*
Table Key: [1]Indiana Bat Species Only [2]NLEB Species Only

| HUC 12 | Subwatershed Names | HUC 12 | Subwatershed Names |
|---|---|---|---|
| 031501060409 | Woods Island-Coosa River | 031501070201 | North Fork Yellowleaf Creek |
| 031501060501 | Chinch Creek-Shoal Creek | 031501070202 | South Fork Yellowleaf Creek |
| 031501060502 | Cottaquila Creek | 031501070203 | Muddy Prong |
| 031501060503 | Hillabee Creek | 031501070204 | Upper Yellowleaf Creek |
| 031501060504 | Willis Branch | 031501070205 | Lower Yellowleaf Creek |
| 031501060505 | City of Anniston | 031501070301 | Kahatchee Creek |
| 031501060506 | Coldwater Springs | 031501070302 | Beeswax Creek |
| 031501060507 | Tuskehadky Branch-Choccolocco Creek | 031501070303 | Cohabie Creek-Cedar Creek |
| 031501060508 | Dry Creek-Salt Creek | 031501070304 | Hay Spring Branch |
| 031501060509 | Upper Cheaha Creek | 031501070401 | Big Creek-Waxahatchee Creek |
| 031501060510 | Kelly Creek | 031501070402 | Camp Branch |
| 031501060511 | Lower Cheaha Creek | 031501070403 | Upper Waxahatchee Creek |
| 031501060512 | Emorai Church-Choccolocco Creek | 031501070404 | [1]Watson Creek |
| 031501060513 | Eastaboga Creek | 031501070405 | [1]Peckerwood Creek |
| 031501060514 | Jackson Shoals-Choccolocco Creek | 031501070406 | [1]Paint Creek |
| 031501060601 | Trout Creek | 031501070501 | [1]Middle Weogufka Creek |
| 031501060602 | Leather Creek-Broken Arrow Creek | 031501070502 | [1]Lower Weogufka Creek |
| 031501060603 | Embry Bend-Coosa River | 031501070503 | [1]Baker Creek |
| 031501060604 | Blue Eye Creek | 031501070601 | [1]Jacks Creek |
| 031501060605 | Broken Arrow Shoals-Coosa River | 031501070602 | [1]Socapatoy Creek |
| 031501060701 | Upper Talladega Creek | 031501070603 | [1]Middle Hatchet Creek |
| 031501060702 | Middle Talladega Creek | 031501070701 | [1]Lower Hatchet Creek |
| 031501060703 | Lower Talladega Creek | 031501070702 | [1]Noneless Creek |
| 031501060801 | Poorhouse Branch | 031501070703 | [1]Yellow Leaf Creek |
| 031501060802 | Haw Branch-Clear Creek | 031501070704 | [1]Walnut Creek |
| 031501060803 | Rabbit Branch | 031501070705 | [1]Cargle Creek |
| 031501060804 | Jess Branch-Shoal Creek | 031501070706 | [1]Finley Creek-Mill Creek |
| 031501060805 | Upper Kelly Creek | 031501070708 | [1]Little Chatahospee Creek |
| 031501060806 | Hearthstone Creek-Wolf Creek | 031501070709 | [1]Allen Creek |
| 031501060807 | Buckhorn Branch-Bear Creek | 031501070801 | [1]Upper Chatahospee Creek |
| 031501060808 | Lower Kelly Creek | 031501070802 | [1]Lower Chatahospee Creek |
| 031501060809 | Fanning Branch | 031501070803 | [1]Chikasanoxee Creek |
| 031501060810 | Spring Creek-Coosa River | 031501080205 | Little Creek |
| 031501070101 | Emauhee Creek | 031501080303 | Muscadine Creek |
| 031501070102 | Upper Tallaseehatchee Creek | 031501080304 | Norman Creek |
| 031501070103 | Weewoka Creek | 031501080305 | Kemp Creek |
| 031501070104 | Shirtee Creek | 031501080401 | Silas Creek |
| 031501070105 | Fourmile Creek | 031501080402 | Owen Creek |
| 031501070106 | Lower Tallaseehatchee Creek | 031501080403 | Henry Creek-Cane Creek |

*Source: USFWS 2018*

*Table A-1 (continued). Indiana Bat and NLEB Subwatersheds (HUC12) Consultation Zone – Alabama*
Table Key: [1]Indiana Bat Species Only [2]NLEB Species Only

| HUC 12 | Subwatershed Names | HUC 12 | Subwatershed Names |
|---|---|---|---|
| 031501080404 | Cahulga Creek | 031501090401 | [1]Benson Creek |
| 031501080405 | Verdin Creek | 031501090402 | [1]Upper Mulberry Creek |
| 031501080704 | Lower Indian Creek | 031501090403 | [1]Walker Branch |
| 031501080801 | Lost Creek | 031501090404 | Lower Enitachopco Creek |
| 031501080802 | Rice Branch-Shoal Creek | 031501090405 | [1]Upper Hillabee Creek |
| 031501080803 | Knokes Creek | 031501090406 | [1]Lower Hillabee Creek |
| 031501080901 | Cohabadiah Creek | 031501090801 | [1]Timbergut Creek |
| 031501080902 | Bear Creek-Little Tallapoosa River | 031501090802 | [1]Jay Bird Creek |
| 031501080903 | Turpentine Still Branch-Pineywoods Creek | 031501090803 | [1]Elkahatchee Creek |
| 031501080904 | Wedowee Creek | 031502011001 | [1]Benson Creek |
| 031501080905 | Coppers Rock Creek | 031502011002 | [1]Upper Mulberry Creek |
| 031501080906 | Allen Branch | 031502011003 | [1]Walker Branch |
| 031501081001 | Dynne Creek | 031502020101 | |
| 031501081002 | Chulafinnee Creek | 031502020102 | Big Black Creek |
| 031501081003 | Ketchepedrakee Creek | 031502020103 | Little Cahaba River |
| 031501081004 | Carr Creek-Cedar Creek | 031502020104 | Lower Cahaba River |
| 031501081005 | Mad Indian Creek | 031502020201 | Peavine Creek |
| 031501081006 | Gobbler Creek | 031502020202 | Cahaba Valley Creek |
| 031501090101 | Prairie Creek-Fox Creek | 031502020203 | Prairie Brook-Buck Creek |
| 031501090102 | Horsetrough Creek-Crooked Creek | 031502020204 | Patton Creek-Cahaba River |
| 031501090103 | Wesobulga Creek | 031502020205 | Murry Creek-Piney Woods Creek |
| 031501090104 | Cornhouse Creek | 031502020206 | Beaverdam Creek-Cahaba River |
| 031501090105 | Dewberry Branch | 031502020301 | Upper Shades Creek |
| 031501090106 | Cedar Creek-Hurricane Creek | 031502020302 | Cooley Creek-Mud Creek |
| 031501090107 | Hutton Creek-Beaverdam Creek | 031502020303 | Lower Shades Creek |
| 031501090201 | [1]Finley Creek-Mill Creek | 031502020401 | [1]Walker Branch |
| 031501090202 | [1]Little Chatahospee Creek | 031502020402 | Mahan Creek |
| 031501090203 | [1]Allen Creek | 031502020403 | Mayberry Creek-Shoal Creek |
| 031501090204 | [1]Upper Chatahospee Creek | 031502020404 | Sixmile Creek-Little Cahaba River |
| 031501090205 | [1]Lower Chatahospee Creek | 031502020405 | Alligator Creek-Little Cahaba River |
| 031501090301 | [1]Chikasanoxee Creek | 031502020406 | Caffee Creek |
| 031501090302 | [1]Laney Creek | 031502020407 | Cahaba River |
| 031501090303 | [1]Countyline Creek | 031502020501 | Hill Creek |
| 031501090304 | [1]Eagle Creek | 031502020502 | Shultz Creek |
| 031501090305 | [1]Upper Hillabee Creek | 031502020503 | Sandy Creek-Cahaba River |
| 031501090306 | [1]Lower Hillabee Creek | 031502020504 | Haysop Creek |
| 031501090307 | [1]Timbergut Creek | 031502020505 | Affonee Creek |
| 031501090308 | [1]Jay Bird Creek | 031502020506 | Gully Creek-Cahaba River |
| 031501090309 | [1]Elkahatchee Creek | 031502020507 | Blue Girth Creek |

*Source: USFWS 2018*

*Table A-1 (continued). Indiana Bat and NLEB Subwatersheds (HUC12) Consultation Zone – Alabama*
Table Key: [1]Indiana Bat Species Only [2]NLEB Species Only

| HUC 12 | Subwatershed Names | HUC 12 | Subwatershed Names |
|---|---|---|---|
| 031502020801 | Beaverdam Creek-Oakmulgee Creek | 031601050303 | Lower Hells Creek |
| 031502020802 | Upper Oakmulgee Creek | 031601050304 | Mill Creek-Yellow Creek |
| 031601010501 | Skirum Creek-Bull Mountain Creek | 031601050401 | Cut Bank Creek |
| 031601010502 | McConegal Creek-Bull Mountain Creek | 031601050402 | Wilson Creek-Cut Bank Creek |
| 031601010503 | North Fork Hurricane Creek-Hurricane Creek | 031601050403 | Mud Creek |
| 031601010504 | Briar Creek-Bull Mountain Creek | 031601050404 | Stillman Ditch-Yellow Creek |
| 031601010505 | Johns Creek-Bull Mountain Creek | 031601050405 | Cooper Creek-Yellow Creek |
| 031601010601 | Upper Gum Creek | 031601050502 | Magby Creek |
| 031601030101 | West Branch Buttahatchee River | 031601050503 | McCrary Creek-Luxapallila Creek |
| 031601030102 | Lake Buttahatchee-Buttahatchee River | 031601060201 | Upper Coal Fire Creek |
| 031601030103 | Barn Creek | 031601060202 | Little Coal Fire Creek-Coal Fire Creek |
| 031601030104 | Little Camp Creek-Camp Creek | 031601060203 | Lower Coal Fire Creek |
| 031601030105 | Clifty Creek | 031601060301 | Ellis Creek |
| 031601030106 | Williams Creek | 031601060304 | Nash Creek |
| 031601030107 | Pearces Mill Creek-Buttahatchee River | 031601060305 | Kincaide Creek |
| 031601030201 | Wickett Creek-Beaver Creek | 031601060308 | Aliceville Lake-Lower James Creek |
| 031601030202 | Cannon Mill Creek-Beaver Creek | 031601060401 | Upper Lubbub Creek |
| 031601030301 | Woods Creek | 031601060402 | Bethel Branch-Lubbub Creek |
| 031601030302 | Ragsdale Creek-Buttahatchee River | 031601060403 | Little Lubbub Creek |
| 031601030303 | Central Mill Creek-Buttahatchee River | 031601060404 | Stratton Creek-Lubbub Creek |
| 031601030304 | Mill Creek-Buttahatchee River | 031601060405 | Upper Bear Creek |
| 031601030305 | Bogue Creek | 031601060406 | Sneads Creek |
| 031601030306 | Lost Creek-Buttahatchee River | 031601060407 | Lower Bear Creek |
| 031601030401 | Boardtree Creek-Sipsey Creek | 031601060408 | Lower Lubbub Creek |
| 031601030402 | Barnesville Creek-Sipsey Creek | 031601060501 | Taylor Creek-Big Creek |
| 031601030501 | Reedy Branch-Sipsey Creek | 031601060502 | Cypress Branch-Tombigbee River |
| 031601030502 | Splunge Creek | 031601060503 | Beaver Creek |
| 031601030503 | Dry Creek-Sipsey Creek | 031601060504 | Dinsmore-Bogue Chitto |
| 031601030601 | Sipsey Creek-Buttahatchee River | 031601060505 | Owl Creek-Tombigbee River |
| 031601050101 | East Branch-Luxapallila Creek | 031601060506 | Blubber Creek |
| 031601050102 | Stewart Creek-Luxapallila Creek | 031601060507 | Big Slough-Tombigbee River |
| 031601050103 | Turkey Creek-Luxapallila Creek | 031601060601 | Fenache Creek |
| 031601050201 | Beaver Creek-Luxapallila Creek | 031601060602 | [2]Wilkes Creek |
| 031601050202 | Mill Creek-Luxapallila Creek | 031601060603 | [2]Turkey Paw Creek-Tombigbee River |
| 031601050203 | Driver Creek-Luxapallila Creek | 031601060604 | [2]Tubbs Creek |
| 031601050204 | Gentry Creek-Luxapallila Creek | 031601060605 | [2]Harkness Branch-Trussells Creek |
| 031601050205 | Steens-Luxapallila Creek | 031601060606 | [2]Rogers Creek-Trussells Creek |
| 031601050301 | Blowhorn Creek-Yellow Creek | 031601060607 | [2]Pippen Creek-Brush Creek |
| 031601050302 | Upper Hells Creek | 031601060608 | [2]Boligee Canal |

*Source: USFWS 2018*

*Table A-1 (continued). Indiana Bat and NLEB Subwatersheds (HUC12) Consultation Zone – Alabama*
Table Key: [1]Indiana Bat Species Only [2]NLEB Species Only

| HUC 12 | Subwatershed Names | HUC 12 | Subwatershed Names |
|---|---|---|---|
| 031601060609 | Cypress Swamp-Tombigbee River | 031601090105 | Brindley Creek |
| 031601060701 | Toms Creek | 031601090106 | Broglen River |
| 031601060702 | Factory Creek | 031601090107 | Blue Springs Creek |
| 031601060703 | Wiggins Creek-Jones Creek | 031601090108 | Mud Creek-Mulberry Fork |
| 031601060704 | Taylor Creek | 031601090109 | Pan Creek |
| 031601060705 | Boligee Creek-Tombigbee River | 031601090201 | Thacker Creek |
| 031601060706 | Cobb Creek-Tombigbee River | 031601090202 | Marriott Creek |
| 031601060707 | Acorn Creek-Tombigbee River | 031601090203 | Murphy Creek-Mill Creek |
| 031601060708 | McConnico Creek | 031601090204 | Dorsey Creek |
| 031601060709 | Twelvemile Bend-Tombigbee River | 031601090205 | Rice Creek-Mulberry Fork |
| 031601070101 | Mallards Creek | 031601090206 | Sloan Creek |
| 031601070102 | New River | 031601090301 | Meadow Creek-Splunge Creek |
| 031601070103 | Little New River | 031601090302 | Headwaters Blackwater Creek |
| 031601070104 | Studhorse Creek | 031601090303 | Long Branch |
| 031601070105 | Boxes Creek | 031601090304 | Panther Branch-Buck Creek |
| 031601070106 | Barron Creek-Sipsey River | 031601090305 | Bunkum Creek |
| 031601070201 | Musgrove Creek | 031601090306 | Little Spring Creek-Spring Creek |
| 031601070202 | Belle Creek-Davis Creek | 031601090307 | Middle Blackwater Creek |
| 031601070203 | Lazy Creek-Bear Creek | 031601090308 | Poley Creek |
| 031601070204 | Martins Creek-Sipsey River | 031601090309 | Lower Blackwater Creek |
| 031601070205 | Dunn Creek | 031601090401 | Clifty Branch-Mill Creek |
| 031601070206 | Thorton Creek | 031601090402 | Upper Lost Creek |
| 031601070301 | Box Creek | 031601090403 | West Fork-Lost Creek |
| 031601070302 | Malone Mill Creek | 031601090404 | Black Branck-Cane Creek |
| 031601070303 | Box Creek-Taylor Creek | 031601090405 | Lower Lost Creek |
| 031601070304 | [2]Little Creek-Brush Creek | 031601090501 | Blue Water Creek |
| 031601070305 | Longview Lake-Sipsey River | 031601090502 | Upper Wolf Creek |
| 031601070306 | Hughes Creek | 031601090503 | Lower Wolf Creek |
| 031601080903 | Lower Woodward Creek | 031601090601 | Town Creek-Cane Creek |
| 031601081002 | [2]Bodka Creek-Akron | 031601090602 | Old Town Creek-Mulberry Fork |
| 031601081003 | [2]Shy Hammock Creek | 031601090603 | Burnt Cane Creek |
| 031601081004 | [2]Quilby Creek-Bodka Creek | 031601090604 | Baker Creek-Mulberry Fork |
| 031601081005 | [2]Bodka Creek-Caney Creek | 031601100101 | Borden Creek |
| 031601081101 | [2]Ash Creek-Noxubee River | 031601100102 | Parker Branch-Upper Sipsey Fork |
| 031601081102 | [2]Rogers Creek-Noxubee River | 031601100103 | Caney Creek-Sipsey Fork |
| 031601090101 | Roswell Creek-Mulberry Fork | 031601100104 | Sandy Creek-Sipsey Fork |
| 031601090102 | Upper Duck River | 031601100105 | Rockhouse Creek-Sipsey Fork |
| 031601090103 | Lower Duck River | 031601100201 | Rush Creek-Brushy Creek |
| 031601090104 | Eightmile Creek | 031601100202 | Brushy Creek-Capsey Creek |

*Source: USFWS 2018*

*Table A-1 (continued). Indiana Bat and NLEB Subwatersheds (HUC12) Consultation Zone – Alabama*
Table Key: [1]Indiana Bat Species Only [2]NLEB Species Only

| HUC 12 | Subwatershed Names | HUC 12 | Subwatershed Names |
|---|---|---|---|
| 031601100203 | Inman Creek-Brushy Creek | 031601110303 | Gurley Creek |
| 031601100301 | Right Fork | 031601110304 | Self Creek |
| 031601100302 | Upper Clear Creek | 031601110305 | Neeley Creek |
| 031601100303 | Widows Creek-Clear Creek | 031601110306 | North Creek-Turkey Creek |
| 031601100304 | Middle Clear Creek | 031601110307 | Cunningham Creek |
| 031601100305 | Lower Clear Creek | 031601110308 | Hogeland creek |
| 031601100306 | Sipsey Fork | 031601110401 | Crooked Creek |
| 031601100401 | Belevens Creek | 031601110402 | Cane Creek-Locust Fork |
| 031601100402 | Long Branch-Upper Rock Creek | 031601110403 | Cane Creek |
| 031601100403 | Clifty Creek-Rock Creek | 031601110404 | Campbell Creek |
| 031601100404 | Middle Rock Creek | 031601110405 | Newfound Creek |
| 031601100405 | Upper Crooked Creek | 031601110406 | Upper Fivemile Creek |
| 031601100406 | Lower Crooked Creek | 031601110407 | Lower Fivemile Creek |
| 031601100407 | Whetstone Creek-White Oak Creek | 031601110408 | Upper Village Creek |
| 031601100408 | Lower Rock Creek | 031601110409 | Lower Village Creek |
| 031601100501 | Headwaters Ryan Creek-Alvis Branch | 031601110410 | Falls Creek |
| 031601100502 | Bavar Creek-Ryan Creek | 031601110411 | Short Creek |
| 031601100503 | Moore Branch-Rock Creek | 031601110412 | Fish Trap Branch |
| 031601100504 | Upper Ryan Creek | 031601110413 | Coal Creek |
| 031601100505 | Middle Ryan Creek | 031601120101 | Headwaters Valley Creek |
| 031601100506 | Little Mill Creek-Mill Creek | 031601120102 | Five Mile Creek-Valley Creek |
| 031601100507 | Boyd Creek-Sipsey Fork | 031601120103 | Lost Creek-Rock Creek |
| 031601110101 | Bristow Creek | 031601120104 | Lick Creek-Valley Creek |
| 031601110102 | Samuels Chapel Creek | 031601120105 | Woods Creek-Mud Creek |
| 031601110103 | Carroll Branch-Clear Creek | 031601120106 | Jordan Spring Branch-Valley Creek |
| 031601110104 | Big Mud Creek | 031601120201 | Upper Big Yellow Creek |
| 031601110105 | Upper Slab Creek | 031601120202 | Lower Big Yellow Creek |
| 031601110106 | Lower Slab Creek | 031601120203 | Shoal Creek-Black Warrior River |
| 031601110107 | Locust Fork-Little Cove Creek | 031601120301 | Lick Creek-Blue Creek |
| 031601110201 | Whippoorwill Creek | 031601120302 | Rockcastle Creek |
| 031601110202 | Graves Creek | 031601120303 | Whiteoak Creek-Davis Creek |
| 031601110203 | Andy Branch-Dry Creek | 031601120304 | Peques Creek |
| 031601110204 | Upper Blackburn Fork-Little Warrior River | 031601120305 | Daniel Creek |
| 031601110205 | Upper Calvert Prong | 031601120306 | Laurel Branch-Bluff Creek |
| 031601110206 | Lower Calvert Prong | 031601120401 | Deadwater Creek-Clear Creek |
| 031601110207 | Lower Blackburn Fork-Little Warrior River | 031601120402 | Headwaters North River |
| 031601110208 | Big Scirum Creek | 031601120403 | Cedar Creek-North River |
| 031601110301 | Sugar Creek-Locust Fork | 031601120404 | Tyro Creek |
| 031601110302 | Longs Branch | 031601120405 | Boone Creek-North River |

*Source: USFWS 2018*

*Table A-1 (continued). Indiana Bat and NLEB Subwatersheds (HUC12) Consultation Zone – Alabama*
Table Key: [1]Indiana Bat Species Only [2]NLEB Species Only

| HUC 12 | Subwatershed Names | HUC 12 | Subwatershed Names |
|---|---|---|---|
| 031601120406 | Dry Branch-Bear Creek | 031601130607 | [2]Bee Branch |
| 031601120407 | Cripple Creek | 031601130701 | [2]Whitsitt Creek |
| 031601120408 | Gin Branch-North River | 031601130704 | [2]Cotton Wood Creek |
| 031601120409 | Barbee Creek | 031601130705 | [2]Middle Big Prairie Creek |
| 031601120410 | Binion Creek | 031601130706 | [2]Little Prairie Creek |
| 031601120411 | Turkey Creek-North River | 031601130707 | [2]Big German Creek |
| 031601120412 | Carroll Creek | 031601130708 | [2]Lower Big Prairie Creek |
| 031601120413 | Lake Tuscaloosa-North River | 031601130801 | [2]Dollar Hyde Creek |
| 031601120501 | Lake Nicol-Yellow Creek | 031601130802 | [2]Hines Creek |
| 031601120502 | Coal Creek-Upper Hurricane Creek | 031601130803 | [2]White Creek |
| 031601120503 | Cottondale Creek | 031601130804 | [2]South Needham Creek |
| 031601120504 | Bee Branch-Lower Hurricane Creek | 031601130805 | [2]French Creek |
| 031601120505 | Two Mile Creek | 031601130806 | [2]Coleman Branch |
| 031601130101 | Lye Branch | 031602010201 | [2]Little Kinterbish Creek |
| 031601130102 | Bear Creek | 031602010202 | [2]Upper Kinterbush Creek |
| 031601130103 | South Sandy Creek | 031602010203 | [2]Lower Kinterbush Creek |
| 031601130104 | Long Branch-Upper Big Sandy Creek | 031602010401 | [2]Hall Creek-Tombigbee River |
| 031601130105 | Rosser Creek-Lower Big Sandy Creek | 031602010402 | [2]Spring Creek-Tombigbee River |
| 031601130201 | Mill Creek-Black Warrior River | 031602010403 | [2]Cotahaga Creek |
| 031601130202 | Jay Creek-Big Creek | 031602010407 | [2]Tallawyah Creek |
| 031601130203 | Cribbs Mill Creek-Cypress Creek | 031602020305 | [2]Tamola-Ponta Creek |
| 031601130204 | Goose Pond-Black Warrior River | 031602020401 | [2]Edmond Branch-Sucarnoochee River |
| 031601130205 | Little Sandy Creek | 031602020402 | [2]Sanusi Creek |
| 031601130301 | Millians Creek | 031602020403 | [2]Sicolocco Creek |
| 031601130302 | Elliotts Creek | 031602020404 | [2]Shumulla Creek-Sucarnoochee River |
| 031601130401 | Latner Branch-Upper Fivemile Creek | 031602020405 | [2]Cedar Creek-Sucarnoochee River |
| 031601130402 | [2]Harry Branch- Fivemile Creek | 031602020502 | [2]Sweetwater Creek-Toomsuba Creek |
| 031601130502 | [2]Sparks Creek | 031602020602 | [2]Salem Creek-Alamuchee Creek |
| 031601130503 | [2]PoleCat Creek | 031602020603 | [2]Buck Creek-Alamuchee Creek |
| 031601130504 | [2]Little Brush Creek-Big Bruch Creek | 031602020604 | [2]Yellow Creek-Alamuchee Creek |
| 031601130505 | [2]Colwell Creek | 031602020701 | [2]Ponkabia Creek |
| 031601130506 | [2]Saint Marks Church-Big Brush Creek | 031602020702 | [2]Fourth Creek-Sucarnoochee River |
| 031601130507 | [2]Dry Creek-Big Brush Creek | 031602020703 | [2]Mill Creek-Sucarnoochee River |
| 031601130601 | Grant Creek | 060200011101 | West Fork Lookout Creek-Dry Creek |
| 031601130602 | Keaton Lake-Carthage Branch | 060200011102 | Gulf Creek |
| 031601130603 | Black Warrior River-Keaton Lake | 060200011103 | Crawfish Creek |
| 031601130604 | Gabriel Creek-Black Warrior River | 060200011204 | Running Water Creek-Nickajack Lake |
| 031601130605 | [2]Sims Creek | 060300010201 | Jones Creek-Tennessee River |
| 031601130606 | [2]Minter Creek | 060300010202 | Long Creek-Miller Creek |

*Source: USFWS 2018*

*Table A-1 (continued). Indiana Bat and NLEB Subwatersheds (HUC12) Consultation Zone – Alabama*
Table Key: [1]Indiana Bat Species Only [2]NLEB Species Only

| HUC 12 | Subwatershed Names | HUC 12 | Subwatershed Names |
|---|---|---|---|
| 060300010203 | Guest Creek-Long Island Creek | 060300010901 | Lower Guntersville Lake |
| 060300010204 | Widows Creek | 060300010902 | Hog Creek |
| 060300010205 | Marshall Branch-Tennessee River | 060300010903 | Big Spring Creek |
| 060300010302 | Middle Crow Creek | 060300010904 | Browns Creek |
| 060300010303 | Little Crow Creek | 060300010905 | Honey Comb Creek |
| 060300010304 | Lower Crow Creek | 060300010906 | Dripping Spring Branch-Tennessee River |
| 060300010305 | Upper Big Coon Creek | 060300020101 | Hurricane Creek |
| 060300010306 | Little Coon Creek | 060300020102 | Larkin Fork |
| 060300010307 | Lower Big Coon Creek | 060300020103 | Estill Fork |
| 060300010401 | Boydston Creek-Burkhalter Creek | 060300020104 | Lick Fork |
| 060300010402 | Flat Rock Creek | 060300020105 | Williams Creek-Dry Creek |
| 060300010403 | Lower Coon Creek | 060300020106 | Guess Creek |
| 060300010404 | Upper Mud Creek | 060300020107 | Williams Cove-Paint Rock River |
| 060300010405 | Lower Mud Creek | 060300020201 | Little Dry Creek-Clear Creek |
| 060300010406 | Bryant Creek | 060300020202 | Little Paint Creek |
| 060300010407 | Rorex Creek-Jones Creek | 060300020203 | Cole Spring Branch |
| 060300010408 | Town Creek-Guntersville Lake | 060300020204 | Tremble Creek |
| 060300010501 | Straight Creek | 060300020301 | State Rock Branch-Flint River |
| 060300010502 | Kirby Creek | 060300020302 | West Fork-Flint River |
| 060300010503 | Upper South Sauty Creek | 060300020303 | Mountain Fork |
| 060300010504 | Mink Branch-Dry Creek | 060300020304 | Upper Brier Fork |
| 060300010505 | Lower South Sauty Creek | 060300020305 | Banyon Creek-Beaverdam Creek |
| 060300010601 | Evans Creek | 060300020306 | Lower Brier Fork |
| 060300010602 | Riley Cove-Dry Creek | 060300020307 | Pigrum Branch-Flint River |
| 060300010603 | Roseberry Creek | 060300020401 | Upper Hurricane Creek |
| 060300010604 | Upper North Sauty Creek | 060300020402 | Lower Hurricane Creek |
| 060300010605 | Lower North Sauty Creek | 060300020403 | Acuff Spring-Flint River |
| 060300010606 | Upper Guntersville Lake | 060300020404 | Goose Creek-Flint River |
| 060300010701 | Bengis Creek | 060300020405 | Yellow Bank Creek-Flint River |
| 060300010702 | Snake Creek-Town Creek | 060300020501 | Upper Indian Creek |
| 060300010703 | Reedy Creek-Town Creek | 060300020502 | Upper Huntsville Spring Branch |
| 060300010704 | Black Oak Creek | 060300020503 | Lower Huntsville Spring Branch |
| 060300010705 | Minky Creek-Town Creek | 060300020504 | Barren Fork Creek |
| 060300010801 | Cross Creek | 060300020505 | Lower Indian Creek |
| 060300010802 | Upper Short Creek | 060300020601 | Winton Branch-Hughes Creek |
| 060300010803 | Upper Scarham Creek | 060300020602 | West Fork-Cottaco Creek |
| 060300010804 | Whippoorwill Creek-Shoal Creek | 060300020603 | Upper Cotaco Creek |
| 060300010805 | Drum Creek-Short Creek | 060300020604 | Gill Creek-Town Creek |
| 060300010806 | Lower Short Creek | 060300020605 | Middle Cotaco Creek |

*Source: USFWS 2018*

*Table A-1 (continued). Indiana Bat and NLEB Subwatersheds (HUC12) Consultation Zone – Alabama*
Table Key: [1]Indiana Bat Species Only [2]NLEB Species Only

| HUC 12 | Subwatershed Names | HUC 12 | Subwatershed Names |
|---|---|---|---|
| 060300020606 | Lower Cottage Creek | 060300030601 | Larkin Springs Branch |
| 060300020701 | Upper Limestone Creek | 060300040303 | Sugar Creek |
| 060300020702 | Middle Limestone Creek | 060300040401 | Shoal Creek |
| 060300020703 | Lower Limestone Creek | 060300040402 | Ragsdale Creek-Elk River |
| 060300020801 | Upper Piney Creek | 060300040403 | Elk River-Sulphur Creek |
| 060300020802 | Middle Piney Creek | 060300040404 | Anderson Creek |
| 060300020803 | Lower Piney Creek | 060300040405 | Big Creek-Elk River |
| 060300020901 | Peachtree Creek-Shoal Creek | 060300050101 | Rutherford Creek |
| 060300020902 | Pigeon Roost Creek-Tennessee River | 060300050102 | Upper Big Nance Creek-Muddy Fork |
| 060300020903 | Aldridge Creek | 060300050103 | Big Nance Creek-Clear Fork |
| 060300020904 | Bartee Branch-Hambrick Slough | 060300050104 | Middle Big Nance Creek |
| 060300020905 | Oakland Spring Branch-Beaverdam Creek | 060300050105 | Lower Big Nance Creek |
| 060300020906 | Matney Branch-Tennessee River | 060300050201 | Upper Bluewater Creek |
| 060300021001 | East Fork Flint Creek | 060300050202 | Lower Bluewater Creek |
| 060300021002 | Dry Creek-Mill Creek | 060300050301 | Rock Creek-Mud Creek |
| 060300021003 | Upper Flint Creek | 060300050302 | Upper Town Creek |
| 060300021004 | Robertson Branch-Cedar Creek | 060300050303 | Middle Town Creek |
| 060300021005 | Sleighton Branch-Shoal Creek | 060300050304 | Lower Town Creek |
| 060300021006 | Crowdabout Creek | 060300050507 | Butler Creek |
| 060300021007 | Middle Flint Creek | 060300050508 | Upper Shoal Creek |
| 060300021008 | No Busisness Creek | 060300050509 | Lower Shoal Creek |
| 060300021009 | Elam Creek | 060300050601 | Greenbrier Branch |
| 060300021010 | Upper West Flint Creek | 060300050602 | Threet Creek |
| 060300021011 | Big Shoal Creek | 060300050603 | Burcham Creek |
| 060300021012 | Middle West Flint Creek | 060300050604 | Little Cypress Creek |
| 060300021013 | Lower West Flint Creek | 060300050605 | Cox Creek |
| 060300021014 | Lower Flint Creek | 060300050701 | Foxtrap Creek-Upper Spring Creek |
| 060300021101 | Swan Creek | 060300050702 | Sink Pond-Dry Creek |
| 060300021102 | Bakers Creek-Tennessee River | 060300050703 | Lower Spring Creek |
| 060300021103 | Briley Creek | 060300050801 | McKieman Creek-Tennessee River |
| 060300021104 | Fox Creek | 060300050802 | Abernathy Bottom-Pond Creek |
| 060300021105 | Spring Creek-Mud Creek | 060300050803 | Sweetwater Creek-Tennessee River |
| 060300021106 | Dry Creek-Mallard Creek | 060300050804 | Hargett Creek |
| 060300021107 | Coxey Creek-Tennessee River | 060300050805 | Little Bear Creek |
| 060300021201 | Red Branch-Spring Creek | 060300050806 | Sinking Creek |
| 060300021202 | First Creek | 060300050807 | Tanyard Branch-Cane Creek |
| 060300021203 | Upper Second Creek | 060300050808 | Coffee Slough-Tennessee River |
| 060300021204 | Lower Second Creek | 060300050901 | Bumpass Creek |
| 060300021205 | Page Branch-Tennessee River | 060300050902 | Second Creek |

*Source: USFWS 2018*

*Table A-1 (continued). Indiana Bat and NLEB Subwatersheds (HUC12) Consultation Zone – Alabama*
Table Key: [1]Indiana Bat Species Only [2]NLEB Species Only

| HUC 12 | Subwatershed Names | HUC 12 | Subwatershed Names |
|---|---|---|---|
| 060300051001 | Bitter Branch-Bluff Creek | 060300060202 | Dunkin Creek-Cedar Creek |
| 060300051002 | Colbert Creek-Pickwick Lake | 060300060203 | Tollison Creek-Cedar Creek |
| 060300051003 | Brush Creek | 060300060204 | Cody Branch-Cedar Creek |
| 060300051004 | Ross Branch-Pickwick Lake | 060300060205 | Upper Little Bear Creek |
| 060300051202 | Panther Creek-Pickwick Lake | 060300060206 | Lower Little Bear Creek |
| 060300051203 | Dry Creek-Pickwick Lake | 060300060207 | Mill Branch-Cedar Creek |
| 060300060101 | Little Turkey Creek | 060300060301 | Chandelower Creek-Rock Creek |
| 060300060102 | Headwaters Bear Creek | 060300060302 | Cripple Deer Creek |
| 060300060103 | Bear Creek-Bluff Creek | 060300060303 | Pennywinkle Creek |
| 060300060104 | Holcomb Branch-Bear Creek | 060300060304 | Rock Creek-Bear Creek |
| 060300060105 | Bear Creek-Mud Branch | 060300060305 | Buzzard Roost Creek |
| 060300060106 | Cypress Pond Ditch-Bear Creek | 060300060306 | Clear Creek-Pickwick Lake |
| 060300060201 | Cedar Creek-Harris Creek | 060300060307 | Bear Creek-Pickwick Lake |

*Source: USFWS 2018*

## Appendix B – Indiana Bat and Northern Long-Eared Bat Effects Determination Key

ORM2 Number _____ Date _____
Reference File: _____

1) Is the action area located within either the Indiana bat or NLEB consultation zones (see Appendix A)?
   a) Yes.....go to 2
   b) No.....No effect[1]

2) Will project affect caves or mines where Indiana bat or NLEB are known to hibernate (i.e., hibernaculum) or could it alter the entrance or the environment of a hibernaculum, including the removal of any trees within 0.25 miles of a NLEB hibernaculum at any time of year?
   a) Yes.....Consultation required[3]
   b) No.....go to 3

3) Will there be removal of woody vegetation (live or dead standing trees that have exfoliating bark, cracks, crevices and/or hollows) over 3 inches diameter breast height (dbh)?
   a) Yes.....go to 4
   b) No.....No effect[1]

4) Will the applicant accept the following permit condition: The felling of all trees over 3 inches dbh must occur during the non-active season (October 15 to March 31)?
   a) Yes.....NLAA[2]
   b) No (for NLEB).....go to 5
   c) No (for Indiana bat).....go to 6

5) Will the project remove a known NLEB-occupied maternity roost tree or any trees within 150 feet of a known occupied maternity roost tree from June 1 to July 31; or remove any trees within 0.25 miles of a NLEB hibernaculum at any time of year?
   a) Yes.....Consultation required[3]
   b) No.....Complete Appendix D, and forward to the USFWS Daphne, Alabama Ecological Services Field Office; May Affect, but take not prohibited under 4(d) Rule; No 30-day waiting for a response - Consultation complete[4]

6) Has the action area been surveyed for Indiana bats using USFWS-approved acoustical or mist-net survey guidelines[5]?
   a) Yes.....go to 7
   b) No.....Consultation required[3]

7) Was Indiana bat collected or detected?
   a) Yes .....Consultation required[3]
   b) No .....NLAA[2]

[1]No effect - The proposed project would result in no effect to this species and/or its federally designated critical habitat (if applicable). Further consultation with the Daphne, Alabama Ecological Services Office is not necessary for the project as described.

[2]NLAA - The proposed project may affect, but is not likely to adversely affect, this species and/or its designated critical habitat (if applicable). NLAA determinations for projects made pursuant to this key require no further consultation with the USFWS Daphne, Alabama Ecological Services Office.

[3]Consultation required - Further consultation with the USFWS Daphne, Alabama Ecological Services Office is necessary to discern if the activity would result in a "no effect," "not likely to adversely affect," or "likely to adversely affect" determination.

[4] Consultation complete – The incidental take that may result from the project is exempted by the 4(d) rule and no further action is necessary to comply with Endangered Species Act prohibitions to protect NLEB.

[5]Applicant can also elect to conduct a Habitat Assessment (see 2018 summer survey guidelines, Appendix A) and forward to the USFWS Daphne, Alabama Ecological Services Office to determine if suitable habitat is present before conducting mist net and/or acoustical surveys. 2018 survey guidance can be found at https://www.fws.gov/midwest/endangered/mammals/inba/inbasummersurveyguidance.html.

Additional Information _____

## Appendix C – Conservation Recommendations

*These recommendations are optional and if implemented would support the agency's goals toward recovery. These recommendations are to be used at the discretion of the permittee.*

Currently, the greatest controllable threat to the survival and recovery of federally listed bats in Alabama is destruction of caves and maternity and foraging habitats. Measures that should be considered to minimize impacts include:

1. Protect cavity trees, snags, and foraging habitats near known or potential roosting trees.
2. Maintain a 150-foot wooded/vegetated buffer around caves and mines.
3. Maintain a 150-foot wooded/vegetated buffer around streams, ponds, and reservoirs.
4. Limit removal of contiguous acres of woody vegetation within known or potential maternity habitats.
5. Limit human disturbance in areas of maternity habitats during maternity season.
6. Conduct tree removal activities outside of the NLEB pup season (June 1 to July 31) and/or the active season (April 1 to October 31). This will minimize impacts to pups at roosts not yet identified.
7. Conduct tree removal activities, for those trees containing suitable roosting habitat, October 15 to March 31, which is outside of the Indiana bat summer roosting season.

Contact the USFWS Daphne, Alabama Ecological Services Office (251) 441-5181 regarding the locations of known maternity roosts, hibernaculum, or mist nest capture sites in Alabama.

Other USFWS offices have created consultation keys for the general public and federal agencies. As an example, see "Key to the Northern Long-Eared Bat 4(d) Rule for Federal Actions that May Affect Northern Long-Eared Bats" at https://www.fws.gov/midwest/endangered/mammals/nleb/pdf/KeyFinal4dNLEB_FedAgencies17Feb2016.pdf.

## Appendix D – Northern Long-Eared Bat 4(d) Rule Streamlined Consultation Form

Federal agencies should use this form for the optional streamlined consultation framework for the northern long-eared bat (NLEB). This framework allows federal agencies to rely upon the U.S. Fish and Wildlife Service's (USFWS) January 5, 2016, intra-Service Programmatic Biological Opinion (BO) on the final 4(d) rule for the NLEB for section 7(a)(2) compliance by: (1) notifying the USFWS that an action agency will use the streamlined framework; (2) describing the project with sufficient detail to support the required determination; and (3) enabling the USFWS to track effects and determine if re-initiation of consultation is required per 50 CFR 402.16.

This form is not necessary if an agency determines that a proposed action will have no effect to the NLEB or if the USFWS has concurred in writing with an agency's determination that a proposed action may affect, but is not likely to adversely affect, the NLEB (i.e., the standard informal consultation process). Actions that may cause prohibited incidental take requires separate formal consultation. Providing this information does not address section 7(a)(2) compliance for any other listed species.

| **Information to Determine 4(d) Rule Compliance:** | **YES** | **NO** |
|---|---|---|
| 1. Does the project occur wholly outside of the WNS Zone[1]? | ☐ | ☐ |
| 2. Have you contacted the appropriate agency[2] to determine if your project is near known hibernacula or maternity roost trees? | ☐ | ☐ |
| 3. Could the project disturb hibernating NLEBs in a known hibernaculum? | ☐ | ☐ |
| 4. Could the project alter the entrance or interior environment of a known hibernaculum? | ☐ | ☐ |
| 5. Does the project remove any trees within 0.25 miles of a known hibernaculum at any time of year? | ☐ | ☐ |
| 6. Would the project cut or destroy known occupied maternity roost trees, or any other trees within a 150-foot radius from the maternity roost tree from June 1 through July 31? | ☐ | ☐ |

You are eligible to use this form if you have answered yes to question #1 **or** yes to question #2 **and** no to questions 3, 4, 5 and 6. The remainder of the form will be used by the USFWS to track our assumptions in the BO.

**Agency and Applicant**[3] (Name, Email, Phone No.):

**Project Name**:

**Project Location** (include coordinates if known):

**Basic Project Description** (provide narrative below or attach additional information):

[1] http://www.fws.gov/midwest/endangered/mammals/nleb/pdf/WNSZone.pdf
[2] See http://www.fws.gov/midwest/endangered/mammals/nleb/nhisites.html
[3] If applicable - only needed for federal actions with applicants (e.g., for a permit, etc.) who are party to the consultation.

| General Project Information | YES | NO |
|---|---|---|
| Does the project occur within 0.25 miles of a known hibernaculum? | ☐ | ☐ |
| Does the project occur within 150 feet of a known maternity roost tree? | ☐ | ☐ |
| Does the project include forest conversion[4]? (if yes, report acreage below) | ☐ | ☐ |
| Estimated total acres of forest conversion | | |
| If known, estimated acres[5] of forest conversion from April 1 to October 31 | | |
| If known, estimated acres of forest conversion from June 1 to July 31[6] | | |
| Does the project include timber harvest? (if yes, report acreage below) | ☐ | ☐ |
| Estimated total acres of timber harvest | | |
| If known, estimated acres of timber harvest from April 1 to October 31 | | |
| If known, estimated acres of timber harvest from June 1 to July 31 | | |
| Does the project include prescribed fire? (if yes, report acreage below) | ☐ | ☐ |
| Estimated total acres of prescribed fire | | |
| If known, estimated acres of prescribed fire from April 1 to October 31 | | |
| If known, estimated acres of prescribed fire from June 1 to July 31 | | |
| Does the project install new wind turbines? (if yes, report capacity in MW below) | ☐ | ☐ |
| Estimated wind capacity (MW) | | |

Note: MW = megawatts

Agency Determination:

By signing this form, the action agency determines that this project may affect the NLEB, but that any resulting incidental take of the NLEB is not prohibited by the final 4(d) rule.

If the USFWS does not respond within 30 days from submittal of this form, the action agency may presume that its determination is informed by the best available information and that its project responsibilities under 7(a)(2) with respect to the NLEB are fulfilled through the USFWS January 5, 2016, Programmatic BO. The action agency will update this determination annually for multi-year activities.

The action agency understands that the USFWS presumes that all activities are implemented as described herein. The action agency will promptly report any departures from the described activities to the appropriate USFWS Field Office. The action agency will provide the appropriate USFWS Field Office with the results of any surveys conducted for the NLEB. Involved parties will promptly notify the appropriate USFWS Field Office upon finding a dead, injured, or sick NLEB.

Signature: _____

Date Submitted: _____

[4] Any activity that temporarily or permanently removes suitable forested habitat, including, but not limited to, tree removal from development, energy production and transmission, mining, agriculture, etc. (see page 48 of the BO).
[5] If the project removes less than 10 trees and the acreage is unknown, report the acreage as less than 0.1 acre.
[6] If the activity includes tree clearing in June and July, also include those acreage in April to October.

# Meeting Postponed

## APC Harris Relicensing <g2apchr@southernco.com>

Wed 3/17/2021 2:44 PM

**To:** APC Harris Relicensing <harrisrelicensing@southernco.com>
**Bcc:** damon.abernethy@dcnr.alabama.gov <damon.abernethy@dcnr.alabama.gov>; nathan.aycock@dcnr.alabama.gov <nathan.aycock@dcnr.alabama.gov>; steve.bryant@dcnr.alabama.gov <steve.bryant@dcnr.alabama.gov>; todd.fobian@dcnr.alabama.gov <todd.fobian@dcnr.alabama.gov>; chris.greene@dcnr.alabama.gov <chris.greene@dcnr.alabama.gov>; keith.henderson@dcnr.alabama.gov <keith.henderson@dcnr.alabama.gov>; mike.holley@dcnr.alabama.gov <mike.holley@dcnr.alabama.gov>; evan.lawrence@dcnr.alabama.gov <evan.lawrence@dcnr.alabama.gov>; matthew.marshall@dcnr.alabama.gov <matthew.marshall@dcnr.alabama.gov>; brian.atkins@adeca.alabama.gov <brian.atkins@adeca.alabama.gov>; tom.littlepage@adeca.alabama.gov <tom.littlepage@adeca.alabama.gov>; jhaslbauer@adem.alabama.gov <jhaslbauer@adem.alabama.gov>; cljohnson@adem.alabama.gov <cljohnson@adem.alabama.gov>; mlen@adem.alabama.gov <mlen@adem.alabama.gov>; fal@adem.alabama.gov <fal@adem.alabama.gov>; djmoore@adem.alabama.gov <djmoore@adem.alabama.gov>; arsegars@southernco.com <arsegars@southernco.com>; dkanders@southernco.com <dkanders@southernco.com>; wtanders@southernco.com <wtanders@southernco.com>; jefbaker@southernco.com <jefbaker@southernco.com>

HAT 1,

Given the severe weather forecast for most of the southeast today and throughout tonight and the uncertainty in what the impact may be and how many of us may be without power, we have decided to postpone tomorrow's HAT 1 meeting until **Thursday, April 1** from 9:00-3:00 (Central Time). The agenda will be the same.

I apologize for any inconvenience. Please be weather aware and stay safe!

**Angie Anderegg**
Hydro Services
(205)257-2251
arsegars@southernco.com

HAT 1,

We will have a HAT 1 meeting on **March 18th** from 9:00-3:00 (Central Time) in order to review the results of the Phase 2 analyses of both the Operating Curve Change Feasibility and Downstream Release Alternatives Studies. The agenda and Teams meeting information is below. Let me know if you have any questions.

Thanks,

**Angie Anderegg**
Hydro Services
(205)257-2251
arsegars@southernco.com

**Agenda**

9:00-11:00 Review results of Downstream Release Alternatives Phase 2 analysis

11:00-1:00 Break for lunch

1:00-3:00 Review results of Operating Curve Change Feasibility Phase 2 analysis

# Microsoft Teams meeting

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Phone Conference ID: 740 663 097#

Find a local number

## APC Harris Relicensing

**From:** APC Harris Relicensing
**Sent:** Wednesday, March 17, 2021 1:23 PM
**To:** Barry Morris
**Subject:** RE: Meeting Postponed

Hi Barry,

You're right that the study report won't be ready prior to the April 1 meeting. We have quite a bit that we're working on wrapping up right now in order to meet the April 12 Updated Study Report filing. We will file the full report on that date.

We have been working with Southern Company in-house battery experts to answer the BESS questions, including capital and O&M costs and how the battery would be charged, and will file that info on April 12th as well.

Stay safe today!

**Angie Anderegg**
Hydro Services
(205)257-2251
arsegars@southernco.com

---

**From:** Barry Morris <rbmorris222@gmail.com>
**Sent:** Wednesday, March 17, 2021 11:45 AM
**To:** APC Harris Relicensing <g2apchr@southernco.com>
**Subject:** Re: Meeting Postponed

Angie: Barry Morris with the Lake Wedowee Property Owners Association. Too bad about the postponement. Is it safe to conclude that the HAT 1 Operations Phase 2 Study results will not be available until the April 1 meeting? I'd love to get a pre-read.

Also, it seems to me that installing a 60MW battery won't fix anything unless the company has a way to charge it from a source other than generating from the dam. Maybe charging it overnight with excess steam plant capacity? Dare I ask the cost and cycles/lifespan of a 60MW battery? These are rhetorical questions. Don't worry about having one of the experts give a detailed reply. I'm sure it will be covered in the meeting.

See you (sort of) on April Fools day. Barry

On Wed, Mar 17, 2021 at 9:44 AM APC Harris Relicensing <g2apchr@southernco.com> wrote:

> HAT 1,
>
> Given the severe weather forecast for most of the southeast today and throughout tonight and the uncertainty in what the impact may be and how many of us may be without power, we have decided to postpone tomorrow's HAT 1 meeting until **Thursday, April 1** from 9:00-3:00 (Central Time). The agenda will be the same.

I apologize for any inconvenience. Please be weather aware and stay safe!

**Angie Anderegg**

Hydro Services

(205)257-2251

arsegars@southernco.com

HAT 1,

We will have a HAT 1 meeting on **March 18th** from 9:00-3:00 (Central Time) in order to review the results of the Phase 2 analyses of both the Operating Curve Change Feasibility and Downstream Release Alternatives Studies. The agenda and Teams meeting information is below. Let me know if you have any questions.

Thanks,

**Angie Anderegg**

Hydro Services

(205)257-2251

arsegars@southernco.com

**Agenda**

9:00-11:00 Review results of Downstream Release Alternatives Phase 2 analysis

11:00-1:00 Break for lunch

1:00-3:00  Review results of Operating Curve Change Feasibility Phase 2 analysis

# Microsoft Teams meeting

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Southern Company

# HAT 3 - meeting on March 31

Anderegg, Angela Segars <ARSEGARS@southernco.com>

Wed 3/17/2021 6:16 PM

**To:** APC Harris Relicensing <harrisrelicensing@southernco.com>
**Bcc:** amy.silvano@dcnr.alabama.gov <amy.silvano@dcnr.alabama.gov>; chris.greene@dcnr.alabama.gov <chris.greene@dcnr.alabama.gov>; damon.abernethy@dcnr.alabama.gov <damon.abernethy@dcnr.alabama.gov>; evan.lawrence@dcnr.alabama.gov <evan.lawrence@dcnr.alabama.gov>; keith.henderson@dcnr.alabama.gov <keith.henderson@dcnr.alabama.gov>; mike.holley@dcnr.alabama.gov <mike.holley@dcnr.alabama.gov>; steve.bryant@dcnr.alabama.gov <steve.bryant@dcnr.alabama.gov>; matthew.marshall@dcnr.alabama.gov <matthew.marshall@dcnr.alabama.gov>; todd.fobian@dcnr.alabama.gov <todd.fobian@dcnr.alabama.gov>; nathan.aycock@dcnr.alabama.gov <nathan.aycock@dcnr.alabama.gov>; ken.wills@jcdh.org <ken.wills@jcdh.org>; arsegars@southernco.com <arsegars@southernco.com>; ammcvica@southernco.com <ammcvica@southernco.com>; dkanders@southernco.com <dkanders@southernco.com>; jcarlee@southernco.com <jcarlee@southernco.com>; jefbaker@southernco.com <jefbaker@southernco.com>; kechandl@southernco.com <kechandl@southernco.com>; tlmills@southernco.com <tlmills@southernco.com>; afleming@southernco.com <afleming@southernco.com>; cggoodma@southernco.com <cggoodma@southernco.com>

1 attachments (5 MB)

2021-3-16 Auburn Univ Harris Bioenergetics Final Report.pdf;

HAT 3,

We will have a HAT 3 meeting on **March 31st** from 9:00-11:30 AM (Central Time) Microsoft Teams information is below. In this meeting, Auburn will present the results of the Aquatic Resources Bioenergetics Study. Attached is Auburn's Final Bioenergetics Report if you would like to review it prior to the meeting.

Thanks,

**Angie Anderegg**
Hydro Services
(205)257-2251
arsegars@southernco.com

# Microsoft Teams meeting

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## APC Harris Relicensing

**From:** Anderegg, Angela Segars
**Sent:** Wednesday, March 17, 2021 2:43 PM
**To:** todd.fobian@dcnr.alabama.gov; Marshall, Matthew; 'Mike Holley'; 'Chris Greene'
**Cc:** McVicar, Ashley M; Carlee, Jason; Baker, Jeffery L.; Chandler, Keith Edward
**Subject:** FW: Final revised report
**Attachments:** 2021-3-16 Auburn Univ Harris Bioenergetics Final Report.pdf

I wanted to bring to your attention that Auburn made a few minor changes to the report based on our discussion on 3/5. See Dr. Wright's note below.

Stay safe today!

**Angie Anderegg**
Hydro Services
(205)257-2251
arsegars@southernco.com

---

**From:** Rusty Wright <wrighr2@auburn.edu>
**Sent:** Wednesday, March 17, 2021 11:05 AM
**To:** Anderegg, Angela Segars <ARSEGARS@southernco.com>
**Cc:** Ehlana Stell <egs0046@auburn.edu>; Elijah Lamb <ebl0020@auburn.edu>; Dennis Devries <devridr@auburn.edu>
**Subject:** Final revised report



---

Angie,

Sorry for the delay getting this back to you. As we said in the meeting we had with the AL Power team and ADCNR, we did find a few minor errors in the report (typos, and an analysis where we double log transformed some data) that we felt should be corrected in the report. Also, Todd Fobian asked if we had included hybrids in our diversity analyses. We thought more about this and concluded that those occurrences should not be used in calculations of species diversity, so those indices were recalculated without the hybrids resulting in minor changes (see page 21 and Table 3.2). None of these corrections changed our conclusions.

Please find attached the revised final report in PDF format. If you need it in Word format, please let me know.

Stay safe in this severe weather coming our way!

Rusty Wright

Associate Professor/Extension Specialist
School of Fisheries, Aquaculture, and Aquatic Sciences
Auburn University
Office PH 334-844-9311
Extension Cell 334-734-4932

## APC Harris Relicensing

**From:** Anderegg, Angela Segars
**Sent:** Monday, March 22, 2021 11:54 AM
**To:** Gauldin, Keith; 'Chris Smith'; todd.fobian@dcnr.alabama.gov
**Cc:** Mills, Tina L.; Carlee, Jason; Baker, Jeffery L.; McVicar, Ashley M; Chandler, Keith Edward
**Subject:** Draft Harris WMP for your review and meeting date
**Attachments:** 2021-03-18 DRAFT Harris WMP.pdf

Good afternoon,

Attached for your review is the draft Wildlife Management Plan for the Harris project. We would like to give you a few weeks to review and then get together to hear your thoughts. Could you let me know your availability the **week of April 12th** for a 1.5 hr conference call? If that week is really busy, we can look at the following week. Also, please forward to anyone else at DNR who also needs to be plugged in.

Thanks!

**Angie Anderegg**
Hydro Services
(205)257-2251
arsegars@southernco.com

# WILDLIFE MANAGEMENT PLAN

## R.L. HARRIS HYDROELECTRIC PROJECT

FERC No. 2628

**DRAFT**

***Prepared by:***

Alabama Power

Birmingham, Alabama

March 2021

# WILDLIFE MANAGEMENT PLAN

# R.L. HARRIS HYDROELECTRIC PROJECT

**ALABAMA POWER COMPANY**
**BIRMINGHAM, ALABAMA**

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**WILDLIFE MANAGEMENT PLAN**

**R.L. HARRIS HYDROELECTRIC PROJECT**
**(FERC NO. 2628)**

**ALABAMA POWER COMPANY**
**BIRMINGHAM, ALABAMA**

# 1.0 INTRODUCTION

Alabama Power Company (Alabama Power) owns and operates the R.L. Harris Hydroelectric Project (Harris Project), FERC Project No. 2628, licensed by the Federal Energy Regulatory Commission (FERC). Alabama Power is relicensing the 135-megawatt (MW) Harris Project, and the existing license expires in 2023. This Wildlife Management Plan was developed as part of Alabama Power's efforts to acquire a new operating license. The relicensing process included a multi-year cooperative effort between Alabama Power, state and federal resource agencies, and interested stakeholders to address operational, recreational, and ecological concerns associated with hydroelectric project operations. During the initial (scoping) phase of the relicensing process, Alabama Power consulted a wide variety of stakeholders, including state and federal resource agencies, non-governmental organizations, and concerned citizens, for input on important relicensing issues. On November 13, 2018, Alabama Power filed ten proposed study plans for the Harris Project, including a study plan for an evaluation of Project lands and the development of a Shoreline Management Plan and a Wildlife Management Plan. FERC issued a Study Plan Determination on April 12, 2019[1], which included FERC staff recommendations. Alabama Power incorporated FERC's recommendations and filed the Final Study Plans with FERC on May 13, 2019. The Wildlife Management Plan described herein was developed in accordance with the Project Lands Evaluation Study Plan (Study Plan).

[1] Accession Number 20190412-3000

## 1.1 PROJECT DESCRIPTION

The Harris Project consists of a dam, spillway, powerhouse, and those lands and waters necessary for the operation of the hydroelectric project and enhancement and protection of environmental resources. These structures, lands, and water are enclosed within the FERC Project Boundary. Under the existing Harris Project license, the FERC Project Boundary encloses two distinct geographic areas, described below.

Harris Reservoir is the 9,870-acre reservoir (Harris Reservoir) created by the R.L. Harris Dam (Harris Dam). The lands adjoining the reservoir total approximately 7,392 acres and are included in the FERC Project Boundary (Figure **1-1**). This includes land to 795 feet mean sea level (msl)[2], as well as natural undeveloped areas, hunting lands, prohibited access areas, recreational areas, and all islands.


The Harris Project also contains 15,063 acres of land within the James D. Martin-Skyline Wildlife Management Area (Skyline WMA) located in Jackson County, Alabama (**Figure** 1-2). These lands are located approximately 110 miles north of Harris Reservoir and were acquired and incorporated into the FERC Project Boundary as part of the July 29, 1988 Harris Project Wildlife Mitigative Plan and the June 29, 1990 Wildlife Management Plan. These lands are leased to, and managed by, the State of Alabama for wildlife management and public hunting and are part of the Skyline WMA.

For the purposes of this Plan, "Lake Harris" refers to the 9,870-acre reservoir, adjacent 7,392 acres of Project land, and the dam, spillway, and powerhouse. "Skyline" refers to the 15,063 acres of Project land within the Skyline WMA in Jackson County. "Harris Project" refers to all the lands, waters, and structures enclosed within the FERC Project Boundary, which includes both Lake Harris and Skyline. Harris Reservoir refers to the 9,870-acre reservoir only; Harris

[2] Also includes a scenic easement (to 800 feet msl or 50 horizontal feet from 793 feet msl, whichever is less, but never less than 795 feet msl).

Dam refers to the dam, spillway, and powerhouse. The Project Area refers to the land and water in the Project Boundary and immediate geographic area adjacent to the Project Boundary.

Lake Harris and Skyline are located within two river basins: the Tallapoosa and Tennessee River Basins, respectively. The only waterbody managed by Alabama Power as part of their FERC license for the Harris Project is the Harris Reservoir.

Within Section 3.0 of this report, Alabama Power describes the Lake Harris resource first, followed by the Skyline resource. Specific references to the Harris Reservoir will be identified as Harris Reservoir; specific reference to the dam will be identified as Harris Dam. The "Project Area" refers to the land and water in the Project Boundary and immediate geographic area adjacent to the Project Boundary. The "Project Vicinity" refers to a larger geographic area near a hydroelectric project, such as a county.

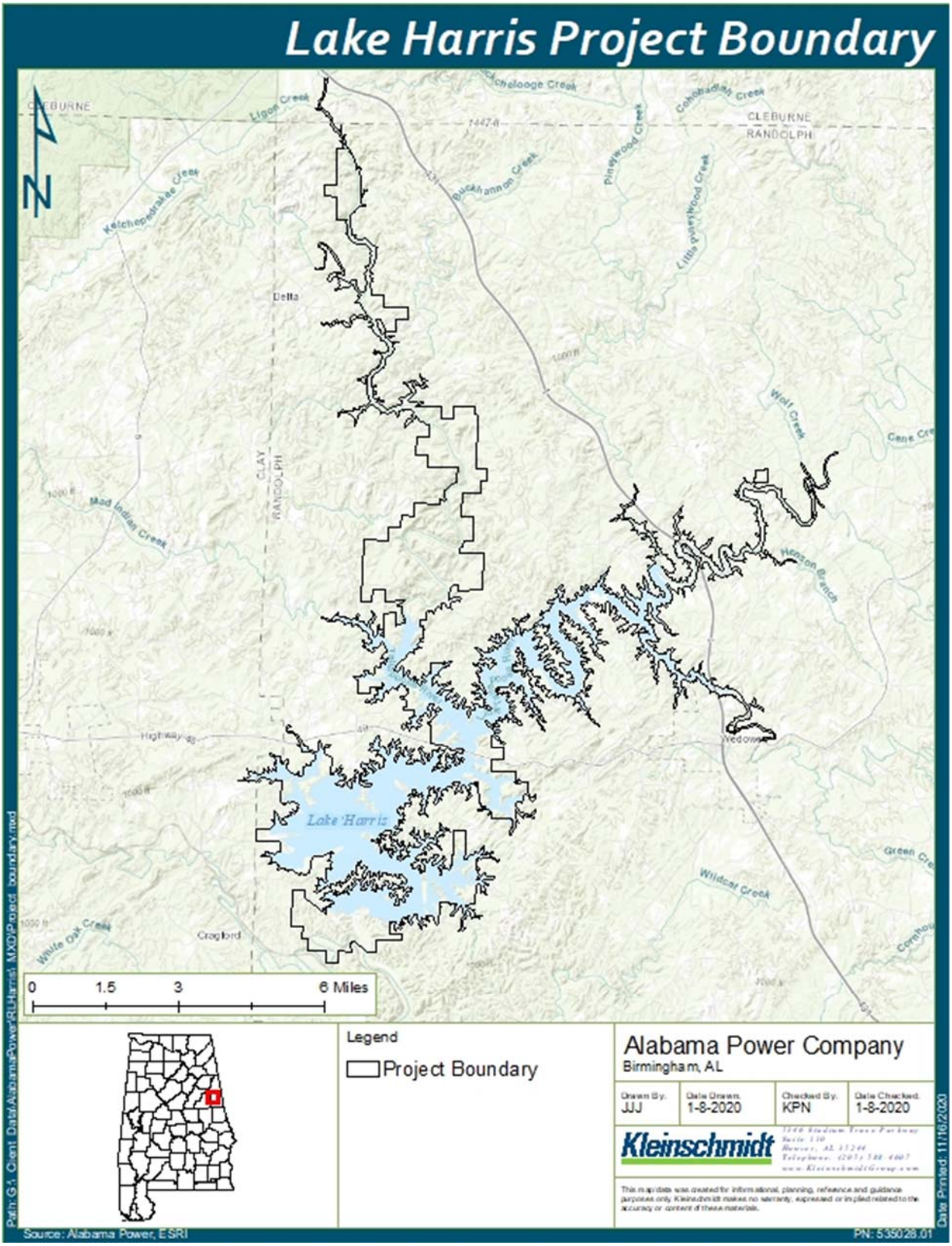


**FIGURE 1-1 LAKE HARRIS PROJECT BOUNDARY**

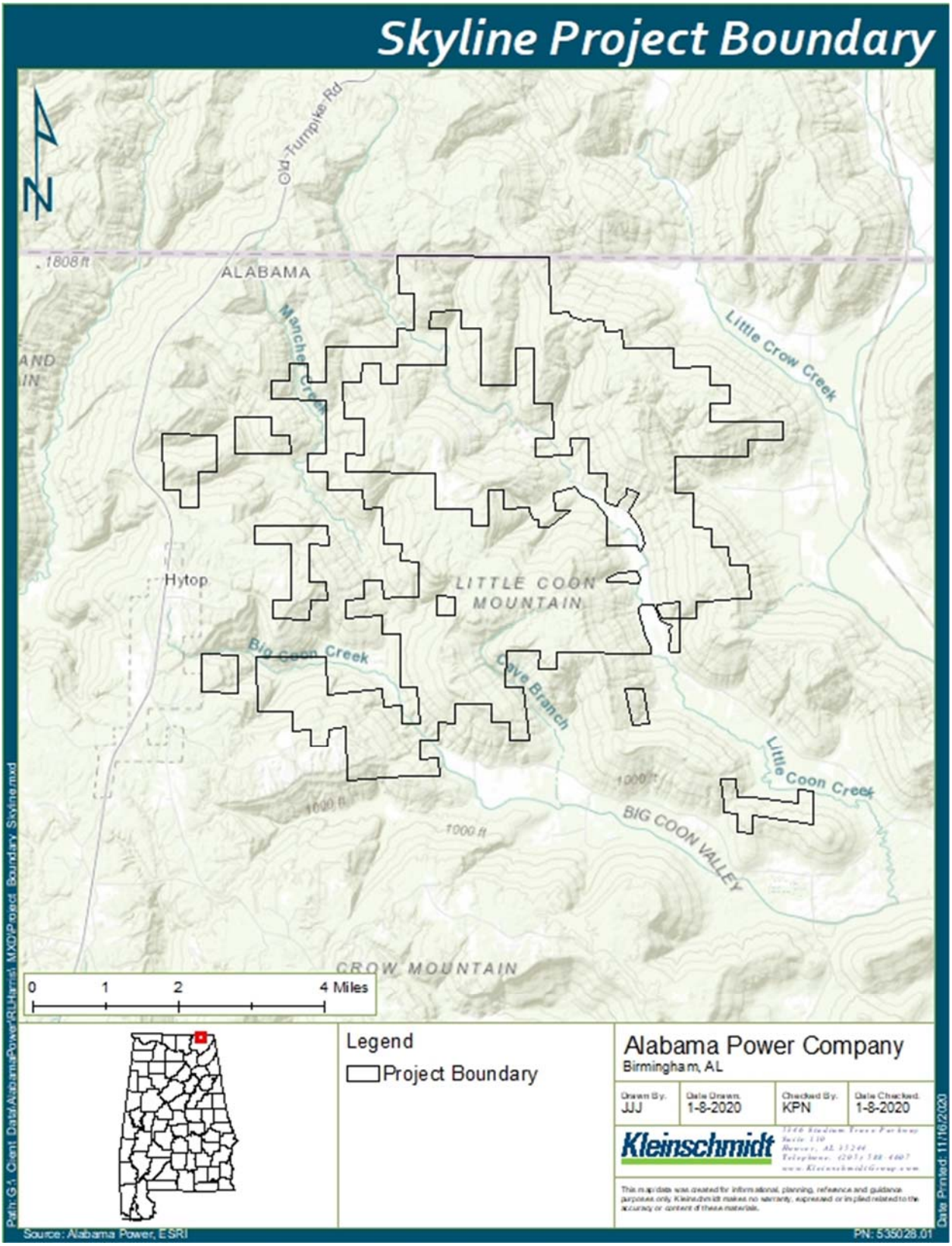


**Figure** 1-2 **Skyline Project Boundary**

# 2.0 PURPOSE OF THE PLAN

The overall purpose of this Wildlife Management Plan is to protect and enhance the available wildlife habitat within the Project boundaries of the Harris Project. The Plan consolidates numerous wildlife management activities into a single document and provides the additional technical information and management guidelines requested by resource agencies and other stakeholders during relicensing.

# 3.0 BACKGROUND AND EXISTING INFORMATION

## 3.1 BACKGROUND OF FERC-APPROVED PLANS

As part of the original license, Alabama Power developed a Wildlife Mitigation Plan (Alabama Power 1988) in consultation with Alabama Department of Conservation and Natural Resources (ADCNR) and U.S. Fish and Wildlife Service (USFWS) that FERC approved on July 29, 1988. The Wildlife Mitigation Plan outlined specific measures to mitigate for the impacts to wildlife and habitats caused by the development of the Harris Project. The Wildlife Mitigation Plan included provisions for the management of 5,900 acres of existing Project lands and acquisition of 779.5 additional acres of land in the vicinity of the Harris Reservoir. The Wildlife Mitigation Plan required Alabama Power to install Wood Duck (*Aix sponsa*) boxes, install Osprey (*Pandion haliaetus*) nesting platforms, develop and implement a Canada Goose (*Branta canadensis*) restoration project, manage wildlife openings, and create artificial nesting structures. In addition, the Wildlife Mitigation Plan included provisions for Alabama Power to purchase and subsequently lease to ADCNR, over 15,000 acres of land adjacent to the already established Skyline Wildlife Management Area. A Skyline Wildlife Management Plan (Skyline WMP) (Alabama Power 1989) was developed to guide the development and maintenance of wildlife habitat, timber management, and recreational access. The Skyline WMP was approved by FERC on June 29, 1990.

As part of the management activities conducted under the 1988 Wildlife Management Plan, Alabama Power identified 263 acres of suitable Wood Duck habitat and installed over 100 Wood Duck boxes. Alabama Power also released Canada Geese to establish a population in and around Lake Harris. Additionally, Alabama Power constructed Osprey nesting platforms along the reservoir shoreline. Finally, Alabama Power managed forest lands within the Lake Harris Project Area and established 105 acres of permanent openings to provide diverse habitat that benefits both game and nongame species.

Alabama Power conducts annual monitoring and maintenance of 104 Wood Duck boxes installed around Lake Harris. Maintenance activities include repair and replacement of broken boxes, as

well as the relocation of underutilized boxes. Double boxes were installed in higher use areas. Since 2000, an average of 33 Wood Ducks have been hatched from the Wood Duck boxes per year. Annual Wood Duck hatchlings ranged from 17 hatchings in 2000 to 47 hatchlings in 2017. Although Wood Ducks have utilized the artificial boxes, these structures were installed as a mitigative measure for lost habitat associated with the initial impoundment of Harris Reservoir. Wood Ducks using the area have had time to adapt to the surrounding habitat, and likely have demonstrated tolerance, or the ability to habituate, to existing human presence, activities, and infrastructure at Lake Harris. Therefore, Alabama Power will not continue monitoring and maintenance of the Wood Duck box program under this WMP. Wood Duck boxes will be left in place until they are no longer usable. This will allow wildlife using the structures to transition to the surrounding suitable habitat.

Alabama Power installed Osprey platforms around Lake Harris. The platforms are constructed of concrete poles with a galvanized steel ring at the top to serve as a nesting platform. Due to construction materials, the platforms require minimal maintenance. While many of the platforms have been used by Osprey, they are not included in a monitoring program. Further, no additional platforms are planned for construction as the currently installed platforms are adequate for the Osprey population at Lake Harris and will last for years to come.

## 3.2 LAND USE AND EXISTING HABITAT – LAKE HARRIS

### 3.2.1 WILDLIFE RESOURCES

Harris Reservoir lies within the Northern Piedmont Upland district of the Piedmont Upland Physiographic Section. Harris Reservoir and surrounding woodland, agricultural, and residential areas provide high quality habitat for a variety of upland and semi-aquatic wildlife species. In addition to typical southeastern species, such as Gray Fox (*Urocyon cinereoargenteus*), White-tailed Deer (*Odocoileus virginianus*), Virginia Opossum (*Didelphis virginiana*), and Gray Squirrel (*Sciurus carolinensis*), the area supports species characteristic of the Piedmont region, such as the Wood Frog (*Lithobates sylvatica*) and Copperhead (*Agkistrodon contortrix*) (Alabama Power 2018). Birdlife typical of the Lake Harris Project Area uplands includes game species such as Northern Bobwhite (*Colinus virginianus*), Eastern Wild Turkey (*Meleagris*

*gallapavo silvestris*), and Mourning Dove (*Zenaida macroura*); resident songbirds include Downy Woodpecker (*Picoides pubescens*), American Robin (*Turdus migratorius*), Eastern Bluebird (*Sialia sialis*), and Eastern Meadowlark (*Sturnella magna*), and an abundance of neotropical migrants, including numerous warblers (Parulidae), vireos (Vireonidae), and hummingbirds (Trochilidae) (Alabama Power 2018). A number of raptors are known to occur in the Lake Harris Project Vicinity including Osprey, American Kestrel (*Falco sparverius*), Broad-winged Hawk (*Buteo platypterus*), Red-tailed Hawk (*Buteo jamaicensis*), Bald Eagle (*Haliaeetus leucocephalus*), Barred Owl (*Strix varia*), Great Horned Owl (*Bubo virginianus*), and Eastern Screech Owl. Typical small mammals of uplands include North American Least Shrew (*Cryptotis parva*), Southern Flying Squirrel (*Glaucomys volans*), Eastern Woodrat (*Neotoma floridana*), Eastern Red Bat (*Lasiurus borealis*), and Big Brown Bat (*Eptesicus fuscus*). Reptiles and amphibians found in the Lake Harris Project Area uplands include Eastern Spadefoot Toad (*Scaphiopus holbrooki holbrooki*); Marbled Salamander (*Ambystoma opacum*) and Northern Slimy Salamander (*Plethodon glutinosus*); Green Anole (*Anolis carolinensis*) and Eastern Fence Lizard (*Sceloporus undulatus*); Five-lined Skink (*Plestiodon fasciatus*) and Broad-headed Skink (*Plestiodon laticeps*); Black Racer (*Coluber constrictor*), and Gray Ratsnake (*Pantherophis spiloides*); and Eastern Box Turtle (*Terrapene carolina carolina*) (Alabama Power 2018).

Although limited, Harris Reservoir's littoral zone provides habitat for North American River Otter (*Lontra canadensis*), American Mink (*Neovison vison*), Muskrat (*Ondatra zibethicus*), and Beaver (*Castor canadensis*), as well as seasonal and year-round habitat for waterfowl and wading birds including Mallard (*Anas platyrhynchos*), Gadwall (*Mareca strepera*), Wood Duck, Hooded Merganser (*Lophodytes cucullatus*), Great Blue Heron (*Ardea herodias*), Green Heron (*Butorides virescens*), and Great Egret (*Ardea alba*). Birds such as Ring-billed Gull (*Larus delawarensis*), Osprey, Purple Martin (*Progne subis*), and Belted Kingfisher (*Megaceryle alcyon*) are also common in areas of open water. Littoral areas provide potential breeding habitat for aquatic and semi-aquatic amphibian species including Red-spotted Newt (*Notophthalmus viridescens viridescens*) and Central Newt (*Notophthalmus viridescens louisianensis*); Northern Red Salamander (*Pseudotriton ruber ruber*) and Northern Dusky Salamander (*Desmognathus fuscus*); and American Bullfrog (*Lithobates catesbeiana*), Northern Spring Peeper (*Pseudacris crucifer crucifer*), and Southern Leopard Frog (*Lithobates sphenocephala*) (Alabama Power

2018). Reptile species typical of the littoral zone include Cottonmouth (*Agkistrodon piscivorus*), Red-bellied Water Snake (*Nerodia erythrogaster erythrogaster*), and Yellow-bellied Water Snake (*Nerodia erythrogaster flavigaster*); Alabama Map Turtle (*Graptemys pulchra*), River Cooter (*Pseudemys concinna*), and Red-eared slider (*Trachemys scripta elegans*). Currently, no invasive wildlife species are being managed within the Lake Harris Project Area.

### 3.2.2 BOTANICAL RESOURCES

The Lake Harris Project Area is comprised of an impounded portion of the Tallapoosa River and includes mainly open water, deciduous, and evergreen forests with only small areas of agricultural and residential development.

The Southern Piedmont Dry Oak forest occurs in upland ridges and mid-slopes and is typically comprised of upland oaks; pines may be a significant component, especially in the southern part of the range. Overstory vegetation commonly found within this forest type includes upland oaks (*Quercus* spp.) such as White Oak (*Quercus alba*), Northern Red Oak (*Quercus rubra*), Black Oak (*Quercus velutina*), Post Oak (*Quercus stellata*), Scarlet Oak (*Quercus coccinea*), and Southern Red Oak (*Quercus falcata*) as well as hickory species (*Carya* spp.) such as Pignut Hickory (*Carya glabra*) and Mockernut Hickory (*Carya alba*). Other common species include Loblolly Pine (*Pinus taeda*), Shortleaf Pine (*Pinus echinata*), Virginia Pine (*Pinus virginiana*), Red Maple (*Acer rubrum*), American Sweetgum (*Liquidambar styraciflua*), and Tulip Tree (*Liriodendron tulipifera*). Generally, there is a well-developed shrub layer, and species vary with soil chemistry. Shrub species may include Mountain Laurel (*Kalmia latifolia*), Common Sweetleaf (*Symplocos tinctoria*), Flowering Dogwood (*Cornus florida*), Deerberry (*Vaccinium stamineum*), and Farkleberry (*Vaccinium arboretum*). The herb layer is typically sparse (NatureServe 2009).

### 3.2.3 RIPARIAN AND LITTORAL HABITAT

Riparian habitat is the vegetated zone that serves as a buffer between the upland vegetation community and the riverine environment. This zone provides streambank stability and sediment filtration. Based on the ecological systems classification developed by NatureServe (2009), much

of the riparian areas for the streams within the Lake Harris Project Boundary are classified as Southern Piedmont Small Floodplain and Riparian Forest (Section 5.5.1). This habitat type is often dominated by Tulip Tree, American Sweetgum, and Red Maple along with representative alluvial and bottomland species such as American Sycamore (*Platanus occidentalis*), River Birch (*Betula nigra*), Box Elder (*Acer negundo*), Sugarberry (*Celtis laevigata*), Green Ash (*Fraxinus pennsylvanica*), Swamp Chestnut Oak (*Quercus michauxii*), and Cherrybark Oak (*Quercus pagoda*). American Beech (*Fagus grandifolia*) may be present in drier areas. Loblolly Pine, Virginia Pine, American Sweetgum, and Tulip Tree are dominant in successional areas. The shrub layer is typically dominated by Mountain Laurel, American Witch-hazel (*Hamamelis virginiana*), Possumhaw (*Ilex decidua*), Spicebush (*Lindera benzoin*), and Yaupon Holly (*Ilex vomitoria*). Wandflower (*Galax urceolata*), Jack-in-the-pulpit (*Arisaema triphyllum*), Sensitive Fern (*Onoclea sensibilis*), and Fringed Sedge (*Carex crinita*) may be dominant in the herb layer (NatureServe 2009).

## 3.3 LAND USE AND EXISTING HABITAT – SKYLINE

### 3.3.1 WILDLIFE RESOURCES

Skyline provides quality habitat for a variety of wildlife species. Alabama Power leases Skyline lands to ADCNR and provides funding for the wildlife management activities on Skyline lands. ADCNR is responsible for the wildlife management activities (Alabama Power 1988). In addition to typical southeastern species, such as Gray Fox, White-tailed Deer, Virginia Opossum, and Gray Squirrel, the area supports species characteristic of the Cumberland Plateau Region of Alabama such as the American Toad (*Bufo americanus*), Green Anole, and Timber Rattlesnake (*Crotalus horridus*) (Alabama Power 2018). Birdlife typical of the Skyline Area includes game species such as Eastern Wild Turkey, Northern Bobwhite (*Colinus virginianus*), and Mourning Dove; resident songbirds include Downy Woodpecker, Blue Jay (*Cyanocitta cristata*), and Eastern Bluebird. Other common bird species include American Crow *(Corvus brachyrhynchos)* and Pileated Woodpecker (*Dryocopus pileatus*) (Alabama Power 2018). Raptors known to occur in or near the Skyline area include American Kestrel, Broad-winged Hawk and Red-tailed Hawk, Barred Owl, Great Horned Owl, and Eastern Screech Owl (Alabama Power 2018). Small mammals common in or near Skyline include Southern Flying Squirrel, Big Brown Bat, Eastern

Cottontail (*Sylvilagus floridanus*), Eastern Chipmunk (*Tamias striatus*), and Raccoon (*Procyon lotor*) (Alabama Power 2018). Reptiles and amphibians found in the Skyline area include Marbled Salamander and Northern Slimy Salamander; Eastern Fence Lizard; Five-lined Skink and Broad-headed Skink; Copperhead, Black Racer, and Gray Ratsnake; and Eastern Box Turtle (Alabama Power 2018).

### 3.3.2 BOTANICAL RESOURCES

Skyline is located in Jackson County, in the Cumberland Plateau Region of Alabama. This area is underlain by sandstones along with siltstones, shales, and coal. The landscape consists of flat-topped, high-elevation plateaus separated by deep, steep-sided valleys. The plateaus slope gently from the northeast to the southwest. Most of the area is forested, with Southern Ridge and Valley/Cumberland Dry Calcareous Forest and South-Central Interior Mesophytic Forest types. The Southern Ridge and Valley/Cumberland Dry Calcareous forest is comprised of dry-to-dry mesic calcareous forests in a variety of landscape positions, including ridge tops and upper and mid-slopes. They dominate vegetation type under natural conditions. High quality examples are characteristically dominated by White Oak, Chinkapin Oak (*Quercus muehlenbergii*), Post Oak, and Shumard's Oak (*Quercus shumardii*), with varying amounts of hickory, Sugar Maple (*Acer saccharum*), Southern Sugar Maple (*Acer floridanum*), Chalk Maple (*Acer leucoderme*), Red Maple, and other species. This system also includes successional communities resulting from logging or agriculture and are dominated by Tulip Tree, pine (Pinaceae), Eastern Red Cedar (*Juniperus virginiana*), and Black Locust (*Robinia pseudoacacia*) (NatureServe 2009).

The South-Central Interior Mesophytic forest is primarily deciduous forests that typically occur in deep, enriched soils in protected landscape settings such as covers or lower slopes. This forest is generally highly diverse and is dominated by Sugar Maple, American Beech, Tulip Tree, American Basswood (*Tilia americana*), Northern Red Oak, Cucumber Tree (*Magnolia acuminata*), and Eastern Black Walnut (*Juglans nigra*). Eastern Hemlock (*Tsuga canadensis*) may be present in some stands. Common shrubs include Coralberry (*Symphoricarpos orbiculatus*), Bladdernut (*Staphylea trifolia*), American Strawberry Bush (*Euonymus americanus*), and Flowering Dogwood. The herb layer is often very plentiful and may include

Licorice Bedstraw (*Galium circaezans*), Black Cohosh (*Actaea racemosa*), Southern Lady Fern (*Athyrium filix-femina* ssp. *asplenioides*), and Crownbeard (*Verbesina alternifolia*).

The Allegheny-Cumberland Dry Oak forest and woodland consists of dry hardwood forests found in nutrient-poor or acidic substrates on plateaus or ridges. Typical dominants include White Oak, Southern Red Oak, Chestnut Oak (*Quercus prinus*), Scarlet Oak, with lesser amounts of Red Maple, Pignut Hickory, and Mockernut Hickory. Shortleaf Pine and/or Virginia Pine may occur in smaller amounts, particularly adjacent to steep cliffs or slopes or in area impacted by fire. White Pine (*Pinus strobus*) may be prominent in some stands in the absence of fire. American Chestnut (*Castanea dentata*) saplings may be found where it was once a common tree. The shrub layer may include Lowbush Blueberry (*Vaccinium angustifolium*), Bear Huckleberry (*Gaylussacia ursina*), Deerberry (*Vaccinium stamineum*), Hillside Blueberry (*Vaccinium pallidum*), Oakleaf Hydrangea (*Hydrangea quercifolia*), and Mapleleaf Viburnum (*Viburnum acerifolium*). Common herbs include Boott's Sedge (*Carex picta*), Black Seed Speargrass (*Piptochaetium avenaceum*), Nakedflower Tick Trefoil (*Desmodium nudiflorum*), Longleaf Woodoats (*Chasmanthium sessiliflorum*), and Dwarf Violet Iris (*Iris verna* var. *smalliana*).

### 3.3.3 RIPARIAN AND LITTORAL HABITAT

Cahaba Consulting described the stream riparian zone as consisting of primarily mature forest vegetation. Riparian habitat is the vegetated zone that serves as a buffer between the upland vegetation community and the riverine environment. This zone provides streambank stability and sediment filtration. Based on the ecological systems classification developed by NatureServe (2009), much of the riparian areas for the streams within the Skyline Project Boundary are classified as Allegheny-Cumberland Dry Oak Forest and Woodland, South-Central Interior Mesophytic Forest, and Southern Ridge and Valley/Cumberland Dry Calcareous Forest (Section 5.5.1). The Southern Ridge and Valley is dominated by White Oak, Chinkapin Oak, Post Oak, and Shumard's Oak, with varying amounts of hickory, Sugar Maple, Southern Sugar Maple, Chalk Maple, Red Maple, and other species. The South-Central Interior is dominated by Sugar Maple, American Beech, Tulip Tree, American Basswood, Northern Red Oak, Cucumber Tree, and Eastern Black Walnut. The Allegheny-Cumberland is dominated by White Oak, Southern

Red Oak, Chestnut Oak, Scarlet Oak, with lesser amounts of Red Maple, Pignut Hickory, and Mockernut Hickory (NatureServe 2009).

# 4.0 WILDLIFE MANAGEMENT OBJECTIVES

Specific wildlife management objectives for the Harris Project lands were initially identified during the scoping phase of the relicensing process. These objectives were further refined through subsequent meetings with ADCNR and USFWS and include:

1) Management of shoreline areas for native vegetative communities and enhanced value as wildlife habitat;
2) Implementation of timber management methods that result in enhanced value of Project lands as wildlife habitat;
3) Management of public hunting areas, including areas for the physically disabled.

# 5.0 SHORELINE MANAGEMENT

Protection and enhancement of available shoreline habitat for wildlife will be accomplished through implementation of the proposed Shoreline Management Plan (SMP). Pending approval by FERC, the SMP will be implemented for the 367 miles of shoreline within the Lake Harris Project Boundary.

## 5.1 MANAGEMENT ACTIONS

### 5.1.1 SHORELINE CLASSIFICATION SYSTEM AND SENSITIVE RESOURCES DESIGNATION

As part of the proposed SMP, Alabama Power developed a shoreline classification system to guide management and permitting activities within the Project Boundary and to protect natural resources such as, including wildlife habitat and wetlands. The shoreline classifications are based on an evaluation of existing and potential land use. While not solely designed for protection of wildlife habitat, the Sensitive Resources designation and the Natural/Undeveloped and Hunting shoreline management classifications often include valuable wildlife habitats. Best management practices (BMPs), associated designations, and classifications can be found within the SMP.

### 5.1.2 SHORELINE BUFFERS

As specified in the SMP, Alabama Power provides for preservation or establishment of a naturally managed vegetative filter strip along the shoreline to keep clearing of native trees and vegetation to a minimum[3]. Unmanaged vegetation associated with these buffers enhances available food and cover for wildlife species, provides corridors that enhance linkages between larger habitat patches, and protects nearshore environments. Nearshore environments provide important breeding and nursery areas for numerous fish and amphibian species and are utilized for feeding and cover by species such as North American River Otter, Beaver, and various wading birds and waterfowl. At a microhabitat level, accumulated leaf litter, pine needle duff,

[3] The BMP recommended here does not in any way supersede or replace the requirements of the scenic easement. Scenic easements include covenants running with the land for the project purpose of protecting scenic and environmental values and, as such, are requirements and not recommendations.

and coarse, woody debris (fallen logs, etc.) in these vegetated buffers will provide much needed refugia for reptiles and amphibians. Specific management actions associated with shoreline buffers can be found in the SMP.

### 5.1.3 PLANTING OF NATIVE SPECIES

The SMP recommends, and in some instances requires, planting of native trees, shrubs, and plant species for landscaping and for purposes of shoreline stabilization. Plants native to the soils and climate of a particular area typically provide the best overall food sources for wildlife, while generally requiring less fertilizer, less water, and less effort in controlling pests. Planting of native species will be required on all lands within the SMP Recreation and Commercial Recreation classifications and recommended as a BMP on all other Project lands. Specific management actions associated with native plantings can be found in the SMP.

## 6.0 TIMBER MANAGEMENT

Alabama Power has had an active forest management program since World War II. Shortly after World War II, timber stands were inventoried, and long-range timber management plans were developed. These plans directed an all-aged, sustained-yield management scheme with the forest rotation age of 60 years. Under this management strategy, trees would be grown to an average age of 60 years and would produce forest products on a continuous basis. Saw timber would be harvested on 16 year cutting cycles and pulpwood would be thinned as a secondary product at interim periods of 10 years.

In the early 1970s, the cutting cycle for saw timber was lengthened to 20 years because power skidders were then being used. As a result, more volume was being cut per acre and more reseeding was occurring (from the additional exposure of mineral soil caused by the skidders). The extended cutting cycle allowed for per acre volumes to recover and the young seedlings to put on additional volume. This all or uneven-aged management scheme has produced a notably diverse forest both in terms of species composition and in forest products. The result is not only the production of valuable high-quality products but the production of diverse quality habitat for both game and non-game wildlife species. These planned and controlled forest management practices have, over the years, aided in the protection of the watersheds of the associated reservoirs that indirectly have enhanced the fisheries habitat of these lakes, rivers, and streams. These practices have also produced habitats that have promoted and sustained several threatened and endangered species of plants and animals.

Contemporary timber stands on Project lands at Lake Harris are dominated by Mixed Pine-Hardwood. Timber stand composition on the 6,269 acres within the Harris Project Boundary at Lake Harris is summarized in Table 6-1. Contemporary timber stands on Project lands at Skyline are dominated by Upland Hardwood. Most of the timber stands are mature to over-mature mixed hardwood forest, made up primarily of various upland species of red and white oak, yellow poplar, hard and soft maple, and hickory. There is a small component of shortleaf, loblolly, and Virginia pine. Historically, past harvesting practices have focused on removing higher value red and white oak timber, resulting in many stands that are dominated by maple, hickory, yellow poplar and chestnut oak. Most stands have closed canopies resulting in little or no desirable

understory species to provide the potential for future stands. Timber stand composition on the 15,188 acres within the Harris Project Boundary at Skyline is summarized in Table 6-2.

**TABLE 6-1 TIMBER STAND COMPOSITION ON HARRIS PROJECT LANDS AT LAKE HARRIS**
(Source: Alabama Power Timber Stand Data)

| Stand Type | Percent Cover | Acreage |
|---|---|---|
| Mixed Pine-Hardwood | 47 | 2938 |
| Natural Longleaf Pine | 0 | 0 |
| Natural Pine | 18 | 1109 |
| Upland Hardwood | 21 | 1343 |
| Planted Pines | 8 | 476 |
| Other | 6 | 403 |
| **Total** | 100 | 6269 |

**TABLE 6-2 TIMBER STAND COMPOSITION ON HARRIS PROJECT LANDS AT SKYLINE**
(Source: Alabama Power Timber Stand Data)

| Stand Type | Percent Cover | Acreage |
|---|---|---|
| Mixed Pine-Hardwood | 0.15 | 23 |
| Natural Longleaf Pine | 0 | 0 |
| Natural Pine | 0 | 0 |
| Upland Hardwood | 99 | 14,922 |
| Planted Pines | 0 | 0 |
| Other | 0.85 | 118 |
| **Total** | 100 | 15,063 |

Forest lands located within the Project Boundary of the Harris Project will be managed according to the actions described below.

## 6.1 MANAGEMENT ACTIONS

### 6.1.1 LAKE HARRIS

Alabama Power will continue to manage Project forest lands according to the existing all or uneven-aged management schemes, with a sawtimber cycle of 20 years and an overall forest rotation of 60 years (see above description). Prescribed burning and/or use of herbicides will be considered on stands within the Project forest lands, and such use will be based on conditions and characteristics of the individual stands.

Alabama Power will continue to utilize selective cutting as the primary means of timber harvest on Project lands. Natural regeneration will continue to be the primary means by which harvested forests are replaced. However, if a particular timber stand cannot be regenerated naturally, or if a stand is destroyed by some catastrophic event, any residual trees without potential roost tree characteristics will be harvested, the site prepared, and the stand planted with genetically improved seedling stock.

Alabama Power is working with the USFWS to develop forestry management plans that are protective of listed species that may be present within the project boundary.

### 6.1.2 SKYLINE

The objective of timber management at Skyline is to ensure long-term health and sustainability of the forest, while enhancing wildlife management through ecological diversity and habitat improvement. Increasing the oak component of the forest through selective harvesting and natural regeneration is a primary goal.

Prudent timber management ensures the long-term health and sustainability of the forest while increasing the oak component over time. The management of the timber not only works in concert with but also enhances the primary objectives of sound wildlife management, habitat improvement, and aesthetics. At least two harvest units will be targeted annually for harvest, and Alabama Power will be responsible for administering the timber sale.

The management actions at Skyline are intended to be a cooperative effort between the APC Forestry Team and the ADCNR, with coordination and communication between the two groups. Alabama Power is working with the USFWS to develop forestry management plans that are protective of listed species that may be present within the project boundary.

# 7.0 HARRIS HUNTING AREAS

As part of the original license, Alabama Power developed a Land Use Plan for the Project that FERC approved on September 21, 1984 (1984 Land Use Plan). Following the construction of the Project, site evaluations and use patterns indicated that uses under the 1984 Land Use Plan were dated, and Alabama Power determined that changes to the Land Use Plan were needed. Therefore, Alabama Power developed in agency consultation a Revised Land Use Plan (1995 Land Use Plan) that FERC approved on September 22, 1998. The 1995 Land Use Plan was further revised in 2008 (2008 Land Use Plan) and approved by FERC on May 26, 2010. The 2008 Land Use Plan differs from the 1995 Land Use Plan only in that it was revised to reflect a land swap at Skyline that resulted in the modification of the project boundary and associated land uses of the parcels affected. The 2008 Land Use Plan (and the preceding 1995 Land Use Plan) included provisions for lands dedicated for hunting at both Lake Harris and Skyline as well as the addition of physically disabled hunting areas. Additionally, as part of the original license, Alabama Power developed the 1988 WMP and the 1990 Skyline WMP (discussed in Section 3.0 above), both which included provisions pertaining to lands dedicated for hunting.

Lands located at Lake Harris provide hunting opportunities through either hunting leases or individual permits. Additionally, in consultation with ADCNR, Alabama Power developed the Harris physically disabled hunting area, including the construction of four shooting houses specifically designed to accommodate disabled hunters, access roads, and greenfields.

Hunting opportunities provided at Skyline are managed by ADCNR as outlined in the 1990 Skyline WMP, including the issuance of permits and maps as well as the determination of regulations such as hunting seasons and bag limits.

## 7.1 MANAGEMENT ACTIONS

### 7.1.1 LAKE HARRIS

Alabama Power will continue to provide hunting opportunities on lands located at Lake Harris through either hunting leases or individual permit.

### 7.1.2 SKYLINE

Hunting opportunities provided at Skyline will continue to be managed by ADCNR, including the issuance of permits and maps as well as the determination of regulations such as hunting seasons and bag limits.

### 7.1.3 HARRIS PHYSICALLY DISABLED HUNTING AREAS

Alabama Power will continue to plant and maintain greenfields and/or other wildlife openings in the vicinity of the shooting houses annually. Shooting houses, specifically designed to accommodate disabled hunters, as well as road access to the shooting houses will be maintained.

# 8.0 REFERENCES


Alabama Department of Conservation and Natural Resources. 2016. Wildlife Management Areas. Available at: http://www.outdooralabama.com/wildlife-management-areas. Accessed November 2016.

Alabama Power Company. 1988. R.L. Harris Project FERC Project No. 2628 Wildlife Mitigation Plan. April 15, 1988.

Alabama Power Company. 1989. R.L. Harris Project FERC Project No. 2628 Wildlife Management Plan for the Skyline Tract. July 1989.

Alabama Power Company. 2018. Pre-Application Document for the Harris Hydroelectric Project (FERC No. 2628). Alabama Power Company, Birmingham, AL.

DeGraff, R.M., and D.D. Rudis. 1986. New England Wildlife: habitat, natural history, and distribution. Gen. Tech. Report NE-108. U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station, Broomall, Pennsylvania.

NatureServe. 2009. International Ecological Classification Standard: Terrestrial Ecological Classifications. NatureServe Central Databases. Arlington, VA, U.S.A. Data current as of 06 February 2009. Available at: http://downloads.natureserve.org/get_data/data_sets/veg_data/nsDescriptions.pdf. Accessed November 11, 2016.

## APC Harris Relicensing

**From:** Anderegg, Angela Segars
**Sent:** Monday, March 29, 2021 1:09 PM
**To:** APC Harris Relicensing
**Subject:** HAT 1 Meeting - April 1st

HAT 1,

The presentations we will be walking through this Thursday in our HAT 1 meeting are on the relicensing website in the HAT 1 folder: HAT 1 - Project Operations - All Documents (harrisrelicensing.com). Agenda and Teams meeting info is below.

Thanks,

**Angie Anderegg**
Hydro Services
(205)257-2251
arsegars@southernco.com

**Agenda**

9:00-11:00 Review results of Downstream Release Alternatives Phase 2 analysis

11:00-1:00 Break for lunch

1:00-3:00 Review results of Operating Curve Change Feasibility Phase 2 analysis

# Microsoft Teams meeting

**Join on your computer or mobile app**
Click here to join the meeting
**Join with a video conferencing device**
southerncompany@m.webex.com
Video Conference ID: 112 415 227 9
Alternate VTC dialing instructions
**Or call in (audio only)**
+1 470-705-0860,,740663097# United States, Atlanta
Phone Conference ID: 740 663 097#
Find a local number

Southern Company

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**From:** APC Harris Relicensing
**Sent:** Wednesday, March 17, 2021 9:45 AM
**To:** APC Harris Relicensing <harrisrelicensing@southernco.com>
**Subject:** Meeting Postponed

HAT 1,

Given the severe weather forecast for most of the southeast today and throughout tonight and the uncertainty in what the impact may be and how many of us may be without power, we have decided to postpone tomorrow's HAT 1 meeting until **Thursday, April 1** from 9:00-3:00 (Central Time). The agenda will be the same.

I apologize for any inconvenience. Please be weather aware and stay safe!

**Angie Anderegg**
Hydro Services
(205)257-2251
arsegars@southernco.com

HAT 1,

We will have a HAT 1 meeting on **March 18th** from 9:00-3:00 (Central Time) in order to review the results of the Phase 2 analyses of both the Operating Curve Change Feasibility and Downstream Release Alternatives Studies. The agenda and Teams meeting information is below. Let me know if you have any questions.

Thanks,

**Angie Anderegg**
Hydro Services
(205)257-2251
arsegars@southernco.com

## APC Harris Relicensing

**From:** Anderegg, Angela Segars
**Sent:** Wednesday, March 31, 2021 1:58 PM
**To:** Gauldin, Keith; Smith, Chris (chris.smith@dcnr.alabama.gov); todd.fobian@dcnr.alabama.gov
**Cc:** Mills, Tina L.; Carlee, Jason; Baker, Jeffery L.; McVicar, Ashley M; Chandler, Keith Edward
**Subject:** FW: Draft Harris WMP for your review and meeting date
**Attachments:** 2021-03-18 DRAFT Harris WMP.pdf

Just checking back in on your availability the week of April 12th for a call to discuss the attached draft WMP. We can also do a subsequent week if that works better for y'all.

Thanks!

**Angie Anderegg**
Hydro Services
(205)257-2251
arsegars@southernco.com

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**From:** Anderegg, Angela Segars
**Sent:** Monday, March 22, 2021 11:54 AM
**To:** Gauldin, Keith <Keith.Gauldin@dcnr.alabama.gov>; 'Chris Smith' <chris.smith@dcnr.alabama.gov>; todd.fobian@dcnr.alabama.gov
**Cc:** Mills, Tina L. <tlmills@southernco.com>; Carlee, Jason <JCARLEE@southernco.com>; Baker, Jeffery L. <JEFBAKER@southernco.com>; McVicar, Ashley M <AMMcVica@southernco.com>; Chandler Keith <KECHANDL@SOUTHERNCO.COM>
**Subject:** Draft Harris WMP for your review and meeting date

Good afternoon,

Attached for your review is the draft Wildlife Management Plan for the Harris project. We would like to give you a few weeks to review and then get together to hear your thoughts. Could you let me know your availability the **week of April 12th** for a 1.5 hr conference call? If that week is really busy, we can look at the following week. Also, please forward to anyone else at DNR who also needs to be plugged in.

Thanks!

**Angie Anderegg**
Hydro Services
(205)257-2251
arsegars@southernco.com

# HAT 6 Meeting Notes- Public

APC Harris Relicensing <g2apchr@southernco.com>

Thu 4/1/2021 4:33 PM

**To:** APC Harris Relicensing <harrisrelicensing@southernco.com>
**Bcc:** nathan.aycock@dcnr.alabama.gov <nathan.aycock@dcnr.alabama.gov>; steve.bryant@dcnr.alabama.gov <steve.bryant@dcnr.alabama.gov>; todd.fobian@dcnr.alabama.gov <todd.fobian@dcnr.alabama.gov>; chris.greene@dcnr.alabama.gov <chris.greene@dcnr.alabama.gov>; mike.holley@dcnr.alabama.gov <mike.holley@dcnr.alabama.gov>; matthew.marshall@dcnr.alabama.gov <matthew.marshall@dcnr.alabama.gov>; amanda.mcbride@ahc.alabama.gov <amanda.mcbride@ahc.alabama.gov>; eric.sipes@ahc.alabama.gov <eric.sipes@ahc.alabama.gov>; leeanne.wofford@ahc.alabama.gov <leeanne.wofford@ahc.alabama.gov>; arsegars@southernco.com <arsegars@southernco.com>; dkanders@southernco.com <dkanders@southernco.com>; kechandl@southernco.com <kechandl@southernco.com>; afleming@southernco.com <afleming@southernco.com>; wsgardne@southernco.com <wsgardne@southernco.com>; ammcvica@southernco.com <ammcvica@southernco.com>; tlmills@southernco.com <tlmills@southernco.com>; mhunter@alabamarivers.org <mhunter@alabamarivers.org>; jwest@alabamarivers.org <jwest@alabamarivers.org>; celestine.bryant@actribe.org <celestine.bryant@actribe.org>; ryargee@alabama-quassarte.org <ryargee@alabama-quassarte.org>

1 attachments (62 KB)

2021-03-04_Harris Relicensing Skyline Virtual Visit_Public.docx;

HAT 6,

The meeting notes from our March 4th meeting can be found on the Harris relicensing website in the HAT 6 folder.

Thanks,

**Angie Anderegg**
Hydro Services
(205)257-2251
arsegars@southernco.com

**Meeting Summary**
**Harris Relicensing Meeting**
**March 4, 2021**
**9am-11:00am**
**Microsoft Teams Meeting**

**Participants:**
Angie Anderegg – Alabama Power
Dave Anderson – Alabama Power
RaeLynn Butler – Muscogee (Creek) Nation
Keith Chandler – Alabama Power
Amanda Fleming – Alabama Power
Matthew Gage – Office of Archaeological Research (OAR)
Bill Gardner – Alabama Power
Stacye Hathorn – Alabama Historical Commission (AHC)
Turner Hunt – Muscogee (Creek) Nation
Amanda McBride – AHC
Rachel McNamara – Federal Energy Regulatory Commission (FERC)
Ashley McVicar – Alabama Power
Tina Mills – Alabama Power
Gano Perez – Muscogee (Creek) Nation
Sarah Salazar – FERC
Kelly Schaeffer – Kleinschmidt Associates
Eric Sipes – AHC
Robin Soweka, Jr. – Muscogee (Creek) Nation
Jeremiah Stager – OAR
Sandra Wash – Kleinschmidt Associates
LeeAnne Wendt – Muscogee (Creek) Nation

*Note: Due to the privileged nature of material, the Skyline Virtual Visit presentation is not included as an attachment.*

**Action Items:**
- Alabama Power to provide a list of bat species viewed incidentally during the cave surveys, either in the Preliminary License Proposal (PLP) or the Final License Application (FLA).

**Meeting Summary:**
Angie Anderegg (Alabama Power) and Amanda Fleming (Alabama Power) opened the meeting with a safety moment and stated the purpose of the meeting, to present a virtual cultural resources overview of Skyline.

Matthew Gage (Office of Archaeological Research (OAR)) started the presentation, noting that it included videos and photos to provide a sense of Skyline's aesthetics. Matt noted that there are two geographic areas of the R. L. Harris Project, Lake Harris and Skyline. The Harris Project Boundary at Skyline consists of approximately 15,000 acres in Jackson County. Matt reviewed the research design, as agreed upon during previous consultation

The Alabama Historical Commission (AHC) had previously requested OAR to investigate whether the historic sites in Skyline represented historic districts. Matt presented detailed field and research results and concluded that these historic sites do not represent historic districts but are dispersed homestead sites. Stacye Hathorn (AHC) noted the familial ties between the sites and stated her appreciation of this investigation.

Matt presented information on the 11 caves and shelters that were surveyed, noting that the locations were mapped prior to Global Positioning System (GPS) technology and were hand-plotted on a topographic map.

Matt presented additional information on one of the caves that was used as a whiskey still. Sarah Salazar (FERC) asked for confirmation of the name of the cave, specifically if it was a nickname. Matt replied that it was its official name, adding that caves do not have a formal naming system unlike archaeological sites. Matt explained the trinomial system used in naming archaeological sites, with the number 1 representing the state of Alabama (alphabetically), JA representing Jackson County, and the additional number representing the sequential order the site was found.

Sarah requested a list of all bat species observed incidentally during the cave surveys. Amanda F. replied Alabama Power compiled a list and will present the information to the United States Fish and Wildlife and in the Preliminary License Proposal (PLP). Matt added that White-nose Syndrome (WNS) protocols were followed while performing cave surveys.

Matt presented information on the rock art surveys. Over 2-miles of bluff lines were surveyed and two rock shelters with art were located.

Amanda F. concluded the meeting and noted that she would reach out to the Cherokee Nation to inquire if they were interested in viewing the presentation.

**From:** Collins, Evan R <evan_collins@fws.gov>
**Sent:** Thursday, April 1, 2021 3:59 PM
**To:** Baker, Jeffery L. <JEFBAKER@southernco.com>
**Subject:** Sauta Cave



Sauta Cave is the only Indiana Bat hibernaculum in Jackson County in our records. Its coordinates are:
[redacted]

-Evan

--
Evan Collins
Fish and Wildlife Biologist
U.S. Fish and Wildlife Service
Alabama Ecological Services Field Office
1208-B Main Street
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**From:** Fobian, Todd <Todd.Fobian@dcnr.alabama.gov>
**Sent:** Friday, April 2, 2021 12:26 PM
**To:** Anderegg, Angela Segars; APC Harris Relicensing
**Cc:** Marshall, Matthew; Greene, Chris; Abernethy, Damon
**Subject:** Using Bioenergetics to Address the Effects of Temperature and Flow on Fishes in the Harris Dam Tailrace Auburn Final Report
**Attachments:** Harris Project Initial Study Report (ISR) Auburn BioenergeticsFinalReportforAquatic Resources _tbf_040221_Final_ADCNR_Comments.pdf

Good Afternoon,

Attached please find our review comments of the Harris Project Initial Study Report (ISR), Using Bioenergetics to Address the Effects of Temperature and Flow on Fishes in the Harris Dam Tailrace Auburn Final Report, part of the Aquatic Resources Final Report for the R. L. Harris Hydroelectric Project (FERC No. 2628). If you have any questions or concerns, please contact me. Thank you for the opportunity to review this report.

Sincerely,

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April 2, 2021

Angie Anderegg
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**RE: Comments on the Harris Project Initial Study Report (ISR), Using Bioenergetics to Address the Effects of Temperature and Flow on Fishes in the Harris Dam Tailrace Auburn Final Report, part of the Aquatic Resources Final Report for the R. L. Harris Hydroelectric Project (FERC No. 2628).**

Dear Ms. Anderegg:

The Alabama Department of Natural Resources (ADCNR) Division of Wildlife and Freshwater Fisheries (WFF) has reviewed the Harris Project Initial Study Report (ISR), Using Bioenergetics to Address the Effects of Temperature and Flow on Fishes in the Harris Dam Tailrace Auburn Final Report (Auburn Report), part of the Aquatic Resources Final Report for the R. L. Harris Hydroelectric Project, and submits the following comments and recommendations:

Draft Aquatic Resources Report

- ADCNR is providing these comments in addition to our Aquatic Resources Draft Report comments. Please note that responses to our initial comments are still pending, as Alabama Power Company (APC) noted they would be addressed in the Final Aquatic Resources Report. The remaining FERC approved Aquatic Resources Study Plan requirements that ADCNR identified include:

    - Section 4.2.2 of Study Plan, states, "*Auburn will compare temperatures at regulated sites (i.e., Tallapoosa River from Harris Dam to Horseshoe Bend) to unregulated sites (i.e., Newell and Heflin)*". Heflin temperature data is included in the Auburn University (Auburn) final report although not statistically analyzed and Newell temperature data, to date, has not been provided.

    - Section 4.2.3 of Study Plan states, "*Auburn and Alabama Power will perform field sampling to characterize the current fishery in deep and shallow water habitats in the Study Area and in unregulated portions of the Tallapoosa River. Wadeable, shallow water habitats will be sampled using a standardized protocol known as the 30+2 method (O'Neil*

*et al. 2006). Backpack electrofishing will consist of 10 efforts each in riffle, run, and pool habitats, with an additional 2 shoreline efforts. Non-wadeable, deepwater habitats will be sampled using boat and barge electrofishing under standardized protocols (O'Neil et al. 2014). Auburn will perform boat sampling quarterly for 7 events between fall 2018 and fall 2020 in reaches at varying distances downstream of Harris Dam, including sites in the tailrace, near Malone, Wadley, Horseshoe Bend, and at least one additional site on an unregulated reach. Auburn researchers may employ additional passive capture techniques as conditions warrant (e.g., hoop nets, minnow traps, etc.). Data from ADEM's 2018 fish surveys in the Tallapoosa River may be used to supplement collections by Auburn and Alabama Power*." The non-wadeable, deepwater habitats sampling is included in the Auburn report and has been completed using boat and barge electrofishing under standardized protocols (O'Neil et al. 2014). To date, wadeable, shallow water habitat field sampling work has not been provided using a standardized protocol known as the 30+2 method (O'Neil et al. 2006).

- Section 4.2 of Study Plan states, "*Alabama Power and Auburn University (Auburn) will evaluate factors affecting fish populations in the Tallapoosa River below Harris Dam through field and laboratory studies. Although this study will include an assessment of the entire fish population, a subset of target species will be studied more intensively.*" Although stakeholders agreed on target species to focus on, it was also explained in the study plan that fish populations would be studied, not just the four species identified to be studied extensively with bioenergetics and other methodologies. To date, with the Final Aquatic Resources Report still pending, neither APC or Auburn has identified aquatic species and populations whose presence and/or sustainability within the Study Area may have been affected by the Harris Project

- It is unclear if the fish population assessment in the Final Aquatic Resources will include shallow water sampling analysis and assessment of the entire fish population as stated in the Aquatic Resources Study Plan. The Auburn report only provides a deep-water fish population assessment and should be noted as such throughout the report and in conclusions. The methods describe deep water sampling methods only "boat and barge electrofishing under standardized protocols (O'Neil et al. 2014)". In conclusions and discussion, any comparisons to past fish population collections such as Swingle (1951), Irwin and Hornsby (1997) and Travnicheck and Maceina (1994), should specify that these are for deep water fish population comparisons only, not overall fish population and exclude shallow water analyses. Travnicheck and Maceina (1994), clearly separated collection methods, results and discussion into deep water and shallow water analyses. ADCNR comments in the initial scoping document specify that "*The study plan uses the terms "fishery" and "fish populations" interchangeably, particularly in section 4.3. The index of biotic integrity (IBI) is intended to provide an index of river or stream health based on the fish population and is not intended to explain the "fishery". The methods indicate a fish population survey using IBI methodology, which does not give an indication of the current status of the "fishery"; therefore, we still recommend the term "fish population" be used instead of "fishery"*." In addition, ADCNR has addressed its concern with the shallow water sampling data gaps in previous Draft Aquatic Resources comments and at several meetings.

- If any of ADEM's 2018 fish surveys in the Tallapoosa River will be used to supplement collections by Auburn and APC for the Final Aquatic Resources Report, these data should be included in the report or in an appendix with a results discussion. Provide deep and shallow fish survey sampling metrics such as numbers of each species collected, abundance, diversity, evenness, etc. and calculate for each study reach (Recommend a similar basin calibrated IBI calculation for comparison to previous studies (Bowen et al. 1996; O'Neil et al. 2006; Irwin 2019)). Including how many sampling trips and shocking hours for each trip were completed. At the March 5, 2021

meeting it was indicated that seasonal collection comparisons included variable numbers of collection trips. Providing the number of sampling trips and boat shocking hours for each site and season column is important.

- On page 47 of the Auburn report, it states, "*Overall trends in fish diversity upstream to downstream were similar between our findings and those of Travnichek and Maceina (1994), who found little evidence of river regulation effect on fish diversity.*" Failing to specify that this result from Travnichek and Maceina (1994) was for the deep-water fish populations only. Include that Travnicheck and Maceina (1994) results suggested that the effect of flow regulation on species richness and diversity of fishes in deep water habitats was negligible in the Tallapoosa River system downstream of hydroelectric facilities, but that flow regulation appeared to alter shallow water fish assemblages with species richness progressively increasing with distance from Harris Dam. Alteration in natural flow corresponded to decreased species richness, diversity and abundance of species inhabiting shallow water areas, particularly species classified as fluvial specialists. Remove, replace or provide caveats to conclusion statements regarding upstream to downstream fish composition to illustrate that results are for deep water fish population assessment only and include statements from past literature of both deep and shallow water fishery analyses. When discussing Auburn's deep water fish population collections in the discussion include that reporting of the shallow water fish community monitoring between 2006 and 2016 indicates that fish densities in the regulated river downstream of Harris Dam were depressed when compared to unregulated sites (Irwin et al. 2019).

- ADCNR appreciates the Auburn modification and removal of hybrid occurrences in the initial calculations of species diversity after ADCNR inquiries at the March 5, 2021 meeting. In addition, total species and total native-species categories should be included. Including non-native species, such as Blueback Herring (*Alosa aestivalis*) and Snail Bullhead (*Ameiurus brunneus*), into species totals and analyses without this delineation can inflate species numbers and make it difficult to fully assess native species diversity changes. A decline of native species may not be evident if only evaluating total species diversity. Hughes and Oberdorff (1999) recommend using native species over total number of species in order to exclude several species of non-native fishes, which are generally tolerant, invasive, and could detract from the responsiveness of analyses in impaired streams. Incidence of unhealthy individuals in a fish community in the form of DELT's (Deformities, Eroded fins, Lesions, and Tumors) is frequently used in IBI metrics to reflect the health and condition of the fish community. Hybridization between species is also indicative of highly disturbed habitats and sometimes combined with DELT evaluation scores in IBI's (Karr et al. 1986, O'Neil et al. 2006). In addition, past research of the Harris tailwater often includes fluvial and benthic species specialists into analyses. This is highly recommended for comparisons and have been metrics strongly correlated to regulated tailwater operations. Adjust any conclusion statements and comparisons accordingly after separating non-native species from total species in calculations. Fluvial and benthic native species categories should be included as well.

- On page 48 of the Auburn report, it states, "*The proportion of cyprinids and catostomids in our sample were higher than in the 1996 rotenone sample and the combined contribution of the two families was similar to the 1951 sample (Irwin and Hornsby 1997).*" Although proportionally this statement may be accurate, it is a deceiving conclusion to make regarding the overall density comparisons of cyprinids among studies. Catastomid overall catch numbers between these three studies (Swingle, 1951; Irwin and Hornsby,1997; Auburn Report) are fairly similar ranging between 26 and 66 individuals, cyprinids on the other hand went from ~928 individuals collected by Swingle (1951) to between 12 and 77 cyprinids per site in collections by Irwin and Hornsby (1997) and 2020 Auburn samples respectively. This is a dramatic decline of cyprinid abundance since 1951. It is also important to keep in mind when comparing Swingle (1951) data, that this study was attempting to monitor effects on the Tallapoosa River fish populations ~23 years post

filling of Lake Martin and two other hydropower impoundments. Although Swingle (1951) fish collection data represent fish compositions closer to other southeastern U.S. unregulated large river fish population assessments in regards to Ictalurid and Cyprinid abundance/species richness, it was still a river that had already been impacted by fragmentation and regulated flows from dams and reservoirs downstream. Other studies including the Auburn Report 2020 deep water fish collection results (Irwin and Hornsby 1997, Travnichek and Maceina 1994) have indicated dramatic declines in Ictalurid diversity and abundance, post dam construction. Ictalurid diversity and abundance changes and comparisons to other studies should be included and discussed in more detail.

- On page 48 of the Auburn Report, explain and discuss potential reasons why two important forage species (Threadfin and Gizzard Shad) are not present in the Harris Tailrace collections. These two species are the most dominant species for sportfish in Alabama rivers. Considering Blueback Herring have been introduced illegally to Martin Reservoir, and that they prefer cooler water over native clupeids, the dam could be offering suitable habitat to Blueback Herring, and negatively impacting native clupeids with the cold-water discharges. In addition, results indicate that no Tallapoosa Shiners were collected. Include how this result compares with other fish population studies in the Tallapoosa River system that utilized both deep or shallow water fish collection methodologies.

- On page 47 of the Auburn Report, it states, "*Overall values of H (i.e., species diversity) in their study (Travnicheck and Maceina, 1994) were slightly higher in 1994 compared to our study (2019-2021) (3.53 compared to 3.07 respectively), though this change may be influenced by differences in sampling technique versus actual fish diversity differences.*" This statement is inaccurate. The 3.53 value included from Travnicheck and Maceina (1994) is the overall value of H for deep water sampling Site 5 only (68km downstream, Horseshoe Bend), not the overall value of H for the entire study. Either remove statement or correct using deep water H value means from sites 1-5 of Travnicheck and Maceina (1994). Note that collection sites 6 and 7 in Travnicheck and Maceina (1994) were below Thurlow Dam.

- On page 21 and 47 of the Auburn Report, explain in greater detail the results of the diversity index, H. Considering all sites combined diversity index was 3.07, it is important to know how other sites compare and what is significant about the index when comparing across sites. Compare and contrast each site, to allow for inferences about site specific significance, and comparisons to other studies mentioned.

- On page 17 and pages 46-47, boat electrofishing was used at Lee's Bridge, Wadley, and Horseshoe Bend, while barge electrofishing was used at Tailrace. Since the report indicates that percids had a higher catch rate in the tailrace compared to other sites, this may be due to the difference in the sampling techniques. Include and discuss if barge electrofishing is more effective at catching smaller fish, such as darters, compared to boat electrofishing. In the discussion include how different methods of fish collection at various sites may bias sampling results. Provide and discuss any studies that compare catch rates from these two different methodologies.

- Unregulated Heflin data was provided but not statistically analyzed. Include statements clarifying how three years of temperature data was unable to be statistically analyzed and why the Newell temperature data was not included. If the data was unable to be compared to the full regulated site data, a separate analysis could be completed for the same available time periods allowing for statistical evaluation comparisons. Regardless of the variables associated with the Heflin site, temperature was the main metric of interest in the study, and there is no reason not to conduct analyses at the Heflin site or Newell site. Certain statements made, such as air hitting loggers at Heflin, and the suspect data at Malone and Wadley where water temperature consistently exceeds air temperature could potentially be further examined with the addition of the Newell data. For

example, during the March 5, 2021 meeting Auburn indicated that the Heflin water temperature data during winter was suspect. If data at Newell was analyzed, the researchers could distinguish whether the changes were due to logger malfunction, or the logger being exposed to air. In limited comparisons of unregulated and regulated temperature data included in the Auburn Report, it appears that the Heflin data included December to March months while the regulated site data excluded these December to March time periods. These time periods should either be fully analyzed for regulated sites as well or removed from the unregulated site data for equivalent comparison. ADCNR recommends fully evaluating all time periods, especially with initial indications that warmer water temperatures, compared to unregulated sites and downstream regulated sites, are being released into the tailwater during winter months.

- Explain how high temperature variation for a specific time period could be detected in the Tailrace and Wadley, but not at Malone (for example months 9-12 Figure 2.2, year 2015). As noted in our draft Aquatic Resources comments, if temperature data is unavailable for a specific site during a time period when other sites indicate high temperature variation, provide a caveat recognizing these specific key data range gaps with an explanation for the absence. For example, Tailrace 2000 Temperature Range is unavailable for 10-12-month data, but Malone and Wadley both indicate high temperature variation during this same time period. Unavailable temperature data gaps, during key high temperature variation events, have the potential to significantly reduce analyses of temperature changes and impacts occurring in the regulated reach. These limitations to the overall conclusions of temperature analyses should be included and discussed.

- On page 12 of the Auburn Report it states, "*Hourly data points were used to generate hourly and daily averages, minimum, and maximum temperatures through the year. This eliminated some variation but allowed for a consistent comparison of temperatures across years.*" Analyzing the temperature data in a way that "eliminates variation" in a study aimed at targeting the amount of "temperature variation" conflicts with the overall purpose. It is important to make sure that minimums and maximums that occur in the tailrace are not averaged or reduced. Provide Tables in addition to Figures similar to draft Water Quality Study Report Tables 4-9 and 4-10 for each year and site. In the draft Water Quality Study Report Tables 4-9 and 4-10 indicate that maximum temperature ranges reaching 29.35° C during generation and 35.60° C from the continuous downstream monitor for the 2019 monitoring period. Although the 2019 temperature data is not included in the Tailrace figures provided in Figure 2.2A of the Auburn Report, the maximum temperatures displayed do not seem to correlate with previous years. Explain how maximum temperature ranges from the continuous downstream monitor for 2019 are higher than the Auburn Report temperature range maximums included in Figure 2.2A for the tailrace. If they are at different locations or using different instrumentation, explain how they could differentiate so much in their temperature readings.

- On page 13 of the Auburn Report it states, "*Extreme fluctuations in temperature were rare (extreme fluctuations were defined here as a 10 C shift within a day; Malone: 0.61% days pre Green Plan, 0% days post-Green Plan, Wadley: 0% days pre-Green Plan, 0.57% days post-Green Plan, Heflin 0% 2018-2020) (Figure 2.3).*" It is important to remember that like dissolved oxygen (DO) declines, only one significant low DO event or one single sudden and dramatic temperature change event can stress or kill aquatic species. In addition, temperature highly influences dissolved oxygen levels in aquatic environments and significant dissolved oxygen declines and extreme temperature fluctuations can often coincide. Extreme fluctuations in temperature should be noted in the results and the discussion.. With potential negative effects to aquatic species from just a single event, the magnitude and number of individual extreme fluctuation events is important. As presented in Figure 2.3, the scales make discerning these number of events difficult. Proportionately overall it may be low but could still consist of many extreme temperature fluctuations. Consider providing

additional or zoomed in y-axis excerpts for low percentage of overall time temperature data when it is difficult to discern in large y-axis scale figures.

- In figures 2.7B and 2.7C of the Auburn Report, it indicates that mean water temperatures were above mean air temperature at both Malone and Wadley. Provide how this was calculated and verification of this result and include a more detailed explanation of potential causes for how mean water temperatures could be above mean air temperatures and were outside of standard error or standard deviation ranges (specify in the Figures what the error bars represent).

- In NOI, PAD, Scoping Document and Study Plans, ADCNR October 1, 2018 comments we recommended "*that selected sampling sites closely mirror those of samples collected historically and with the ADEM water quality and fish survey sites. This will allow for an ease of comparison over time and among various data sets.*" ADCNR had agreed with the Draft Aquatic Resources assessment that an alternative site was necessary for the current upstream control site due to its closely linked dam operation characteristics. ADCNR had requested input on site selection alternatives. Please include in the report why this was determined unnecessary and provide any comparison limitations the original upstream control site might contribute. The Auburn Report states on page 6, "*There is little habitat heterogeneity at this site which is dominated by sluggish, turbid water.*" and page 47,"*Higher catch rates of clupeids above the reservoir were likely due to the high connectivity between the reservoir and the Lee's Bridge site.*" indicating remaining researcher doubts about Lee's Bridge as an adequate control site. In addition, on page 22 of the Auburn Report, it states that Lee's Bridge was not accessible by boat during the winter due to reservoir drawdown. Using the Foster's Bridge access area, ADCNR frequently collects brood stock from the shoals above Lee's Bridge during early spring when Harris is still at winter pool and accessibility issues have not been problematic during low water. Overall, ADCNR remains concerned that the lack of an adequate control site, could limit any strong conclusions when comparing data throughout the report.

- On page 50 of the Auburn Report it states, "*Based on the evidence in the literature combined with our telemetry data, it is clear that high flow from peaking hydropower operation is not displacing Tallapoosa or Alabama Bass downstream.*" This is a strong statement that does not provide the referenced literature citations or provide a caveat that this telemetry study only tracked sixteen total fish (n=3 Tallapoosa Bass and n=13 Alabama Bass) during a short three month period (August 1, 2020 to October 1, 2020) outside of spawning periods. Moreover, it appears these fish were only exposed to one hydrological event over 2,000 cfs (Wadley gage) towards the very end of the study period. The term "displacement" used for this study needs to be defined and the temperatures and flow event variation that occurred during the study when fish movement was observed need specifying. Additionally, the limitations to this tracking methodology should be recognized since the receivers set to detect longitudinal stream distance movements will not capture lateral movements that could be occurring between stationary acoustic receiver locations. At the March 5, 2021 meeting, ADCNR inquired on the reasoning behind specific months being chosen regarding the telemetry study. Auburn stated that late summer was chosen due to higher flows and temperature variation, but the correlating discharge flows during the telemetry study period were not provided. These are necessary to verify that the tagged fish were exposed to "higher flows and temperature variation". Even cited literature statements included on page 54 stating "*Earley and Sammons (2015) manually tracked Alabama Bass and Redeye Bass near Wadley, Alabama and found that during pulses these fish tended to move laterally into tributaries or along the bank of the river and then returned to the main channel once the pulse subsided, suggesting fish choose to seek shelter during these events*" contradict the conclusion that bass are not being displaced. Fish behavior observations by Martin (2008) indicated that increased flows caused disruption of spawning and nesting behavior. In the NOI, PAD, Scoping Document and Study Plans, ADCNR comments on October 1, 2018 recommended, "that field telemetry studies occur over a period of

time such that tagged fish can experience a range of flows and seasonal variability to provide a full understanding of the varying conditions that occur during different flow types. Also, it should be noted that during spawning season some fish species (i.e.Redbreast Sunfish) may not move as much throughout the system because they are using most of their energy for nest building, and parental care of eggs and fry." Provide what conditions the tagged fish were exposed to during the study and if any observed movements correlated to flow or temperature changes. Provide references for the "evidence in the literature", you are referring to in the Auburn Report telemetry statement above. Limitations to the overall conclusions of the telemetry study should be included and discussed.

- In the March 5, 2021 meeting, Auburn stated that the fish were likely in the two-river kilometer gaps between the acoustic receivers. This lack of data between receivers or instream movement during pulsing and high flow events is the reason the Study Plan requested EMG tags, "…*the EMG tags will measure fish movement, including tail-beat frequency, to provide an in-situ measure of energy expenditures across the range of flow conditions experienced during baseline Harris Dam operations*…" Include in the discussion why the original electromyogram (EMG) telemetry data methodologies which included "tail-beat frequency" were modified and what key data gaps this change might have created.

- The Auburn Report bioenergetics model did not run a cold to warm scenario. When asked why impacts of cold to warm temperatures were not analyzed during the March 5, 2021 meeting, Auburn noted that the dam does not typically release warmer water into the river, so the analysis focused on warm to cold water transitions. The temperature data and analyses presented in the Auburn Report clearly show aquatic resources in the Harris tailrace are exposed to extreme changes in temperature both from warm to cold and cold to warm. After colder pulses in the summer or warmer pulses in the winter are discharged, water temperature fluctuations occur in both directions. Reasons for why this scenario was omitted even though fish in the tailrace are exposed to extreme temperature shifts from cold to warm, should be included in the discussion. Include in the discussion with supporting literature how physiologically taking fish from cold to warm temperatures is more detrimental than taking fish from warm to cold. The interaction of temperature and dissolved oxygen should also be included and note how it only takes one low DO event or only one drastic temperature change event to harm aquatic fish species. In addition, the Auburn Report does not specify how quickly temperature was changed in the lab chamber. This information should be included in the methods section.

- On page 19 of the Auburn Report, provide length distribution by site so that relative weight results can be more discernable. Often, biologists do not compare relative weights below stock size, even though some equations allow for such to be accomplished (for instance 70mm Channel Catfish with Gabelhouse's equation (Gabelhouse 1984)). ADCNR does not typically calculate relative weights for fish below stock size for the selected study target game species. Some studies require determination of the minimum total length (TL) to be used in relative weight equation development to avoid inaccurate or imprecise weights for small fish. (Murphy et al. 1990, Bister et al. 2000). A minimum size threshold for relative weights should be considered. Describe the accuracy of the scale used to take weight measurements and if the scale was tared between measurements. This would allow for inferences on weight to be made for small catfish.

- On page 19 of the Auburn Report, it includes brief methods for calculating relative weights. Explain in detail how von Bertalanffy growth curves were derived. For example, explain if convergence criterion or model significance was met. Particularly, for some of the Channel Catfish and Redbreast Sunfish curves, theoretical maximum lengths are not plausible, and linear, instead of non-linear growth functions are evident. Having accurate growth estimates is important to be able to evaluate bioenergetics results. In addition, age agreement between multiple readers is important,

and if agreement for each species is known, this information should be reported. Provide if Channel Catfish otoliths were sectioned with an isomet saw or hand sanded. Hand sanding is considered to be the most accurate method in order to see visible annuli and not distort the range of visible annular marks (Heidinger and Clodfelter 1987, Buckmeier et al. 2002). If photos are available for review of the sectioned otoliths, we suggest including these in the report since inter annular measurements were taken.

- On pages 22-25 and 48-49 of the Auburn Report. Provide the range and mean total length of fish at each site. In Figures 3.7, 3.11, 3.16, 3.21 it appears that older, larger Channel Catfish and Alabama Bass were much less abundant in the tailrace than at other sites. Include in the discussion, potential reasons why small Channel Catfish could be common in the tailrace, with no adults present. Possible points to include and explore are the potential for immigration from tributaries, small fish passing through from Harris Reservoir or barge sampling bias allowing for more juveniles to be collected in the tailrace. A length frequency of target species by site is needed to compare collections, as age information is not adequate to discern the size structure of the samples by site.

- Figures 3.5 and 3.16 of the Auburn Report indicate that most of the Channel Catfish collected in the Tailrace were under 100mm, which is below stock size. This cohort of fish had obviously higher Wr values between 115-140. Include in the discussion if this could be a driving factor for the higher condition values observed in the Tailrace compared to other sites.

- On page 51 of the Auburn Report, it states, "*The first section of Objective 4 focused on measuring Ucrit of all the targeted species from the four study sites.*" According to Table 4.1 and Figure 4.2 this was not done and Ucrit was only measured for Channel Catfish at 2 of 4 sites, Redbreast Sunfish at 2 of 4 sites, Alabama Bass at 3 of 4 sites, and Tallapoosa Bass at 2 of 4 sites. Provide why Ucrit was not measured at the missing sites and why critical swimming speed was not measured for any fish collected from the Tailrace.

- Comparing Figures 4.2, 4.6 and 4.10 of the Auburn Report, it appears that there were additional fish from different sites used in the standard metabolic rate trials that were not used in the critical swimming speed trials or the active metabolic rate trials (For example, Channel Catfish from Wadley, Redbreast Sunfish from Lee's Bridge and Tailrace, Alabama Bass from Tailrace, Tallapoosa Bass from Lee's Bridge). Provide reasoning why fish from these locations were included in the SMR trials but not in the Ucrit or AMR trials.

- When presenting and comparing similar Figures throughout the Auburn Report, keep x and y axis on the same scale. Provide lines in figures at key data points for reference and assistance to the reader. Additionally, further correction is needed in the report as some Tables are listed as Figures.

Thank you for the opportunity to provide additional comments on the R.L. Harris Hydroelectric Project relicensing, Harris Project Initial Study Report (ISR), Using Bioenergetics to Address the Effects of Temperature and Flow on Fishes in the Harris Dam Tailrace, Auburn Final Report, part of the Aquatic Resources Final Report for the R. L. Harris Hydroelectric Project. We look forward to continuing our cooperative efforts with the Alabama Power, Federal Energy Regulatory Commission and other stakeholders during this process.

If you have any questions regarding these comments, please contact me at (334-353-7484) or Todd.Fobian@dcnr.alabama.gov.

Sincerely,

Todd Fobian
Environmental Affairs Supervisor

References:

Bister, T.J., Willis, D.W., Brown, M.L., Jordan, S.M., Neumann, R.M., Quist, M.C. and Guy, C.S., 2000. Proposed standard weight (W s) equations and standard length categories for 18 warmwater nongame and riverine fish species. North American Journal of Fisheries Management, 20(2), pp.570-574.

Bowen, Z.H., M.C. Freeman, and D.L. Watson. 1996. Index of biotic integrity applied to a flow-regulated river system. Proceedings of the Annual Conference Southeastern Association of Fish and Wildlife Agencies 50:26-37.

Buckmeier, D.L., Irwin, E.R., Betsill, R.K. and Prentice, J.A., 2002. Validity of otoliths and pectoral spines for estimating ages of channel catfish. North American Journal of Fisheries Management, 22(3), pp.934-942.

Earley, L.A., S.M. Sammons. 2015. Alabama bass and redeye bass movement and habitat use in a reach of the Tallapoosa River, Alabama exposed to an altered flow regime. American Fisheries Society Symposium 82:263–280.

Gabelhouse, D. W., Jr. 1984. A length-categorization system to assess fish stocks. North American Journal of Fisheries Management 4:273–285.

Heidinger, R.C. and Clodfelter, K., 1987. Validity of the otolith for determining age and growth of walleye, striped bass, and smallmouth bass in power plant cooling ponds. Age and growth of fish. Iowa State University Press, Ames, pp.241-251.

Hughes, R.M., and Oberdorff, Thierry, 1999, Applications of IBI concepts and metrics to waters outside the United States and Canada, in Simon, T.P., ed., Assessing the sustainability and biological integrity of water resources using fish communities: Boca Raton, Florida, CRC Press, p. 79-93.

Irwin, E.R. and J. Hornsby. 1997. Measuring change: the Tallapoosa River fish assemblage in 1951 and 1995. Project F-40-30 Final Report, Alabama Department of Conservation and Natural Resources, Montgomery, Alabama.

Irwin, Elise R., Mary C. Freeman, James Peterson, Kathryn D.M. Kennedy Kristie M. Ouellette Coffman, Ely Kosnicki, Tom Hess, and M. Clint Lloyd. 2019. Adaptive Management of Flows from R.L. Harris Dam (Tallapoosa River, Alabama)—Stakeholder Process and Use of Biological Monitoring Data for Decision Making. U.S. Department of the Interior and U.S. Geological Survey.Open-File Report 2019–1026 pp.108

Karr, J.R., Fausch, K.D., Angermeier, P.L., Yant, P.R., and Schlosser, I.J., 1986, Assessing biological integrity in running waters, a method and its rationale: Urbana, Illinois, Illinois Natural History Survey Special Publication 5, 28 p.

Murphy, B.R., Brown, M.L. and Springer, T.A., 1990. Evaluation of the relative weight (Wr) index, with new applications to walleye. North American Journal of Fisheries Management, 10(1), pp.85-97.

O'Neil, Patrick E., T.E. Shepard, and M.R. Cook. 2006. Habitat and Biological Assessment Of The Terrapin Creek Watershed And Development Of The Index Of Biotic Integrity For The Coosa And Tallapoosa River Systems. Open-File Report 0601. Water Investigations Program, Geological Survey of Alabama, Tuscaloosa, Alabama.

O'Neil, Patrick E., C.C. Johnson, J.B. Smith, S.W. McGregor, T.E. Shepard, E.A. Wynn, and S. Rider. 2014. A Nonwadeable River and Stream Electrofishing Methodology for Assessing Biological Condition of Shoreline Habitats. Open File Report 1312. Ecosystems Investigation Program, Geological Survey of Alabama, Tuscaloosa, Alabama.

Swingle, H.S. 1954. Fish populations in Alabama rivers and impoundments. Transactions of the American Fisheries Society 83(1):47-57.

Travnichek, V. H., and M. J. Maceina. 1994. Comparison of flow regulation effects on fish assemblages in shallow and deep-water habitats in the Tallapoosa River, Alabama. Journal of Freshwater Ecology 9:207–216.

# Harris Relicensing - Updated Study Report

## APC Harris Relicensing <g2apchr@southernco.com>

Mon 4/12/2021 6:46 PM

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Harris relicensing stakeholders,

Pursuant to FERC's Integrated Licensing Process, Alabama Power filed its Harris Project Updated Study Report (USR) today. Concurrent with the USR filing, Alabama Power filed three draft study reports, four final study reports and the results of a Botanical Inventory at Flat Rock Park. Stakeholders may access the USR and the study reports on FERC's website (http://www.ferc.gov) by going to the "eLibrary" link and entering the docket number (P-2628). The USR and study reports are also available on the Project relicensing website at https://harrisrelicensing.com.

The Updated Study Report meeting will be held on **April 27, 2021**. Please hold this date from 9:00 am to 12:00 pm central time. Call in information for the meeting can be found below. The purpose of the meeting is to provide an opportunity to review the contents of the USR.

Alabama Power will file a summary of the USR meeting by **May 12, 2021**. Stakeholders will have until **June 11, 2021** to file written comments with FERC on the USR Meeting Summary.

Thanks,

**Angie Anderegg**
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# RE: Harris Relicensing - Updated Study Report

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Mon 4/12/2021 6:52 PM

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emathews@aces.edu <emathews@aces.edu>; eric.sipes@ahc.alabama.gov <eric.sipes@ahc.alabama.gov>; erin_padgett@fws.gov <erin_padgett@fws.gov>; evan.lawrence@dcnr.alabama.gov <evan.lawrence@dcnr.alabama.gov>; evan_collins@fws.gov <evan_collins@fws.gov>; eveham75@gmail.com <eveham75@gmail.com>; fal@adem.alabama.gov <fal@adem.alabama.gov>; Fleming, Amanda <afleming@southernco.COM>; fredcanoes@aol.com <fredcanoes@aol.com>; gardenergirl04@yahoo.com <gardenergirl04@yahoo.com>; garyprice@centurytel.net <garyprice@centurytel.net>; gene@wedoweelakehomes.com <gene@wedoweelakehomes.com>; georgettraylor@centurylink.net <georgettraylor@centurylink.net>; gerryknight77@gmail.com <gerryknight77@gmail.com>; gfhorn@southernco.com <gfhorn@southernco.com>; gjobsis@americanrivers.org <gjobsis@americanrivers.org>; gld@adem.alabama.gov <gld@adem.alabama.gov>; glea@wgsarrell.com <glea@wgsarrell.com>; gordon.lisa-perras@epa.gov <gordon.lisa-perras@epa.gov>; goxford@centurylink.net <goxford@centurylink.net>; granddadth@windstream.net <granddadth@windstream.net>; 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jhouser@osiny.org <jhouser@osiny.org>; jkwdurham@gmail.com <jkwdurham@gmail.com>; jnyerby@southernco.com <jnyerby@southernco.com>; joan.e.zehrt@usace.army.mil <joan.e.zehrt@usace.army.mil>; john.free@psc.alabama.gov <john.free@psc.alabama.gov>; johndiane@sbcglobal.net <johndiane@sbcglobal.net>; jonas.white@usace.army.mil <jonas.white@usace.army.mil>; josh.benefield@forestry.alabama.gov <josh.benefield@forestry.alabama.gov>; jpsparrow@att.net <jpsparrow@att.net>; jsrasber@southernco.com <jsrasber@southernco.com>; jthacker@southernco.com <jthacker@southernco.com>; jthroneberry@tnc.org <jthroneberry@tnc.org>; judymcrealtor@gmail.com <judymcrealtor@gmail.com>; jwest@alabamarivers.org <jwest@alabamarivers.org>; kajumba.ntale@epa.gov <kajumba.ntale@epa.gov>; karen.brunso@chickasaw.net <karen.brunso@chickasaw.net>; kcarleton@choctaw.org <kcarleton@choctaw.org>; kechandl@southernco.com <kechandl@southernco.com>; keith.gauldin@dcnr.alabama.gov <keith.gauldin@dcnr.alabama.gov>; keith.henderson@dcnr.alabama.gov <keith.henderson@dcnr.alabama.gov>; kelly.schaeffer@kleinschmidtgroup.com <kelly.schaeffer@kleinschmidtgroup.com>; ken.wills@jcdh.org <ken.wills@jcdh.org>; kenbarnes01@yahoo.com <kenbarnes01@yahoo.com>; kenneth.boswell@adeca.alabama.gov <kenneth.boswell@adeca.alabama.gov>; kmhunt@maxxsouth.net <kmhunt@maxxsouth.net>; kmo0025@auburn.edu <kmo0025@auburn.edu>; kodom@southernco.com <kodom@southernco.com>; kpritchett@ukb-nsn.gov <kpritchett@ukb-nsn.gov>; kristina.mullins@usace.army.mil <kristina.mullins@usace.army.mil>; lakewedoweedocks@gmail.com <lakewedoweedocks@gmail.com>; leeanne.wofford@ahc.alabama.gov <leeanne.wofford@ahc.alabama.gov>; leon.m.cromartie@usace.army.mil <leon.m.cromartie@usace.army.mil>; leopoldo_miranda@fws.gov <leopoldo_miranda@fws.gov>; lewis.c.sumner@usace.army.mil <lewis.c.sumner@usace.army.mil>; lgallen@balch.com <lgallen@balch.com>; lgarland68@aol.com <lgarland68@aol.com>; lindastone2012@gmail.com <lindastone2012@gmail.com>; llangley@coushattatribela.org <llangley@coushattatribela.org>; lovvornt@randolphcountyalabama.gov <lovvornt@randolphcountyalabama.gov>; 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nancyburnes@centurylink.net <nancyburnes@centurylink.net>; nanferebee@juno.com <nanferebee@juno.com>; nathan.aycock@dcnr.alabama.gov <nathan.aycock@dcnr.alabama.gov>; orr.chauncey@epa.gov <orr.chauncey@epa.gov>; pace.wilber@noaa.gov <pace.wilber@noaa.gov>; partnersinfo@wwfus.org <partnersinfo@wwfus.org>; patti.powell@dcnr.alabama.gov <patti.powell@dcnr.alabama.gov>; patty@ten-o.com <patty@ten-o.com>; paul.trudine@gmail.com <paul.trudine@gmail.com>; ptrammell@reddyice.com <ptrammell@reddyice.com>; publicaffairs@doc.gov <publicaffairs@doc.gov>; rachel.mcnamara@ferc.gov <rachel.mcnamara@ferc.gov>; raebutler@mcn-nsn.gov <raebutler@mcn-nsn.gov>; rancococ@teleclipse.net <rancococ@teleclipse.net>; randall.b.harvey@usace.army.mil <randall.b.harvey@usace.army.mil>; randy@randyrogerslaw.com <randy@randyrogerslaw.com>; randy@wedoweemarine.com <randy@wedoweemarine.com>; rbmorris222@gmail.com <rbmorris222@gmail.com>; rcodydeal@hotmail.com <rcodydeal@hotmail.com>; reuteem@auburn.edu <reuteem@auburn.edu>; richardburnes3@gmail.com <richardburnes3@gmail.com>; rick.oates@forestry.alabama.gov <rick.oates@forestry.alabama.gov>; rickmcwhorter723@icloud.com <rickmcwhorter723@icloud.com>; rifraft2@aol.com <rifraft2@aol.com>; rjdavis8346@gmail.com <rjdavis8346@gmail.com>; robert.a.allen@usace.army.mil <robert.a.allen@usace.army.mil>; robinwaldrep@yahoo.com <robinwaldrep@yahoo.com>; roden@scottsboro.org <roden@scottsboro.org>; roger.mcneil@noaa.gov <roger.mcneil@noaa.gov>; ron@lakewedowee.org <ron@lakewedowee.org>; rosoweka@mcn-nsn.gov <rosoweka@mcn-nsn.gov>; russtown@nc-cherokee.com <russtown@nc-cherokee.com>; ryan.prince@forestry.alabama.gov <ryan.prince@forestry.alabama.gov>; ryargee@alabama-quassarte.org <ryargee@alabama-quassarte.org>; sabrinawood@live.com <sabrinawood@live.com>; sandnfrench@gmail.com <sandnfrench@gmail.com>; sandra.wash@kleinschmidtgroup.com <sandra.wash@kleinschmidtgroup.com>; sarah.salazar@ferc.gov

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Corrected Harris relicensing link

**Angie Anderegg**
Hydro Services
(205)257-2251
arsegars@southernco.com

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**From:** APC Harris Relicensing
**Sent:** Monday, April 12, 2021 1:47 PM
**To:** APC Harris Relicensing <harrisrelicensing@southernco.com>
**Subject:** Harris Relicensing - Updated Study Report

Harris relicensing stakeholders,

Pursuant to FERC's Integrated Licensing Process, Alabama Power filed its Harris Project Updated Study Report (USR) today. Concurrent with the USR filing, Alabama Power filed three draft study reports, four final study reports and the results of a Botanical Inventory at Flat Rock Park. Stakeholders may access the USR and the study reports on FERC's website (http://www.ferc.gov) by going to the "eLibrary" link and entering the docket number (P-2628). The USR and study reports are also available on the Project relicensing website at www.harrisrelicensing.com.

The Updated Study Report meeting will be held on **April 27, 2021**. Please hold this date from 9:00 am to 12:00 pm central time. Call in information for the meeting can be found below. The purpose of the meeting is to provide an opportunity to review the contents of the USR.

Alabama Power will file a summary of the USR meeting by **May 12, 2021**. Stakeholders will have until **June 11, 2021** to file written comments with FERC on the USR Meeting Summary.

Thanks,

**Angie Anderegg**
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# Microsoft Teams meeting

**Join on your computer or mobile app**
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# HAT 1 - Draft Operations Reports

## APC Harris Relicensing <g2apchr@southernco.com>

Mon 4/12/2021 7:03 PM

**To:** APC Harris Relicensing <harrisrelicensing@southernco.com>
**Bcc:** damon.abernethy@dcnr.alabama.gov <damon.abernethy@dcnr.alabama.gov>; nathan.aycock@dcnr.alabama.gov <nathan.aycock@dcnr.alabama.gov>; steve.bryant@dcnr.alabama.gov <steve.bryant@dcnr.alabama.gov>; todd.fobian@dcnr.alabama.gov <todd.fobian@dcnr.alabama.gov>; chris.greene@dcnr.alabama.gov <chris.greene@dcnr.alabama.gov>; keith.henderson@dcnr.alabama.gov <keith.henderson@dcnr.alabama.gov>; mike.holley@dcnr.alabama.gov <mike.holley@dcnr.alabama.gov>; evan.lawrence@dcnr.alabama.gov <evan.lawrence@dcnr.alabama.gov>; matthew.marshall@dcnr.alabama.gov <matthew.marshall@dcnr.alabama.gov>; brian.atkins@adeca.alabama.gov <brian.atkins@adeca.alabama.gov>; tom.littlepage@adeca.alabama.gov <tom.littlepage@adeca.alabama.gov>; jhaslbauer@adem.alabama.gov <jhaslbauer@adem.alabama.gov>; cljohnson@adem.alabama.gov <cljohnson@adem.alabama.gov>; mlen@adem.alabama.gov <mlen@adem.alabama.gov>; fal@adem.alabama.gov <fal@adem.alabama.gov>; djmoore@adem.alabama.gov <djmoore@adem.alabama.gov>; arsegars@southernco.com <arsegars@southernco.com>; 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drheinzen@charter.net <drheinzen@charter.net>; sforehand@russelllands.com <sforehand@russelllands.com>; 1942jthompson420@gmail.com <1942jthompson420@gmail.com>; nancyburnes@centurylink.net <nancyburnes@centurylink.net>; sandnfrench@gmail.com <sandnfrench@gmail.com>; lgarland68@aol.com <lgarland68@aol.com>; rbmorris222@gmail.com <rbmorris222@gmail.com>; irapar@centurytel.net <irapar@centurytel.net>; mitchell.reid@tnc.org <mitchell.reid@tnc.org>; richardburnes3@gmail.com <richardburnes3@gmail.com>; eilandfarm@aol.com <eilandfarm@aol.com>; athall@fujifilm.com <athall@fujifilm.com>; ebt.drt@numail.org <ebt.drt@numail.org>; georgettraylor@centurylink.net <georgettraylor@centurylink.net>; beckyrainwater1@yahoo.com <beckyrainwater1@yahoo.com>; dbronson@charter.net <dbronson@charter.net>; wmcampbell218@gmail.com <wmcampbell218@gmail.com>; jec22641@aol.com <jec22641@aol.com>; robinwaldrep@yahoo.com <robinwaldrep@yahoo.com>; sonjahollomon@gmail.com <sonjahollomon@gmail.com>; butchjackson60@gmail.com <butchjackson60@gmail.com>; donnamat@aol.com <donnamat@aol.com>; goxford@centurylink.net <goxford@centurylink.net>; mhpwedowee@gmail.com <mhpwedowee@gmail.com>; jerrelshell@gmail.com <jerrelshell@gmail.com>; bsmith0253@gmail.com <bsmith0253@gmail.com>; inspector_003@yahoo.com <inspector_003@yahoo.com>; paul.trudine@gmail.com <paul.trudine@gmail.com>; lindastone2012@gmail.com <lindastone2012@gmail.com>; granddadth@windstream.net <granddadth@windstream.net>; trayjim@bellsouth.net <trayjim@bellsouth.net>; straylor426@bellsouth.net <straylor426@bellsouth.net>; robert.a.allen@usace.army.mil <robert.a.allen@usace.army.mil>; randall.b.harvey@usace.army.mil <randall.b.harvey@usace.army.mil>; james.e.hathorn.jr@sam.usace.army.mil <james.e.hathorn.jr@sam.usace.army.mil>; lewis.c.sumner@usace.army.mil <lewis.c.sumner@usace.army.mil>; jonas.white@usace.army.mil <jonas.white@usace.army.mil>; gordon.lisa-perras@epa.gov <gordon.lisa-perras@epa.gov>; holliman.daniel@epa.gov <holliman.daniel@epa.gov>; mayo.lydia@epa.gov <mayo.lydia@epa.gov>; jennifer_grunewald@fws.gov <jennifer_grunewald@fws.gov>; erin_padgett@fws.gov <erin_padgett@fws.gov>; jeff_powell@fws.gov <jeff_powell@fws.gov>; jeff_duncan@nps.gov <jeff_duncan@nps.gov>

HAT 1,

The draft Operating Curve Feasibility Analysis Phase 2 Report, draft Downstream Release Alternatives Phase 2 Report and draft BESS Report are available for your review on the Harris relicensing website in the HAT 1 folder. These reports can also be found on FERC's website (http://www.ferc.gov) by going to the "elibrary" link and entering docket number P-2628.

Please submit your comments on these reports to Alabama Power at harrisrelicensing@southernco.com by **May 11, 2021**.

Thanks,

**Angie Anderegg**
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Alabama Power

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April 12, 2021

***VIA ELECTRONIC FILING***

Project No. 2628-065
R.L. Harris Hydroelectric Project
Transmittal of the Updated Study Report

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

Dear Secretary Bose,

Alabama Power Company (Alabama Power) is the Federal Energy Regulatory Commission (FERC or Commission) licensee for the R.L. Harris Hydroelectric Project (Harris Project) (FERC No. 2628-065). On April 12, 2019, FERC issued its Study Plan Determination[1] (SPD) for the Harris Project, approving Alabama Power's ten relicensing studies with FERC modifications. On May 13, 2019, Alabama Power filed Final Study Plans to incorporate FERC's modifications and posted the Final Study Plans on the Harris relicensing website at www.harrisrelicensing.com. In the Final Study Plans, Alabama Power proposed a schedule for each study that included filing a voluntary Progress Update in October 2019[2] and October 2020[3].

Pursuant to the Commission's Integrated Licensing Process (ILP) and 18 CFR § 5.15(f), Alabama Power is filing the Harris Project Updated Study Report (USR) (Attachment 1). The enclosed USR describes Alabama Power's overall progress in implementing the study plans, and summarizes the data collected and any variances from the study plan and schedule.

Concurrent with this USR filing, Alabama Power is filing:

- **Draft** *Downstream Release Alternatives Phase 2 Study Report*
- **Draft** *Operating Curve Change Feasibility Analysis Phase 2 Study Report*
- **Final** *Aquatic Resources Study Report*
- **Final** *Downstream Aquatic Habitat Study Report*
- **Final** *Erosion and Sedimentation Study Report*
- **Final** *Water Quality Study Report*
- A Botanical Inventory of a 35-Acre Parcel at Flat Rock Park, Blake's Ferry, Alabama

[1] Accession No 20190412-3000.
[2] Accession No 20191030-5053.
[3] Accession No 20201030-5215.

- **Draft** *Battery Energy Storage System at R.L. Harris Project Report*

Alabama Power is reporting the following variance to schedule/methods for the following studies:

- Operating Curve Change Feasibility Analysis Phase 2 Study - While use of historic photos from Lake Harris was mentioned in the Study Plan, photos could not be used to assess the effects of the winter pool alternatives due to the limited resolution of publicly available historical photos needed to assess individual erosion areas. In addition, Alabama Power provided qualitative information (rather than quantitative information noted in the Study Plan) regarding cultural resources on Lake Harris as the analysis of cultural resources is ongoing.

- Battery Energy Storage System (BESS) Study - FERC did not request a study plan for the BESS Study but provided recommendations for the type of analysis FERC expected Alabama Power to complete. Alabama Power evaluated the BESS separately from the other downstream release alternatives and results of the analysis are presented in a separate report, rather than included in the Downstream Release Alternatives Study.

- Erosion and Sedimentation Study - Alabama Power provided the results of the *Nuisance Aquatic Vegetation Survey Report* in Appendix F of the final report rather than providing to HAT 3 in the form of a technical memorandum.

- Aquatic Resources Study - Auburn University did not use the 30+2 sampling method as it was determined in the field to not be feasible/effective for sampling the sites and instead, shallow areas were sampled using boat and barge electrofishing equipment, which were found to be effective in sampling shallow areas within the study sites. The boat method used was a modification of the recently developed non-wadeable index of biological integrity (IBI). Sampling intensity was modified to accommodate available habitat, sampling frequency, and therefore IBI scores were not calculated.

- Cultural Resources Programmatic Agreement and Historic Properties Management Plan Study - A schedule variance occurred for completing the TCP identification process with the Muscogee (Creek) Nation in April 2021 (rather than February 2021 as noted in the Study Plan).

Pursuant to 18 CFR §5.15(f), Alabama Power will host the Updated Study Report Meeting (Meeting) with stakeholders and FERC on April 27, 2021 by conference call. The Meeting will begin at 9 AM central and conclude by 12 PM central. The purpose of the Meeting is to provide an opportunity to review the contents of the USR.

Alabama Power will file the Updated Study Report Meeting Summary by May 12, 2021. Stakeholders will have until June 11, 2021, to file written comments with FERC on the USR Meeting Summary. All comments must adhere to FERC regulations at 18 CFR Section 5.15 (c)(2)-(7). All Harris studies have been completed and a proposal for new information gathering or studies is subject to paragraph (e) of Section 5.15 except

that the proponent must demonstrate extraordinary circumstances warranting approval. Stakeholders may access the USR and the individual study reports on FERC's website (http://www.ferc.gov) by going to the "eLibrary" link and entering the docket number (P-2628). The USR and study reports are also available on the Project relicensing website at https://harrisrelicensing.com.

If there are any questions concerning this filing, please contact me at arsegars@southernco.com or 205-257-2251.

Sincerely,

Angie Anderegg
Harris Relicensing Project Manager

Attachment – Updated Study Report

cc: Harris Stakeholder List

# Attachment
# Updated Study Report

Document Accession #: 20210412-5737 Filed Date: 04/12/2021

# UPDATED STUDY REPORT

## R.L. HARRIS HYDROELECTRIC PROJECT

FERC NO. 2628

HARRIS DAM RELICENSING

Prepared for:

**Alabama Power Company**

Prepared by:

**Kleinschmidt Associates**

April 2021

Alabama Power

Kleinschmidt

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## LIST OF FIGURES

# 1.0 INTRODUCTION

Alabama Power Company (Alabama Power) owns and operates the R.L. Harris Project (FERC Project No. 2628) (Harris Project), licensed by the Federal Energy Regulatory Commission (FERC). Alabama Power is relicensing the 135-megawatt (MW) Harris Project, and the existing license expires in 2023. The Harris Project consists of a dam, spillway, powerhouse, and those lands and waters necessary for the operation of the hydroelectric project and enhancement and protection of environmental resources. These structures, lands, and water are enclosed within the FERC Project Boundary. Under the existing Harris Project license, the FERC Project Boundary encloses two distinct geographic areas, described below.


Harris Reservoir is the 9,870-acre reservoir (Harris Reservoir) created by the R.L. Harris Dam (Harris Dam). Harris Reservoir is located on the Tallapoosa River, near Lineville, Alabama. The lands adjoining the reservoir total approximately 7,392 acres and are included in the FERC Project Boundary. This includes land to 795-feet mean sea level (msl)[1], as well as natural undeveloped areas, hunting lands, prohibited access areas, recreational areas, and all islands.

The Harris Project also contains 15,063 acres of land within the James D. Martin-Skyline Wildlife Management Area (Skyline WMA) located in Jackson County, Alabama. These lands are located approximately 110 miles north of Harris Reservoir and were acquired and incorporated into the FERC Project Boundary as part of the FERC-approved Harris Project Wildlife Mitigative Plan and Wildlife Management Plan. These lands are leased to, and managed by, the state of Alabama for wildlife management and public hunting and are part of the Skyline WMA.

The following Project terms will have these meanings throughout this Updated Study Report (USR):

[1] Also includes a scenic easement (to 800-feet msl or 50-horizontal-feet from 793-feet msl, whichever is less, but never less than 795-feet msl).

- Lake Harris refers to the 9,870-acre reservoir, the adjacent 7,392 acres of Project land, and the dam, spillway, and powerhouse.
- Skyline refers to the 15,063 acres of Project land within the Skyline WMA in Jackson County.
- Harris Project refers to all the lands, waters, and structures enclosed within the FERC Project Boundary, which includes both Lake Harris and Skyline.
- Harris Reservoir refers to the 9,870-acre reservoir only.
- Harris Dam refers to the dam, spillway, and powerhouse.
- The Project Area refers to the land and water in the Project Boundary and immediate geographic area adjacent to the Project Boundary.

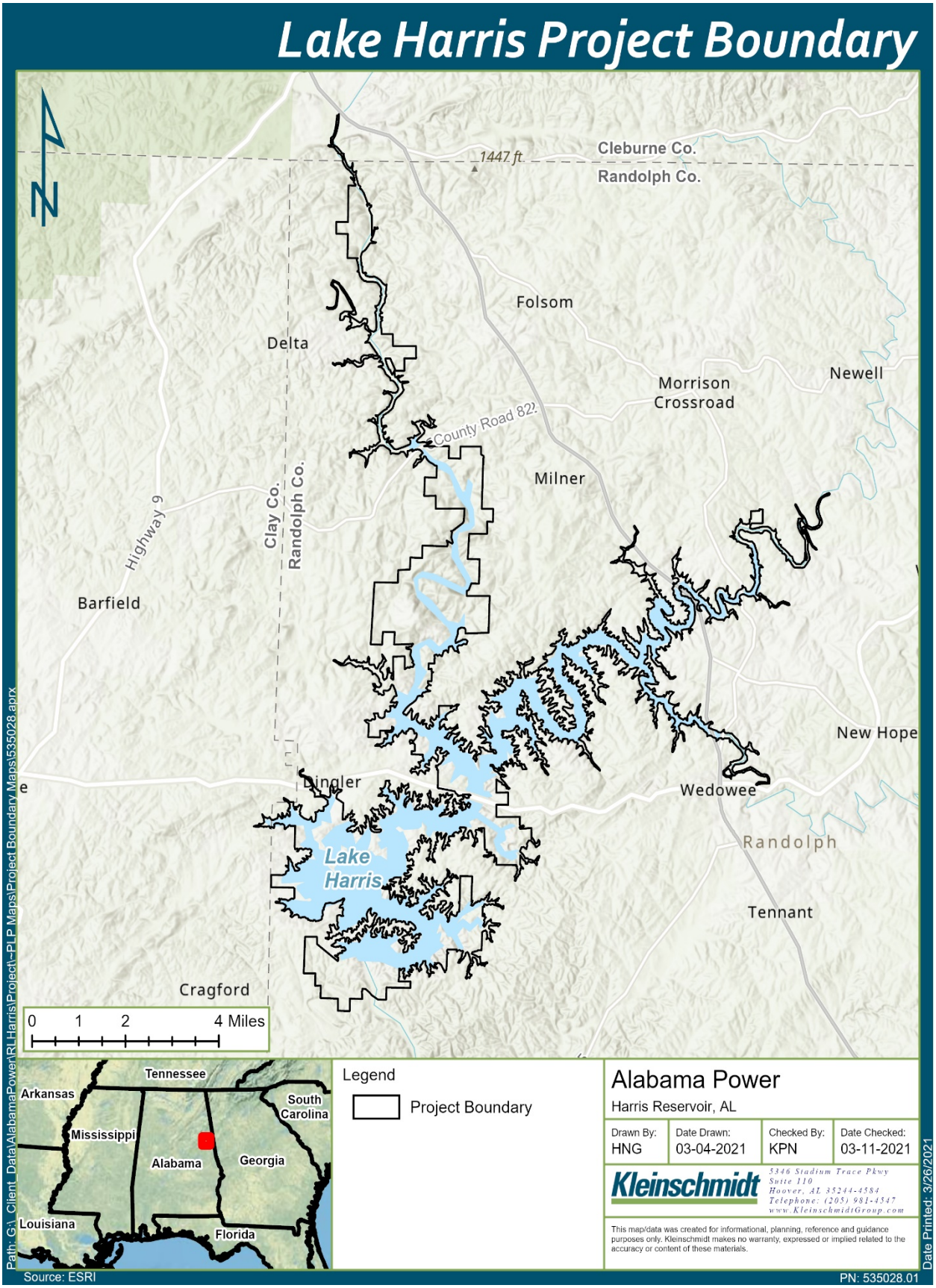


**Figure 1 Lake Harris Project Boundary**

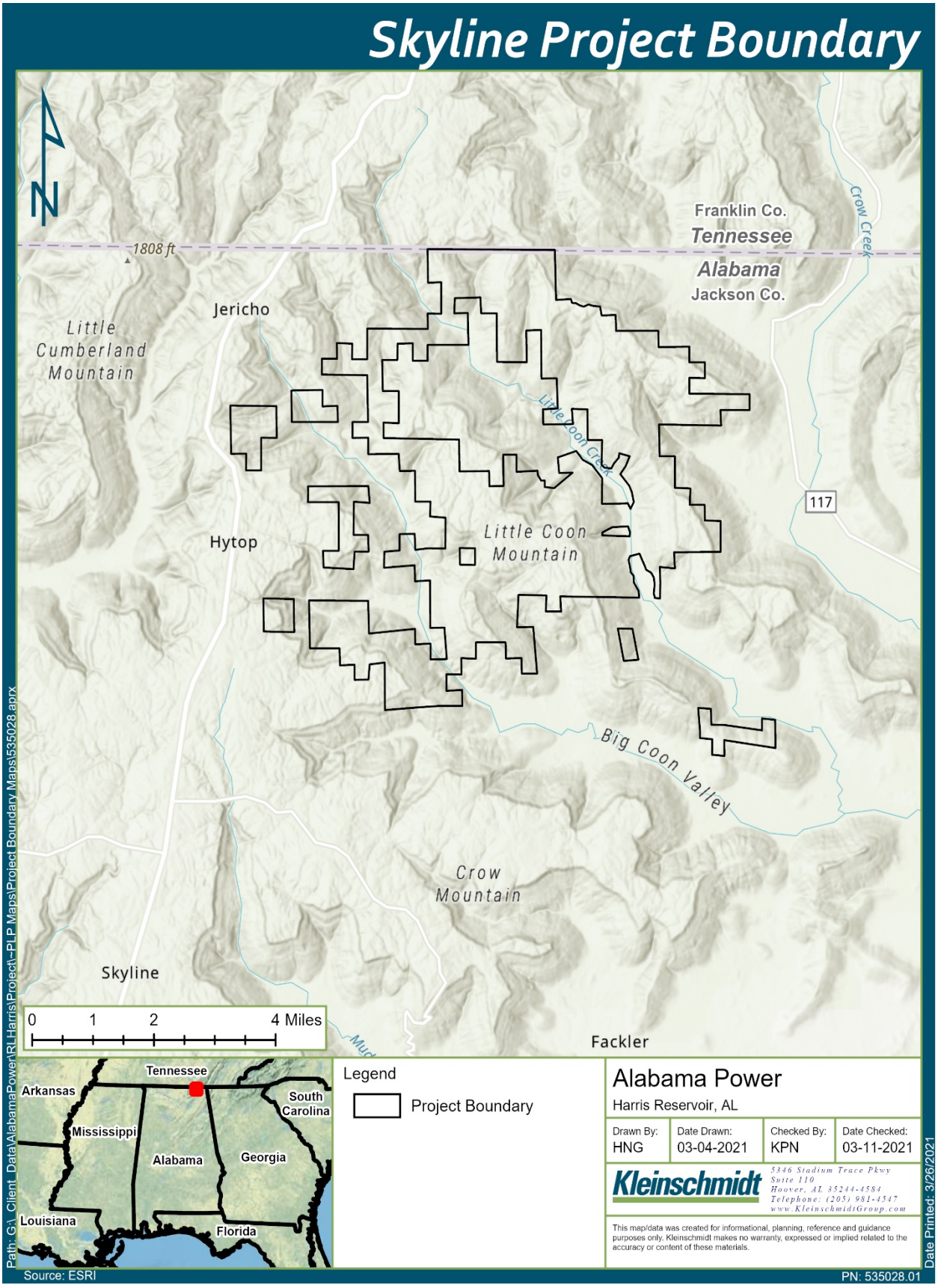


**Figure 2 Skyline Project Boundary**

# 2.0 HARRIS STUDY PLAN PROCESS OVERVIEW

During the October 19, 2017 Issue Identification Workshop, stakeholders provided information on resources that may be affected by the Harris Project. On August 28 and 29, 2018, FERC held Harris Project Scoping Meetings[2] to provide additional opportunities for stakeholders and the public to present and discuss any issues related to the Harris Project relicensing. On November 13, 2018, Alabama Power filed the following 10 proposed study plans for the Harris Project.

- Operating Curve Change Feasibility Analysis Study
- Downstream Release Alternatives Study
- Erosion and Sedimentation Study
- Water Quality Study
- Aquatic Resources Study
- Downstream Aquatic Habitat Study
- Threatened and Endangered Species Study
- Project Lands Evaluation Study
- Recreation Evaluation Study
- Cultural Resources Programmatic Agreement and Historic Properties Management Plan Study

Based on comments filed by stakeholders, Alabama Power filed revised study plans on March 13, 2019[3]. FERC issued a Study Plan Determination (SPD)[4] on April 12, 2019, which approved Alabama Power's study plans and included FERC staff recommendations. Alabama Power incorporated FERC's recommendations and filed the Final Study Plans with FERC on May 13, 2019[5].

Alabama Power formed the Harris Action Teams (HATs) to provide stakeholders an opportunity to work on the issues of most importance to them and, in the case of federal and state agencies, those issues where it has regulatory or statutory responsibility. The HATs include:

[2] Accession Nos. 20181010-4002 and 20181010-4003
[3] Accession No. 20190313-5060
[4] Accession No. 20190412-3000
[5] Accession No. 20190513-5093

- HAT 1 – Project Operations
- HAT 2 – Water Quality and Use
- HAT 3 – Fish and Wildlife
- HAT 4 – Project Lands
- HAT 5 – Recreation
- HAT 6 – Cultural Resources

The HATs met throughout 2018, 2019, 2020, and into 2021 to discuss the various studies. All HAT meetings from April 2020 to present were held virtually due to Coronavirus 2019 (COVID-19) and related travel and public gathering restrictions.

On April 10, 2020, Alabama Power filed six of the ten draft study reports and two cultural resources documents concurrently with the Initial Study Report (ISR), which included the consultation record for each of these six reports and cultural resource documents. On August 10, 2020, FERC sent a letter to Alabama Power discussing the Determination on Requests for Study Modifications for the R.L. Harris Hydroelectric Project [6], recommending an additional study on a Battery Energy Storage System (BESS).

The following provides a chronological account of all Draft and Final Study Reports as well as Progress Reports filed with FERC since the ISR filing on April 10, 2020.

- **Final** *Area of Potential Effects Report* on June 29, 2020[7]
- **Draft** *Downstream Aquatic Habitat Study Report* on June 30, 2020[8],
- **Final** *Downstream Release Alternatives Phase 1 Study Report* on July 27, 2020[9];
- **Draft** *Aquatic Resources Study Report* on July 28, 2020[10],
- **Draft** *Recreation Evaluation Study Report on* August 24, 2020[11].
- **Final** *Operating Curve Change Feasibility Analysis Phase 1 Study Report* on August 31, 2020[12];
- **Final** *Phase 1 Project Lands Evaluation Study Report* on October 2, 2020[13];

[6] Accession No. 20200810-3007
[7] Accession No. 20200629-5328
[8] Accession No. 20200630-5200
[9] Accession No. 20200727-5088
[10] Accession No. 20200728-5120
[11] Accession No. 20200824-5241
[12] Accession No. 20200831-5339
[13] Accession No. 20201002-5139

- Voluntary Progress Report on October 30, 2020[14];
- **Final** *Recreation Evaluation Study Report* on November 24, 2020[15]; and
- **Final** *Threatened and Endangered Species Study Report* on January 29, 2021[16].

Concurrent with this USR filing and pursuant to FERC's SPD and Determination on Requests for Study Modifications, Alabama Power is filing two draft Phase 2 study reports, four final study reports, a botanical inventory report, and the BESS Report, as follows.

- **Draft** *Downstream Release Alternatives Phase 2 Study Report*
- **Draft** *Operating Curve Change Feasibility Analysis Phase 2 Study Report*
- **Final** *Aquatic Resources Study Report*
- **Final** *Downstream Aquatic Habitat Study Report*
- **Final** *Erosion and Sedimentation Study Report*
- **Final** *Water Quality Study Report*
- A Botanical Inventory of a 35-Acre Parcel at Flat Rock Park, Blake's Ferry, Alabama
- **Draft** *Battery Energy Storage System at R.L. Harris Project Report*

The draft and final study reports include HAT meeting summaries and presentations, and documentation of consultation between April 2019 [17] through March 2021. Alabama Power will hold an USR meeting on April 27, 2021 and will file the meeting summary with FERC on May 12, 2021. Stakeholders may submit to Alabama Power and FERC by June 11, 2021, any disagreement concerning the USR meeting summary, and/or any modifications to any on-going studies or proposal to gather new information (18 Code of Federal Regulations (CFR), Section 5.15 (f)).

Sections 3.0 through 13.0 of this USR summarize the 11 FERC-approved studies in accordance with 18 CFR, Section 5.15, including 1) overall study progress, including data collected; 2) any variance from the FERC SPD and schedule; and 3) remaining activities and any modifications to the existing study or new studies proposed by Alabama Power.

[14] Accession No 20201030-5215
[15] Accession No. 20201124-5182
[16] Accession No. 20210129-5393
[17] Consultation records on some studies predate April 2019; the BESS consultation record begins April 2020 through March 2021.

# 3.0 OPERATING CURVE CHANGE FEASIBILITY ANALYSIS STUDY

## 3.1 Study Progress and Data Collection Summary

In accordance with the FERC-approved Study Plan, the evaluation of the winter pool alternatives were completed in two phases. Alabama Power filed the Draft *Operating Curve Change Feasibility Phase 1 Study Report* on April 10, 2020[18]. Alabama Power held a virtual HAT 1 meeting on June 4, 2020. Subsequently, FERC and the Alabama Department of Conservation and Natural Resources (ADCNR) submitted comments to Alabama Power on the Draft Phase 1 Study Report. As noted in Section 2.0, Alabama Power filed the Final *Operating Curve Change Feasibility Phase 1 Study Report* on August 31, 2020.

The Phase 1 Report described the hydrologic models (Hydrologic Engineering Center's River Analysis System [HEC-RAS] and Hydrologic Engineering Center's Reservoir System Simulation [HEC-ResSim]) developed for evaluating the winter pool alternatives (increasing the winter pool elevation in increments of 1 foot from 786 feet msl to 789 feet msl) and presented the results of the potential impacts of the alternatives on hydropower generation, flood control, navigation, drought operations, Green Plan (GP) flows, and downstream release alternatives. Due to timing of the development of the Phase 1 Report, Alabama Power included only the Pre-Green Plan (PGP), GP, and a 150 cubic feet per second (cfs) continuous minimum flow (CMF) in the Phase 1 Report. Shortly after Alabama Power finalized the Phase 1 Report, FERC required Alabama Power to evaluate additional downstream release alternatives. Alabama Power included the analysis of the impacts of raising the winter operating curve on the ability to pass the additional downstream release alternatives in the Draft *Operating Curve Change Feasibility Analysis Phase 2 Study Report*.

Alabama Power used the information in the Final Phase 1 Study Report along with FERC-approved relicensing study results and existing information to conduct the Phase 2 analysis to determine potential resource impacts on water quality, water use, erosion, sedimentation (including invasive species), aquatic resources, wildlife, threatened and endangered (T&E) species, terrestrial wetlands, recreation resources, downstream structures, and cultural resources. The Draft *Operating Curve Change Feasibility Analysis Phase 2 Study Report* provides the detailed methodology used to evaluate impacts on Project resources and accompanying results. Additional analyses were conducted using data from existing sources and the relicensing studies.

[18] Accession No. 20200410-5086

Alabama Power held a HAT 1 meeting on April 1, 2021, to review the results of the Phase 2 analysis with stakeholders and is filing the Draft *Operating Curve Change Feasibility Analysis Phase 2 Study Report* concurrently with the USR.

## 3.2 Variance from the Study Plan and Schedule

Alabama Power conducted the Operating Curve Change Feasibility Analysis Phase 2 Study in accordance with the methods and schedule described in the FERC SPD with the following variances:

- While use of historic photos from Lake Harris was mentioned in the Study Plan, photos could not be used to assess the effects of the winter pool alternatives due to the limited resolution of publicly available historical photos needed to assess individual erosion areas.
- Alabama Power provided qualitative information (rather than quantitative information noted in the Study Plan) regarding cultural resources on Lake Harris as the analysis of cultural resources is ongoing.

## 3.3 Remaining Activities/Modifications or Other Proposed Studies

Phase 2 analyses are complete. Alabama Power does not propose any additional operating curve change studies beyond those in the FERC SPD.

Remaining activities include:

- Review comments on the Draft *Operating Curve Change Feasibility Analysis Phase 2 Study Report* and modify the Final Report, as appropriate. The Final Report will be filed with the Final License Application (FLA).
- Alabama Power will present its operating proposal and protection, mitigation, and enhancement (PME) measures in the Preliminary Licensing Proposal (PLP), which will be filed by July 3, 2021.

# 4.0 DOWNSTREAM RELEASE ALTERNATIVES STUDY

## 4.1 Study Progress and Data Collection Summary

In accordance with the FERC-approved Study Plan, the evaluation of the downstream release alternatives was completed in two phases. In Phase 1, study methods included using existing data (hydrologic record and baseline information) to develop the appropriate simulation models to conduct the analysis of the following downstream release alternatives:

- GP (baseline or existing condition)
- PGP
- 150CMF

The primary tool for this study was the HEC-River Analysis System (HEC-RAS); however, Alabama Power used other HEC models to address the effects of downstream release alternatives. For example, effects to Harris Reservoir in Phase 2 were evaluated by modeling the current operations combined with each downstream release alternative through the daily HEC-Reservoir Simulation Model (HEC Res-Sim) for the ACT basin.

Alabama Power filed the Draft *Downstream Release Alternatives Phase 1 Study Report* on April 10, 2020[19]. Subsequently, FERC, the Alabama Rivers Alliance (ARA), ADCNR, and the U.S. Environmental Protection Agency (USEPA) submitted comments to Alabama Power on the Draft Phase 1 Study Report. As noted in Section 2.0, Alabama Power filed the Final *Downstream Release Alternatives Phase 1 Study Report* on July 27, 2020.

During Phase 2 of this study, the outflow hydrographs from HEC-ResSim were routed downstream using HEC-RAS to assess effects of the following downstream release alternatives on Project resources (water quality, water use, erosion and sedimentation, downstream aquatic resources [temperature and habitat], wildlife and terrestrial resources, T&E species, recreation, and cultural resources):

- GP
- PGP
- Modified Green Plan
- 150CMF
- 300CMF
- 600CMF

[19] Accession No. 20200410-5069

- 800CMF
- 150CMF+GP
- 300CMF+GP
- 600CMF+GP
- 800CMF+GP

Additional analyses in Phase 2 were conducted using data from existing sources and the relicensing studies. Due to timing of the development of the Phase 1 Report and the request to evaluate additional downstream alternatives, Alabama Power included impacts from all downstream release alternatives on existing operational parameters (reservoir levels, hydropower generation, flood control, navigation and drought operations) in the Phase 2 analysis. While the SPD notes the effects analysis ongoing from June 2020-November 2021, Alabama Power and Kleinschmidt have completed the analyses.

Alabama Power held a HAT 1 meeting on April 1, 2021 to review the results of the Phase 2 analysis with stakeholders and is filing the Draft *Downstream Release Alternatives Phase 2 Study Report* concurrently with the USR.

### 4.2 Variance from the Study Plan and Schedule

Alabama Power conducted the Downstream Release Alternatives Phase 2 Study in conformance with FERC's SPD. There are no variances from the study plan or schedule.

### 4.3 Remaining Activities/Modifications or Other Proposed Studies

Phase 2 analyses are complete. Alabama Power does not propose any downstream release alternative studies beyond those in the FERC SPD**.**

Remaining Activities include:

- Review comments on the Draft *Downstream Release Alternatives Study Phase 2 Report* and modify the Final Report, as appropriate. The Final Report will be filed with the FLA.
- Alabama Power will present its operating proposal and PME measures in the PLP, which will be filed by July 3, 2021.

# 5.0 BATTERY ENERGY STORAGE SYSTEM

## 5.1 Study Progress and Data Collection Summary

On August 10, 2020, FERC sent a letter to Alabama Power discussing the Determination on Requests for Study Modifications for the Project. In that letter, FERC recommended that Alabama Power conduct a BESS study. FERC recommended that the BESS study be conducted along with the Downstream Release Alternative Study and include at least two new release alternatives: (a) a 50 percent reduction in peak releases associated with installing one 60 MW battery unit, and (b) a proportionately smaller reduction in peak releases associated with installing a smaller MW battery unit (i.e., 5, 10 or 20 MW battery). FERC further recommended that Alabama Power include in its cost estimates for installing a BESS, any specific structural changes, any changes in turbine-generator units, and costs needed to implement each battery storage type. Finally, FERC recommended that, consistent with the Downstream Release Alternative Study Plan, Alabama Power evaluate how each of the release alternatives (i.e., items (a) and (b) above) would affect recreation and aquatic resources in the Harris Project reservoir and downstream of Harris Dam.

As discussed in the BESS report, Alabama Power does not consider installation of a BESS at the Harris Project as a reasonable alternative. The BESS study was conducted to provide FERC with the information needed to support its analysis. Although FERC recommended that these analyses be conducted as part of the Downstream Release Alternatives Study, Alabama Power determined that a separate analysis is more appropriate in that the BESS study is a screening level effort, requires a more detailed economic analysis, and considers the replacement and addition of generation equipment such as the replacement cost of a turbine and installation/replacement cost of batteries. Additionally, to model Project operations with peaking removed, the HEC-ResSim and HEC-RAS models would need to be redesigned to incorporate new operating rules. Defining new operating rules and redesigning the models is outside the scope of the study proposed by ARA and recommended by FERC. Alabama Power is filing the *Battery Energy Storage System Report* concurrently with the USR.

## 5.2 Variance from the Study Plan and Schedule

FERC did not request a study plan for the BESS Study but provided recommendations for the type of analysis FERC expected Alabama Power to complete. The BESS was evaluated separately from the other downstream release alternatives and results of the analysis are presented in a separate report.

## 5.3 Remaining Activities/Modifications or Other Proposed Studies

The BESS Study is complete. Alabama Power does not propose any additional BESS analysis beyond that recommended by FERC in its Determination on Requests for Study Modifications for the Project

Remaining Activities include:

- Review comments on the Draft *Battery Energy Storage System at R.L. Harris Project Report* and modify the Final Report, as appropriate. The Final Report will be filed with the FLA.

# 6.0 WATER QUALITY STUDY

## 6.1 Study Progress and Data Collection Summary

The Draft *Water Quality Study Report* was filed concurrently with the ISR on April 10, 2020[20]. Subsequently, the ADCNR, ARA, EPA, Alabama Department of Environmental Management (ADEM), and FERC submitted comments to Alabama Power on the Draft Study Report.

Alabama Power collected dissolved oxygen and temperature data at the generation monitor from June 1 to October 31, 2020 and at the continuous monitor from May 4 to October 31, 2020[21]. In addition, Alabama Power also collected monthly vertical profiles in the Harris Reservoir forebay from March to October 2020 and will continue collecting from March to October 2021. Alabama Power is continuing to collect water quality data at both downstream monitoring locations in 2021 (from March 1 – June 30, 2021 at the continuous monitor and June 1 – June 30, 2021 at the generation monitor) to include in the final license application.

Alabama Power is filing the *Final Water Quality Study Report* concurrently with the USR.

## 6.2 Variance from the Study Plan and Schedule

Alabama Power conducted the Water Quality Study in conformance with FERC's SPD. There are no variances from the study plan or schedule.[22]

## 6.3 Remaining Activities/Modifications or Other Proposed Studies

Alabama Power does not propose any additional water quality studies.

[20] Accession No. 20200410-5095

[21] As noted in the ISR, Alabama Power also collected water quality data at 15-minute intervals at the generation monitor from June to October 2017-2019, and at the continuous monitor from March to October 2019.

[22] In the ISR, Alabama Power requested a variance to the approved Water Quality Study schedule to submit its Clean Water Act section 401 water quality certification to ADEM in April 2021, instead of as originally proposed in 2020. In the Determination on Study Modifications, FERC noted that Section 5.23(b) of the Commission's regulations requires the application for certification to be submitted to the certifying agency within 60 days of issuance of the Ready for Environmental Analysis notice, which will occur post-filing. Accordingly, a variance for submitting the certification application prior to filing the license application is not needed. As such, although a variance to the schedule does not need to be requested, Alabama Power notes that it plans to submit an application to ADEM for the 401 Water Qualification Certification (WQC) after the FLA is submitted in November 2021, not in April 2021 as noted in Alabama Power's ISR.

Remaining Activities include:

- Alabama Power will prepare the 401 WQC application and submit to ADEM after the FLA is filed with FERC.

# 7.0 EROSION AND SEDIMENTATION STUDY

## 7.1 Study Progress and Data Collection Summary

The Draft *Erosion and Sedimentation Study Report* was filed concurrently with the ISR on April 10, 2020[23]. Subsequently, the ADCNR, ARA, FERC and individual stakeholders submitted comments to Alabama Power on the Draft Study Report. Alabama Power is filing the Final *Erosion and Sedimentation Study Report* concurrently with the USR.

### 7.1.1 Lake Harris

Alabama Power performed additional reconnaissance at identified sedimentation sites on Lake Harris during full (summer) pool conditions to determine if any nuisance aquatic vegetation was present. Alabama Power provided the results of the nuisance aquatic vegetation assessment in Appendix F of the Final *Erosion and Sedimentation Study Report*.

### 7.1.2 Tallapoosa River Downstream of Harris Dam

No additional data were collected in the Tallapoosa River downstream of Harris Dam to complete the analyses presented in the Final *Erosion and Sedimentation Study Report*.

## 7.2 Variance from the Study Plan and Schedule

Alabama Power conducted the Erosion and Sedimentation Study in accordance with the methods **and schedule described in the FERC SPD except for the following variance:**

- Alabama Power provided the results of the Nuisance Aquatic Vegetation Survey Report in Appendix F of the Final Erosion and Sedimentation Study Report rather than providing to HAT 3 in the form of a technical memorandum.

## 7.3 Remaining Activities/Modifications or Other Proposed Studies

Alabama Power does not propose any additional erosion and sedimentation studies, and there are no remaining activities.

[23] Accession No. 20200410-5091

# 8.0 AQUATIC RESOURCES STUDY

## 8.1 Study Progress and Data Collection Summary

As noted in Section 2.0, Alabama Power filed the Draft *Aquatic Resources Study Report*, which included the aquatic resources desktop assessment, on July 28, 2020. Subsequently, the ADCNR, ARA, EPA, individual stakeholders, and FERC submitted comments to Alabama Power on the Draft Study Report. Alabama Power held HAT 3 meetings on June 2, 2020, November 5, 2020, and March 31, 2021.

Auburn University (Auburn) conducted a literature review of temperature requirements of target species (Redbreast Sunfish [*Lepomis auratus*], Channel Catfish [*Ictalurus punctatus*], Tallapoosa Bass [*Micropterus tallapoosae*], and Alabama Bass [*Micropterus henshalli*]). Auburn University obtained temperature data from the U.S. Geological Survey (USGS), Alabama Power monitors, and the 20 temperature level loggers stationed downstream of Harris Dam and consolidated these data with historical data. Auburn continued fish sampling through January 2021 and tagged and tracked fish with acoustic/radio (CART tags) during the summer of 2020. Auburn also conducted static respirometry tests and measured active metabolic rates using a combination of increasing water velocity and decreasing water temperature. Auburn incorporated the necessary physiological parameters into bioenergetics models to conduct simulations needed to test potential influence of water temperature and flow on specific growth rates of target fishes below Harris Dam. Auburn conducted growth simulations of Redbreast Sunfish using respiration rate parameters largely gathered from Bluegill, a closely-related species. Growth simulations could not be conducted for other target species due to one or more factors, such as low sample sizes for laboratory experiments, a lack of published models developed for riverine populations, or because parameters for other target species did not fit models developed for closely-related species.

Alabama Power is filing the Final *Aquatic Resources Study Report*, including Auburn's final bioenergetics report, concurrently with the USR.

## 8.2 Variance from the Study Plan and Schedule

Alabama Power conducted the Aquatic Resources Study in accordance with the methods and schedule described in the FERC SPD with the following variance:

- Auburn University did not use the 30+2 sampling method as it was determined in the field to not be feasible/effective for sampling the sites and instead, shallow areas were sampled using boat and barge electrofishing equipment, which were found to be effective in sampling shallow areas within the study sites. The boat method used was a modification of the recently developed non-wadeable index of biological integrity (IBI). Sampling intensity was modified to accommodate available habitat, sampling frequency, and therefore IBI scores were not calculated.

## 8.3 Remaining Activities/Modifications or Other Proposed Studies

Alabama Power does not propose any additional aquatic resources studies, and there are no remaining activities.

# 9.0 DOWNSTREAM AQUATIC HABITAT STUDY

## 9.1 Study Progress and Data Collection Summary

As noted in Section 2.0, Alabama Power filed the Draft *Downstream Aquatic Habitat Study Report* on June 30, 2020. Subsequently, the ADCNR and ARA submitted comments to Alabama Power on the Draft Study Report. Alabama Power held a virtual HAT 3 meeting on June 2, 2020, November 5, 2020, and March 31, 2021.

In reviewing the comments on the Draft *Downstream Aquatic Habitat Study Report*, Alabama Power determined that the primary purpose of this study was to examine effects on habitat only; therefore, in the final report, all previous data and references to temperature were removed and are now included in the Final *Aquatic Resources Study Report* and the Draft *Downstream Release Alternatives Phase 2 Study Report* consistent with that FERC-approved Study Plan.

Alabama Power continued collecting level logger data at 20 locations in the Tallapoosa River below Harris Dam through June 2020, which were incorporated into the analysis and subsequent final report.

Alabama Power is filing the Final *Downstream Aquatic Habitat Study Report* concurrently with the USR.

## 9.2 Variance from the Study Plan and Schedule

Alabama Power conducted the Downstream Aquatic Habitat Study in conformance with FERC's SPD. There are no variances from the study plan or schedule.

## 9.3 Remaining Activities/Modifications or Other Proposed Studies

Alabama Power does not propose any additional downstream aquatic habitat studies, and there are no remaining activities.

# 10.0 THREATENED AND ENDANGERED SPECIES STUDY

## 10.1 Study Progress and Data Collection Summary

The Draft *Threatened and Endangered Species Desktop Assessment* was filed concurrently with the ISR on April 10, 2020[24]. Subsequently, the U.S. Fish and Wildlife Service (USFWS), ADCNR, FERC, ARA, the Alabama Glade Conservation Association, and an individual stakeholder submitted comments and questions regarding the Draft Desktop Assessment. Alabama Power held a virtual HAT 3 meeting on June 2, 2020, November 5, 2020, and March 31, 2021.

Alabama Power completed field surveys at Lake Harris and Skyline to determine if T&E species are located within the Project Boundary. As noted in Section 2.0, Alabama Power filed the Final *Threatened and Endangered Species Study Report*, including the Desktop Assessment and the results of all field investigations, on January 29, 2021.

## 10.2 Variance from the Study Plan and Schedule

Alabama Power conducted the Threatened & Endangered Species Study in conformance with FERC's SPD. There are no variances from the study plan or schedule.

## 10.3 Remaining Activities/Modifications or Other Proposed Studies

Alabama Power does not propose any additional threatened and endangered species studies, and there are no remaining activities.

[24] Accession No. 20200410-5094

# 11.0 PROJECT LANDS EVALUATION STUDY

## 11.1 Study Progress and Data Collection Summary

The Draft *Phase 1 Project Lands Evaluation Study Report* was filed concurrently with the ISR on April 10, 2020[25]. Subsequently, the ADCNR and FERC submitted comments to Alabama Power on the Draft Study Report. As noted in Section 2.0, Alabama Power filed the Final *Phase 1 Project Lands Evaluation Study Report* on October 2, 2020. Alabama Power held a HAT 4 meeting on October 19, 2020, to present the Draft Shoreline Management Plan (SMP) and the Wildlife Management Plan (WMP) annotated outline.

Samford University conducted a botanical survey on an additional 35 acres of land adjacent to the previously surveyed area at Flat Rock Park. This additional botanical inventory report (*A Botanical Inventory of a 35-Acre Parcel at Flat Rock Park, Blake's Ferry, Alabama)* is being filed concurrently with the USR.

Phase 2 of this study is using the results of Phase 1 and other Harris relicensing studies to develop a WMP and a SMP. Specific activities for developing the SMP and WMP are included in the FERC-approved Study Plan.

## 11.2 Variance from the Study Plan and Schedule

Alabama Power conducted the Project Lands Evaluation in conformance with FERC's SPD. There are no variances from the study plan or schedule.

## 11.3 Remaining Activities/Modifications or other Proposed Studies

Alabama Power does not propose any additional land evaluation studies.

Remaining activities include:

- Alabama Power will file a WMP and SMP with the FLA.

[25] Accession No. 20200410-5092

# 12.0 RECREATION EVALUATION STUDY

## 12.1 Study Progress and Data Collection Summary

As noted in Section 2.0, Alabama Power filed the Draft *Recreation Evaluation Study Report* on August 24, 2020[26]. Subsequently, the ADCNR, ARA, Tim Coe (Mayor of Wedowee), Donna McKay (Mayor of Town of Wadley), Bob Fincher (State Representative 37th House District), individual stakeholders, and FERC submitted comments to Alabama Power on the Draft Study Report. Alabama Power held HAT 5 meetings on June 4, 2020 and October 19, 2020. As noted in Section 2.0, Alabama Power filed the Final *Recreation Evaluation Study Report* on November 24, 2020.

## 12.2 Variance from the Study Plan and Schedule

Alabama Power conducted the Recreation Evaluation Study in accordance with the methods and schedule described in the FERC SPD, including a variance that was approved by FERC on August 10, 2020.

## 12.3 Remaining Activities/Modifications or Other Proposed Studies

Alabama Power does not propose any additional recreation studies, and there are no remaining activities.

[26] This was noted as a schedule variance in the Initial Study Report due to the additional study elements and extended participation deadlines.

# 13.0 CULTURAL RESOURCES STUDY

## 13.1 Study Progress and Data Collection Summary

The Harris Project Cultural Resources *Programmatic Agreement and Historic Properties Management Plan* Study Plan involves collecting and summarizing existing cultural resources baseline information and developing a plan to assess cultural resources identified in the Harris Project Area of Potential Effect (APE). Alabama Power filed the *Inadvertent Discovery (IDP) Plan and Traditional Cultural Properties (TCP) Identification Plan* concurrent with the ISR on April 10, 2020[27]. Subsequently, stakeholders submitted comments to Alabama Power[28]. On May 15, 2020, Alabama Power provided the Draft *Area of Potential Effects Report* to HAT 6 for review. Alabama Power held a HAT 6 meeting on May 28, 2020 to discuss the APE report and the status of the TCP Identification study. Alabama Power filed the Final *Area of Potential Effects Report* on June 29, 2020[29]. On August 11, 2020, FERC issued its Determination of Area of Potential Effects for the Project[30]. Alabama Power held a virtual site visit of Skyline on March 4, 2021, for applicable tribes and the Alabama Historical Commission.

Alabama Power concluded cultural resources assessments for the sites identified during the Lake Harris preliminary archeological assessment in February 2021 and will complete the TCP identification process with the Muscogee (Creek) Nation in April 2021.

In addition to assessments on sites on Lake Harris, Alabama Power completed cultural resource assessments for Skyline. Further, as part of the Draft *Downstream Release Alternatives Phase 2 Study Report,* Alabama Power reviewed the effects of Project operations (including any proposed changes in downstream releases) to the known cultural resources downstream of Harris Dam[31].

[27] Accession No. 20200410-5068
[28] The Draft TCP Identification Plan and IDP Plan were distributed to HAT 6 for comments in February 2020.
[29] This was noted as a schedule variance in the Initial Study Report.
[30] Accession No. 20200811-3007
[31] This was a desktop review and did not include cultural resource assessments as most of the cultural resources downstream are outside of Alabama Power's administrative area of control.

## 13.2 Variance from the Study Plan and Schedule

Alabama Power conducted the Cultural Resources Programmatic Agreement and Historic Properties Management Plan Study in conformance with FERC's SPD with the following variances:

- a variance for filing the Final *Area of Potential Effects Report* which was approved by FERC following the ISR.
- will complete the TCP identification process with the Muscogee (Creek) Nation in April 2021 (rather than February 2021 as noted in the Study Plan).

## 13.3 Remaining Activities/Modifications or Other Proposed Studies

Alabama Power does not propose any additional cultural studies.

Remaining Activities include:

- Alabama Power will complete eligibility assessments for known cultural resources by July 2021.
- Alabama Power will issue determination of effect on historic properties by July 2021.
- Alabama Power will develop a Draft Historic Properties Management Plan (HPMP) for the Harris Project to be filed concurrently with the PLP. The HPMP will describe the Harris Project, APE, anticipated effects, and Alabama Power's proposed measures to protect historic properties.

Document Content(s)

Alabama Power

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April 12, 2021

***VIA ELECTRONIC FILING***

Project No. 2628-065
R.L. Harris Hydroelectric Project
Transmittal of the Final Aquatic Resources Report

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

Dear Secretary Bose,

Alabama Power Company (Alabama Power) is the Federal Energy Regulatory Commission (FERC or Commission) licensee for the R.L. Harris Hydroelectric Project (Harris Project) (FERC No. 2628-065). On April 12, 2019, FERC issued its Study Plan Determination[1] (SPD) for the Harris Project, approving Alabama Power's ten relicensing studies with FERC modifications. On May 13, 2019, Alabama Power filed Final Study Plans to incorporate FERC's modifications and posted the Final Study Plans on the Harris relicensing website at www.harrisrelicensing.com.

Consistent with FERC's April 12, 2019 SPD, Alabama Power filed the Draft Aquatic Resources Report (Draft Report) on July 28, 2020[2]. The Draft Report was only a portion of the Aquatic Resources study and included the results of the aquatic resources desktop assessment and methodology for Auburn University's research. Stakeholders were to submit their comments to Alabama Power on the Draft Report by August 28, 2020. The Alabama Department of Conservation and Natural Resources, Alabama Rivers Alliance, Environmental Protection Agency, individual stakeholders, and FERC submitted comments on the Draft Report. These comments are included in the updated consultation record (April 2019 through March 2021) for this study (Attachment 1) and responses to comments on the Draft Report are provided in Attachment 2. The Final Aquatic Resources Report is included as Attachment 3.

[1] Accession Number 20190412-3000.
[2] Accession Number 20200728-5120.

If there are any questions concerning this filing, please contact me at arsegars@southernco.com or 205-257-2251.

Sincerely,

Angie Anderegg
Harris Relicensing Project Manager

Attachment 1 – Aquatic Resources Consultation Record (April 2019 – March 2021)
Attachment 2 – Comments and Responses on the Draft Aquatic Resources Report
Attachment 3 – Final Aquatic Resources Report

cc: Harris Action Team 3 Stakeholder List

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April 12, 2021

***VIA ELECTRONIC FILING***

Project No. 2628-065
R.L. Harris Hydroelectric Project
Transmittal of the Battery Energy Storage System Report

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

Dear Secretary Bose,

Alabama Power Company (Alabama Power) is the Federal Energy Regulatory Commission (FERC or Commission) licensee for the R.L. Harris Hydroelectric Project (Harris Project) (FERC No. 2628-065). On April 12, 2019, FERC issued its Study Plan Determination[1] (SPD) for the Harris Project, approving Alabama Power's ten relicensing studies with FERC modifications. On May 13, 2019, Alabama Power filed Final Study Plans to incorporate FERC's modifications and posted the Final Study Plans on the Harris relicensing website at www.harrisrelicensing.com.

Alabama Power filed its Initial Study Report (ISR)[2] with FERC on April 10, 2020 and held an ISR Meeting on April 27, 2020. On June 11, 2020, Alabama Rivers Alliance (ARA) filed comments on the ISR, requesting a new study titled "Battery Storage Feasibility Study to Retain Full Peaking Capabilities While Mitigating Hydropeaking Impacts". On August 10, 2020, FERC issued a Determination on Requests for Study Modifications for the Harris Project. In its determination, FERC recommended that Alabama Power conduct a BESS Study along with the Downstream Release Alternative Study. Alabama Power determined that a separate analysis is more appropriate in that the BESS study is a screening level effort, requires a more detailed economic analysis, and considers the replacement and addition of generation equipment such as the replacement cost of a turbine and installation/replacement cost of batteries. The Draft Battery Energy Storage System Report (Draft Report) is contained in Attachment 1. Stakeholders have until May 11, 2021 to submit their comments to Alabama Power on the Draft Report. Comments should be sent directly to harrisrelicensing@southernco.com.

[1] Accession Number 20190412-3000.
[2] Accession Number 20200410-5084.

If there are any questions concerning this filing, please contact me at arsegars@southernco.com or 205-257-2251.

Sincerely,

Angie Anderegg
Harris Relicensing Project Manager

Attachment 1 – Draft Battery Energy Storage System Report
Attachment 2 – BESS Study Report Consultation Record (April 2020-March 2021)

cc: Harris Action Team 1 Stakeholder List

Alabama Power

600 North 18th Street
Hydro Services 16N-8180
Birmingham, AL 35203
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April 12, 2021

***VIA ELECTRONIC FILING***

Project No. 2628-065
R.L. Harris Hydroelectric Project
Transmittal of A Botanical Inventory of a 35-Acre Parcel at Flat Rock Park, Blake's Ferry, Alabama

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

Dear Secretary Bose,

Alabama Power Company (Alabama Power) is the Federal Energy Regulatory Commission (FERC or Commission) licensee for the R.L. Harris Hydroelectric Project (Harris Project) (FERC No. 2628-065). On April 12, 2019, FERC issued its Study Plan Determination[1] (SPD) for the Harris Project, approving Alabama Power's ten relicensing studies with FERC modifications. On May 13, 2019, Alabama Power filed Final Study Plans to incorporate FERC's modifications and posted the Final Study Plans on the Harris relicensing website at www.harrisrelicensing.com.

Consistent with FERC's April 12, 2019 SPD, Alabama Power filed the Draft Phase 1 Project Lands Evaluation Study Report (Draft Report) on April 10, 2020[2] and the Final Phase 1 Project Lands Evaluation Study Report (Final Report) on October 10, 2020[3]. The Draft and Final Report included a proposal to reclassify +/-57 acres of existing Project lands from Recreation to Natural/Undeveloped due to the presence of the rare Blake's Ferry Pluton. Initial stakeholder consultation identified a 20-acre parcel to be inventoried for the purposes of cataloguing all plants present at the rare Blake's Ferry Pluton located adjacent to Alabama Power's Flat Rock Park (Flat Rock). Stakeholder comments provided during the Initial Study Report Meeting held April 28, 2020, highlighted the need to inventory an additional 35-acre parcel adjacent to the original 20-acre parcel. A botanical inventory of the 20-acre parcel was completed during the spring and fall 2019, and the 20-acre parcel inventory report was included in the Final Report. Following the filing of the Final Report, Samford University performed an additional botanical inventory on the 35-acre parcel, and the 35-acre parcel inventory report is contained in Attachment 1.

[1] Accession Number 20190412-3000.
[2] Accession Number 20200410-5092.
[3] Accession Number 20201002-5139.

If there are any questions concerning this filing, please contact me at arsegars@southernco.com or 205-257-2251.

Sincerely,

Angie Anderegg
Harris Relicensing Project Manager

Attachment 1 – A Botanical Inventory of a 35-Acre Parcel at Flat Rock Park, Blake's Ferry, Alabama

cc: Harris Action Team 4 Stakeholder List

# Attachment 1
# A Botanical Inventory of a 35-Acre Parcel at Flat Rock Park, Blake's Ferry, Alabama

# A BOTANICAL INVENTORY OF A 35-ACRE PARCEL AT FLAT ROCK PARK, BLAKE'S FERRY, ALABAMA

## A report prepared for

## ALABAMA POWER COMPANY

## by

James T. Diggs, Katie N. Horton, Daniel Spaulding,
David M. Frings

December 29, 2020

## Introduction

This botanical inventory, begun in March 2020, was undertaken to catalog all plant species present at a 35-acre parcel at the rare Blake's Ferry Pluton, located adjacent to Alabama Power Company's (Alabama Power) Flat Rock Park (Flat Rock) on Lake Harris at 7115 CR 870 Wedowee, AL 36278. The area of the botanical inventory (Inventory Area) is delineated in Figure 1. This botanical inventory is intended to support the Alabama Glade Conservation Coalition's August 28, 2018 request to reclassify this 35-acre parcel of Flat Rock Park from "Recreational" to "Natural/Undeveloped", affording the natural plant and animal community at this location protection from potential future degradation.

The Inventory Area consists of approximately 35 acres of woodland habitat adjacent to the popular Flat Rock recreational area on Lake Harris. The proximity of this wooded tract to the rare granite pluton allows animals to take potential shelter during the heat of Alabama summer, and creates safe habitat for vulnerable animals such as the Carolina box turtle (*Terrapene carolina*) during their breeding season. It may be worth noting that while some areas in the land originally surveyed adjacent to the visitor-accessible portion of Flat Rock appeared to have only become wooded in the absence of fire maintenance, this 35-acre plot appeared to be older natural forest with deep roots rather than an encroachment onto the granite pluton. We found that several indicators of a rich and healthy forest were present, including *Collinsonia canadensis, Platanthera clavellata,* and *Listera australis* with a healthy population of native azaleas (*Rhododendron* sp.) on neighboring lands. These rich forests provide an important buffer zone for the rare granite outcrop community at the heart of Flat Rock.

The field team of botanists (Diggs, Spaulding, and Horton) began this inventory in March 2020, and visited the site at least monthly throughout the growing season, with the final field day occurring on October 25, 2020. We walked the entire 35-acre property during each visit, paying careful attention to specialized habitats on the parcel that were likely to harbor additional or more ecologically-restricted species (wetlands, power line cuts, rich woodlands, grasslands, etc.). All plant species were identified either in the field, or in cases where identification was more difficult, a voucher specimen was taken for later identification in the laboratory. All vouchers are housed at the Anniston Museum of Natural History, Anniston, Alabama (AMAL, Daniel D. Spaulding, curator). All identifications were made *sensu* Weakley (2015)[1], and all nomenclature was checked against the Alabama Plant Atlas[2].

In all, 401 species of plants were documented from the Inventory Area and surrounding buffer areas. These 401 species represent 106 plant families. Several of these species are of federal and/or state conservation concern. These species and their ranks are presented in Table 1. The

[1] Weakley, A.S. 2015. Flora of the southern and mid-Atlantic states, working draft of May 2015. University of North Carolina Herbarium, North Carolina Botanical Garden, Chapel Hill, NC.
[2] Keener, B. R., A.R. Diamond, L. J. Davenport, P. G. Davison, S. L. Ginzbarg, C. J. Hansen, C. S. Major, D. D. Spaulding, J. K. Triplett, and M. Woods. 2019. *Alabama Plant Atlas*. [S.M.]Landry and K.N. Campbell (original application development), Florida Center for Community Design and Research. University of South Florida]. University of West Alabama, Livingston, Alabama.

inventory team recorded 43 species that had never been reported for Randolph County (denoted as "County record" within the comments of Table 2). These results are presented in Table 2. The approximate locations for representative populations of the rare species found in Table 1 are shown in the map in Figure 2. There are 44 documented species of non-native taxa (designated "not native" in Table 2) within the Inventory Area, 22 of which are considered invasive by the Southeast Exotic Pest Plant Council (SE-EPPC).[3] These are designated as "invasive" in Table 2. In addition, there are several very large, mature American beech (*Fagus grandifolia*) on the property which should be measured for potential state Champion Tree status.


**FIGURE 1: INVENTORY AREA, APPROXIMATELY 35 ACRES.**

[3] Miller, J., Chambliss, E., and Bargeron, C. 2004. Invasive Plants of the Thirteen Southern States. https://www.invasive.org/south/seweeds.cfm

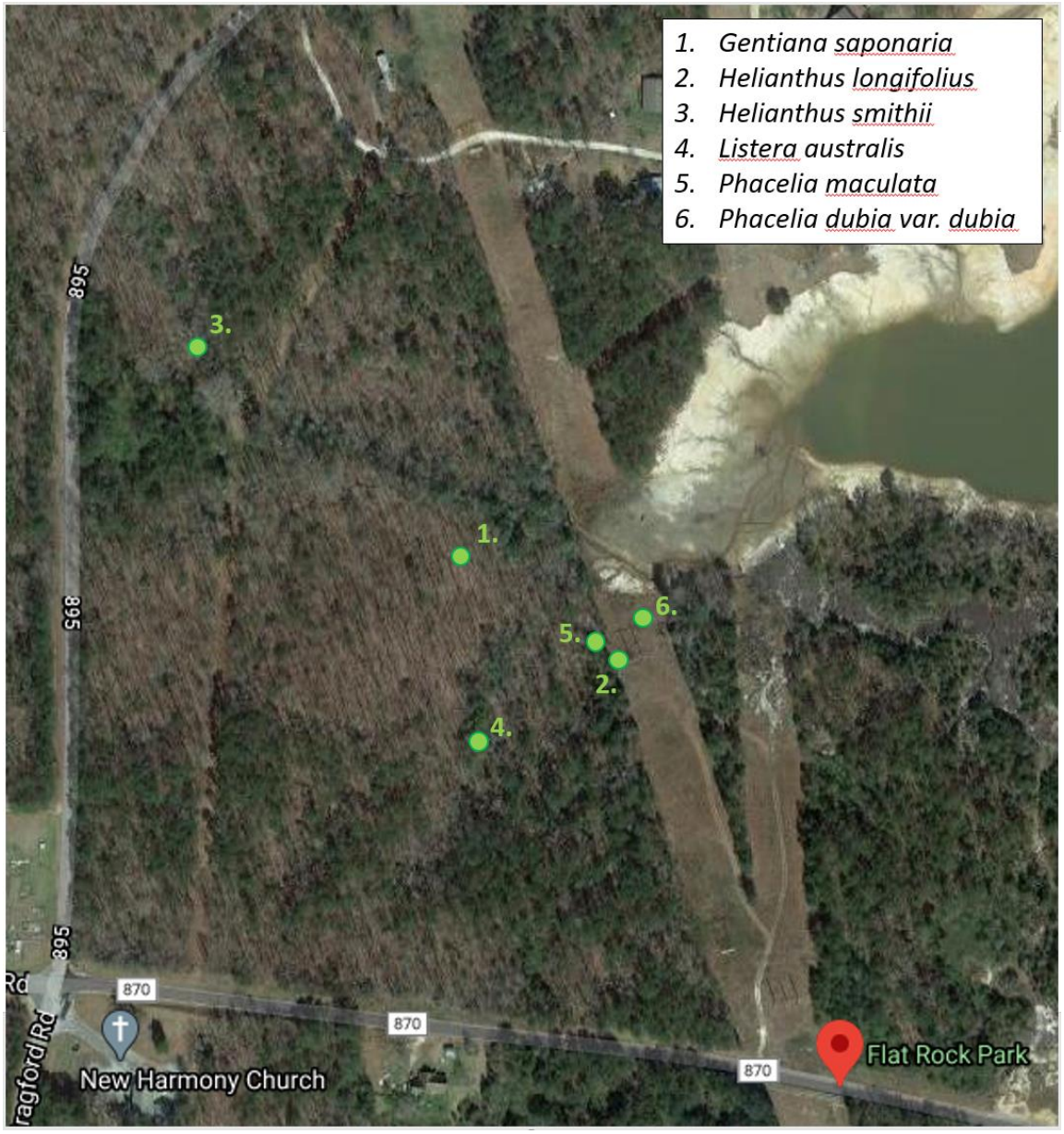


**FIGURE 2: REPRESENTATIVE LOCATIONS OF POPULATIONS OF SPECIES OF CONSERVATION CONCERN FROM TABLE 1.**

**TABLE 1: SPECIES OF CONSERVATION CONCERN DOCUMENTED IN INVENTORY AREA**

| Species | Conservation rank |
|---|---|
| *Gentiana saponaria*, soapwort gentian | S3 |
| *Helianthus longifolius*, longleaf sunflower | S1S2, G3 |
| *Helianthus smithii*, Smith's sunflower | S2, G2 |
| *Listera australis*, southern twayblade orchid | S2, G4 |
| *Phacelia maculata,* spotted scorpion weed | S1, G3 |
| *Phacelia dubia* var. *dubia* | S1S2 |

Legend: In all rankings, "S" denotes the range of the plant in the state of Alabama. "G" denotes the entire natural range of the plant.[4]

- G1 or S1: Critically Imperiled — At very high risk of extinction or elimination due to very restricted range, very few populations or occurrences, very steep declines, very severe threats, or other factors. S1 denotes fewer than 5 known occurrences within the state.
- G2 or S2: Imperiled — At high risk of extinction or elimination due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors. S2 denotes 6-20 known occurrences within the state.
- G3 or S3: Vulnerable — At moderate risk of extinction or elimination due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors. S3 denotes 21-100 occurrences within the state.
- G4 or S4: Apparently Secure — At fairly low risk of extinction or elimination due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors. S4 denotes species which are apparently secure within the state.
- G5 or S5: Secure — At very low risk or extinction or elimination due to a very extensive range, abundant populations or occurrences, and little to no concern from declines or threats. S5 denotes species which are demonstrably secure within the state.

[4] Master, L. L., D. Faber-Langendoen, R. Bittman, G. A. Hammerson, B. Heidel, L. Ramsay, K. Snow, A. Teucher, and A. Tomaino. 2012. NatureServe Conservation Status Assessments: Factors for Evaluating Species and Ecosystem Risk. NatureServe, Arlington, VA

**TABLE 2: SPECIES DOCUMENTED WITHIN INVENTORY AREA**

| | *Taxon name* | Common name | Family | Comments |
|---|---|---|---|---|
| 1 | ***Acalypha gracilens*** | Slender three seed mercury | Euphorbiaceae | |
| 2 | ***Acalypha virginica*** | Virginia three seed mercury | Euphorbiaceae | |
| 3 | ***Acer rubrum*** | Red maple | Aceraceae | |
| 4 | ***Aesculus pavia*** | Red buckeye | Hippocastanaceae | |
| 5 | ***Agrimonia parviflora*** | Harvestlice | Rosaceae | |
| 6 | ***Agrostis hyemalis*** | Ticklegrass | Poaceae | |
| 7 | ***Agrostis perennans*** | Autumn bentgrass | Poaceae | |
| 8 | ***Albizia julibrissin*** | Mimosa | Fabaceae | Not native, invasive |
| 9 | ***Allium canadense*** | Wild onion | Alliaceae | |
| 10 | ***Allium vineale*** | Field garlic | Alliaceae | Not native, invasive |
| 11 | ***Alnus serrulata*** | Tag alder | Betulaceae | |
| 12 | ***Alopecurus carolinianus*** | Carolina foxtail grass | Poaceae | |
| 13 | ***Ambrosia artemisiifolia*** | Common ragweed | Asteraceae | |
| 14 | ***Amphicarpaea bracteata*** | American hog peanut | Fabaceae | |
| 15 | ***Andropogon virginicus*** | Broom sedge | Poaceae | |
| 16 | ***Anemone quinquefolia*** | Nightcaps | Ranunculaceae | |
| 17 | ***Apios americana*** | American groundnut | Fabaceae | |
| 18 | ***Apocynum cannabinum*** | Hemp dogbane | Apocynaceae | |
| 19 | ***Arisaema pusillum*** | Small-flowered jack-in-the-pulpit | Araceae | |
| 20 | ***Arundinaria gigantea*** | River cane | Poaceae | |
| 21 | ***Asclepias amplexicaulis*** | Clasping milkweed | Apocynaceae | |
| 22 | ***Asclepias variegata*** | Red ring milkweed | Apocynaceae | |
| 23 | ***Asimina parviflora*** | Small-flowered pawpaw | Annonaceae | |
| 24 | ***Asplenium platyneuron*** | Ebony spleenwort | Aspleniaceae | |
| 25 | ***Athyrium asplenioides*** | Southern lady fern | Athyriaceae | |
| 26 | ***Baccharis halimifolia*** | Groundsel tree | Asteraceae | |

| | *Taxon name* | **Common name** | **Family** | **Comments** |
|---|---|---|---|---|
| 27 | ***Berberis bealei*** | Leather leaf mahonia | Berberidaceae | Not native, invasive, County record |
| 28 | ***Bignonia capreolata*** | Cross-vine | Bignoniaceae | |
| 29 | ***Boehmeria cylindrica*** | False nettle | Urticaceae | |
| 30 | ***Botrychium biternatum*** | Southern grape fern | Ophioglossaceae | |
| 31 | ***Botrychium dissectum*** | Cutleaf grape fern | Ophioglossaceae | |
| 32 | ***Botrychium virginianum*** | Rattlesnake fern | Ophioglossaceae | |
| 33 | ***Briza minor*** | Lesser quaking grass | Poaceae | Not native |
| 34 | ***Bromus japonicus*** | Japanese brome | Poaceae | Not native |
| 35 | ***Callicarpa americana*** | American beautyberry | Lamiaceae | |
| 36 | ***Calycanthus floridus*** | Carolina allspice | Calycanthaceae | |
| 37 | ***Cardamine hirsuta*** | Hairy bittercress | Brassicaceae | Not native |
| 38 | ***Carex caroliniana*** | Carolina sedge | Cyperaceae | County record |
| 39 | ***Carex complanata*** | Hirsute sedge | Cyperaceae | |
| 40 | ***Carex crinita*** | Fringed sedge | Cyperaceae | |
| 41 | ***Carex debilis*** | White-edge sedge | Cyperaceae | |
| 42 | ***Carex festucacea*** | Fescue sedge | Cyperaceae | |
| 43 | ***Carex leptalea*** | Bristle stalk sedge | Cyperaceae | |
| 44 | ***Carex lurida*** | Sallow sedge | Cyperaceae | |
| 45 | ***Carex nigromarginata*** | Black-edged sedge | Cyperaceae | |
| 46 | ***Carex striatula*** | Lined sedge | Cyperaceae | |
| 47 | ***Carex styloflexa*** | Bent sedge | Cyperaceae | |
| 48 | ***Carex tribuloides*** | Blunt broom sedge | Cyperaceae | |
| 49 | ***Carpinus caroliniana*** | American hornbeam | Betulaceae | |
| 50 | ***Carya glabra*** | Pignut hickory | Juglandaceae | |
| 51 | ***Carya tomentosa*** | Mockernut hickory | Juglandaceae | |
| 52 | ***Centrosema virginianum*** | Spurred butterfly pea | Fabaceae | |
| 53 | ***Cephalanthus occidentalis*** | Buttonbush | Rubiaceae | |
| 54 | ***Cerastium glomeratum*** | Sticky chickweed | Caryophyllaceae | |
| 55 | ***Chamaecrista nictitans*** | Common sensitive plant | Fabaceae | |
| 56 | ***Chamaecrista fasciculata*** | Common Partridge Pea | Fabaceae | |
| 57 | ***Chamaelirium luteum*** | Devil's bit | Melanthiaceae | |
| 58 | ***Chasmanthium latifolium*** | River Oats | Poaceae | |
| 59 | ***Chasmanthium laxum*** | Slender wood oats | Poaceae | County record |

| | *Taxon name* | Common name | Family | Comments |
|---|---|---|---|---|
| 60 | ***Chasmanthium sessiliflorum*** | Longleaf wood oats | Poaceae | |
| 61 | ***Chimaphila maculata*** | Pipsissewa | Ericaceae | |
| 62 | ***Chrysopsis mariana*** | Maryland golden aster | Asteraceae | |
| 63 | ***Cicuta maculata*** | Water hemlock | Apiaceae | |
| 64 | ***Clematis virginiana*** | Virgin's bower | Ranunculaceae | |
| 65 | ***Clitoria mariana*** | Butterfly pea | Fabaceae | |
| 66 | ***Cocculus carolinus*** | Carolina snailseed | Menispermaceae | |
| 67 | ***Coleataenia anceps*** | Beaked panic grass | Poaceae | |
| 68 | ***Coleataenia rigidula*** | Redtop panic grass | Poaceae | |
| 69 | ***Collinsonia canadensis*** | Northern horsebalm | Lamiaceae | County record |
| 70 | ***Commelina communis*** | Asiatic dayflower | Commelinaceae | Not native, invasive |
| 71 | ***Commelina erecta*** | Erect dayflower | Commelinaceae | |
| 72 | ***Commelina virginica*** | Virginia dayflower | Commelinaceae | County record |
| 73 | ***Coreopsis auriculata*** | Eared tickseed | Asteraceae | |
| 74 | ***Coreopsis grandiflora* var. *grandiflora*** | Large-flowered tickseed | Asteraceae | |
| 75 | ***Coreopsis major*** | Woodland tickseed | Asteraceae | |
| 76 | ***Cornus florida*** | Flowering dogwood | Cornaceae | |
| 77 | ***Croton glandulosus*** | Vente conmigo | Euphorbiaceae | |
| 78 | ***Croton michauxii*** | Narrowleaf rushfoil | Euphorbiaceae | |
| 79 | ***Cuscuta campestris*** | Field dodder | Convolvulaceae | |
| 80 | ***Cuscuta compacta*** | Love vine | Convolvulaceae | |
| 81 | ***Cuscuta gronovii*** | Scaldweed | Convolvulaceae | |
| 82 | ***Cyclospermum leptophyllum*** | Marsh parsley | Apiaceae | County record |
| 83 | ***Cyperus retrofractus*** | Rough flatsedge | Cyperaceae | County record |
| 84 | ***Cyperus retrorsus*** | Pinebarren flatsedge | Cyperaceae | |
| 85 | ***Cyperus strigosus*** | Straw color flatsedge | Cyperaceae | |
| 86 | ***Danthonia sericea*** | Downy oatgrass | Poaceae | |
| 87 | ***Decumaria barbara*** | Climbing hydrangea | Hydrangeaceae | |
| 88 | ***Desmodium ciliare*** | Hairy small-leaf tick-trefoil | Fabaceae | |
| 89 | ***Desmodium paniculatum*** | Panicled tick-trefoil | Fabaceae | |

| | *Taxon name* | Common name | Family | Comments |
|---|---|---|---|---|
| 90 | ***Desmodium rotundifolium*** | Prostrate tick-trefoil | Fabaceae | |
| 91 | ***Desmodium viridiflorum*** | Velvetleaf tick-trefoil | Fabaceae | |
| 92 | ***Dichanthelium acuminatum* var. *lindheimeri*** | Lindheimer's witch grass | Poaceae | |
| 93 | ***Dichanthelium boscii*** | Bosc's witchgrass | Poaceae | |
| 94 | ***Dichanthelium clandestinum*** | Deer tongue witchgrass | Poaceae | |
| 95 | ***Dichanthelium commutatum*** | Variable witchgrass | Poaceae | |
| 96 | ***Dichanthelium curtifolium*** | Shortleaf witchgrass | Poaceae | County record |
| 97 | ***Dichanthelium depauperatum*** | Starved witchgrass | Poaceae | |
| 98 | ***Dichanthelium dichotomum* var. *dichotomum*** | Forked witchgrass | Poaceae | |
| 99 | ***Dichanthelium laxiflorum*** | Lax-flowered witchgrass | Poaceae | |
| 100 | ***Dichanthelium microcarpon*** | Small-fruit witchgrass | Poaceae | |
| 101 | ***Dichanthelium scoparium*** | Velvet witchgrass | Poaceae | |
| 102 | ***Dichanthelium sphaerocarpon*** | Round-fruit witchgrass | Poaceae | |
| 103 | ***Dioscorea polystachya*** | Chinese yam | Dioscoreaceae | Not native, invasive, County record |
| 104 | ***Dioscorea villosa*** | Common wild yam | Dioscoreaceae | |
| 105 | ***Diospyros virginiana*** | American persimmon | Ebenaceae | |
| 106 | ***Diphasiastrum digitatum*** | Running ground pine | Lycopodiaceae | |
| 107 | ***Dulichium arundinaceum*** | Three-way sedge | Cyperaceae | |
| 108 | ***Elephantopus carolinianus*** | Leafy elephant's foot | Asteraceae | |
| 109 | ***Elephantopus tomentosus*** | Woolly elephant's foot | Asteraceae | |
| 110 | ***Elymus glabriflorus*** | Southeastern wild rye | Poaceae | |
| 111 | ***Endodeca serpentaria*** | Virginia snake root | Aristolochiaceae | |
| 112 | ***Eragrostis japonica*** | Pond lovegrass | Poaceae | Not native, County record |
| 113 | ***Erechtites hieraciifolius*** | American burnweed | Asteraceae | |
| 114 | ***Erianthus alopecuroides*** | Silver plume grass | Poaceae | |
| 115 | ***Erigeron annuus*** | Annual fleabane | Asteraceae | |

| | *Taxon name* | Common name | Family | Comments |
|---|---|---|---|---|
| 116 | ***Erigeron canadensis*** | Common horseweed | Asteraceae | |
| 117 | ***Erigeron philadelphicus*** | Philadelphia fleabane | Asteraceae | |
| 118 | ***Erigeron strigosus*** | Common eastern fleabane | Asteraceae | |
| 119 | ***Eryngium prostratum*** | Creeping eryngo | Apiaceae | |
| 120 | ***Euonymus americanus*** | American strawberry bush | Celastraceae | |
| 121 | ***Eupatorium album*** | White thoroughwort | Asteraceae | |
| 122 | ***Eupatorium capillifolium*** | Common dogfennel | Asteraceae | |
| 123 | ***Eupatorium hyssopifolium*** | Hyssop-leaf thoroughwort | Asteraceae | |
| 124 | ***Eupatorium rotundifolium*** | Common roundleaf thoroughwort | Asteraceae | |
| 125 | ***Eupatorium serotinum*** | Late-flowering thoroughwort | Asteraceae | |
| 126 | ***Euphorbia pubentissima*** | False flowering spurge | Euphorbiaceae | |
| 127 | ***Euthamia caroliniana*** | Slender goldentop | Asteraceae | County record |
| 128 | ***Eutrochium fistulosum*** | Hollow-stem joe pye weed | Asteraceae | |
| 129 | ***Eutrochium purpureum*** | Sweet-scented Joe Pye weed | Asteraceae | |
| 130 | ***Fagus grandifolia*** | American beech | Fagaceae | |
| 131 | ***Fallopia scandens*** | Climbing false buckwheat | Polygonaceae | County record |
| 132 | ***Festuca myuros*** | Rat tail fescue | Poaceae | Not native |
| 133 | ***Fraxinus biltmoreana*** | Biltmore ash | Oleaceae | County record |
| 134 | ***Fraxinus pennsylvanica*** | Green ash | Oleaceae | |
| 135 | ***Galactia regularis*** | Eastern milk pea | Fabaceae | |
| 136 | ***Galium uniflorum*** | One-flower bedstraw | Rubiaceae | |
| 137 | ***Gamochaeta chionesthes*** | White cloaked cudweed | Asteraceae | Not native |
| 138 | ***Gelsemium sempervirens*** | Carolina jessamine | Gelsemiaceae | |
| 139 | ***Gentiana saponaria*** | Soapwort gentian | Gentianaceae | S3 |
| 140 | ***Geranium carolinianum*** | Carolina geranium | Geraniaceae | |
| 141 | ***Gladiolus X gandavensis*** | Garden gladiolus | Iridaceae | |
| 142 | ***Gleditsia triacanthos*** | Honey locust | Fabaceae | |
| 143 | ***Goodyera pubescens*** | Downy rattlesnake plantain | Orchidaceae | |

| | *Taxon name* | **Common name** | **Family** | **Comments** |
|---|---|---|---|---|
| 144 | ***Gratiola neglecta*** | Clammy hedge hyssop | Plantaginaceae | County record |
| 145 | ***Helianthus angustifolius*** | Narrowleaf sunflower | Asteraceae | |
| 146 | ***Helianthus hirsutus*** | Hairy sunflower | Asteraceae | |
| 147 | ***Helianthus longifolius*** | Longleaf sunflower | Asteraceae | S1S2, G3 |
| 148 | ***Helianthus microcephalus*** | Small head sunflower | Asteraceae | |
| 149 | ***Helianthus smithii*** | Smith's sunflower | Asteraceae | S2, G2 |
| 150 | ***Hemerocallis fulva*** | Orange day lily | Hemerocallidaceae | Not native, invasive |
| 151 | ***Heuchera americana*** | American alumroot | Saxifragaceae | |
| 152 | ***Hexasepalum teres*** | Poor Joe | Rubiaceae | |
| 153 | ***Hexastylis arifolia*** | Little brown jug | Aristolochiaceae | |
| 154 | ***Hibiscus laevis*** | Smooth rose mallow | Malvaceae | County record |
| 155 | ***Hieracium venosum*** | Veiny hawkweed | Asteraceae | |
| 156 | ***Hieracium gronovii*** | Hairy hawkweed | Asteraceae | |
| 157 | ***Hordeum pusillum*** | Mouse barley | Poaceae | |
| 158 | ***Houstonia caerulea*** | Common bluet | Rubiaceae | |
| 159 | ***Houstonia purpurea*** | Summer bluet | Rubiaceae | |
| 160 | ***Houstonia pusilla*** | Tiny bluet | Rubiaceae | |
| 161 | ***Houstonia tenuifolia*** | Slender leaf bluet | Rubiaceae | |
| 162 | ***Hydrocotyle verticillata*** | Whorled pennywort | Araliaceae | |
| 163 | ***Hylodesmum nudiflorum*** | Naked flower tick-trefoil | Fabaceae | |
| 164 | ***Hypericum crux-andreae*** | St. Peter's wort | Hypericaceae | |
| 165 | ***Hypericum drummondii*** | Nits and lice | Hypericaceae | |
| 166 | ***Hypericum gentianoides*** | Orange grass | Hypericaceae | |
| 167 | ***Hypericum hypericoides*** | St. Andrew's cross | Hypericaceae | |
| 168 | ***Hypericum mutilum*** | Dwarf St. John's wort | Hypericaceae | |
| 169 | ***Hypericum punctatum*** | Spotted St. John's wort | Hypericaceae | |
| 170 | ***Hypericum virgatum*** | Sharpleaf St. John's wort | Hypericaceae | |
| 171 | ***Hypochaeris radicata*** | Hairy cat's ear | Asteraceae | Not native |
| 172 | ***Hypoxis hirsuta*** | Common star grass | Hypoxidaceae | |
| 173 | ***Ilex longipes*** | Georgia holly | Aquifoliaceae | County record |
| 174 | ***Ilex opaca*** | American holly | Aquifoliaceae | |
| 175 | ***Ilex verticillata*** | Black alder | Aquifoliaceae | |

| | *Taxon name* | **Common name** | **Family** | **Comments** |
|---|---|---|---|---|
| 176 | ***Impatiens capensis*** | Orange jewelweed | Balsaminaceae | |
| 177 | ***Ipomoea hederifolia*** | Scarlet creeper | Convolvulaceae | Not native, County record |
| 178 | ***Ipomoea pandurata*** | Man of the Earth | Convolvulaceae | |
| 179 | ***Iris cristata*** | Dwarf crested iris | Iridaceae | County record |
| 180 | ***Iris verna*** | Upland dwarf iris | Iridaceae | |
| 181 | ***Iris virginica*** | Blue flag iris | Iridaceae | |
| 182 | ***Juglans nigra*** | Black walnut | Juglandaceae | |
| 183 | ***Juncus acuminatus*** | Sharp fruit rush | Juncaceae | |
| 184 | ***Juncus biflorus*** | Bog rush | Juncaceae | County record |
| 185 | ***Juncus coriaceus*** | Leathery rush | Juncaceae | |
| 186 | ***Juncus effusus*** | Soft rush | Juncaceae | |
| 187 | ***Juncus tenuis*** | Path rush | Juncaceae | |
| 188 | ***Juniperus virginiana*** | Eastern redcedar | Cupressaceae | |
| 189 | ***Kellochloa verrucosa*** | Warty panic grass | Poaceae | |
| 190 | ***Krigia biflora*** | Two-flower dwarf dandelion | Asteraceae | |
| 191 | ***Krigia cespitosa*** | Common dwarf dandelion | Asteraceae | |
| 192 | ***Krigia virginica*** | Virginia dwarf dandelion | Asteraceae | |
| 193 | ***Lactuca canadensis*** | Wild lettuce | Asteraceae | |
| 194 | ***Lactuca floridana*** | Woodland lettuce | Asteraceae | |
| 195 | ***Lactuca serriola*** | Prickly lettuce | Asteraceae | Not native |
| 196 | ***Landoltia punctata*** | Dotted duckweed | Araceae | Not native |
| 197 | ***Lechea racemulosa*** | Oblong fruit pinweed | Cistaceae | |
| 198 | ***Leersia virginica*** | White cutgrass | Poaceae | County record |
| 199 | ***Lespedeza repens*** | Creeping bush clover | Fabaceae | |
| 200 | ***Lespedeza virginica*** | Slender bush clover | Fabaceae | |
| 201 | ***Liatris elegantula*** | Grassleaf blazing star | Asteraceae | |
| 202 | ***Liatris microcephala*** | Small head blazing star | Asteraceae | |
| 203 | ***Liatris spicata*** | Dense blazing star | Asteraceae | |
| 204 | ***Ligustrum japonicum*** | Japanese privet | Oleaceae | Not native, invasive, County record |
| 205 | ***Ligustrum sinense*** | Chinese privet | Oleaceae | Not native, invasive |
| 206 | ***Lilium michauxii*** | Carolina lily | Liliaceae | |
| 207 | ***Linaria canadensis*** | Common toadflax | Plantaginaceae | |

| | *Taxon name* | Common name | Family | Comments |
|---|---|---|---|---|
| 208 | ***Linum medium* var. *texanum*** | Texas yellow flax | Linaceae | |
| 209 | ***Linum striatum*** | Ridged yellow flax | Linaceae | |
| 210 | ***Liquidambar styraciflua*** | Sweetgum | Altingiaceae | |
| 211 | ***Liriodendron tulipifera*** | Tulip poplar | Magnoliaceae | |
| 212 | ***Liriope spicata*** | Creeping turf lily | Ruscaceae | |
| 213 | ***Listera australis*** | Southern twayblade | Orchidaceae | County record, S2, G4 |
| 214 | ***Lobelia inflata*** | Indian tobacco | Campanulaceae | |
| 215 | ***Lobelia puberula*** | Downy lobelia | Campanulaceae | |
| 216 | ***Lolium arundinaceum*** | Tall fescue | Poaceae | Not native, invasive |
| 217 | ***Lonicera japonica*** | Japanese honeysuckle | Caprifoliaceae | Not native, invasive |
| 218 | ***Lorinseria areolata*** | Netted chain fern | Blechnaceae | |
| 219 | ***Ludwigia alternifolia*** | Alternate-leaf seedbox | Onagraceae | |
| 220 | ***Ludwigia decurrens*** | Wingstem water primrose | Onagraceae | |
| 221 | ***Ludwigia palustris*** | Marsh seedbox | Onagraceae | |
| 222 | ***Luzula bulbosa*** | Bulbous wood rush | Juncaceae | |
| 223 | ***Lycopus rubellus*** | Stalked bugleweed | Lamiaceae | County record |
| 224 | ***Lycopus virginicus*** | Virginia bugleweed | Lamiaceae | |
| 225 | ***Lygodium japonicum*** | Japanese climbing fern | Lygodiaceae | Not native, invasive |
| 226 | ***Lysimachia ciliata*** | Fringed loosestrife | Primulaceae | |
| 227 | ***Macrothelypteris torresiana*** | Mariana maiden fern | Thelypteridaceae | Not native, County record |
| 228 | ***Magnolia grandiflora*** | Southern magnolia | Magnoliaceae | |
| 229 | ***Magnolia virginiana*** | Sweet bay magnolia | Magnoliaceae | |
| 230 | ***Maianthemum racemosum*** | Solomon's plume | Ruscaceae | |
| 231 | ***Malaxis unifolia*** | Green adder's mouth orchid | Orchidaceae | |
| 232 | ***Matelea carolinensis*** | Carolina milkvine | Apocynaceae | |
| 233 | ***Mazus pumilus*** | Japanese mazus | Mazaceae | Not native |
| 234 | ***Melothria pendula*** | Melonette | Cucurbitaceae | |
| 235 | ***Microstegium vimineum*** | Japanese stilt grass | Poaceae | Not native, invasive |
| 236 | ***Mikania scandens*** | Climbing hempvine | Asteraceae | |
| 237 | ***Mimosa microphylla*** | Littleleaf mimosa | Fabaceae | |
| 238 | ***Mitchella repens*** | Partridge berry | Rubiaceae | |

| | ***Taxon name*** | **Common name** | **Family** | **Comments** |
|---|---|---|---|---|
| 239 | ***Monarda fistulosa*** | Eastern bergamot | Lamiaceae | |
| 240 | ***Monotropa uniflora*** | Ghost plant | Ericaceae | |
| 241 | ***Morus rubra*** | Red mulberry | Moraceae | |
| 242 | ***Muhlenbergia schreberi*** | Nimblewill | Poaceae | |
| 243 | ***Muscadinia rotundifolia*** | Muscadine | Vitaceae | |
| 244 | ***Nabalus altissimus*** | Tall rattlesnake root | Asteraceae | |
| 245 | ***Nandina domestica*** | Heavenly bamboo | Berberidaceae | County record, not native, invasive |
| 246 | ***Narcissus pseudonarcissus*** | Common daffodil | Amaryllidaceae | Not native |
| 247 | ***Narcissus x odorus*** | Campernelle Jonquil | Amaryllidaceae | Not native |
| 248 | ***Nyssa sylvatica*** | Black gum | Nyssaceae | |
| 249 | ***Oenothera biennis*** | Common evening primrose | Onagraceae | |
| 250 | ***Oenothera fruticosa* var. *subglobosa*** | Flatrock sundrops | Onagraceae | |
| 251 | ***Oenothera linifolia*** | Threadleaf sundrops | Onagraceae | |
| 252 | ***Onoclea sensibilis*** | Sensitive fern | Onocleaceae | |
| 253 | ***Ophioglossum pycnostichum*** | Southern adder's tongue | Ophioglossaceae | County record |
| 254 | ***Opuntia cespitosa*** | Red-flowered prickly pear | Cactaceae | |
| 255 | ***Osmundastrum cinnamomeum*** | Cinnamon fern | Osmundaceae | |
| 256 | ***Oxalis dillenii*** | Gray green wood sorrel | Oxalidaceae | |
| 257 | ***Oxalis stricta*** | Common yellow wood sorrel | Oxalidaceae | |
| 258 | ***Oxalis violacea*** | Violet wood sorrel | Oxalidaceae | |
| 259 | ***Oxydendrum arboreum*** | Sourwood | Ericaceae | |
| 260 | ***Packera anonyma*** | Appalachian ragwort | Asteraceae | |
| 261 | ***Parathelypteris noveboracensis*** | New York fern | Thelypteridaceae | |
| 262 | ***Parthenocissus quinquefolia*** | Virginia creeper | Vitaceae | |
| 263 | ***Paspalum dilatatum*** | Golden crowngrass | Poaceae | Not native |
| 264 | ***Paspalum setaceum*** | Slender crowngrass | Poaceae | County record |
| 265 | ***Passiflora incarnata*** | Purple passion flower | Passifloraceae | |
| 266 | ***Passiflora lutea*** | Yellow passion flower | Passifloraceae | |
| 267 | ***Penstemon australis*** | Southern beardtongue | Plantaginaceae | |

| | *Taxon name* | Common name | Family | Comments |
|---|---|---|---|---|
| 268 | ***Perilla frutescens*** | Beefsteak plant | Lamiaceae | Not native, invasive, County record |
| 269 | ***Persicaria hydropiperoides*** | Swamp smartweed | Polygonaceae | |
| 270 | ***Persicaria longiseta*** | Long Bristle Smartweed | Polygonaceae | Not native, invasive |
| 271 | ***Persicaria setacea*** | Bog Smartweed | Polygonaceae | |
| 272 | ***Phacelia dubia*** | Small flower scorpion weed | Hydrophyllaceae | |
| 273 | ***Phacelia maculata*** | Spotted scorpion weed | Hydrophyllaceae | |
| 274 | ***Phegopteris hexagonoptera*** | Broad beech fern | Thelypteridaceae | |
| 275 | ***Philadelphus hirsutus*** | Hairy mock orange | Hydrangeaceae | County record |
| 276 | ***Photinia serratifolia*** | Taiwanese redtip | Rosaceae | Not native |
| 277 | ***Phyllanthus caroliniensis*** | Carolina leaf flower | Phyllanthaceae | |
| 278 | ***Physalis heterophylla*** | Clammy ground cherry | Solanaceae | |
| 279 | ***Phytolacca americana*** | American pokeweed | Phytolaccaceae | |
| 280 | ***Pinus palustris*** | Longleaf pine | Pinaceae | |
| 281 | ***Pinus taeda*** | Loblolly pine | Pinaceae | |
| 282 | ***Pinus virginiana*** | Virginia pine | Pinaceae | |
| 283 | ***Piptochaetium avenaceum*** | Eastern needlegrass | Poaceae | |
| 284 | ***Pityopsis aspera*** | Carolina silkgrass | Asteraceae | |
| 285 | ***Plantago aristata*** | Large bract plantain | Plantaginaceae | |
| 286 | ***Plantago heterophylla*** | Slender plantain | Plantaginaceae | County record |
| 287 | ***Plantago virginica*** | Virginia plantain | Plantaginaceae | |
| 288 | ***Platanthera clavellata*** | Small green wood orchid | Orchidaceae | |
| 289 | ***Platanthera cristata*** | Crested fringed orchid | Orchidaceae | |
| 290 | ***Pleopeltis michauxiana*** | Resurrection fern | Polypodiaceae | |
| 291 | ***Poa autumnalis*** | Autumn bluegrass | Poaceae | County record |
| 292 | ***Polygala ambigua*** | Loose milkwort | Polygalaceae | County record |
| 293 | ***Polygala incarnata*** | Procession flower | Polygalaceae | County record |
| 294 | ***Polygonatum biflorum*** | Solomon's seal | Ruscaceae | |
| 295 | ***Polypremum procumbens*** | Rustweed | Tetrachondraceae | |
| 296 | ***Polystichum acrostichoides*** | Christmas fern | Dryopteridaceae | |
| 297 | ***Pontederia cordata*** | Pickerel weed | Pontederiaceae | |
| 298 | ***Potentilla indica*** | Mock strawberry | Rosaceae | Not native, invasive |

| | *Taxon name* | Common name | Family | Comments |
|---|---|---|---|---|
| 299 | ***Potentilla simplex*** | Common cinquefoil | Rosaceae | |
| 300 | ***Prunella vulgaris* var. *lanceolata*** | American self heal | Lamiaceae | |
| 301 | ***Prunus serotina*** | Black cherry | Rosaceae | |
| 302 | ***Pseudognaphalium obtusifolium*** | Eastern rabbit tobacco | Asteraceae | |
| 303 | ***Ptilimnium capillaceum*** | Herb William | Apiaceae | |
| 304 | ***Pycnanthemum incanum*** | Southern hoary mountain mint | Lamiaceae | |
| 305 | ***Pycnanthemum loomisii*** | Loomis' mountain mint | Lamiaceae | |
| 306 | ***Pyrus calleryana*** | Bradford pear | Rosaceae | Not native, invasive |
| 307 | ***Quercus alba*** | Northern white oak | Fagaceae | |
| 308 | ***Quercus falcata*** | Southern red oak | Fagaceae | |
| 309 | ***Quercus marilandica*** | Black Jack oak | Fagaceae | |
| 310 | ***Quercus nigra*** | Water oak | Fagaceae | |
| 311 | ***Quercus nigra X stellata*** | Hybrid oak | Fagaceae | This oak needs more study |
| 312 | ***Quercus rubra*** | Northern red oak | Fagaceae | |
| 313 | ***Quercus stellata*** | Post oak | Fagaceae | |
| 314 | ***Ranunculus hispidus*** | Bristly buttercup | Ranunculaceae | County record |
| 315 | ***Ranunculus pusillus*** | Low buttercup | Ranunculaceae | |
| 316 | ***Ranunculus recurvatus*** | Hooked crowfoot | Ranunculaceae | |
| 317 | ***Rhexia mariana*** | Pale meadow beauty | Melastomataceae | |
| 318 | ***Rhexia virginica*** | Handsome Harry | Melastomataceae | |
| 319 | ***Rhododendron viscosum*** | Swamp azalea | Ericaceae | |
| 320 | ***Rhynchosia tomentosa*** | Twining snout bean | Fabaceae | |
| 321 | ***Rosa lucieae*** | Dorothy Perkins rose | Rosaceae | Not native |
| 322 | ***Rosa multiflora*** | Multiflora rose | Rosaceae | Not native, invasive, County record |
| 323 | ***Rubus cuneifolius*** | Sand blackberry | Rosaceae | County record |
| 324 | ***Rubus flagellaris*** | Whiplash dewberry | Rosaceae | |
| 325 | ***Rubus pensilvanicus*** | Southern Blackberry | Rosaceae | |
| 326 | ***Rubus trivialis*** | Southern dewberry | Rosaceae | County record |
| 327 | ***Ruellia caroliniensis*** | Hairy wild petunia | Acanthaceae | |

| | *Taxon name* | Common name | Family | Comments |
|---|---|---|---|---|
| 328 | ***Rumex acetosella*** | Sheep sorrel | Polygonaceae | Not native, invasive |
| 329 | ***Salvia lyrata*** | Lyre leaf sage | Lamiaceae | |
| 330 | ***Salvia urticifolia*** | Nettle leaf sage | Lamiaceae | |
| 331 | ***Sambucus canadensis*** | Common elderberry | Adoxaceae | |
| 332 | ***Sanicula canadensis*** | Canadian black snakeroot | Apiaceae | |
| 333 | ***Sanicula smallii*** | Small's black snakeroot | Apiaceae | |
| 334 | ***Sassafras albidum*** | Sassafras | Lauraceae | |
| 335 | ***Schizachyrium scoparium*** | Little bluestem | Poaceae | |
| 336 | ***Scirpus cyperinus*** | Wool grass | Cyperaceae | |
| 337 | ***Scleria oligantha*** | Little head nutrush | Cyperaceae | |
| 338 | ***Scutellaria elliptica*** | Hairy skullcap | Lamiaceae | |
| 339 | ***Scutellaria integrifolia*** | Helmet skullcap | Lamiaceae | |
| 340 | ***Scutellaria ovata*** | Heartleaf skullcap | Lamiaceae | |
| 341 | ***Silene stellata*** | Starry campion | Caryophyllaceae | |
| 342 | ***Silphium compositum*** | Composite leaf rosinweed | Asteraceae | |
| 343 | ***Sisyrinchium angustifolium*** | Narrowleaf blue eyed grass | Iridaceae | |
| 344 | ***Sisyrinchium rosulatum*** | Fairy stars | Iridaceae | Not native, County record |
| 345 | ***Smilax bona-nox*** | Saw greenbrier | Smilacaceae | |
| 346 | ***Smilax glauca*** | White leaf catbrier | Smilacaceae | |
| 347 | ***Smilax laurifolia*** | Blaspheme vine | Smilacaceae | |
| 348 | ***Smilax rotundifolia*** | Common greenbriar | Smilacaceae | |
| 349 | ***Solanum carolinense*** | Carolina horse nettle | Solanaceae | |
| 350 | ***Solanum nigrum*** | European black nightshade | Solanaceae | Not native, County record |
| 351 | ***Solidago altissima*** | Tall goldenrod | Asteraceae | |
| 352 | ***Solidago arguta*** | Sharpleaf goldenrod | Asteraceae | |
| 353 | ***Solidago caesia*** | Wreath goldenrod | Asteraceae | |
| 354 | ***Solidago erecta*** | Slender goldenrod | Asteraceae | |
| 355 | ***Solidago nemoralis*** | Eastern gray goldenrod | Asteraceae | |
| 356 | ***Solidago odora*** | Sweet goldenrod | Asteraceae | |
| 357 | ***Solidago patula*** | Swamp goldenrod | Asteraceae | County record |
| 358 | ***Solidago rugosa* var. *aspera*** | Wrinkle-leaf goldenrod | Asteraceae | |

| | *Taxon name* | Common name | Family | Comments |
|---|---|---|---|---|
| 359 | ***Sorghastrum nutans*** | Yellow indian grass | Poaceae | |
| 360 | ***Spiranthes lacera* var. *gracilis*** | Southern slender ladies' tresses | Orchidaceae | |
| 361 | ***Steinchisma hians*** | Gaping panic grass | Poaceae | |
| 362 | ***Stellaria media*** | Common chickweed | Caryophyllaceae | |
| 363 | ***Stylosanthes biflora*** | Sidebeak pencil flower | Fabaceae | |
| 364 | ***Symphyotrichum dumosum*** | White bushy aster | Asteraceae | |
| 365 | ***Symphyotrichum lateriflorum*** | Calico aster | Asteraceae | |
| 366 | ***Symphyotrichum patens*** | Late purple aster | Asteraceae | |
| 367 | ***Symplocos tinctoria*** | Horse sugar | Symplocaceae | |
| 368 | ***Tephrosia spicata*** | Spiked hoary pea | Fabaceae | |
| 369 | ***Tipularia discolor*** | Cranefly orchid | Orchidaceae | |
| 370 | ***Toxicodendron radicans*** | Eastern poison ivy | Anacardiaceae | |
| 371 | ***Tradescantia ohiensis*** | Ohio spiderwort | Commelinaceae | |
| 372 | ***Tragia urticifolia*** | Nettle-leaf noseburn | Euphorbiaceae | |
| 373 | ***Trichostema dichotomum*** | Common bluecurls | Lamiaceae | |
| 374 | ***Trichostema setaceum*** | Narrowleaf bluecurls | Lamiaceae | |
| 375 | ***Tridens flavus*** | Purpletop greasegrass | Poaceae | |
| 376 | ***Trifolium campestre*** | Low hop clover | Fabaceae | Not native |
| 377 | ***Triodanis perfoliata*** | Clasping leaf Venus's looking glass | Campanulaceae | |
| 378 | ***Typha latifolia*** | Cat tail | Typhaceae | |
| 379 | ***Uvularia perfoliata*** | Perfoliate bellwort | Colchicaceae | |
| 380 | ***Vaccinium arboreum*** | Sparkleberry | Ericaceae | |
| 381 | ***Vaccinium elliottii*** | Mayberry | Ericaceae | |
| 382 | ***Vaccinium pallidum*** | Early lowbush blueberry | Ericaceae | |
| 383 | ***Vaccinium stamineum*** | Deerberry | Ericaceae | |
| 384 | ***Valerianella radiata*** | Beaked cornsalad | Caprifoliaceae | |
| 385 | ***Verbascum thapsus*** | Woolly mullein | Scrophulariaceae | Not native, invasive |
| 386 | ***Verbena brasiliensis*** | Brazilian vervain | Verbenaceae | Not native |
| 387 | ***Verbesina alternifolia*** | Wingstem | Asteraceae | |
| 388 | ***Vernonia gigantea*** | Giant ironweed | Asteraceae | |
| 389 | ***Veronica peregrina*** | Common purslane speedwell | Plantaginaceae | Not native |

| | ***Taxon name*** | **Common name** | **Family** | **Comments** |
|---|---|---|---|---|
| 390 | ***Viburnum rufidulum*** | Rusty blackhaw | Adoxaceae | |
| 391 | ***Vinca major*** | Greater periwinkle | Apocynaceae | Not native, invasive |
| 392 | ***Viola affinis*** | Sand violet | Violaceae | |
| 393 | ***Viola bicolor*** | Field pansy | Violaceae | |
| 394 | ***Viola hirsutula*** | Southern woodland violet | Violaceae | County record |
| 395 | ***Viola sororia*** | Common blue violet | Violaceae | |
| 396 | ***Vitis cinerea*** | Downy grape | Vitaceae | County record |
| 397 | ***Wisteria sinensis*** | Chinese wisteria | Fabaceae | Not native, invasive |
| 398 | ***Xanthorhiza simplicissima*** | Yellowroot | Ranunculaceae | |
| 399 | ***Xyris jupicai*** | Richard's yellow eyed grass | Xyridaceae | |
| 400 | ***Youngia thunbergiana*** | Youngia | Asteraceae | County record |
| 401 | ***Yucca flaccida*** | Flaccid leaf yucca | Agavaceae | |

Document Content(s)

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April 12, 2021

***VIA ELECTRONIC FILING***

Project No. 2628-065
R.L. Harris Hydroelectric Project
Transmittal of the Draft Downstream Release Alternatives Phase 2 Report

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

Dear Secretary Bose,

Alabama Power Company (Alabama Power) is the Federal Energy Regulatory Commission (FERC or Commission) licensee for the R.L. Harris Hydroelectric Project (Harris Project) (FERC No. 2628-065). On April 12, 2019, FERC issued its Study Plan Determination[1] (SPD) for the Harris Project, approving Alabama Power's ten relicensing studies with FERC modifications. On May 13, 2019, Alabama Power filed Final Study Plans to incorporate FERC's modifications and posted the Final Study Plans on the Harris relicensing website at www.harrisrelicensing.com. In the Final Study Plans, Alabama Power proposed a schedule for each study that included filing a voluntary Progress Update in October 2019[2] and October 2020[3].

Due to timing of the development of the Phase 1 Report and the request to evaluate additional downstream alternatives, Alabama Power included impacts from all downstream release alternatives on existing operational parameters (reservoir levels, hydropower generation, flood control, navigation, and drought operations) in the Phase 2 analysis. While the SPD notes the effects analysis ongoing from June 2020 to November 2021, Alabama Power and Kleinschmidt have completed the analyses. While not specified in the SPD schedule for this study, Alabama Power is filing the Draft Downstream Release Alternatives Phase 2 Report (Draft Report) (Attachment 1). This filing also includes the stakeholder consultation for this study beginning April 2019 through March 2021 (Attachment 2). Stakeholders have until May 11, 2021 to submit their comments to Alabama Power on the Draft Report. Comments should be sent directly to harrisrelicensing@southernco.com.

[1] Accession Number 20190412-3000.
[2] Accession Number 20191030-5053.
[3] Accession Number 20201030-5215.

If there are any questions concerning this filing, please contact me at arsegars@southernco.com or 205-257-2251.

Sincerely,

Angie Anderegg
Harris Relicensing Project Manager

Attachment 1 – Draft Downstream Release Alternatives Phase 2 Report
Attachment 2 – Downstream Release Alternatives Consultation Record (April 2019 – March 2021)

cc: Harris Action Team 1 Stakeholder List

Alabama Power

600 North 18th Street
Hydro Services 16N-8180
Birmingham, AL 35203
205 257 2251 tel
arsegars@southernco.com

April 12, 2021

***VIA ELECTRONIC FILING***

Project No. 2628-065
R.L. Harris Hydroelectric Project
Transmittal of the Draft Operating Curve Change Feasibility Analysis Phase 2 Report

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

Dear Secretary Bose,

Alabama Power Company (Alabama Power) is the Federal Energy Regulatory Commission (FERC or Commission) licensee for the R.L. Harris Hydroelectric Project (Harris Project) (FERC No. 2628-065). On April 12, 2019, FERC issued its Study Plan Determination[1] (SPD) for the Harris Project, approving Alabama Power's ten relicensing studies with FERC modifications. On May 13, 2019, Alabama Power filed Final Study Plans to incorporate FERC's modifications and posted the Final Study Plans on the Harris relicensing website at www.harrisrelicensing.com. In the Final Study Plans, Alabama Power proposed a schedule for each study that included filing a voluntary Progress Update in October 2019[2] and October 2020[3].

Consistent with FERC's April 12, 2019 SPD, Alabama Power is filing the Draft Operating Curve Change Feasibility Analysis Phase 2 Report (Draft Report) (Attachment 1). This filing also includes the stakeholder consultation for this study beginning April 2019 through March 2021 (Attachment 2). Stakeholders have until May 11, 2021 to submit their comments to Alabama Power on the Draft Report. Comments should be sent directly to harrisrelicensing@southernco.com.

[1] Accession Number 20190412-3000.
[2] Accession Number 20191030-5053.
[3] Accession Number 20201030-5215.

If there are any questions concerning this filing, please contact me at arsegars@southernco.com or 205-257-2251.

Sincerely,

Angie Anderegg
Harris Relicensing Project Manager

Attachment 1 – Draft Operating Curve Change Feasibility Analysis Phase 2 Report
Attachment 2 – Operating Curve Change Feasibility Analysis Consultation Record (April 2019 – March 2021)

cc: Harris Action Team 1 Stakeholder List

Alabama Power

600 North 18th Street
Hydro Services 16N-8180
Birmingham, AL 35203
205 257 2251 tel
arsegars@southernco.com

April 12, 2021

***VIA ELECTRONIC FILING***

Project No. 2628-065
R.L. Harris Hydroelectric Project
Transmittal of the Final Erosion and Sedimentation Report

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

Dear Secretary Bose,

Alabama Power Company (Alabama Power) is the Federal Energy Regulatory Commission (FERC or Commission) licensee for the R.L. Harris Hydroelectric Project (Harris Project) (FERC No. 2628-065). On April 12, 2019, FERC issued its Study Plan Determination[1] (SPD) for the Harris Project, approving Alabama Power's ten relicensing studies with FERC modifications. On May 13, 2019, Alabama Power filed Final Study Plans to incorporate FERC's modifications and posted the Final Study Plans on the Harris relicensing website at www.harrisrelicensing.com.

Consistent with FERC's April 12, 2019 SPD, Alabama Power filed the Draft Erosion and Sedimentation Report (Draft Report) on April 10, 2020[2]. Stakeholders were to submit their comments to Alabama Power on the Draft Report by June 11, 2020. The Alabama Department of Conservation and Natural Resources, Alabama Rivers Alliance, FERC, and stakeholders submitted comments on the Draft Report. In addition, FERC and Alabama Rivers Alliance submitted comments and questions regarding the Draft Report prior to the Initial Study Report Meeting on April 28, 2020. These comments are included in the updated consultation record (April 2019 through March 2021) for this study (Attachment 1) and responses to comments on the Draft Report are provided in Attachment 2. The Final Erosion and Sedimentation Report is included as Attachment 3[3].

[1] Accession Number 20190412-3000.
[2] Accession Number 20200410-5091.
[3] Please note that the style and format of the Harris Project relicensing study reports has changed since submittal of the Draft Report; however, the content of the report has not changed except for the edits made based on stakeholder comments.

If there are any questions concerning this filing, please contact me at arsegars@southernco.com or 205-257-2251.

Sincerely,

Angie Anderegg
Harris Relicensing Project Manager

Attachment 1 – Erosion and Sedimentation Consultation Record (April 2019 – March 2021)
Attachment 2 – Comments and Responses on the Draft Erosion and Sedimentation Report
Attachment 3 – Final Erosion and Sedimentation Report

cc: Harris Action Team 2 Stakeholder List

600 North 18th Street
Hydro Services 16N-8180
Birmingham, AL 35203
205 257 2251 tel
arsegars@southernco.com

April 12, 2021

***VIA ELECTRONIC FILING***

Project No. 2628-065
R.L. Harris Hydroelectric Project
Transmittal of the Final Water Quality Report

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

Dear Secretary Bose,

Alabama Power Company (Alabama Power) is the Federal Energy Regulatory Commission (FERC or Commission) licensee for the R.L. Harris Hydroelectric Project (Harris Project) (FERC No. 2628-065). On April 12, 2019, FERC issued its Study Plan Determination[1] (SPD) for the Harris Project, approving Alabama Power's ten relicensing studies with FERC modifications. On May 13, 2019, Alabama Power filed Final Study Plans to incorporate FERC's modifications and posted the Final Study Plans on the Harris relicensing website at www.harrisrelicensing.com.

Consistent with FERC's April 12, 2019 SPD, Alabama Power filed the Draft Water Quality Report (Draft Report) on April 10, 2020[2]. Stakeholders were to submit their comments to Alabama Power on the Draft Report by June 11, 2020. The Alabama Department of Conservation and Natural Resources, Alabama Rivers Alliance, Environmental Protection Agency, Alabama Department of Environmental Management, and FERC submitted comments on the Draft Report. These comments are included in the updated consultation record (April 2019 through March 2021) for this study (Attachment 1) and responses to comments on the Draft Report are provided in Attachment 2. The Final Water Quality Report is included as Attachment 3[3].

[1] Accession Number 20190412-3000.
[2] Accession Number 20200410-5095.
[3] Please note that the style and format of the Harris Project relicensing study reports has changed since submittal of the Draft Report; however, the content of the report has not changed except for the edits made based on stakeholder comments and the results of 2020 monitoring data.

If there are any questions concerning this filing, please contact me at arsegars@southernco.com or 205-257-2251.

Sincerely,

Angie Anderegg
Harris Relicensing Project Manager

Attachment 1 – Water Quality Consultation Record (April 2019-March 2021)
Attachment 2 – Comments and Responses on the Draft Water Quality Report
Attachment 3 – Final Water Quality Report

cc: Harris Action Team 2 Stakeholder List

Alabama Power

600 North 18th Street
Hydro Services 16N-8180
Birmingham, AL 35203
205 257 2251 tel
arsegars@southernco.com

April 12, 2021

***VIA ELECTRONIC FILING***

Project No. 2628-065
R.L. Harris Hydroelectric Project
Transmittal of the Final Downstream Aquatic Habitat Report

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

Dear Secretary Bose,

Alabama Power Company (Alabama Power) is the Federal Energy Regulatory Commission (FERC or Commission) licensee for the R.L. Harris Hydroelectric Project (Harris Project) (FERC No. 2628-065). On April 12, 2019, FERC issued its Study Plan Determination[1] (SPD) for the Harris Project, approving Alabama Power's ten relicensing studies with FERC modifications. On May 13, 2019, Alabama Power filed Final Study Plans to incorporate FERC's modifications and posted the Final Study Plans on the Harris relicensing website at www.harrisrelicensing.com.

Consistent with FERC's April 12, 2019 SPD, Alabama Power filed the Draft Downstream Aquatic Habitat Report (Draft Report) on June 30, 2020[2]. Stakeholders were to submit their comments to Alabama Power on the Draft Report by August 1, 2020. The Alabama Department of Conservation and Natural Resources, Alabama Rivers Alliance, stakeholders, and FERC submitted comments on the Draft Report. In addition, Alabama Rivers Alliance and FERC submitted comments and questions regarding the Draft Report prior to the Initial Study Report Meeting on April 28, 2020. These comments are included in the updated consultation record (April 2019 through March 2021) for this study (Attachment 1) and responses to comments on the Draft Report are provided in Attachment 2. The Final Downstream Aquatic Habitat Report is included as Attachment 3[3].

[1] Accession Number 20190412-3000.
[2] Accession Number 20200630-5200.
[3] Please note that the style and format of the Harris Project relicensing study reports has changed since submittal of the Draft Report; however, the content of the report has not changed except for the edits made based on stakeholder comments.

If there are any questions concerning this filing, please contact me at arsegars@southernco.com or 205-257-2251.

Sincerely,

Angie Anderegg
Harris Relicensing Project Manager

Attachment 1 – Downstream Aquatic Habitat Consultation Record (April 2019 – March 2021)
Attachment 2 – Comments and Responses on the Draft Downstream Aquatic Habitat Report
Attachment 3 – Final Downstream Aquatic Habitat Report

cc: Harris Action Team 3 Stakeholder List

**From:** Anderegg, Angela Segars
**Sent:** Tuesday, April 13, 2021 8:05 AM
**To:** Wills, Ken
**Cc:** Mills, Tina L.; Kelly Schaeffer
**Subject:** Quick call

Hi Ken,

As you know, we filed the results of the additional botanical survey work at Flat Rock with FERC yesterday (www.harrisrelicensing.com in the HAT 4 folder). Would you have 30 minutes one day next week for a short call with us? If so, just let me know what days you're available and I can send out Teams meeting info.

I hope all is well with you. Thanks!

**Angie Anderegg**
Hydro Services
(205)257-2251
arsegars@southernco.com

# HAT 2 - Final Reports

## APC Harris Relicensing <g2apchr@southernco.com>

Fri 4/16/2021 1:58 PM

**To:** APC Harris Relicensing <harrisrelicensing@southernco.com>
**Bcc:** damon.abernethy@dcnr.alabama.gov <damon.abernethy@dcnr.alabama.gov>; nathan.aycock@dcnr.alabama.gov <nathan.aycock@dcnr.alabama.gov>; Steve Bryant - Alabama Department of Conservation and Natural Resources <Steve Bryant - Alabama Department of Conservation and Natural Resources>; todd.fobian@dcnr.alabama.gov <todd.fobian@dcnr.alabama.gov>; chris.greene@dcnr.alabama.gov <chris.greene@dcnr.alabama.gov>; keith.henderson@dcnr.alabama.gov <keith.henderson@dcnr.alabama.gov>; mike.holley@dcnr.alabama.gov <mike.holley@dcnr.alabama.gov>; matthew.marshall@dcnr.alabama.gov <matthew.marshall@dcnr.alabama.gov>; amy.silvano@dcnr.alabama.gov <amy.silvano@dcnr.alabama.gov>; jhaslbauer@adem.alabama.gov <jhaslbauer@adem.alabama.gov>; cljohnson@adem.alabama.gov <cljohnson@adem.alabama.gov>; mlen@adem.alabama.gov <mlen@adem.alabama.gov>; fal@adem.alabama.gov <fal@adem.alabama.gov>; djmoore@adem.alabama.gov <djmoore@adem.alabama.gov>; arsegars@southernco.com <arsegars@southernco.com>; dkanders@southernco.com <dkanders@southernco.com>; wtanders@southernco.com <wtanders@southernco.com>; jcarlee@southernco.com <jcarlee@southernco.com>; kechandl@southernco.com <kechandl@southernco.com>; mcoker@southernco.com <mcoker@southernco.com>; afleming@southernco.com <afleming@southernco.com>; cggoodma@southernco.com <cggoodma@southernco.com>; gfhorn@southernco.com <gfhorn@southernco.com>; ammcvica@southernco.com <ammcvica@southernco.com>; tlmills@southernco.com <tlmills@southernco.com>; mhunter@alabamarivers.org <mhunter@alabamarivers.org>; clowry@alabamarivers.org <clowry@alabamarivers.org>; jwest@alabamarivers.org <jwest@alabamarivers.org>; gjobsis@americanrivers.org <gjobsis@americanrivers.org>; kmo0025@auburn.edu <kmo0025@auburn.edu>; irwiner@auburn.edu <irwiner@auburn.edu>; reuteem@auburn.edu <reuteem@auburn.edu>; lgallen@balch.com <lgallen@balch.com>; jhancock@balch.com <jhancock@balch.com>; allan.creamer@ferc.gov <allan.creamer@ferc.gov>; rachel.mcnamara@ferc.gov <rachel.mcnamara@ferc.gov>; sarah.salazar@ferc.gov <sarah.salazar@ferc.gov>; monte.terhaar@ferc.gov <monte.terhaar@ferc.gov>; colin.dinken@kleinschmidtgroup.com <colin.dinken@kleinschmidtgroup.com>; jason.moak@kleinschmidtgroup.com <jason.moak@kleinschmidtgroup.com>; kelly.schaeffer@kleinschmidtgroup.com <kelly.schaeffer@kleinschmidtgroup.com>; sandra.wash@kleinschmidtgroup.com <sandra.wash@kleinschmidtgroup.com>; jessecunningham@msn.com <jessecunningham@msn.com>; sforehand@russelllands.com <sforehand@russelllands.com>; 1942jthompson420@gmail.com <1942jthompson420@gmail.com>; nancyburnes@centurylink.net <nancyburnes@centurylink.net>; lgarland68@aol.com <lgarland68@aol.com>; rbmorris333@gmail.com <rbmorris333@gmail.com>; mitchell.reid@tnc.org <mitchell.reid@tnc.org>; richardburnes3@gmail.com <richardburnes3@gmail.com>; eilandfarm@aol.com <eilandfarm@aol.com>; eveham75@gmail.com <eveham75@gmail.com>; wmcampbell218@gmail.com <wmcampbell218@gmail.com>; jec22641@aol.com <jec22641@aol.com>; robinwaldrep@yahoo.com <robinwaldrep@yahoo.com>; chuckdenman@hotmail.com <chuckdenman@hotmail.com>; carolbuggknight@hotmail.com <carolbuggknight@hotmail.com>; donnamat@aol.com <donnamat@aol.com>; harry.merrill47@gmail.com <harry.merrill47@gmail.com>; mhpwedowee@gmail.com <mhpwedowee@gmail.com>; midwaytreasures@bellsouth.net <midwaytreasures@bellsouth.net>; inspector_003@yahoo.com <inspector_003@yahoo.com>; clark.maria@epa.gov <clark.maria@epa.gov>; decker.chris@epa.gov <decker.chris@epa.gov>; gordon.lisa-perras@epa.gov <gordon.lisa-perras@epa.gov>; holliman.daniel@epa.gov <holliman.daniel@epa.gov>; mayo.lydia@epa.gov <mayo.lydia@epa.gov>; jeff_duncan@nps.gov <jeff_duncan@nps.gov>

HAT 2,

The Final Water Quality Report and Final Erosion and Sedimentation Report were filed with FERC this past Monday, April 12, 2021. These reports can be found on the Harris Relicensing website in the HAT 2 folder. They can also be found on FERC's website (http://www.ferc.gov) by going to the "elibrary" link and entering docket number P-2628.

Thanks,

**Angie Anderegg**
Hydro Services
(205)257-2251
arsegars@southernco.com

# HAT 3 - Final Reports

## APC Harris Relicensing <g2apchr@southernco.com>

Fri 4/16/2021 2:01 PM

**To:** APC Harris Relicensing <harrisrelicensing@southernco.com>
**Bcc:** amy.silvano@dcnr.alabama.gov <amy.silvano@dcnr.alabama.gov>; chris.greene@dcnr.alabama.gov <chris.greene@dcnr.alabama.gov>; damon.abernethy@dcnr.alabama.gov <damon.abernethy@dcnr.alabama.gov>; evan.lawrence@dcnr.alabama.gov <evan.lawrence@dcnr.alabama.gov>; keith.henderson@dcnr.alabama.gov <keith.henderson@dcnr.alabama.gov>; mike.holley@dcnr.alabama.gov <mike.holley@dcnr.alabama.gov>; steve.bryant@dcnr.alabama.gov <steve.bryant@dcnr.alabama.gov>; matthew.marshall@dcnr.alabama.gov <matthew.marshall@dcnr.alabama.gov>; todd.fobian@dcnr.alabama.gov <todd.fobian@dcnr.alabama.gov>; nathan.aycock@dcnr.alabama.gov <nathan.aycock@dcnr.alabama.gov>; ken.wills@jcdh.org <ken.wills@jcdh.org>; arsegars@southernco.com <arsegars@southernco.com>; ammcvica@southernco.com <ammcvica@southernco.com>; dkanders@southernco.com <dkanders@southernco.com>; jcarlee@southernco.com <jcarlee@southernco.com>; jefbaker@southernco.com <jefbaker@southernco.com>; kechandl@southernco.com <kechandl@southernco.com>; tlmills@southernco.com <tlmills@southernco.com>; afleming@southernco.com <afleming@southernco.com>; cggoodma@southernco.com <cggoodma@southernco.com>; clowry@alabamarivers.org <clowry@alabamarivers.org>; mhunter@alabamarivers.org <mhunter@alabamarivers.org>; jwest@alabamarivers.org <jwest@alabamarivers.org>; gjobsis@americanrivers.org <gjobsis@americanrivers.org>; devridr@auburn.edu <devridr@auburn.edu>; irwiner@auburn.edu <irwiner@auburn.edu>; kmo0025@auburn.edu <kmo0025@auburn.edu>; wrighr2@aces.edu <wrighr2@aces.edu>; jhancock@balch.com <jhancock@balch.com>; lgallen@balch.com <lgallen@balch.com>; chris@alaudubon.org <chris@alaudubon.org>; sarah.salazar@ferc.gov <sarah.salazar@ferc.gov>; allan.creamer@ferc.gov <allan.creamer@ferc.gov>; rachel.mcnamara@ferc.gov <rachel.mcnamara@ferc.gov>; monte.terhaar@ferc.gov <monte.terhaar@ferc.gov>; colin.dinken@kleinschmidtgroup.com <colin.dinken@kleinschmidtgroup.com>; jason.moak@kleinschmidtgroup.com <jason.moak@kleinschmidtgroup.com>; kelly.schaeffer@kleinschmidtgroup.com <kelly.schaeffer@kleinschmidtgroup.com>; sandra.wash@kleinschmidtgroup.com <sandra.wash@kleinschmidtgroup.com>; sforehand@russelllands.com <sforehand@russelllands.com>; lgarland68@aol.com <lgarland68@aol.com>; rbmorris222@gmail.com <rbmorris222@gmail.com>; pace.wilber@noaa.gov <pace.wilber@noaa.gov>; mitchell.reid@tnc.org <mitchell.reid@tnc.org>; donnamat@aol.com <donnamat@aol.com>; trayjim@bellsouth.net <trayjim@bellsouth.net>; mhpwedowee@gmail.com <mhpwedowee@gmail.com>; straylor426@bellsouth.net <straylor426@bellsouth.net>; triciastearns@gmail.com <triciastearns@gmail.com>; wmcampbell218@gmail.com <wmcampbell218@gmail.com>; robinwaldrep@yahoo.com <robinwaldrep@yahoo.com>; holliman.daniel@epa.gov <holliman.daniel@epa.gov>; decker.chris@epa.gov <decker.chris@epa.gov>; mayo.lydia@epa.gov <mayo.lydia@epa.gov>; bill_pearson@fws.gov <bill_pearson@fws.gov>; evan_collins@fws.gov <evan_collins@fws.gov>; jeff_powell@fws.gov <jeff_powell@fws.gov>; jennifer_grunewald@fws.gov <jennifer_grunewald@fws.gov>; erin_padgett@fws.gov <erin_padgett@fws.gov>; jeff_duncan@nps.gov <jeff_duncan@nps.gov>

HAT 3,

The Final Downstream Aquatic Habitat Report and Final Aquatic Resources Report were filed with FERC this past Monday, April 12, 2021. These reports can be found on the Harris Relicensing website in the HAT 3 folder. They can also be found on FERC's website (http://www.ferc.gov) by going to the "elibrary" link and entering docket number P-2628.

Thanks,

**Angie Anderegg**
Hydro Services
(205)257-2251
arsegars@southernco.com

# HAT 4 - Botanical Inventory Report

## APC Harris Relicensing <g2apchr@southernco.com>

Fri 4/16/2021 2:06 PM

**To:** APC Harris Relicensing <harrisrelicensing@southernco.com>
**Bcc:** damon.abernethy@dcnr.alabama.gov <damon.abernethy@dcnr.alabama.gov>; nathan.aycock@dcnr.alabama.gov <nathan.aycock@dcnr.alabama.gov>; steve.bryant@dcnr.alabama.gov <steve.bryant@dcnr.alabama.gov>; todd.fobian@dcnr.alabama.gov <todd.fobian@dcnr.alabama.gov>; keith.gauldin@dcnr.alabama.gov <keith.gauldin@dcnr.alabama.gov>; chris.greene@dcnr.alabama.gov <chris.greene@dcnr.alabama.gov>; keith.henderson@dcnr.alabama.gov <keith.henderson@dcnr.alabama.gov>; mike.holley@dcnr.alabama.gov <mike.holley@dcnr.alabama.gov>; evan.lawrence@dcnr.alabama.gov <evan.lawrence@dcnr.alabama.gov>; matthew.marshall@dcnr.alabama.gov <matthew.marshall@dcnr.alabama.gov>; amy.silvano@dcnr.alabama.gov <amy.silvano@dcnr.alabama.gov>; chris.smith@dcnr.alabama.gov <chris.smith@dcnr.alabama.gov>; ken.wills@jcdh.org <ken.wills@jcdh.org>; matt.brooks@alea.gov <matt.brooks@alea.gov>; coty.brown@alea.gov <coty.brown@alea.gov>; arsegars@southernco.com <arsegars@southernco.com>; dkanders@southernco.com <dkanders@southernco.com>; jefbaker@southernco.com <jefbaker@southernco.com>; jabeason@southernco.com <jabeason@southernco.com>; jcarlee@southernco.com <jcarlee@southernco.com>; kechandl@southernco.com <kechandl@southernco.com>; afleming@southernco.com <afleming@southernco.com>; cggoodma@southernco.com <cggoodma@southernco.com>; ammcvica@southernco.com <ammcvica@southernco.com>; tlmills@southernco.com <tlmills@southernco.com>; abnoel@southernco.com <abnoel@southernco.com>; btseale@southernco.com <btseale@southernco.com>; scsmith@southernco.com <scsmith@southernco.com>; twstjohn@southernco.com <twstjohn@southernco.com>; mhunter@alabamarivers.org <mhunter@alabamarivers.org>; clowry@alabamarivers.org <clowry@alabamarivers.org>; jwest@alabamarivers.org <jwest@alabamarivers.org>; gjobsis@americanrivers.org <gjobsis@americanrivers.org>; kmo0025@auburn.edu <kmo0025@auburn.edu>; irwiner@auburn.edu <irwiner@auburn.edu>; chris@alaudubon.org <chris@alaudubon.org>; allan.creamer@ferc.gov <allan.creamer@ferc.gov>; rachel.mcnamara@ferc.gov <rachel.mcnamara@ferc.gov>; sarah.salazar@ferc.gov <sarah.salazar@ferc.gov>; monte.terhaar@ferc.gov <monte.terhaar@ferc.gov>; gene@wedoweelakehomes.com <gene@wedoweelakehomes.com>; colin.dinken@kleinschmidtgroup.com <colin.dinken@kleinschmidtgroup.com>; kelly.schaeffer@kleinschmidtgroup.com <kelly.schaeffer@kleinschmidtgroup.com>; sandra.wash@kleinschmidtgroup.com <sandra.wash@kleinschmidtgroup.com>; sforehand@russelllands.com <sforehand@russelllands.com>; lgarland68@aol.com <lgarland68@aol.com>; johndiane@sbcglobal.net <johndiane@sbcglobal.net>; bradandsue795@gmail.com <bradandsue795@gmail.com>; rbmorris222@gmail.com <rbmorris222@gmail.com>; mitchell.reid@tnc.org <mitchell.reid@tnc.org>; snelson@nelsonandco.com <snelson@nelsonandco.com>; mprandolphwater@gmail.com <mprandolphwater@gmail.com>; wmcampbell218@gmail.com <wmcampbell218@gmail.com>; robinwaldrep@yahoo.com <robinwaldrep@yahoo.com>; bruce@bruceknapp.com <bruce@bruceknapp.com>; donnamat@aol.com <donnamat@aol.com>; harry.merrill47@gmail.com <harry.merrill47@gmail.com>; mhpwedowee@gmail.com <mhpwedowee@gmail.com>; midwaytreasures@bellsouth.net <midwaytreasures@bellsouth.net>; inspector_003@yahoo.com <inspector_003@yahoo.com>; gardenergirl04@yahoo.com <gardenergirl04@yahoo.com>; paul.trudine@gmail.com <paul.trudine@gmail.com>; 1942jthompson420@gmail.com <1942jthompson420@gmail.com>; amccartn@blm.gov <amccartn@blm.gov>; j35sullivan@blm.gov <j35sullivan@blm.gov>; mayo.lydia@epa.gov <mayo.lydia@epa.gov>; evan_collins@fws.gov <evan_collins@fws.gov>; jennifer_grunewald@fws.gov <jennifer_grunewald@fws.gov>; erin_padgett@fws.gov <erin_padgett@fws.gov>; jeff_powell@fws.gov <jeff_powell@fws.gov>

HAT 4,

A Botanical Inventory Report at Flat Rock Park was filed with FERC this past Monday, April 12, 2021. This report can be found on the Harris Relicensing website in the HAT 4 folder. It can also be found on FERC's website (http://www.ferc.gov) by going to the "elibrary" link and entering docket number P-2628.

Thanks,

**Angie Anderegg**
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# HAT 1 - April 1 Meeting Summary

## APC Harris Relicensing <g2apchr@southernco.com>

Fri 4/16/2021 4:22 PM

**To:** APC Harris Relicensing <harrisrelicensing@southernco.com>
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drheinzen@charter.net <drheinzen@charter.net>; sforehand@russelllands.com <sforehand@russelllands.com>; 1942jthompson420@gmail.com <1942jthompson420@gmail.com>; nancyburnes@centurylink.net <nancyburnes@centurylink.net>; sandnfrench@gmail.com <sandnfrench@gmail.com>; lgarland68@aol.com <lgarland68@aol.com>; rbmorris222@gmail.com <rbmorris222@gmail.com>; irapar@centurytel.net <irapar@centurytel.net>; mitchell.reid@tnc.org <mitchell.reid@tnc.org>; richardburnes3@gmail.com <richardburnes3@gmail.com>; eilandfarm@aol.com <eilandfarm@aol.com>; athall@fujifilm.com <athall@fujifilm.com>; ebt.drt@numail.org <ebt.drt@numail.org>; georgettraylor@centurylink.net <georgettraylor@centurylink.net>; beckyrainwater1@yahoo.com <beckyrainwater1@yahoo.com>; dbronson@charter.net <dbronson@charter.net>; wmcampbell218@gmail.com <wmcampbell218@gmail.com>; jec22641@aol.com <jec22641@aol.com>; robinwaldrep@yahoo.com <robinwaldrep@yahoo.com>; sonjahollomon@gmail.com <sonjahollomon@gmail.com>; butchjackson60@gmail.com <butchjackson60@gmail.com>; 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jennifer_grunewald@fws.gov <jennifer_grunewald@fws.gov>; erin_padgett@fws.gov <erin_padgett@fws.gov>; jeff_powell@fws.gov <jeff_powell@fws.gov>; jeff_duncan@nps.gov <jeff_duncan@nps.gov>

HAT 1,

The meeting summary and presentation from our April 1 meeting can be found on the Harris relicensing website in the HAT 1 - Project Operations folder.

Thanks,

**Angie Anderegg**
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**Meeting Summary**
**Harris Relicensing Harris Action Team (HAT) 1 Meeting**
**April 1, 2021**
**1:00 pm – 3:00 pm**
**Microsoft Teams Meeting**

**Participants:**

Angie Anderegg – Alabama Power Company (Alabama Power)
Dave Anderson – Alabama Power
Clyde Avery – Lake Harris Property Owner
Jeff Baker – Alabama Power
Jason Carlee – Alabama Power
Keith Chandler – Alabama Power
Allan Creamer – Federal Energy Regulatory Commission (FERC)
Jim Crew – Alabama Power
Colin Dinken – Kleinschmidt Associates (Kleinschmidt)
Scott Fant – Alabama Power
Amanda Fleming – Alabama Power
Todd Fobian – Alabama Department of Conservation and Natural Resources (ADCNR)
Chris Goodman – Alabama Power
Stacey Graham – Alabama Power
Jim Hancock – Balch and Bingham
Jennifer Haslbauer - Alabama Department of Environmental Management (ADEM)
James Hathorn – U.S. Army Corps of Engineers (USACE)
Martha Hunter – Alabama Rivers Alliance
Elise Irwin – U.S. Geological Survey (USGS)
Kelly Kirven – Kleinschmidt
Michael Len – ADEM
Fred Leslie – ADEM
Ashley Lockwood – ADEM
Donna Matthews – Downstream Property Owner
Tina Mills – Alabama Power
Jason Moak – Kleinschmidt
David Moore –ADEM
Barry Morris – Lake Wedowee Property Owners Association (LWPOA)
Kevin Nebiolo – Kleinschmidt
Jessica Nissenbaum – Alabama Power
Kenneth Odom – Alabama Power
Erin Padgett – USFWS
Alan Peeples – Alabama Power
Jennifer Rasberry – Alabama Power
Sarah Salazar – FERC
Kelly Schaeffer – Kleinschmidt
Sheila Smith – Alabama Power
Thomas St. John – Alabama Power
Jimmy Traylor – Downstream Property Owner
Sandra Wash – Kleinschmidt
Jack West – Alabama Rivers Alliance

**Meeting Summary:**

Angie Anderegg (Alabama Power) opened the meeting with a safety moment and stated the meeting purpose: to present a summary of the results of the Phase 2 Operating Curve Change Feasibility Analysis study by resource area. Angie noted the Draft *Operating Curve Change Feasibility Analysis Phase 2 Study Report* (Draft Report) will be filed April 12, 2021 with a stakeholder comment period until May 11, 2021.

Dave Anderson (Alabama Power) provided a summary of the Harris operating curve, the four operating curve alternatives analyzed, and the downstream structures analysis. Sarah Salazar (Federal Energy Regulatory Commission (FERC)) asked if it would be useful to add a point display on top of the graph (slide 16) to show how many structures are impacted under the different operating curve alternatives. Kevin Nebiolo (Kleinschmidt Associates (Kleinschmidt)) noted that this graph is a particular cross section near Wadley and the point display would only show those structures near this particular cross section. Sarah asked if there was another way to show the impacts of the operating curve alternatives on specific structures. Dave replied that the Draft Report does not show which polygons associated with downstream flooding the structures are located in, but the structures identified are presented in a table in the Draft Report. Dave and Angie noted additional information is in the report that is not included in the presentation and recommended stakeholders comment on the Draft Report if additional information is needed. Sarah noted that polygons associated with downstream flooding may be helpful and answer questions regarding flood duration and particular structures. Allan Creamer (FERC) asked if the Draft Report will contain maps of the structures and the flooding limits associated with each of these operating curve alternatives. Dave replied that the Phase 1 Report contained maps of the flooded areas with the operating curve alternatives color-coded. Dave added that the Draft Report contains one map that shows all of the identified structures (over 1,000). Allan agreed with Sarah that this information would be useful in the final report. Sarah requested Alabama Power to file the GIS data related to the structures with the final report. Kelly Schaeffer (Kleinschmidt) noted the data could be filed, at the latest, with the Final License Application (FLA).

Jason Moak (Kleinschmidt) presented results of the water quality and use analysis. Sarah asked for confirmation that all potential operating curves would not affect the ability to release any of the downstream flows. Angie confirmed but noted that some of the downstream release alternatives impact the lake level elevation. Allan asked if Alabama Power is prioritizing the downstream flows. Dave explained that the HEC-ResSim model looked at lake level elevation and downstream releases separately. Stacey Graham (Alabama Power) added that at this point in the analysis, the combinations of operating curve scenarios and downstream release alternatives have not been modeled together.

Jason M. presented the results of the erosion and sedimentation analysis. Jason M. explained that increased potential for scour may occur downstream with higher operating curve elevations due to decreased storage in the reservoir and associated increased velocities downstream. Sarah asked if certain downstream release alternatives, in combination with the operating curve alternatives, could potentially result in less scour. Jason M. noted that the generalized statement regarding increased potential for scour downstream that is associated with higher operating curve elevations is related to extreme events. Jason M. agreed that a minimum flow may not expose the channel to as much fluctuations and could reduce scour downstream. Sarah asked if the effects related to scour would attenuate downstream similar to flows. Jason M. stated the attenuation would likely be further than seven miles downstream with storm events.

Martha Hunter (Alabama Rivers Alliance (ARA)) requested clarification on the use of "submerged" and "inundation", specifically, if that is considered flooding or still within the riverbanks. Jason M. noted that many of the sedimentation areas on the upper portion of the lake are underwater at full pool, and depending on the lake elevation, are currently exposed during the winter drawdown and may be partially flushed by spring rains. Jason noted that a higher winter pool would not allow these areas to be flushed. Martha clarified her question, if the use of "submerged" and "inundation" downstream, specifically in terms of wetted habitat, is considered flooding or within the riverbanks. Jason M. confirmed the use of those terms related to wetted habitat is referencing water in the river channel. Barry Morris (LWPOA) asked for clarification on the Sedimentation Area Change table (slide 20). Dave clarified that numbers in the table represent acreage of sediment areas that are inundated (not exposed) and noted that inundation would allow for vegetation to grow and decrease flushing events. Barry asked if any studies cover deposition of the sediments under the various operating curve changes and how long it would take areas of sediment to be seen above the water. Barry stated that short-term benefits could be experienced with an increase in the operating curve but could potentially cause more mud where the creeks and rivers flow into the lake. Jason M. noted that it was not analyzed but subjectively, the lake has likely reached an equilibrium and increasing the winter operating curve would likely increase sedimentation until a new equilibrium, or new normal, was reached.

Jason M. presented the results on the wildlife and terrestrial species and threatened and endangered (T&E) species analysis. Sarah asked if there were any state-listed species. Jeff Baker (Alabama Power) stated that he checked during the break and did not notice any state-protected species in the Project Area according to the Natural Heritage Database[1]. Sarah asked specifically about the rare plants found at Flat Rock Park (Flat Rock). Jeff noted that he only checked animals but did not know of any state-protected plant species at Flat Rock. Sarah asked how the operating curve alternatives may affect other rare plants documented at Flat Rock. Jason M. noted that due to its elevation, Flat Rock is not impacted by any of the operating curve alternatives. Allan asked if the zone of influence increased upriver with each operating curve increase. Jason M. confirmed. Allan asked how close the zone of influence encroaches on Finelined Pocketbook's (*Hamiota altilis*) (mussel) critical habitat under the four-foot operating curve increase. Jason M. explained that the river downstream of the critical habitat (downstream of the Highway 431 bridge) is still flowing under normal, summer pool conditions. Jason M. stated that Alabama Power could provide a map of the elevation contours during summer pool in relation to the critical habitat boundary. Allan noted that would be helpful. Sarah asked if any sedimentation areas could affect the flow from the Finelined Pocketbook's critical habitat to the reservoir. Jason M. replied no.

Jason M. presented the terrestrial wetlands analysis noting the majority of the wetlands exist in the shallower areas of the reservoir (sloughs, creeks, etc.) due to the terrain surrounding the reservoir. Sarah asked if an increase in the operating curve would potentially inundate mostly upland habitat. Jason M. explained that areas that are typically dewatered for five or six months would be inundated and allow vegetation to persist in littoral areas.

Colin Dinken (Kleinschmidt) presented the results of the recreation analysis. Barry asked what criteria were used to determine if a structure was usable, specifically on floating docks. Colin

[1] The Lipstick Darter (*Etheostoma chuckwachatte*) is a state-protected fish species occurring downstream of Harris Dam. The Finelined Pocketbook (*Hamiota altilis*) is a federal and state-protected mussel species with critical habitat located in the Tallapoosa River upstream of Harris Reservoir.

replied that criteria varied depending on recreation structure type and floats were considered usable if 2.5 feet of water existed on the back end of the structure. Sarah asked if the downstream results of the operating curve change analysis (slide 32) took in account both the downstream release and the operating curve alternatives. Colin confirmed the analysis only considered the operating curve alternatives. Sarah asked when both of those scenarios will be analyzed together. Kelly stated that Alabama Power did not propose to do so in the study plans and focused on the discrete impacts of the downstream release alternatives and the operating curve change alternatives on Project resources. Kelly added that Alabama Power's relicensing proposal will be presented in the Preliminary Licensing Proposal (PLP), but Alabama Power does not have plans to model the downstream release alternatives in combination with the operating curve alternatives. Sarah stated that flooding will have to be addressed and the data sets will need to be combined to understand how water level fluctuations may interact. Jack West (ARA) asked if the final report will provide quantifiable results related to increases in flooding for each operating curve change. Dave explained that percentage of time spent in spillway operations (flooding increase) and in turbine capacity was presented in Phase 1. Angie added that the Phase 1 Report provides quantified results on flooding, specifically related to the increase, frequency, and magnitude of flooding.

Amanda Fleming (Alabama Power) presented the results of the cultural analysis.

James Hathorn (U.S. Army Corps of Engineers (USACE)) asked if additional flooding would be expected upstream with the operating curve alternatives. Dave stated that the Phase 1 Report showed that the reservoir did not exceed the 795 foot-msl flood easement elevation. James asked if any proposed changes to the Induced Surcharge Curve were anticipated with any of the operating curve changes. Kenneth Odom (Alabama Power) replied that it had not been analyzed. Stacey Graham (Alabama Power) confirmed that was not something being considered, and current operations were used in the models. James asked if the HEC-ResSim model would be provided to USACE. Dave noted that the model outputs will be filed with the FLA. James stated that all results are based on the 100-year design flood and asked FERC if any other flood event modeling would be requested. Allan did not anticipate that FERC would require additional modeling based on other storm events. Sarah asked James if the HEC-ResSim model was needed to allow USACE to perform their own model runs. James confirmed it would be used to verify the results and perform "what-if" scenarios that could prompt a comment on the report. Angie confirmed that the model would be provided to USACE.

The meeting concluded.

# HAT 1 Meeting
# Operating Curve Change Feasibility - Phase 2 Analyses

## R.L. Harris Dam Relicensing
## FERC No. 2628

April 1, 2021

# Meeting Etiquette

- ❑ Be patient with technology issues
- ❑ Follow the facilitator's instructions
- ❑ Phones will be muted during presentations
- ❑ Follow along with PDF of presentations
- ❑ Use the "chat" feature in Microsoft Teams or write down any questions you have for the designated question section
- ❑ Facilitator will ask for participant questions following sections of the presentation
- ❑ Clearly state name and organization when asking questions
- ❑ Meeting will be recorded to assist with meeting notes

HARRIS DAM RELICENSING

# Safety and Roll Call

Spring is here!

# Meeting Purpose

- Present a summary of the results of the **Phase 2** Operating Curve Change Feasibility Analysis Study by resource area

- Draft Phase 2 Report will be filed **April 12, 2021**

- Comments on draft report due on **May 11, 2021**

HARRIS DAM RELICENSING

# Relicensing Review

- Much data/reports on Harris Project resources exists – see https://harrisrelicensing.com
- Summary level presentation today
  - Reports available for review & comment April 12
  - Read reports for details
- If you have concerns about current operations, contact Alan Peeples in Reservoir Management
  - Today's focus is summary of operating alternatives

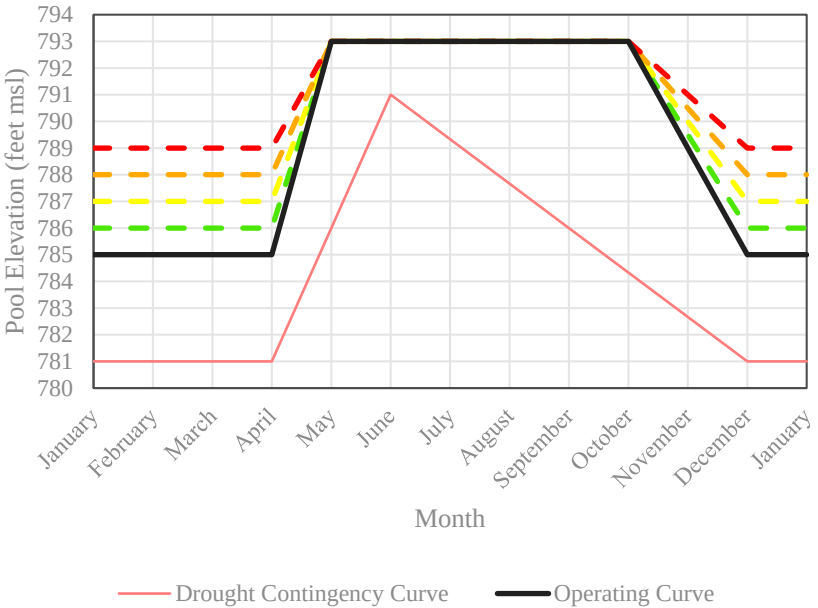
- 4 alternatives analyzed
  - All alternatives include the Harris Dam and peaking operations
  - Baseline for relicensing is the existing condition, which includes Harris Dam, powerhouse, Lake Harris

HARRIS DAM RELICENSING

# Agenda

- Present Operating Curve Change Feasibility Phase 2 Analysis, by resource area
  - Downstream Release Alternatives
  - Structures Downstream of Harris Dam
  - Water Quality
  - Water Use
  - Erosion and Sedimentation
  - Aquatic Resources (Fish spawning and entrainment)
  - Wildlife, Threatened and Endangered Species
  - Terrestrial Wetlands
  - Recreation
  - Cultural

# Harris Operating Curve and Operating Alternatives




- Evaluated in increments of 1 foot from 786 feet msl to 789 feet msl

## Phase 1

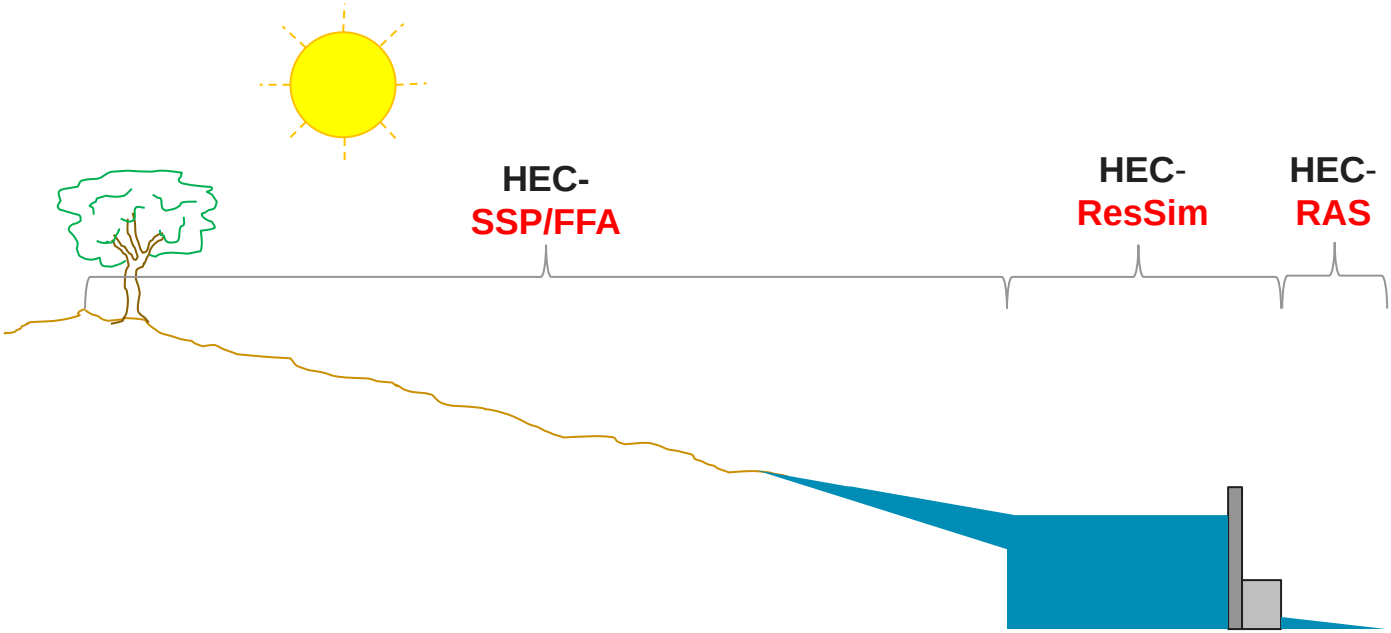
- Modeling to evaluate potential impacts of winter operating curve change on:
  - generation
  - flood control
  - navigation
  - drought operations
  - Green Plan flows
  - downstream release alternatives

## Phase 2

- quantitative and qualitative evaluations of potential resource impacts

HARRIS DAM RELICENSING

# Hydrologic Models



# Operating Curve Effect on Downstream Release Alternatives

## Purpose

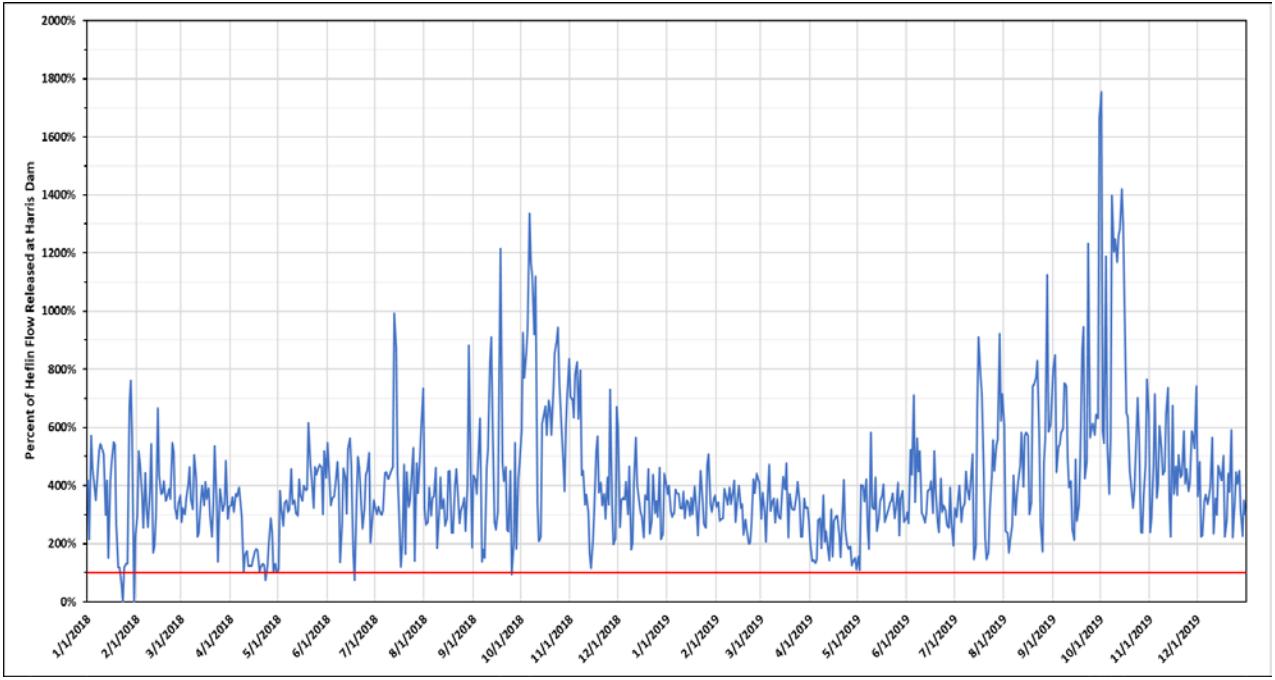
- To evaluate the effect of the operating curve changes on Alabama Power's ability to pass any of the additional downstream release alternatives.

## Methods

- Used HEC-ResSim model
  - Modified Green Plan - changing the time of day in which the Green Plan pulses are released
  - 150 cfs continuous minimum flow (CMF),
  - 300 cfs CMF
  - 600 cfs CMF
  - 800 cfs CMF
  - and four "hybrid" Green Plan alternatives that incorporate both a base and the GP pulsing

HARRIS DAM RELICENSING

# Operating Curve Effect on Downstream Release Alternatives




RELEASES FROM HARRIS DAM IN 2018 AND 2019 COMPARED TO 100% FLOW AT THE USGS HEFLIN GAGE

HARRIS DAM RELICENSING

# Operating Curve Effect on Downstream Release Alternatives

## Results

- Model results indicated that raising the winter operating curve would not affect Alabama Power's ability to pass any of the additional downstream release alternatives.
- The effect of downstream release alternatives on the reservoir level is analyzed in the Downstream Release Alternatives Phase 2 Report.

# Downstream Flooding

TOTAL ACRES INUNDATED DOWNSTREAM OF HARRIS DAM BASED ON RESULTS OF 100-YEAR DESIGN FLOOD IN HARRIS-MARTIN HEC-RAS MODEL

| Elevation | Total Inundation Area (acres) | Increase over Baseline (acres) | Percent Increase over Baseline |
|---|---|---|---|
| Baseline (785 feet msl) | 6,105 | - | - |
| + 1 foot | 6,403 | 298 | 4.9% |
| + 2 feet | 6,590 | 485 | 7.9% |
| + 3 feet | 6,791 | 686 | 11.2% |
| + 4 feet | 6,995 | 889 | 14.6% |

# Downstream Structures Analysis

## Purpose

- Determine the number of structures that would be affected by an increase in high flow events resulting from a change in the elevation of the winter pool (1-4 ft increase), including depth of inundation

## Methods

- Overlay analysis, find those structures affected by worst case scenario
- Spatial join affected structures with tax parcel data
- Summarize by structure type tax-parcel use category (Agricultural, Forestry, Single Family, etc.)
- Count the number of HEC-RAS model timesteps (hours) that each structure is inundated and summarizing by alternative.

# Downstream Structures Analysis

## Results

- Of the 88 structures affected by the 4-foot guide curve change, 29 are in lots classified as single-family home.

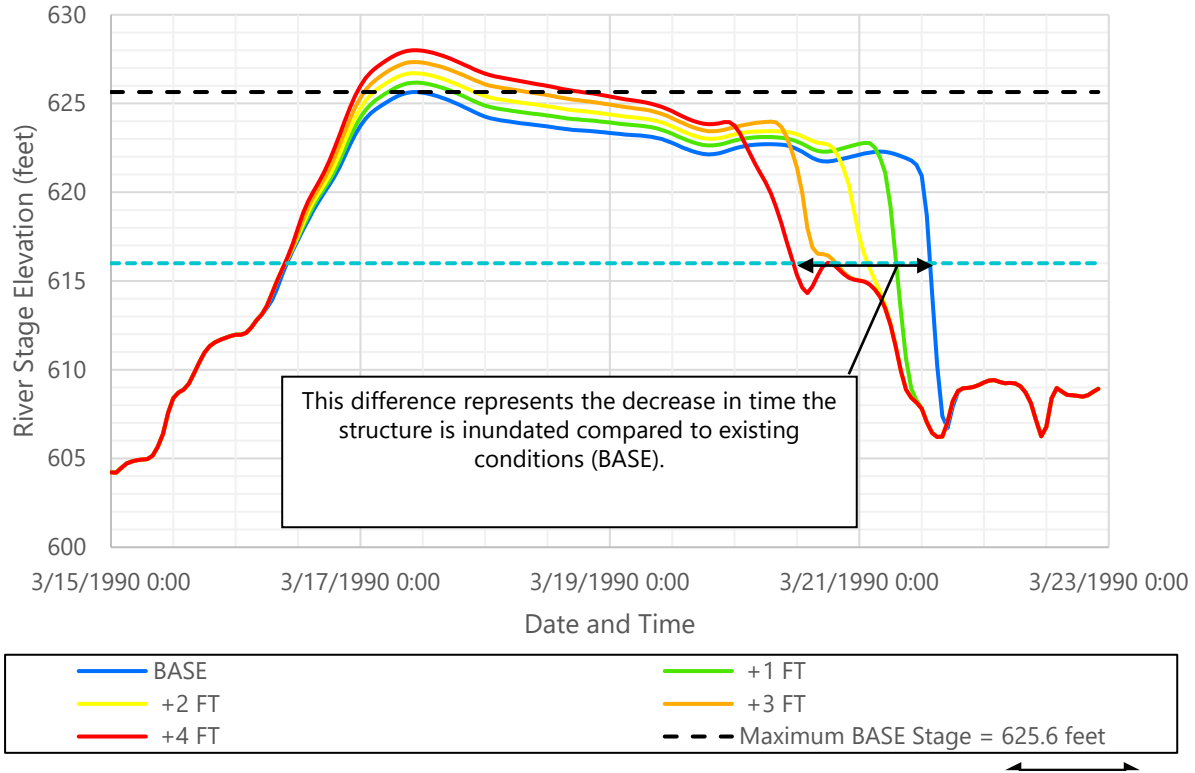
| Parcel Use | 785 | 786 | 787 | 788 | 789 |
|---|---|---|---|---|---|
| Residential | 1 | 1 | 1 | 1 | 1 |
| Vacant Agricultural | 2 | 2 | 2 | 2 | 2 |
| Cabin | 2 | 2 | 2 | 2 | 2 |
| Unknown | 2 | 2 | 2 | 2 | 3 |
| Agricultural | 4 | 4 | 4 | 4 | 4 |
| Forestry | 6 | 6 | 6 | 6 | 6 |
| Commercial | 6 | 6 | 6 | 6 | 6 |
| Mobile Home | 8 | 8 | 9 | 9 | 10 |
| Vacant | 24 | 24 | 25 | 25 | 25 |
| Single Family | 24 | 24 | 26 | 26 | 29 |
| Total | 79 | 79 | 83 | 83 | 88 |

# Downstream Structures Analysis

## Results

- 4-foot winter pool increase has the largest impact in terms of number of structures inundated, the median duration of inundation was the lowest.
- This occurs because changes to the winter operating curve increase the starting pool elevation; Harris has less storage available in the reservoir to store floodwaters before Alabama Power must begin releasing water.
- Downstream flood is more intense in terms of magnitude (greater rise), but more water is released more quickly due to the higher reservoir elevation
- The magnitude of the inundation for each structure is lower because the peak of the flood hydrograph is attenuated by having smaller magnitude floodwaters released over a longer time.

# Downstream Structures Analysis




TALLAPOOSA RIVER STAGE HYDROGRAPHS AT RM 122.7 (WADLEY) FROM RESULTS OF 100-YEAR DESIGN FLOOD IN HARRIS-MARTIN HEC-RAS MODEL

# Water Quality Analysis

## Purpose

- Evaluate the effects of each operating curve change on dissolved oxygen and temperature in the forebay

## Methods

- Developed a three-dimensional Environmental Fluid Dynamics Code (EFDC) hydrodynamic and water quality model for Lake Harris and evaluate the effects of each rule curve change scenario on water temperature and dissolved oxygen versus baseline.

## Results

- Lake Harris
  - EFDC model results indicated that raising the winter pool water level would have negligible effects on water temperature and dissolved oxygen in the forebay withdrawal zone.

- Downstream
  - Since model results indicated negligible changes to water temperature and dissolved oxygen in the forebay withdrawal zone, there would be negligible effects on downstream water quality.

# Water Use Analysis

## Purpose

- Determine effects on water uses in Lake Harris and the Tallapoosa River downstream as a result of a change in winter operating curve.

## Methods

- Review the Water Quantity, Water Use, and Discharge Report to determine water users' location relative to the Project Boundary.
- HEC-ResSim used to determine the effect of an increase in winter operating curve on available water in Harris Reservoir.
- HEC-RAS modeling used to assess how changes in outflow from Harris Dam could affect downstream water users.

## Results

- No adverse effect on existing or future users in Lake Harris or downstream
- Each one-foot winter operating curve increase provides additional water available for use during the winter in Lake Harris

# Erosion and Sedimentation Analysis

## Methods

- Lake Harris
  - Data from the Erosion and Sedimentation Study Report was reviewed to evaluate operating curve change effects on identified E&S areas.
    - Used existing lake LIDAR (2015) data to identify erosion and sedimentation areas impacted at each incremental operating curve elevation.
    - Used existing lake LIDAR (2015) data to identify areas at risk for occurrence of nuisance aquatic vegetation, specifically sedimentation areas.
  - Analyzed the potential effect of increasing recreation on E&S areas.

- Downstream
  - Erosion and Sedimentation Study Report results to evaluate operating curve change effects on downstream E&S areas.
  - Operating Curve Change Feasibility Analysis Phase I Report and associated HEC-RAS model to identify change in magnitude and frequency of flood events downstream.

# Erosion and Sedimentation Analysis

## Results

- Lake Harris
  - None of existing erosion areas would be affected by winter pool alternatives.
    - All existing erosion sites are located above 789 contour.
  - An increase in winter recreation may result in more boat induced wave action.
  - Increased acreage at each sedimentation area left submerged.
    - Increased nuisance aquatic vegetation habitat due to decrease in flushing of exposed sediment to deeper depths.

**Harris Sedimentation Area Change**

| Site | Baseline Acreage | +1 foot | +2 feet | +3 feet | +4 feet |
|---|---|---|---|---|---|
| S1 | 23.83 | 3.95 | 5.66 | 4.25 | 5.95 |
| S2 | 4.96 | 1.93 | 0.93 | 0.27 | 0.15 |
| S3 | 10.51 | 4.42 | 1.01 | 1.62 | 2.94 |
| S4 | 5.49 | 1.51 | 1.27 | 2.34 | 0.13 |
| S5 | 6.68 | 2.57 | 2.70 | 0.73 | 0.23 |
| S6 | 13.55 | 7.11 | 2.14 | 1.18 | 0.83 |
| S7 | 26.14 | 7.07 | 5.46 | 5.15 | 3.13 |
| S8 | 10.59 | 0.93 | 1.32 | 1.46 | 1.78 |
| S9 | 18.25 | 6.54 | 2.57 | 1.90 | 1.81 |

# Erosion and Sedimentation Analysis

## Results

- Downstream
  - Increased potential for scour may occur as velocities increase with the higher channelized flows resulting from the decreased storage in Harris Reservoir associated with higher winter operating curve elevations

  - No effect on sedimentation at tributary confluences

# Fish Spawning Analysis

## Methods

- HEC-RAS
  - determine effects on wetted perimeter and littoral area in Lake Harris
  - determine effects of time spent in spillway operations and at turbine capacity

- Use information on fish spawning from the Aquatic Resources Desktop Assessment

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# Fish Spawning Analysis

## Results

- Lake Harris
  - Winter pool elevations of 786, 787, 788, and 789 would create an additional 276, 506, 730, and 944 acres of wetted perimeter, respectively

  - Potential Beneficial effects: reduced plant desiccation resulting in more plant growth, increased spawning area and structure for young-of-year fish and benthic invertebrates

# Fish Spawning Analysis

## Results

- Downstream
  - Increasing winter pool elevation causes greater outflow from Harris Dam and subsequent flooding associated with outflow.

  - Increases in time spent in spillway operations and at turbine capacity are small and would likely occur outside of the spawning period for the majority of species.

**Percentage of Time Spent in Spillway Operations and in Turbine Capacity for Each Alternative**

| Elevation | Spillway Operations | Turbine Capacity |
|---|---|---|
| Baseline (785 feet msl) | 0.2% | 0.7% |
| + 1 foot (786 feet msl) | 0.3% | 0.7% |
| + 2 feet (787 feet msl) | 0.3% | 0.8% |
| + 3 feet (788 feet msl) | 0.3% | 0.8% |
| + 4 feet (789 feet msl) | 0.4% | 1.0% |

# Fish Entrainment Analysis

## Methods

- Desktop Fish Entrainment and Turbine Mortality Report estimated entrainment rates based of information from the Electric Power Research Institute (EPRI 1992).

- Estimated turbine-induced mortality rates were then applied to fish entrainment estimates to determine potential fish mortality.

## Results

- The volume and velocity of water passing through the turbines would not change under a different winter operating curve; therefore, fish entrainment is not expected to change under any of the winter pool alternatives.

# Wildlife and Terrestrial Species Analysis

## Methods

- Data were reviewed from the Pre-Application Document (PAD) (Alabama Power 2018) to evaluate the potential effects of each winter pool alternative on Wildlife and Terrestrial Resources

## Results

- Lake Harris
  - Increasing operating curve would increase shallow littoral habitats
  - May increase winter cover and feeding sites for waterfowl
  - May increase winter foraging habitat for wading birds
  - May marginally increase breeding sites for amphibians
- Downstream
  - Although a greater number of flood days are expected due to the one to four foot increase, no long-term effects to wildlife downstream are expected

# Threatened and Endangered Species Analysis

## Methods

- Alabama Power reviewed data (e.g., species habitat range, species surveys, etc.) from the FERC-approved Threatened and Endangered Species Study to evaluate the potential effects of each incremental winter operating curve elevation on T&E species

## Results

- Lake Harris
  - No T&E species or critical habitat present at Lake Harris Project Boundary
  - Finelined Pocketbook critical habitat is located 2.45 miles upstream of the Project Boundary and is not affected by rule curve change
  - Not expected to affect T&E species within the Lake Harris Project Boundary

- Downstream
  - No effect because no T&E species or critical habitats are present in the Tallapoosa River from Harris Dam through the Horseshoe Bend.

# Terrestrial Wetlands Analysis

## Methods

- The effects of increasing the winter operating curve on terrestrial resources (wetlands) were assessed using existing wetland data and Phase 1 Results.
- For the Tallapoosa River downstream of Harris Dam, identified wetlands were analyzed based on changes in magnitude and frequency of flood events for each of the winter pool alternatives.

## Results

- Lake Harris
  - 1-4 foot increase in the winter operating curve elevation could potentially alter the dominant vegetation composition of wetlands bordering Harris Reservoir.
    - Existing wetlands may increase in size due to the increase of acreage of the Harris Reservoir during the winter months

- Downstream
  - No effect from periodic high flow events.

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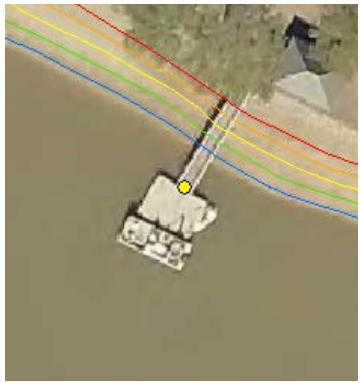
# Recreation Analysis

## Methods

- LIDAR used to measure elevation (785, 786, 787, 788, 789 ft msl contours)
- Elevation data used to calculate depth at point
- Depth for points beyond the 785 ft msl contour was estimated by slope analysis
- The amount of depth was determined separately for each type of private structure (i.e., boathouses, floats, piers, wet slips, and boardwalks) and for public boat ramps.

- Example:




HARRIS DAM RELICENSING

# Recreation Analysis

## Results

- Private structures
  - 2,282 private structures identified
  - Total number analyzed: 2,123 structures

| Winter Pool Elevation (feet msl) | Number of Usable Structures | Percentage of Usable Structures | Incremental Percentage Increase |
|---|---|---|---|
| **785** | 449 | 21.1 | - |
| **786** | 642 | 30.2 | 9.1 |
| **787** | 826 | 38.9 | 8.7 |
| **788** | 1112 | 52.4 | 13.5 |
| **789** | 1327 | 62.5 | 10.1 |

# Recreation Analysis

## Methods

- Public Boat Ramps
  - Used minimum of 4.5 ft of depth over bottom of ramp at low pool

## Results

- Public ramps usable at current winter pool: Highway 48 Bridge, Big Fox Creek, Crescent Crest, and Foster's Boat Ramps

| Boat Ramp | Lowest Reservoir Elevation Usable (feet msl) |
|---|---|
| Big Fox Creek | 785.0 |
| Crescent Crest | 785.0 |
| Foster's Bridge | 785.0 |
| Hwy 48 Bridge | 785.0 |
| Lee's Bridge | 791.5 |
| Little Fox Creek | 790.0 |
| Lonnie White* | 787.5 |
| Swagg** | 790.0 |

*Lonnie White Boat Ramp is frequently used at current winter pool, but larger boats cannot launch, and many boat trailers need to back off the edge of the ramp. ADCNR is currently extending the ramp so that it is fully usable by the drawdown of 2021.

**Swagg Boat Ramp ends right at the water's edge during current winter pool but is still in use by some recreators.

# Recreation Analysis

## Results

- Downstream
  - The maximum depth of inundation at each recreation site increases as the winter pool alternatives increase.
  - The duration of time above the ground elevation that each recreation site is inundated tends to decrease as the winter pool alternatives increase.
    - This is due to the decreasing amount of storage available in Harris Reservoir for each winter pool alternative compared to existing conditions.

# Cultural Analysis

## Methods

- Lake Harris and Downstream
  - Existing information (LIDAR and expert opinion) and Phase 1 Results were used to provide a qualitative analysis for the effects of cultural resources

## Results

- Lake Harris
  - Changes in the operating curve above 785 msl, would leave otherwise exposed cultural resources inundated and less susceptible to water fluctuation, wind erosion, recreational activities, and looting (vandalism).

- Downstream
  - Higher flow releases have the potential to impact cultural resources downstream, including the Miller Covered Bridge, exposing them to additional fluctuations and erosion.
    - These releases would be sporadic and would result in irregular inundation periods for the cultural resources downstream of Harris Dam.

**Meeting Summary**
**Harris Relicensing Harris Action Team (HAT) 1 Meeting**
**April 1, 2021**
**9:00 am – 11:00 am**
**Microsoft Teams Meeting**

**Participants:**
Angie Anderegg – Alabama Power Company (Alabama Power)
Dave Anderson – Alabama Power
Wesley Anderson – Alabama Power
Jeff Baker – Alabama Power
Jason Carlee – Alabama Power
Keith Chandler – Alabama Power
Evan Collins – U.S. Fish and Wildlife Service (USFWS)
Allan Creamer – Federal Energy Regulatory Commission (FERC)
Jim Crew – Alabama Power
Colin Dinken – Kleinschmidt Associates (Kleinschmidt)
Scott Fant – Alabama Power
Amanda Fleming – Alabama Power
Todd Fobian – Alabama Department of Conservation and Natural Resources (ADCNR)
Chris Goodman – Alabama Power
Stacey Graham – Alabama Power
Jim Hancock – Balch and Bingham
Jennifer Haslbauer - Alabama Department of Environmental Management (ADEM)
James Hathorn – U.S. Army Corps of Engineers (USACE)
Mike Holley – ADCNR
Martha Hunter – Alabama Rivers Alliance (ARA)
Elise Irwin – U.S. Geological Survey (USGS)
Kelly Kirven – Kleinschmidt
Michael Len – ADEM
Fred Leslie – ADEM
Ashley Lockwood – ADEM
Donna Matthews – Downstream Property Owner
Tina Mills – Alabama Power
Jason Moak – Kleinschmidt
David Moore –ADEM
Barry Morris – Lake Wedowee Property Owners Association (LWPOA)
Kevin Nebiolo – Kleinschmidt
Jessica Nissenbaum – Alabama Power
Kenneth Odom – Alabama Power
Erin Padgett – USFWS
Alan Peeples – Alabama Power
Sarah Salazar – FERC
Kelly Schaeffer – Kleinschmidt
Sheila Smith – Alabama Power
Thomas St. John – Alabama Power
Monte Terhaar – FERC

Jimmy Traylor – Downstream Property Owner
Sandra Wash – Kleinschmidt
Jack West – ARA

**Meeting Summary:**

Angie Anderegg (Alabama Power) opened the meeting with a safety moment and stated the meeting purpose: to present a summary of the quantitative and qualitative analysis of potential resource effects from the downstream release alternatives. Angie noted the Draft *Downstream Release Alternatives Phase 2 Study Report* would be filed April 12, 2021 with a stakeholder comment period until May 11, 2021. Dave Anderson (Alabama Power) reminded the participants of the downstream release alternatives that were analyzed in the Phase 1 report and provided a summary of the models and assumptions used in the study. Dave presented the effects of the downstream release alternatives on Harris Reservoir elevations, generation, revenue, flood control, navigation, drought operations, and the Martin Project Conditional Fall Extension.

Jimmy Traylor (Downstream Property Owner) asked what the generation would be in megawatts (MWs) with the continuous minimum flow (CMF) of 300 cubic feet per second (cfs). Angie replied the assumption used in the HydroBudget model was approximately 2.5 MWs for the theoretical 300 CMF unit. Angie explained the assumption for all the continuous minimum flow alternatives is that the flow is making power, but the power is provided off-peak with a separate unit. Jimmy inquired if Project resources, including generation for Alabama Power, would benefit if Lake Harris was raised year-round (with updated turbines at Harris Dam). Dave noted that the United States Army Corps of Engineers (USACE) Water Control Manual (WCM) dictates the operations at Lake Harris and the most efficient turbines were installed in the 1970s based on the size and head provided by the reservoir. Jimmy clarified his question, if Alabama Power would benefit financially with a raised operating curve and downstream flow regime that was approved by USACE. Dave explained that the Harris Relicensing Project studies analyze changing the winter rule curve at Lake Harris and providing releases in the Tallapoosa River downstream of the Dam. Specifically, the studies analyze the effects on resources, including generation and revenue to Alabama Power. Barry Morris (Lake Wedowee Property Owners Association, LWPOA) asked for clarification that a third unit would provide the minimum flow. Angie confirmed that the assumption for the model includes a new minimum flow unit that would release the flow and would make power.

Jason Moak (Kleinschmidt Associates (Kleinschmidt)) presented the effects of the downstream release alternatives on water quality and water use. Sarah Salazar (Federal Energy Regulatory Commission (FERC)) asked what stratification layer of the water column was being drawn from for generation. Jason M. confirmed water was being drawn from approximately 30-feet below the surface which, depending on the time of year, is either the metalimnion layer (a transition layer between the epilimnion and hypolimnion layer), or the hypolimnion. Jason M. added that the lake is a dynamic system that varies year-to-year. Jason M. referenced the *Water Quality Study Report* that notes a "u-shaped curve" has been experienced in some years, with a higher dissolved oxygen (DO) layer and warmer temperatures on top, a middle layer exhibiting lower DO, and a bottom layer with higher DO. Jason M. suggested this could be due to runoff and oxygen-demanding organic matter residing in the middle layer. Sarah asked if the models could show how the stratification layer might change under the different alternatives. Jason M. responded that it had not been modeled but major differences would not be expected based on existing information.

Jack West (Alabama Rivers Alliance (ARA)) inquired on the status of existing aeration devices. Jason M. responded that Alabama Power has draft tube aeration on the existing turbines that are operated in the low-DO season as well as a moveable sill that was incorporated into the design to allow the intake to draw from different layers in water column. Jason M. noted that the sill has been in the uppermost position for the last 15-20 years drawing from relatively high in the water column.

Allan Creamer (FERC) inquired if the hypothetical unit to capture the minimum flows would also be designed with aeration. Angie confirmed, as any flow that is passed from the Harris Dam would also need to meet the state water quality standard. Allan provided a hypothetical scenario where the weir is in its uppermost position (not varying) with the lake level elevation decreasing one foot. Allan stated that in theory more of the upper layer in the summer would be heated by the sun and would expect increased temperatures downstream. Jason M. noted that in this scenario the opposite effect also occurs. Jason M. explained that retention time would be reduced, so there would be less time for the water to be heated by the sun. Allan stated he would expect a little variation but that it may not be significant and that the two scenarios could potentially cancel each other. Jason. M. agreed that the two scenarios would likely cancel each other. Allan stated that temperature impacts could be modeled but may be beneficial to monitor the temperature post-implementation.

Jason M. presented the results on Erosion and Sedimentation and mentioned general trends downstream of Harris Dam. Regarding the table on slide 27 in the presentation, Sarah asked why the 300 CMF does not follow those general trends, specifically why the average daily fluctuations increased at 1 mile downstream under the 600 CMF+Green Plan (GP) compared to the 300 CMF+GP. Jason M. noted the data would be rechecked to confirm there was not an error in the presentation[1].

Jason M. presented the Aquatic Resources analysis regarding aquatic habitat, temperature, and fish entrainment. Keith Chandler (Alabama Power) asked for clarification on the Daily Average Wetted Perimeter Fluctuation table (slide 36). Jason M. explained that the percent changes in the table show the differences from existing conditions (GP) in daily average wetted perimeter fluctuation. For example, the 800 CMF alternative at two miles downstream shows wetted perimeter fluctuations would be reduced by 82% compared to baseline conditions.

Jason M. noted the HEC-RAS model revealed little difference in overall average water temperatures between each downstream release alternative at all locations analyzed; however, a noticeable difference in daily temperature fluctuations was present closer to Harris Dam. Barry asked for clarification on his interpretation that under any continuous minimum flow alternative, temperature variations would still exist downstream when generating. Jason M. noted that while the average temperature does not change between the alternatives, the daily fluctuation in temperature is smaller under some of the minimum flow alternatives. Angie confirmed that a delta or change in temperature does exist under any alternative. Jason M. added that daily 2–3-degree Celsius (°C) deltas can be present in unregulated streams on a summer day with natural conditions. Sarah requested that parameters (in graphs and boxplots) be defined in each graph to aid in data interpretation. Jack stated that daily short-term temperature variations decrease as minimum flow alternatives increase. With regard to the new minimum flow unit, Jack asked if

[1] There was an error in the presentation and the results are accurately portrayed in the Draft *Downstream Release Alternatives Phase 2 Study Report*. The table has been corrected in the attached presentation.

the flows would be drawn from higher in the reservoir or at the same depths as the main units. Jason M. replied that the assumption is that the flows from the theoretical unit would be drawn from the same depth and existing penstock, and that is why the average temperatures are not changing.

Regarding a potential new unit and penstock location, Allan asked if a new unit could be designed to draw water from higher in the water column. Angie stated that an engineering design analysis would have to be completed, but a new intake may require boring into the dam. Allan stated that if a minimum flow is drawing from higher in the water column, it could potentially put warmer water downstream and decrease temperature fluctuations but noted design considerations and limitations. Keith added that deltas would likely increase under that scenario when the existing units were loaded. Jason M. also added that deltas decrease with a CMF due to having more water in the channel as it prevents the water from getting shallower and experiencing thermal heating.

Jason M. presented results on wildlife and terrestrial resources and threatened and endangered (T&E) species. Sarah asked if there were any results for state-listed species. Jason M. noted he was unsure if there were any state-listed species in the Project Area. Angie noted Alabama Power would confirm[2]. Sarah asked how littoral and wetland types may shift, in terms of acreage under the different alternatives. Jason M. stated that this information is in the report. Jack asked if the analysis considered the Finelined Pocketbook (*Hamiota altilis*) (mussel) critical habitat that is located upstream of the reservoir. Jason M. confirmed and noted that the critical habitat is upstream of the reservoir and outside of the area that fluctuates. In addition, none of the downstream release alternatives increase the elevation of the reservoir, thus, there is no effect upstream. Jack asked if greater releases downstream could potentially lower the elevation of the lake in a way that impacts the critical habitat. Jason M. responded that if the lake is lower, that transitional section from flowing water into lake habitat would shift further downstream; however, since the critical habitat is above the current reservoir fluctuations, lower lake levels shouldn't impact the area.

Colin Dinken (Kleinschmidt) and Dave presented recreation results. Martha Hunter (ARA) stated that effects on the lake and downstream resources are both important and there are a lot of issues to consider. Martha asked if Alabama Power budgeted for a new generator that would allow for a CMF. Angie responded no and explained that a theoretical unit was used in the modeling. Martha noted that although the unit is theoretical, the study results and the impacts to Project resources suggest there will be some sort of upgrade to the equipment at Harris. Under the assumption that a more efficient generator would be installed, Martha asked if an ideal lake level could first be determined to dictate the amount of flow released downstream. Kelly Schaeffer (Kleinschmidt) replied no and noted that Alabama Power evaluated the alternatives that were proposed by stakeholders and FERC. Kelly added that if a minimum flow is selected, Alabama Power will then evaluate how to provide the flow. Kelly stated that the Preliminary Licensing Proposal (PLP) will incorporate all the study results and contain Alabama Power's operating proposal. Martha asked if Alabama Power would be required to modify the proposal if FERC disagreed. Kelly replied that Alabama Power's goal is to ensure FERC has been provided enough information to make a decision, but FERC could request additional information or clarification. Sarah encouraged stakeholders to provide comments on the PLP. Sarah added that there is an

[2] The Lipstick Darter (*Etheostoma chuckwachatte*) is a state-protected fish species occurring downstream of Harris Dam. The Finelined Pocketbook (*Hamiota altilis*) is a federal and state-protected mussel species with critical habitat located in the Tallapoosa River upstream of Harris Reservoir.

additional comment period on the Final License Application (FLA), and FERC will consider stakeholder comments and recommendations. Sarah asked what criteria were used to determine which lake structures were removed from the recreation analysis, and Colin replied that a field inventory was performed to confirm the imagery, and structures that were severely damaged, appeared to be unmaintained or unused, or were under construction were omitted from the analysis.

Amanda Fleming (Alabama Power) presented results of the cultural analysis. Sarah inquired about the results of the table on slide 59, specifically that the third column represents the increase in percent of time that sites would be inundated versus the total. Amanda confirmed and added that Pre-GP is negative and represents less time of inundation compared to baseline (GP).

Barry mentioned when the GP was first being considered, one of the options was a re-regulation dam downstream that would provide a smaller lake to capture water and release flow slowly. Barry asked if that was still an option. Angie responded that it was eliminated when the GP was being evaluated as it essentially created an additional lake and potential adverse impacts to environmental resources. Jack noted that Alabama Power is in the process of completing the Battery Energy Storage System (BESS) study and inquired if it would be reevaluated with the other alternatives. Angie replied that the BESS analysis is being considered separately due to comparison constraints. Angie explained that models with operating rules exist in the Downstream Release Alternatives Study, with one rule being that the Project is to operate for power/peaking. Angie added that the power/peaking would be removed under the BESS alternative and would require new operating rules, which is beyond the scope of the analysis. Angie noted the analysis has been completed, including the impacts on aquatic resources and recreation, and the report will be filed on April 12, 2021 for review and comment.

The meeting concluded.

# HAT 1 Meeting
# Downstream Release Alternatives - Phase 2 Analyses

# R.L. Harris Dam Relicensing
# FERC No. 2628

April 1, 2021

# Meeting Etiquette

- ❑ Be patient with technology issues
- ❑ Follow the facilitator's instructions
- ❑ Phones will be muted during presentations
- ❑ Follow along with PDF of presentations
- ❑ Use the "chat" feature in Microsoft Teams or write down any questions you have for the designated question section
- ❑ Facilitator will ask for participant questions following sections of the presentation
- ❑ Clearly state name and organization when asking questions
- ❑ Meeting will be recorded to assist with meeting notes

HARRIS DAM RELICENSING

# Safety and Roll Call

Spring is here!

# Meeting Purpose

- Present a summary of the quantitative and qualitative analysis of potential resource effects from the downstream release alternatives.

- Used the modeling results from Phase 1 along with FERC-approved relicensing study results and existing information

- Draft Phase 2 Report will be filed **April 12, 2021**

- Comments on draft report due on **May 11, 2021**

# Relicensing Review

- Much data/reports on the Harris Project resources exists – see https://harrisrelicensing.com

- Summary level Presentation today
  - Reports available for review & comment April 12
  - Read the reports for details

- If you have concerns about current operations, contact Alan Peeples in Reservoir Management
  - Today's focus is the summary of operating alternatives

- 11 alternatives analyzed
  - All alternatives include the Harris Dam and peaking operations
  - **Baseline** for relicensing is the existing condition, which includes Harris Dam, powerhouse, Lake Harris

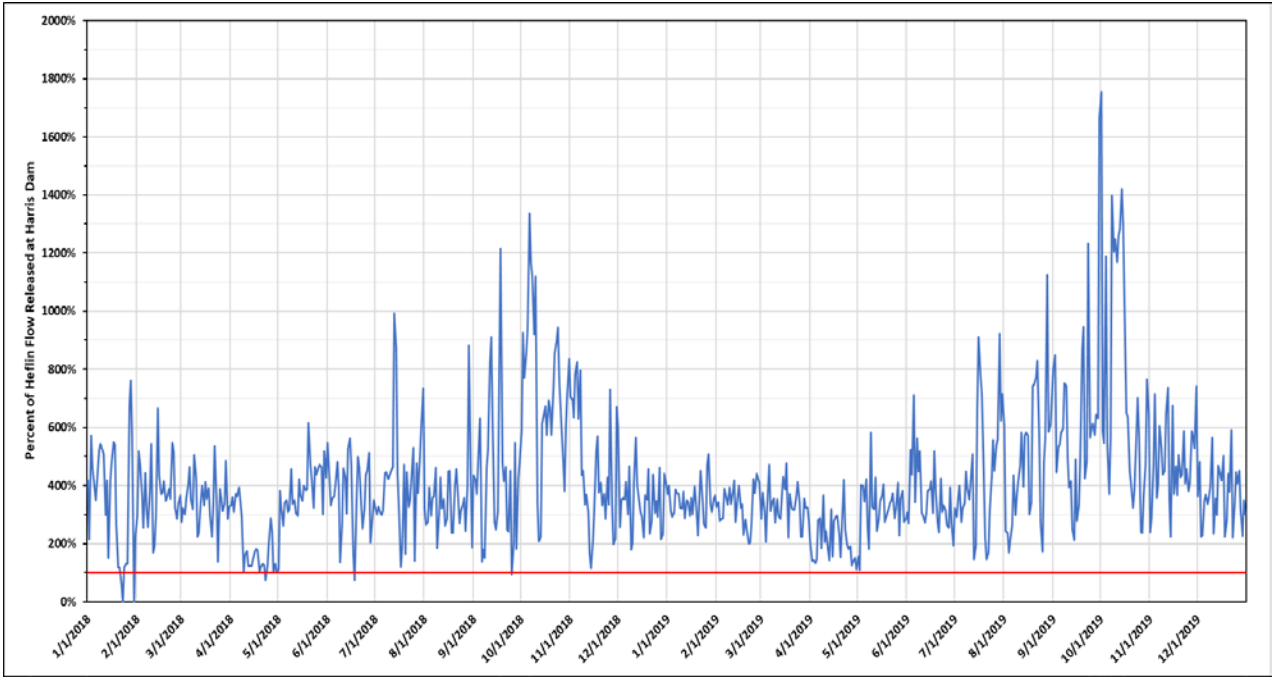
# Agenda

- Present a Summary of Effects of the Downstream Release Alternatives Phase 2 Analysis by resource area
  - Hydrologic Model Summary
  - Operational Parameters
  - Martin Conditional Fall Extension
  - Water Quality
  - Water Use
  - Erosion and Sedimentation
  - Aquatic Resources (Temperature, Habitat, Fish spawning, and Entrainment)
  - Wildlife, Threatened and Endangered Species
  - Terrestrial Wetlands
  - Recreation
  - Cultural

# Review of Alternatives Analyzed in Phase 2

| Name/Description | Abbreviation |
|---|---|
| Green Plan (baseline or existing condition) – pulsing flows as described in the Green Plan release criteria | GP |
| Pre-Green Plan (peaking only; no pulsing or continuous minimum flow) | PreGP or PGP |
| Modified Green Plan | ModGP |
| 150 cfs continuous minimum flow (CMF) | 150CMF |
| 300 cfs continuous minimum flow | 300CMF |
| 600 cfs continuous minimum flow | 600CMF |
| 800 cfs continuous minimum flow | 800CMF |
| A hybrid Green Plan that incorporates both a base minimum flow of 150 cfs and the pulsing described in the existing Green Plan release criteria | 150CMF+GP |
| A hybrid Green Plan that incorporates both a base minimum flow of 300 cfs and the pulsing described in the existing Green Plan release criteria | 300CMF+GP |
| A hybrid Green Plan that incorporates both a base minimum flow of 600 cfs and the pulsing described in the existing Green Plan release criteria | 600CMF+GP |
| A hybrid Green Plan that incorporates both a base minimum flow of 800 cfs and the pulsing described in the existing Green Plan release criteria | 800CMF+GP |

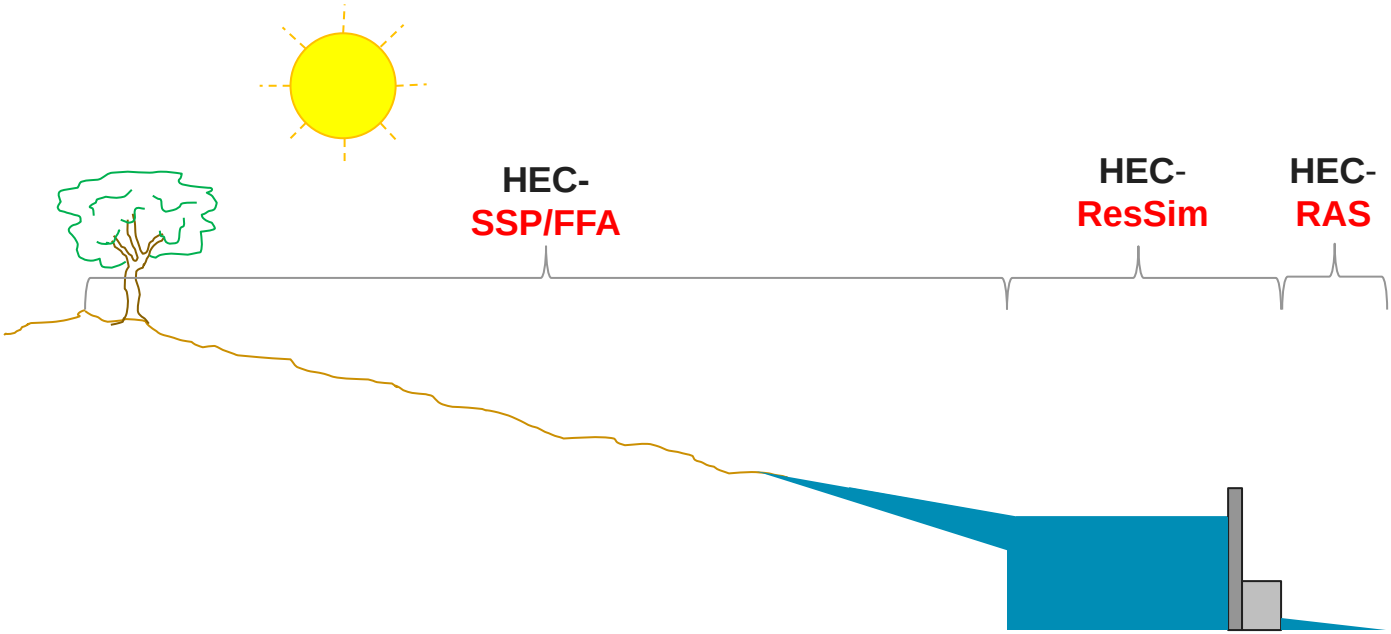
# Review of Alternatives Analyzed in Phase 2




**RELEASES FROM HARRIS DAM IN 2018 AND 2019 COMPARED TO 100% FLOW AT THE USGS HEFLIN GAGE**

HARRIS DAM RELICENSING

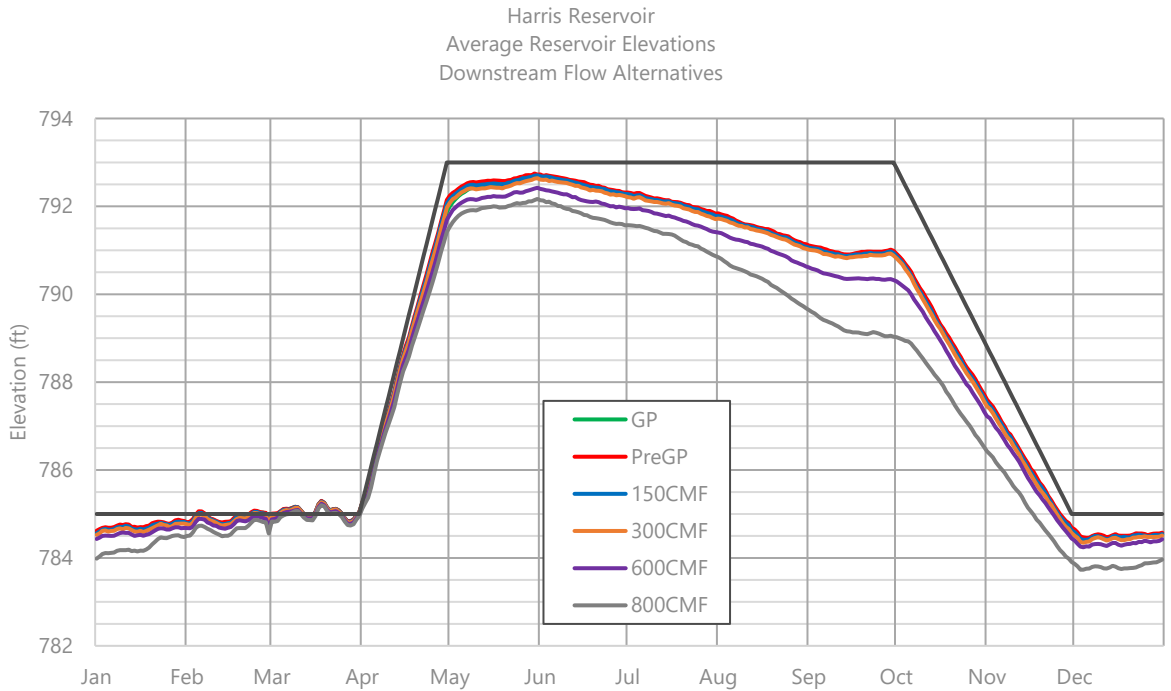
# Hydrologic Models



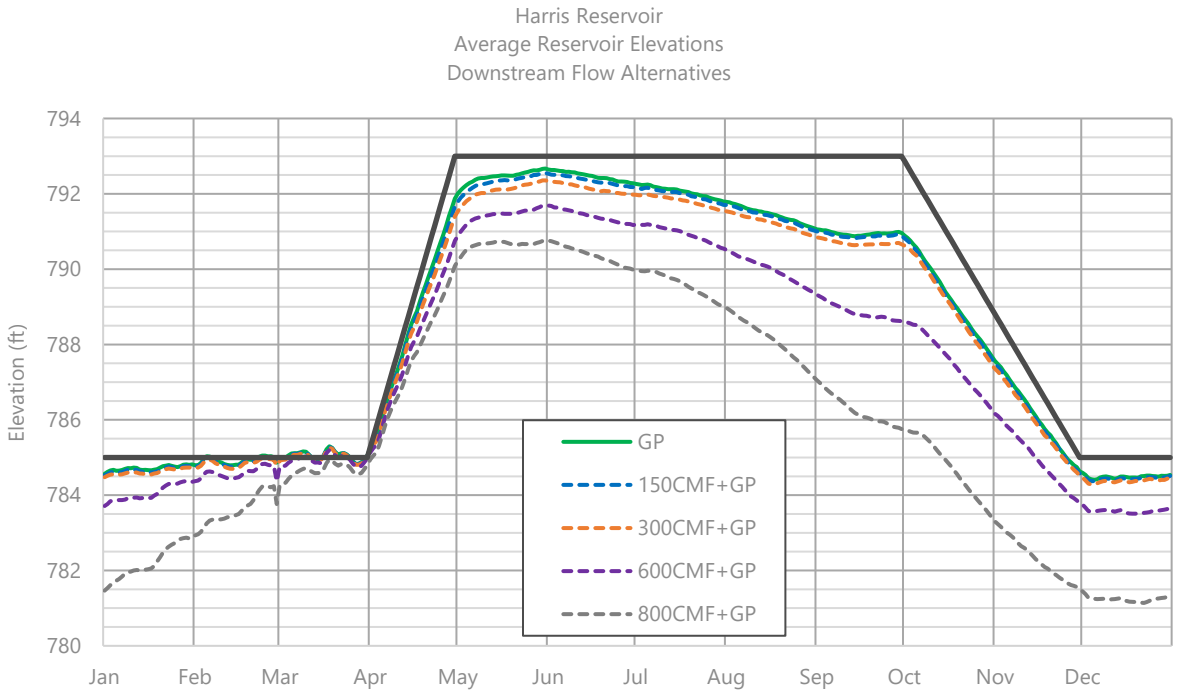
# Operations Model Assumptions

- A rule for peaking operations is included in all simulations.
- The minimum elevation for Harris Reservoir is 770.5 feet msl.
- Pre-Green Plan: The release criteria from the Green Plan contained in the model were removed.
- Continuous Minimum Flows: A new continuous release rule replaces the current Green Plan release rule. The releases were reduced to 85 cfs when the flows at the Heflin gage drop below 50 cfs. This is the drought cutback in the current Green Plan.
- Continuous Minimum Flows + Green Plan: A new continuous release rule is added with the current Green Plan release rule. Both rules reduce their releases to 85 cfs when the flows at the Heflin gage drop below 50 cfs. This is the drought cutback in the current Green Plan.
- A theoretical minimum flow unit that uses same intake as existing Harris unit to produce power.

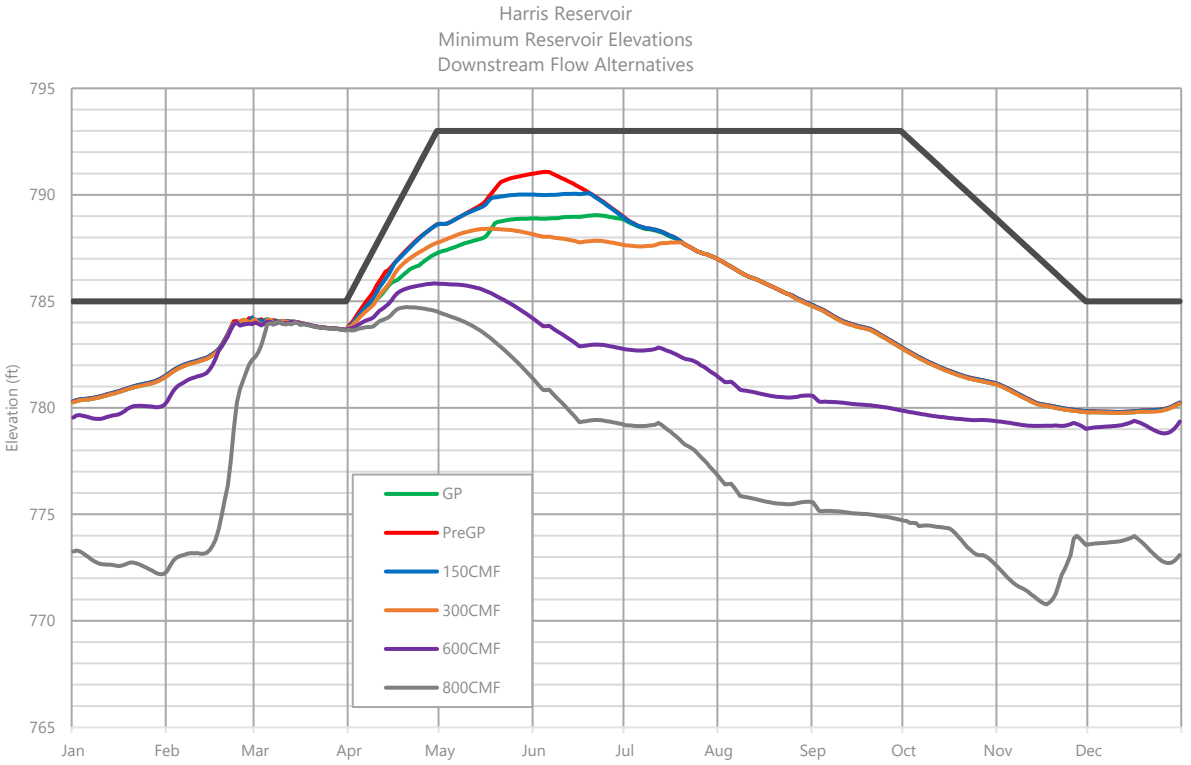
# Operations Analysis



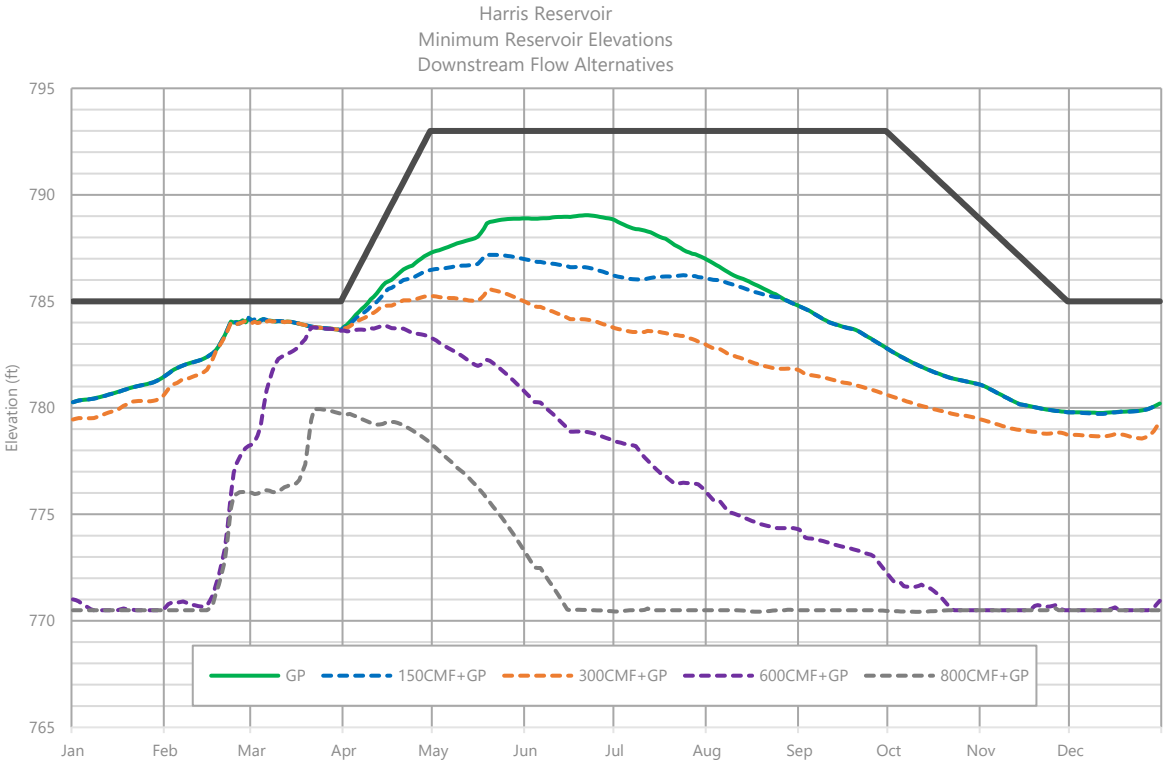
# Operations Analysis



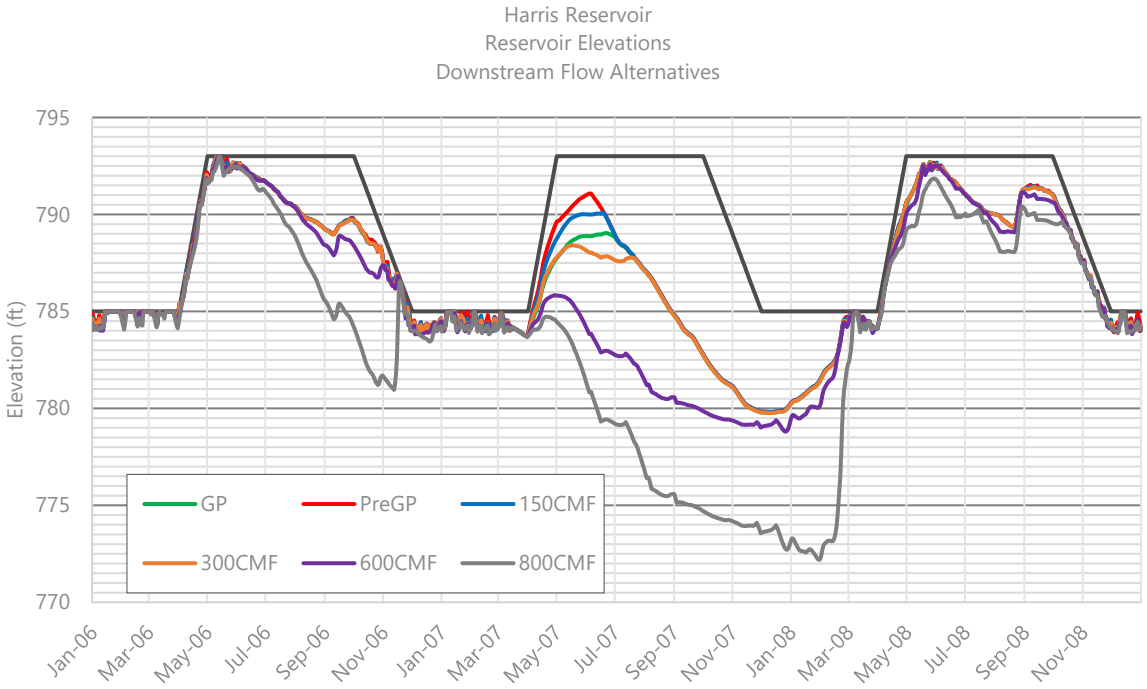
# Operations Analysis



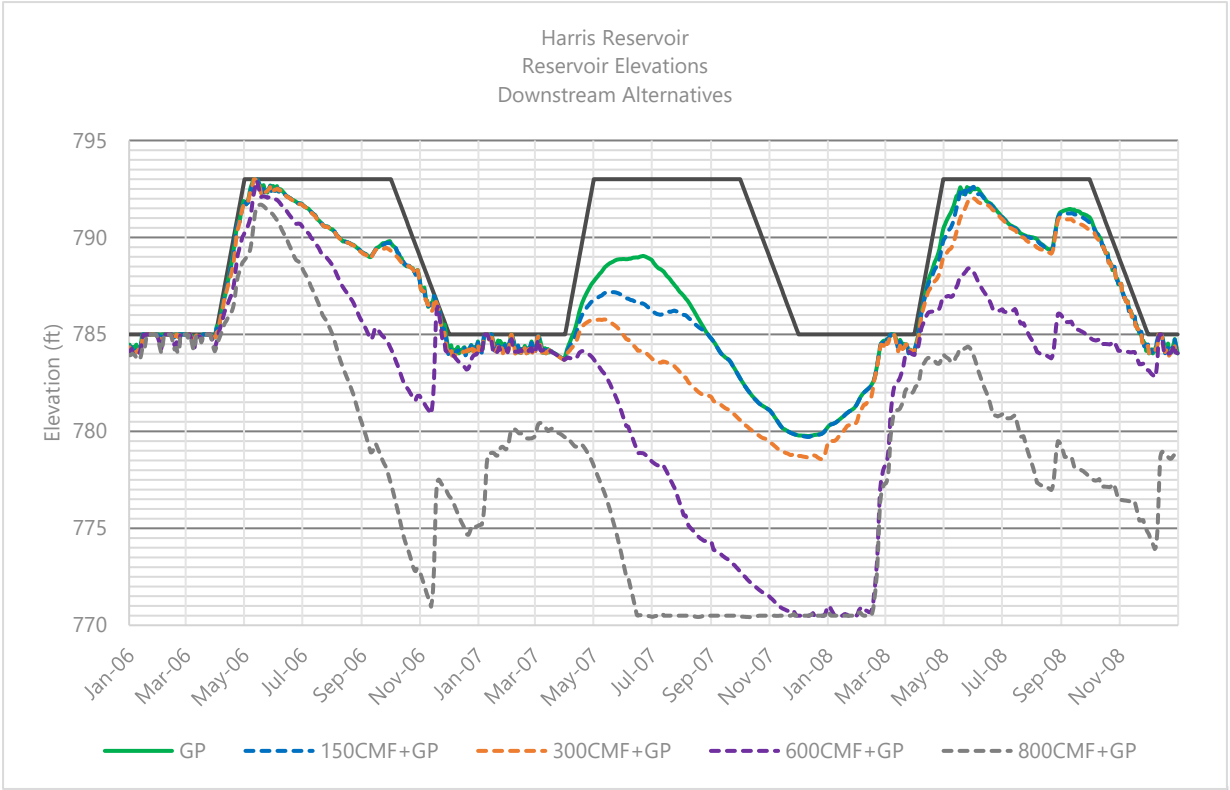
# Operations Analysis



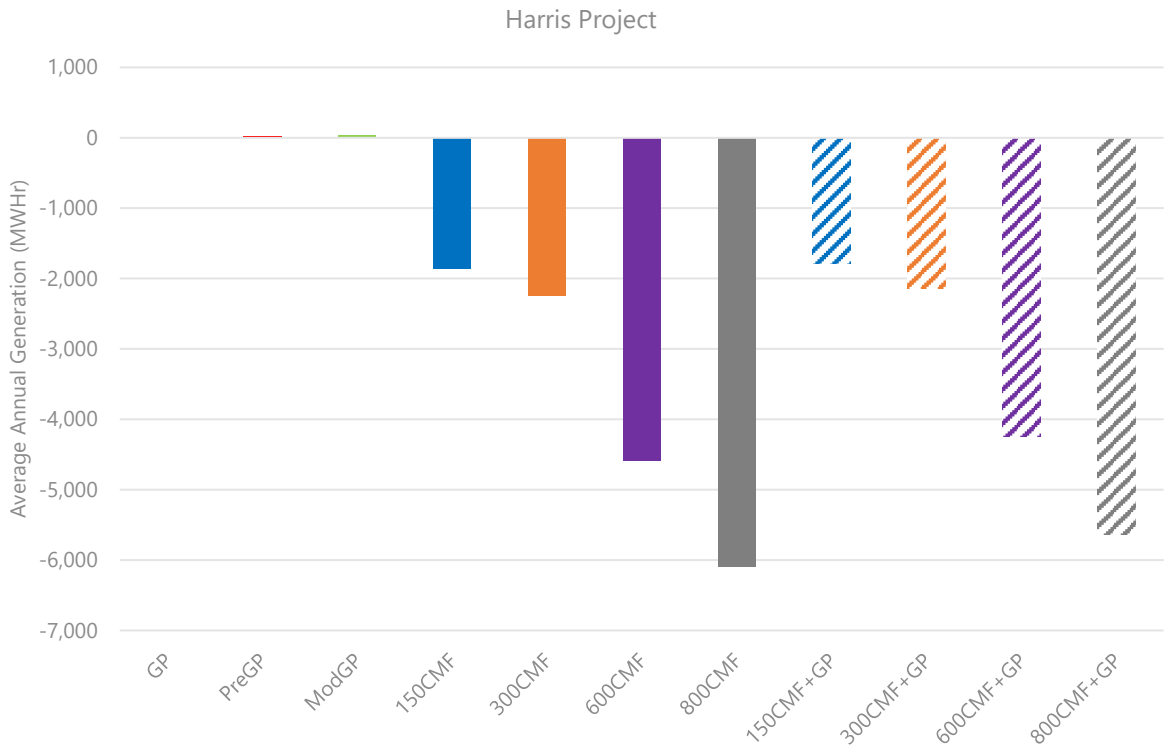
# Operations Analysis



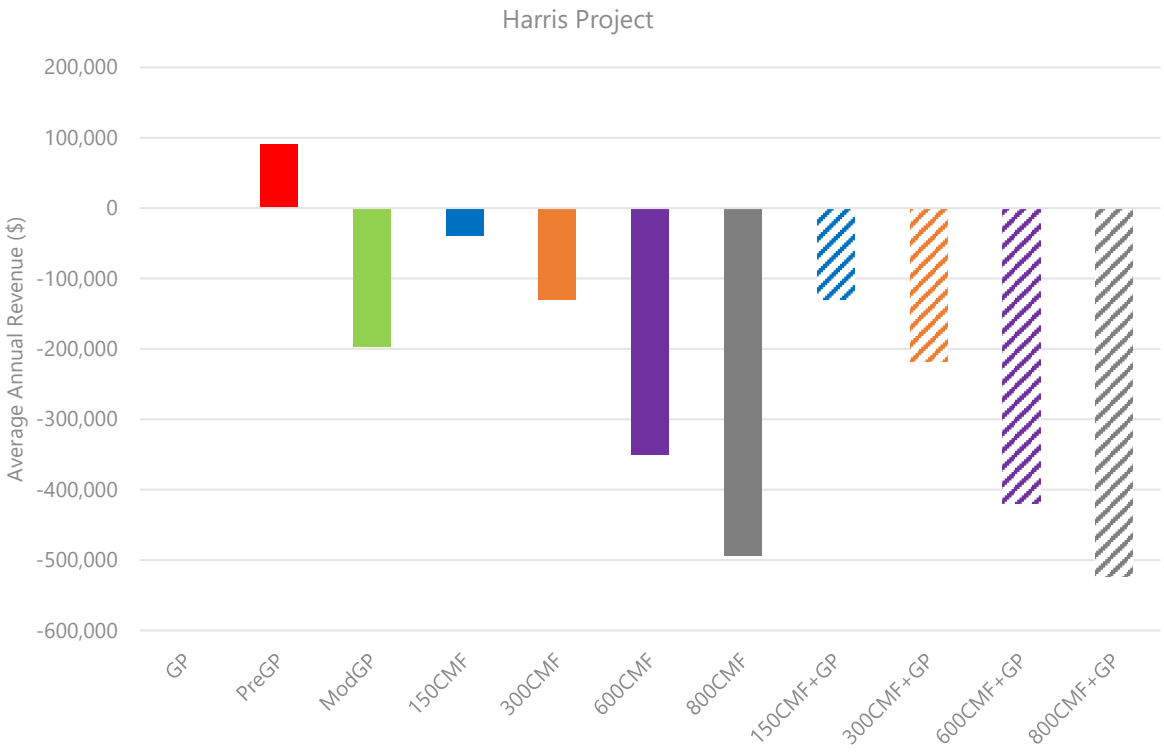
# Operations Analysis



# Operations Analysis



# Operations Analysis



# Operations Analysis

## Flood Control

- The downstream release alternatives were modeled with the current USACE-approved flood control procedures that are incorporated into the daily HEC-ResSim model. Modifying the downstream releases would not impact this operation.

## Navigation

- Altering downstream releases will not impact to the number of days over the period of record that each alternative would support navigation releases under each of the downstream release alternatives.

## Drought Operations

- The HEC-ResSim model was used to evaluate how drought operations may be positively or adversely affected by the downstream release alternatives.
- Little storage is available in Harris Reservoir compared to other storage projects within the ACT basin.
  - Therefore, there is no change in the percentage of time spent over the period of record in each drought intensity level.

# Martin Project Conditional Fall Extension Analysis

Article 403 of the Martin Project license requires Alabama Power to evaluate four conditions annually, beginning July 14, to implement the conditional fall extension (CFE), where the flood control curve remains at elevation 491 feet msl from September 1 to October 15.

## Conditions

1. Lake Martin is above its operating curve during September (487 to 488.5 feet msl).

2. The rolling 7-day average total basin inflow (i.e., the average of the total daily basin inflow for the previous 7 days recalculated on a daily basis for a given period of time) on the Tallapoosa River, calculated at Thurlow Dam, is at or higher than the median flow (i.e., the median of the recorded daily flows over the period of record for the particular day of interest).

3. The rolling 7-day average total basin inflow on the Coosa River, calculated at Jordan Dam, is at or higher than the median flow.

4. The elevations at the Weiss, Neely Henry, and Logan Martin developments on the Coosa River and the R.L. Harris Project on the Tallapoosa River must all be within 1 foot of their respective operating curves.

# Martin Project Conditional Fall Extension Analysis

**NUMBER OF YEARS OVER THE PERIOD OF RECORD (1939-2011) THE CONDITIONAL FALL EXTENSION IS IMPLEMENTED AT THE MARTIN DAM PROJECT BASED ON HEC-RESSIM MODEL OF DOWNSTREAM RELEASE ALTERNATIVES AT HARRIS DAM**

| Alternative | Implementation of Martin Conditional Fall Extension | | |
|---|---|---|---|
| | Number of Years (Over Period of Record) | Number of Years Compared to Baseline | Percent of Time (Over Period of Record) |
| GP (Baseline) | 19 | - | 26% |
| PreGP | 25 | 6 | 34% |
| 150CMF | 22 | 3 | 30% |
| 300CMF | 20 | 1 | 27% |
| 600CMF | 14 | -5 | 19% |
| 800CMF | 14 | -5 | 19% |
| 150CMF+GP | 18 | -1 | 25% |
| 300CMF+GP | 13 | -6 | 18% |
| 600CMF+GP | 10 | -9 | 14% |
| 800CMF+GP | 6 | -13 | 8% |

# Water Quality Analysis

## Methods

- Data from the PAD, Baseline Water Quality Report, and results from the FERC-approved Water Quality Study were used to qualitatively describe potential effects on dissolved oxygen in the tailrace and forebay water quality that may occur due to change in downstream releases.

## Results

- Lake Harris
  - 600CMF and 800 CMF resulted in lower average and minimum elevation compared to the GP, 150 CMF, and 300CMF alternatives.
    - This could reduce retention times compared to the GP and theoretically result in lower surface water temps and less stratification

- Downstream
  - Continuous releases may provide additional aeration, having a beneficial effect on dissolved oxygen in the tailrace
  - Each downstream release alternative that results in lower average lake level elevations would likely result in changes to tailrace water quality.
  - As the depth from the lake surface to the intake becomes shallower, water withdrawn by Harris Dam for generation would theoretically be warmer and have higher dissolved oxygen concentrations.

# Water Use Analysis

## Methods

- Qualitatively assessed using results from:
  - HEC-ResSim modeling
  - HEC-RAS modeling
  - Water Quantity, Water Use, and Discharges Report

## Results

- Lake Harris
  - The Lakeside Campground and Marina – no effect
  - The Wedowee Water, Sewer, and Gas Board
    - 600CMF+GP, 800CMF and 800CMF+GP result in lower winter pools
      - These alternatives could occasionally draw the reservoir level nearly fifteen feet below winter pool, reducing the amount of available water for use in Harris Reservoir.
- Downstream
  - No effect

# Erosion and Sedimentation Analysis

## Methods

- Assessments were used from the Erosion and Sedimentation Study

- HEC-RAS model (downstream)
  - Results were used to produce daily average water surface fluctuations for the study area (Harris Dam through Horseshoe Bend)

  - Analyzed to produce fluctuation exceedance curves at representative locations downstream of Harris Dam

  - Daily fluctuations were calculated for each day of the year for each downstream release alternative then ranked from greatest to least and assigned an exceedance probability

  - These factors were weighed against bank and soils conditions to qualitatively assess potential for bank degradation or erosion

HARRIS DAM RELICENSING

# Erosion and Sedimentation Analysis

## Results

- Lake Harris – No Effect
  - Erosion areas exist at or above the existing full pool elevation
  - While lower reservoir elevations could reduce wind and boat induced wave action affecting these areas, the proposed downstream releases will not affect identified erosion areas on Harris Reservoir

# Erosion and Sedimentation Analysis

## Results

- Downstream
  - Daily average fluctuations at the 15 most impaired streambank areas downstream of Harris Dam range from less than one foot to more than three feet depending on the downstream release alternative at each area.
  - Generally, fluctuations decrease further downstream due to flow attenuation
  - Because water fluctuation can exacerbate bank erosion, the daily fluctuations were calculated by determining the difference between daily maximum and minimum water surface elevations. The values were subsequently ranked from greatest to least and assigned an exceedance probability.

# Erosion and Sedimentation Analysis

**AVERAGE DAILY WATER SURFACE ELEVATION FLUCTUATIONS (IN FEET)**

| Alternative | Miles Below Harris Dam | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0.4 | 1 | 2 | 4 | 7 | 10 | 14 | 19 | 23 | 38 | 43 |
| PreGP | 4.67 | 4.38 | 4.17 | 4.47 | 3.26 | 2.68 | 3.66 | 3.06 | 2.03 | 0.92 | 1.80 |
| GP | 4.62 | 4.24 | 3.99 | 4.22 | 3.20 | 2.56 | 3.60 | 3.01 | 2.01 | 0.92 | 1.79 |
| ModGP | 4.18 | 3.96 | 3.80 | 3.95 | 3.00 | 2.45 | 3.53 | 2.96 | 1.98 | 0.90 | 1.74 |
| 150CMF | 4.10 | 3.94 | 3.81 | 4.07 | 3.15 | 2.56 | 3.63 | 3.02 | 2.01 | 0.93 | 1.80 |
| 300CMF | 3.59 | 3.51 | 3.44 | 3.72 | 2.96 | 2.34 | 3.54 | 2.99 | 1.99 | 0.92 | 1.74 |
| 600CMF | 2.84 | 3.51 | 2.86 | 3.14 | 2.56 | 2.01 | 3.17 | 2.82 | 1.92 | 0.90 | 1.68 |
| 800CMF | 2.50 | 2.57 | 2.57 | 2.85 | 2.34 | 1.83 | 2.97 | 2.70 | 1.85 | 0.88 | 1.63 |
| 150CMF+GP | 4.06 | 3.86 | 3.71 | 3.91 | 3.04 | 2.44 | 3.54 | 2.99 | 2.00 | 0.91 | 1.75 |
| 300CMF+GP | 3.53 | 3.43 | 3.33 | 3.56 | 2.84 | 2.23 | 3.41 | 2.92 | 1.96 | 0.91 | 1.72 |
| 600CMF+GP | 2.78 | 2.80 | 2.77 | 3.03 | 2.46 | 1.95 | 3.11 | 2.77 | 1.88 | 0.89 | 1.65 |
| 800CMF+GP | 2.43 | 2.49 | 2.49 | 2.76 | 2.26 | 1.79 | 2.95 | 2.67 | 1.82 | 0.86 | 1.61 |

# Aquatic Resources Analysis

## Methods

- Aquatic Habitat
  - Used info from the Downstream Aquatic Habitat Study
  - Each downstream release alternative was simulated using the HEC-RAS model
    - Hourly time-series of wetted perimeter values at multiple river cross sections; This data analyzed with same methodology employed in the Downstream Aquatic Habitat Study to assess the amount and stability of wetted habitat.

- Temperature Downstream
  - Water temperature data was used from 2019-2020 to calibrate data for the HEC-RAS model
  - Two weeks of Spring (April), Summer (July) and Fall (Sept.) were simulated
  - HEC-RAS model generated an hourly time-series of water temperature for each downstream release alternative

- Fish Entrainment
  - Reviewed info from Desktop Fish Entrainment and Turbine Mortality Report (PAD Appendix M)
  - The effect of downstream release alternatives on fish entrainment at the Harris Project were assessed based on changes in volume and velocity of water passing the turbines.

# Aquatic Resources Analysis

## Results

- Lake Harris
  - The higher CMF alternatives (600CMF and 800CMF) would result in lower average elevations in Harris Reservoir compared to GP, 150CMF, and 300CMF, reducing the amount of littoral habitat for juvenile fish and mollusks.
  - Lower elevations could reduce retention time and cause less thermal stratification, which could theoretically reduce the amount of cooler, oxygenated water during the summer months necessary for the survival of Striped Bass

- Fish Entrainment
  - The volume and velocity of water passing through the turbines would not differ among downstream release alternatives; therefore, fish entrainment is not expected to change under any of the downstream release alternatives.

# Aquatic Resources Analysis

## Results

- Downstream Aquatic Habitat – Wetted Perimeter

  - All Downstream releases, except the PreGP, increases wetted perimeter compared to the GP
    - ModGP resulted in the smallest increase, while the 800CMF resulted in the largest
    - Wetted perimeter increases generally diminished for each alternative with increasing distance from Harris Dam

  - The addition of GP pulse to the CMF alternatives did not increase wetted perimeter

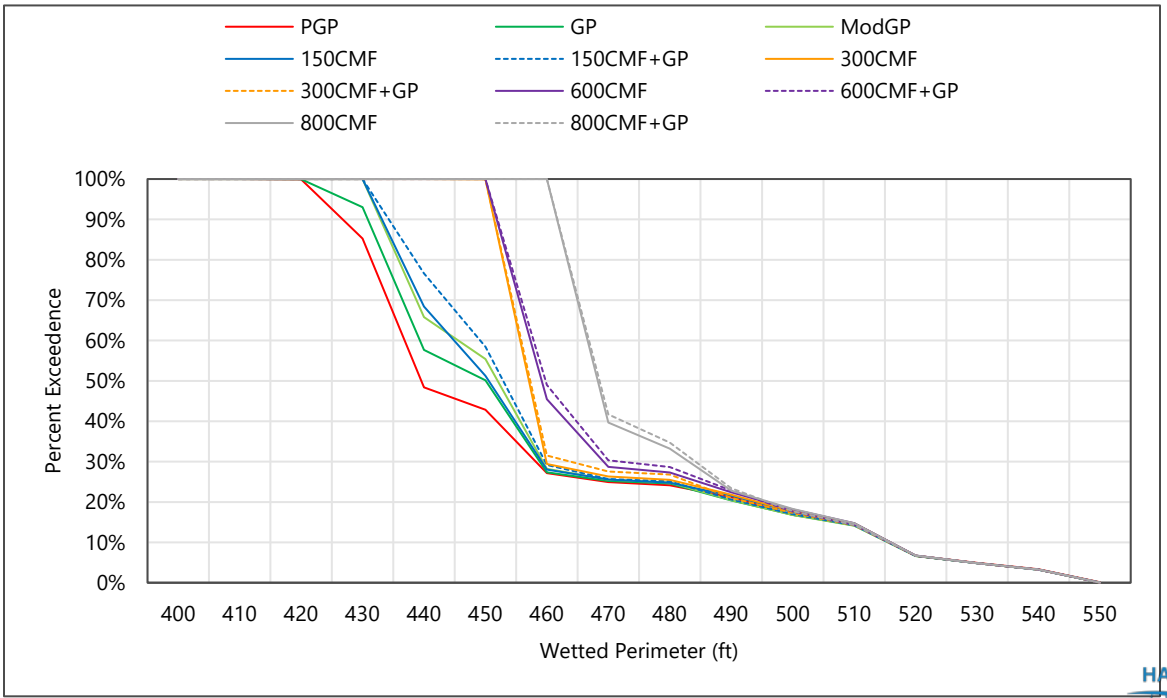
# Aquatic Resources Analysis

DIFFERENCE FROM EXISTING CONDITIONS (GP) IN AVERAGE WETTED PERIMETER

| | Miles Below Harris Dam Habitat Type | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0.4 | 1 | 2 | 4 | 7 | 10 | 14 | 19 | 23 | 38 | 43 |
| Alternative | Riffle | Riffle | Riffle | Pool | Pool | Riffle | Run-Pool | Riffle-Run | Riffle | Riffle | Pool |
| PreGP | -1.2% | -0.5% | -2.2% | -0.2% | -2.0% | -0.3% | -0.1% | -0.6% | -0.5% | -0.1% | -0.1% |
| GP | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| ModGP | 2.2% | 0.6% | 2.3% | 0.2% | 2.8% | 0.5% | 0.3% | 0.6% | 0.5% | 0.5% | 0.1% |
| 150CMF | 2.5% | 0.7% | 2.4% | 0.2% | 2.3% | 0.5% | 0.3% | 0.7% | 1.1% | 0.6% | 0.3% |
| 150CMF+GP | 3.0% | 1.0% | 3.4% | 0.3% | 3.5% | 0.6% | 0.3% | 1.0% | 1.0% | 0.6% | 0.2% |
| 300CMF | 5.8% | 2.2% | 6.8% | 0.5% | 6.0% | 1.1% | 0.6% | 2.4% | 2.8% | 1.3% | 0.7% |
| 300CMF+GP | 6.3% | 2.4% | 7.0% | 0.5% | 6.6% | 1.2% | 0.6% | 2.7% | 3.0% | 1.3% | 0.7% |
| 600CMF | 10.9% | 3.2% | 8.3% | 1.0% | 10.6% | 1.9% | 1.0% | 7.1% | 7.2% | 2.2% | 1.4% |
| 600CMF+GP | 11.1% | 3.3% | 8.4% | 1.0% | 10.8% | 1.9% | 1.0% | 7.1% | 7.4% | 2.2% | 1.4% |
| 800CMF | 14.1% | 4.0% | 9.1% | 1.2% | 12.4% | 2.4% | 1.2% | 10.9% | 10.6% | 2.8% | 1.9% |
| 800CMF+GP | 14.1% | 4.1% | 9.2% | 1.2% | 12.5% | 2.4% | 1.2% | 10.8% | 10.8% | 2.8% | 1.9% |

# Aquatic Resources Analysis

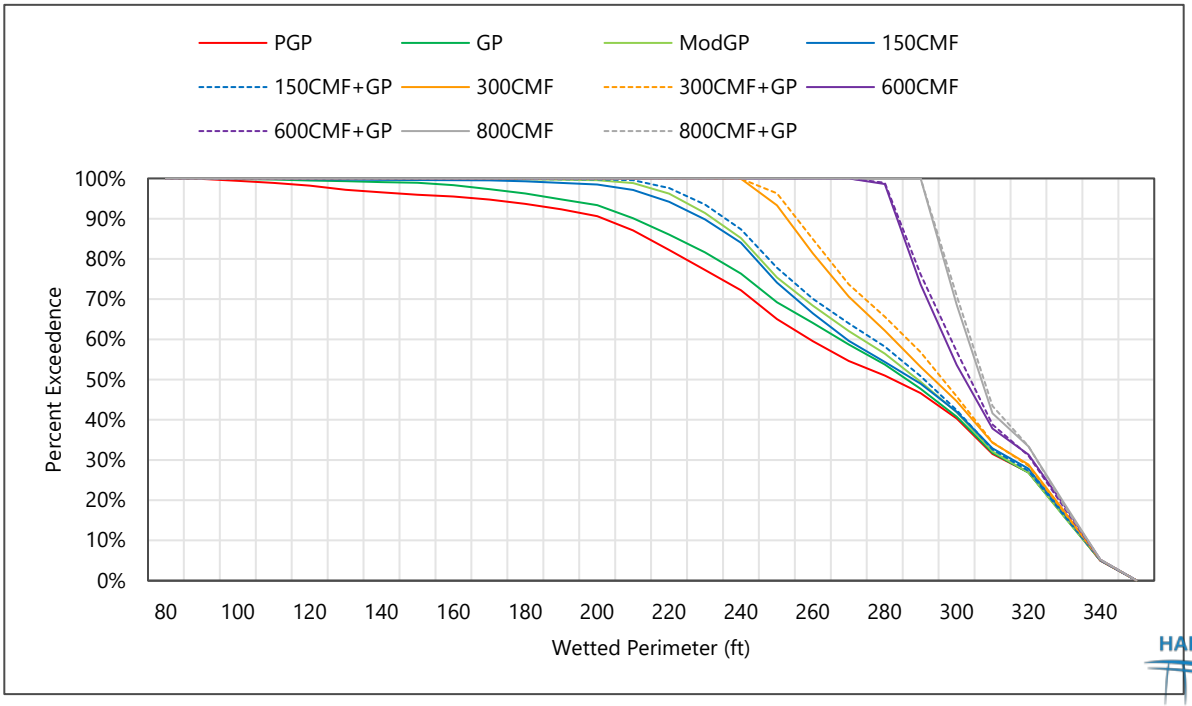
## Results



# Aquatic Resources Analysis

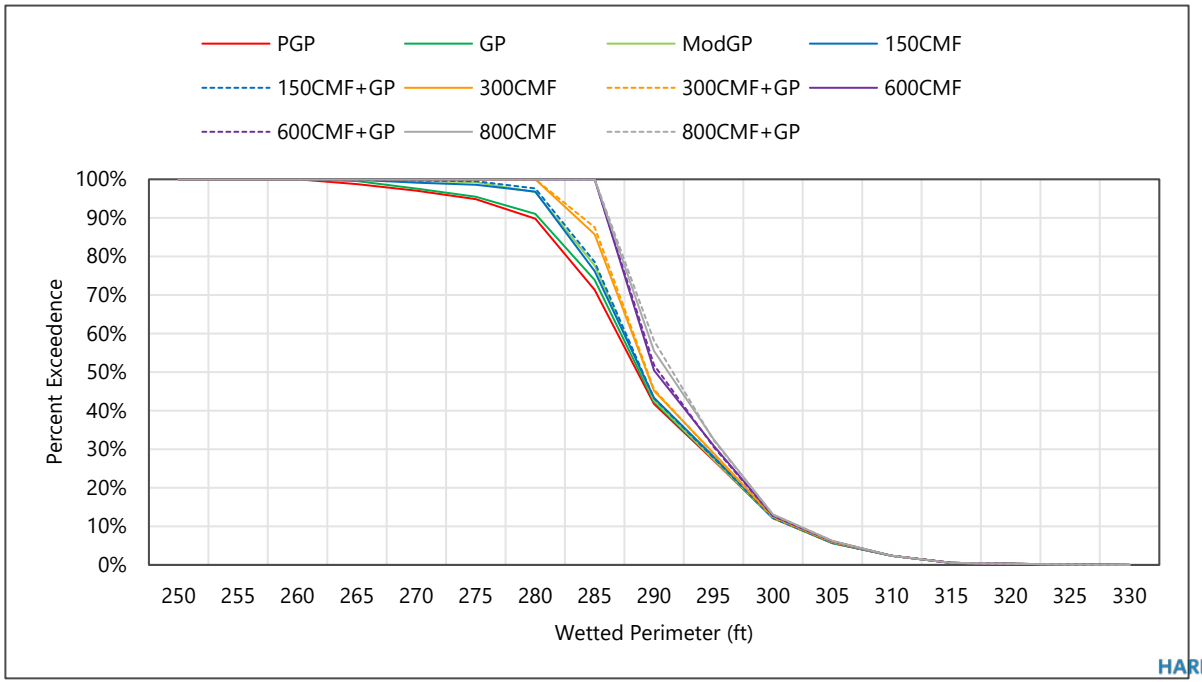
## Results

Wetted Perimeter Duration: **7.5 miles** Below Harris Dam



# Aquatic Resources Analysis

## Results



# Aquatic Resources Analysis

## Results

- Downstream Aquatic Habitat - Habitat Stability
  - All Downstream release alternatives, excluding the PreGP, resulted in decreased wetted perimeter fluctuations (i.e., increased stability)
  - ModGP resulted in the smallest percent decrease in wetted perimeter fluctuation over existing conditions (GP) – ranging from 0-21 percent
  - Wetted perimeter fluctuations generally diminished for each alternative with increasing distance from Harris Dam
  - 800CMF resulted in the largest percent decrease in fluctuations, ranging from 1 to -78 percent
  - The addition of GP pulse to the CMF alternatives did not increase wetted perimeter stability

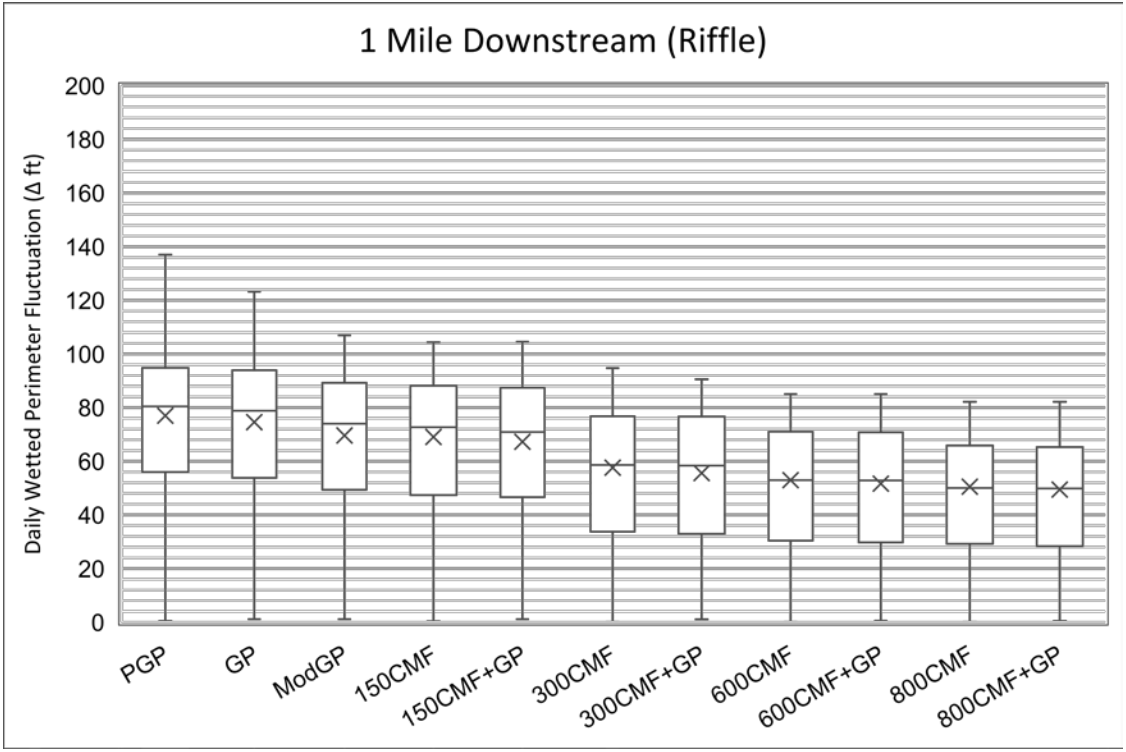
# Aquatic Resources Analysis

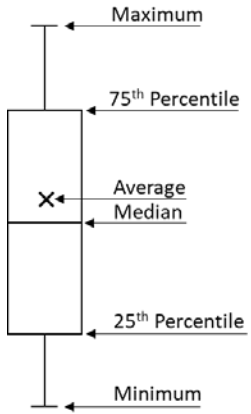
**DIFFERENCE FROM EXISTING CONDITIONS (GP) IN DAILY AVERAGE WETTED PERIMETER FLUCTUATION**

| Alternative | Miles Below Harris Dam Habitat Type | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0.4 | 1 | 2 | 4 | 7 | 10 | 14 | 19 | 23 | 38 | 43 |
| | Riffle | Riffle | Riffle | Pool | Pool | Riffle | Run-Pool | Riffle-Run | Riffle | Riffle | Pool |
| PreGP | -1% | 3% | 5% | 13% | 16% | 5% | 4% | 2% | 0% | 1% | 1% |
| GP | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| ModGP | -15% | -7% | -21% | -9% | -19% | -7% | -9% | -2% | 0% | -5% | -4% |
| 150CMF | -20% | -7% | -31% | -7% | -11% | -3% | -5% | 1% | 1% | -3% | -2% |
| 150CMF+GP | -19% | -10% | -32% | -10% | -19% | -8% | -10% | -1% | 1% | -5% | -5% |
| 300CMF | -37% | -23% | -68% | -14% | -31% | -13% | -13% | 0% | 3% | -9% | -9% |
| 300CMF+GP | -37% | -25% | -70% | -18% | -35% | -16% | -16% | -3% | 2% | -10% | -10% |
| 600CMF | -61% | -29% | -78% | -28% | -56% | -22% | -23% | -5% | 4% | -14% | -20% |
| 600CMF+GP | -61% | -31% | -78% | -30% | -58% | -24% | -25% | -8% | 2% | -15% | -21% |
| 800CMF | -77% | -32% | -82% | -35% | -64% | -26% | -28% | -16% | 2% | -17% | -27% |
| 800CMF+GP | -78% | -34% | -82% | -37% | -66% | -28% | -29% | -17% | 1% | -18% | -27% |

# Aquatic Resources Analysis

**WETTED PERIMETER FLUCTUATION SUMMARY PLOT**



# Aquatic Resources Analysis

## Results

- Downstream Aquatic Habitat – Temperature
- HEC-RAS model revealed little difference in overall average water temperatures between each downstream release alternative at all locations analyzed.
- Noticeable difference in daily temperature fluctuations closer to dam.

| Period | Period Average Temp (℃) | | Daily Average Temp Fluctuation (℃) | |
|---|---|---|---|---|
| | PGP | 800 CMF | PGP | 800 CMF |
| Spring | 16.95 | 17.12 | 3.90 | 1.88 |
| Summer | 24.76 | 23.48 | 5.59 | 1.79 |
| Fall | 25.72 | 25.49 | 4.60 | 1.58 |

- Maximum daily, average hourly, and maximum hourly water temperature fluctuations generally followed this same trend, both in the tailrace and one mile downstream of Harris Dam.
- Differences between all downstream release alternatives were relatively small when compared at a location seven miles downstream of Harris Dam

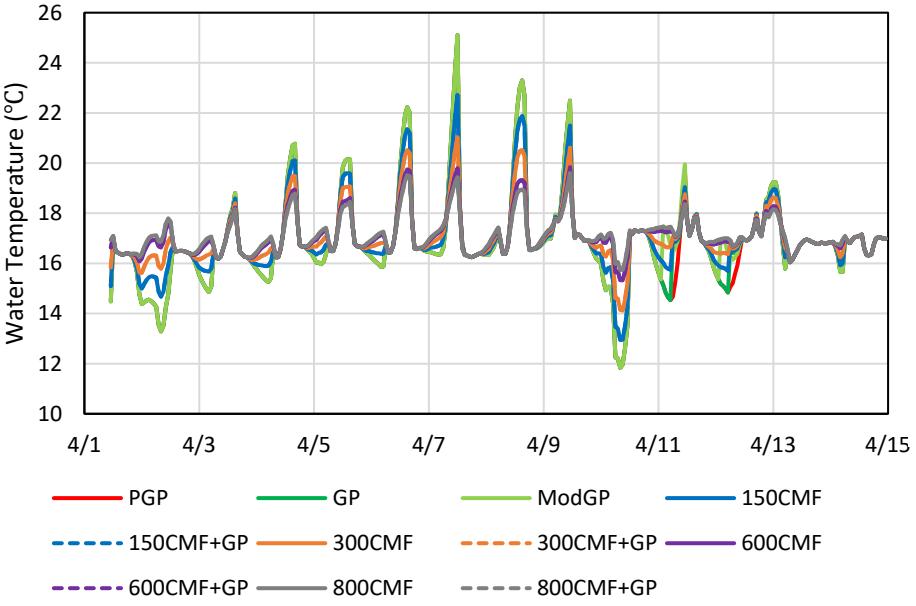
# Aquatic Resources Analysis

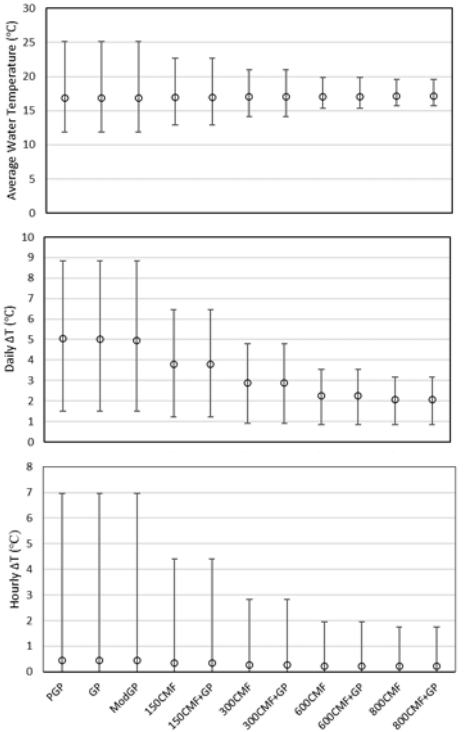
## SUMMARY OF WATER TEMPERATURE MODELING RESULTS

| | Alternative | Spring | | | | | Summer | | | | | Fall | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Period Avg | Avg Daily Δ | Max Daily Δ | Avg Hourly Δ | Max Hourly Δ | Period Avg | Avg Daily Δ | Max Daily Δ | Avg Hourly Δ | Max Hourly Δ | Period Avg | Avg Daily Δ | Max Daily Δ | Avg Hourly Δ | Max Hourly Δ |
| 1-mi Downstream | PGP | **16.82** | **5.03** | **8.85** | **0.43** | **6.96** | **25.38** | **7.43** | **9.37** | **0.67** | **5.87** | **25.87** | **6.48** | **8.36** | **0.548** | **3.38** |
| | GP | 16.85 | 5.00 | 8.85 | 0.43 | 6.96 | 24.15 | 5.15 | 6.04 | 0.59 | 4.07 | 25.41 | 4.75 | 5.67 | 0.45 | 2.22 |
| | ModGP | 16.90 | 4.95 | 8.85 | 0.44 | 6.96 | 24.43 | 5.01 | 6.37 | 0.63 | 5.40 | 25.81 | 4.65 | 5.59 | 0.45 | 2.65 |
| | 150CMF | 16.94 | 3.80 | 6.47 | 0.34 | 4.40 | 24.03 | 4.20 | 5.03 | 0.47 | 3.11 | 25.75 | 4.47 | 5.71 | 0.38 | 2.38 |
| | 150CMF+GP | 16.94 | 3.80 | 6.47 | 0.34 | 4.40 | 24.03 | 4.20 | 5.03 | 0.47 | 3.11 | 25.48 | 3.44 | 4.06 | 0.32 | 1.64 |
| | 300CMF | 17.02 | 2.90 | 4.78 | 0.27 | 2.82 | 23.88 | 3.28 | 4.05 | 0.36 | 2.24 | 25.65 | 2.98 | 3.72 | 0.26 | 1.63 |
| | 300CMF+GP | 17.02 | 2.90 | 4.78 | 0.27 | 2.82 | 23.88 | 3.28 | 4.05 | 0.36 | 2.24 | 25.53 | 2.57 | 3.04 | 0.24 | 1.14 |
| | 600CMF | 17.08 | 2.25 | 3.54 | 0.22 | 1.96 | 23.72 | 2.48 | 3.12 | 0.26 | 1.51 | 25.56 | 2.04 | 2.50 | 0.21 | 1.11 |
| | 600CMF+GP | 17.08 | 2.25 | 3.54 | 0.22 | 1.96 | 23.72 | 2.48 | 3.12 | 0.26 | 1.51 | 25.54 | 1.92 | 2.24 | 0.20 | 0.94 |
| | 800CMF | 17.10 | 2.07 | 3.18 | 0.21 | 1.76 | 23.65 | 2.24 | 2.81 | 0.23 | 1.30 | 25.54 | 1.79 | 2.17 | 0.20 | 0.97 |
| | 800CMF+GP | **17.10** | **2.07** | **3.18** | **0.21** | **1.76** | **23.65** | **2.24** | **2.81** | **0.23** | **1.30** | **25.53** | **1.74** | **2.00** | **0.19** | **0.92** |

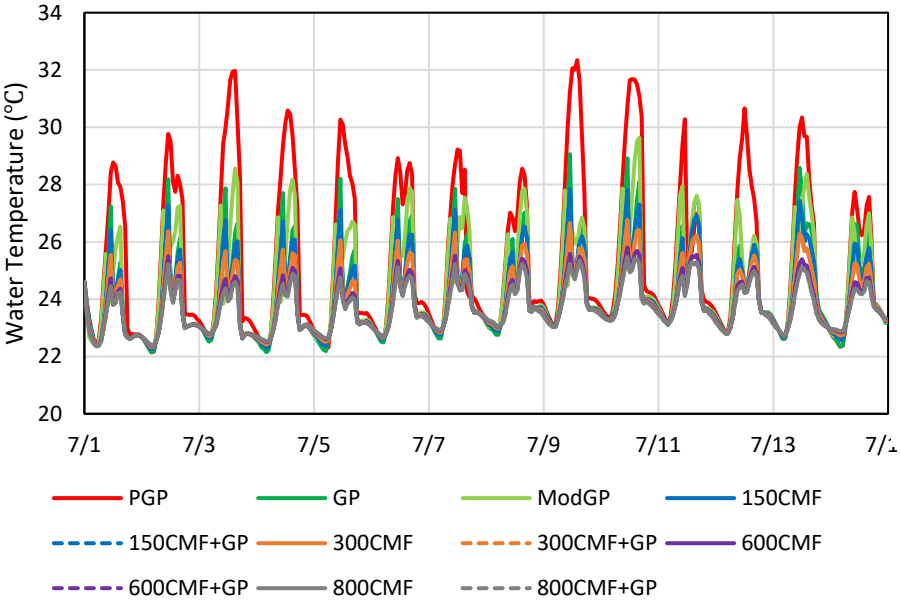
Units = ℃

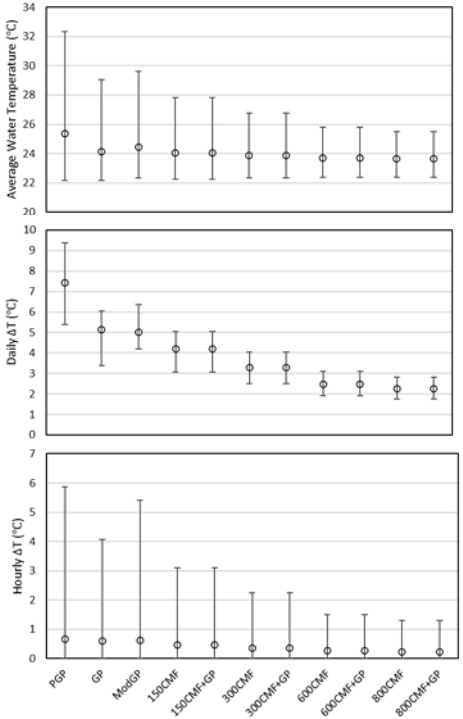
# Aquatic Resources Analysis



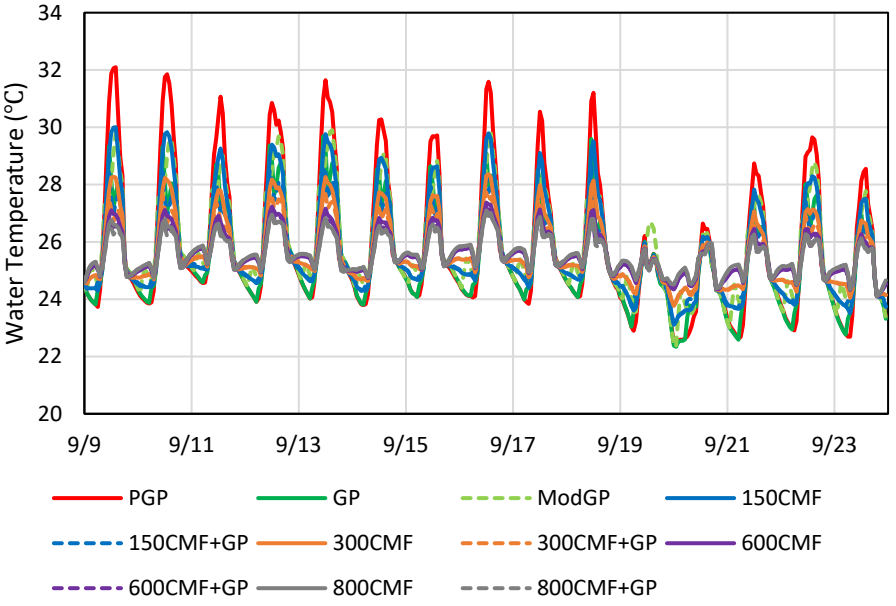



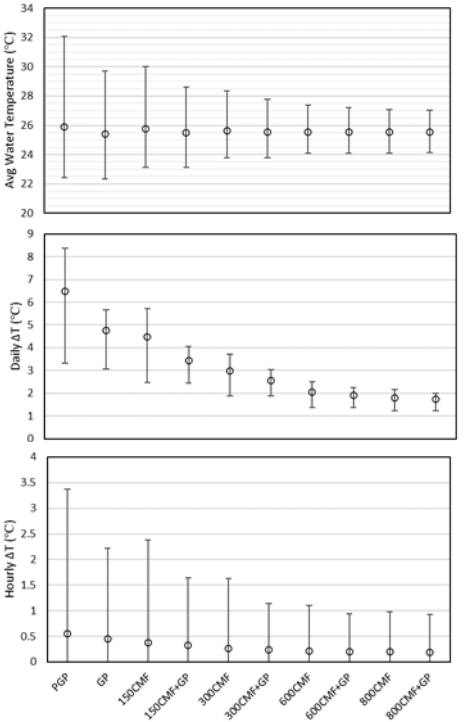
# Aquatic Resources Analysis



# Aquatic Resources Analysis



# Wildlife and Terrestrial Resources Analysis

## Methods

- Lake Harris and Downstream
  - Alabama Power used the outputs from the HEC-ResSim and HEC-RAS models to assess the effects of downstream release alternatives on wildlife and terrestrial resources.

## Results

- Lake Harris
  - 600CMF, 600CMF+GP, 800CMF, and 800CMF+GP alternatives result in lowering the water surface elevation for all months of the year
  - May result in a net decrease in littoral habitat available for amphibians, mussels, and other invertebrates that only persist in shallow water
  - Areas that are permanently de-wetted due to lower water elevations will shift habitat type

# Wildlife and Terrestrial Resources Analysis

## Results

- Downstream
  - All proposed downstream release alternatives are expected to have a positive effect on wildlife and terrestrial resources in the Tallapoosa River below Harris Dam (wetted area and wetted perimeter fluctuation)
    - Littoral habitat is expected to increase at a similar % as the wetted perimeter.
    - Greater amounts of wetted perimeter may result in marginal increases in availability of shallow breeding sites for early spring breeding amphibians

- Wetted Perimeter Fluctuation
  - As water perimeter fluctuations decrease, littoral habitat stability increases.
  - All release alternatives (excluding PreGP) would decrease the wetted perimeter fluctuation between Harris Dam and Horseshoe Bend.
    - 150 CMF provides the least percent increase to littoral habitat stability
    - 800CMF and 800CMF+GP provides the greatest percent increase in littoral habitat stability

# Threatened and Endangered Species Analysis

## Methods

- Alabama Power used the Threatened and Endangered Species Study and outputs from the HEC-RAS model to assess the effects of downstream release alternatives on threatened and endangered species.

## Results

- No T&E species or critical habitats are present in the Tallapoosa River from Harris Dam through Horseshoe Bend; therefore, there would be no effects on T&E species from any of the downstream release alternatives.

# Recreation Analysis

## Methods

- LIDAR used to measure elevation (785, 786, 787, 788, 789 ft msl contours)
- Elevation data used to calculate depth at point
- Depth for points beyond the 785 ft msl contour was estimated by slope analysis
- The amount of depth was determined separately for each type of private structure (i.e., boathouses, floats, piers, wet slips, and boardwalks) and for public boat ramps.

- Example:


HARRIS DAM RELICENSING

# Recreation Analysis

## Results

- Private structures
  - 2,282 private structures identified
  - 2,123 private structures analyzed

- PGP, 150CMF, 300CMF, and 150CMF+GP have minimal effects on usability of lake recreation structures throughout the year
- Higher downstream release alternatives have the potential to reduce the usability of these structures in the summer months.

# Recreation Analysis

**NUMBER OF PRIVATE RECREATION STRUCTURES ON HARRIS RESERVOIR THAT ARE USABLE AT SPECIFIED RESERVOIR ELEVATIONS**

600CMF (summer pool)

800CMF (summer pool)

800CMF (winter pool)

| Lake Elevation (feet msl) | Number of Usable Private Structures | Percentage of Usable Private Structures |
|---|---|---|
| 793 | 2123 | 100.0 |
| 792 | 1990 | 93.8 |
| 791 | 1786 | 84.1 |
| 790 | 1568 | 73.9 |
| 789 | 1327 | 62.5 |
| 788 | 1112 | 52.4 |
| 787 | 826 | 38.9 |
| 786 | 642 | 30.2 |
| 785 | 449 | 21.1 |
| 784 | 311 | 14.6 |
| 783 | 199 | 9.4 |
| 782 | 138 | 6.5 |
| 781 | 95 | 4.5 |
| 780 | 63 | 3.0 |

# Recreation Analysis

**NUMBER OF PRIVATE RECREATION STRUCTURES ON HARRIS RESERVOIR THAT ARE USABLE AT SPECIFIED RESERVOIR ELEVATIONS**

600CMF+GP (summer pool)

800CMF+GP (summer pool)

600CMF+GP (winter pool)

800CMF+GP (winter pool)

| Lake Elevation (feet msl) | Number of Usable Private Structures | Percentage of Usable Private Structures |
|---|---|---|
| 793 | 2123 | 100.0 |
| 792 | 1990 | 93.8 |
| 791 | 1786 | 84.1 |
| 790 | 1568 | 73.9 |
| 789 | 1327 | 62.5 |
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| 786 | 642 | 30.2 |
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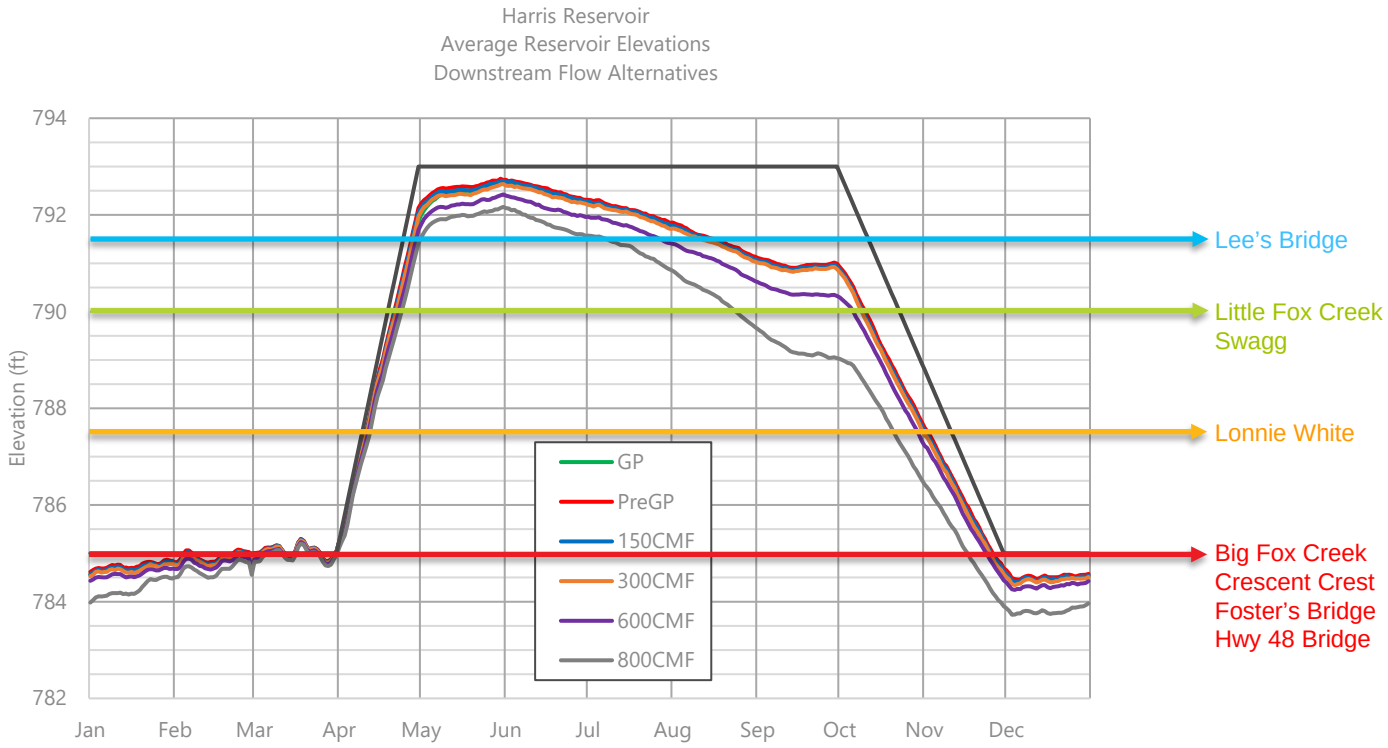
| 784 | 311 | 14.6 |
| 783 | 199 | 9.4 |
| 782 | 138 | 6.5 |
| 781 | 95 | 4.5 |
| 780 | 63 | 3.0 |

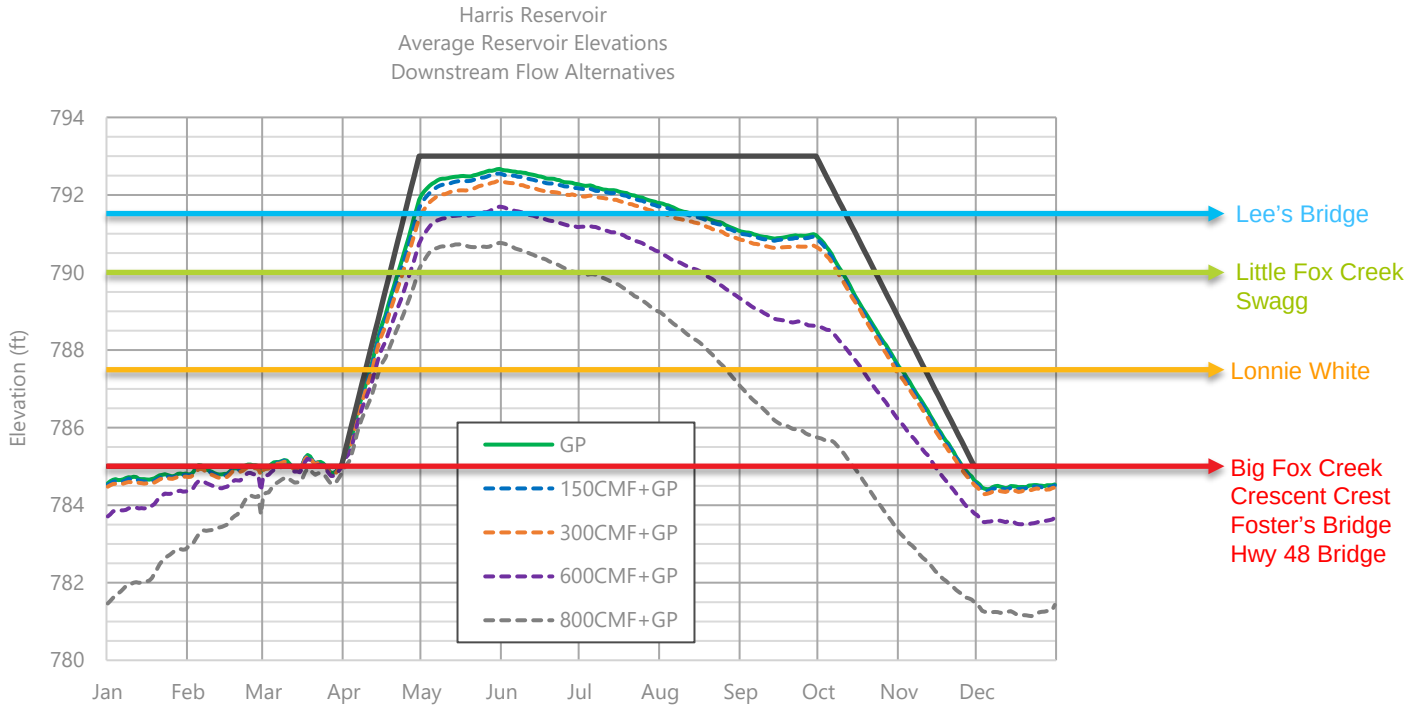
# Recreation Analysis




**MINIMUM WATER LEVELS FOR BOAT RAMP USABILITY**

HARRIS DAM RELICENSING

# Recreation Analysis




**MINIMUM WATER LEVELS FOR BOAT RAMP USABILITY**

# Recreation Analysis

## Methods

- Downstream
  - "Boatable days" were defined as days (both weekday and weekend) when flows measured at the Wadley gage were between 450 cfs and 2,000 cfs between sunrise and sunset

  - HEC-RAS was used to assess the impact of downstream releases on boating recreation closer to Harris Dam
    - HEC-RAS model was used to generate one year of hourly data for each of the 11 alternatives, using 2001 historical data as a baseline typical year, to be able to compare the different alternatives

  - Additionally, flow depth from Harris Dam to Malone was assessed by examining the minimum depth at ten cross sections for each of the downstream release alternatives
    - Minimum water depth was calculated by subtracting the lowest water surface elevation, occurring at any point in the year, from the minimum channel elevation at each cross section

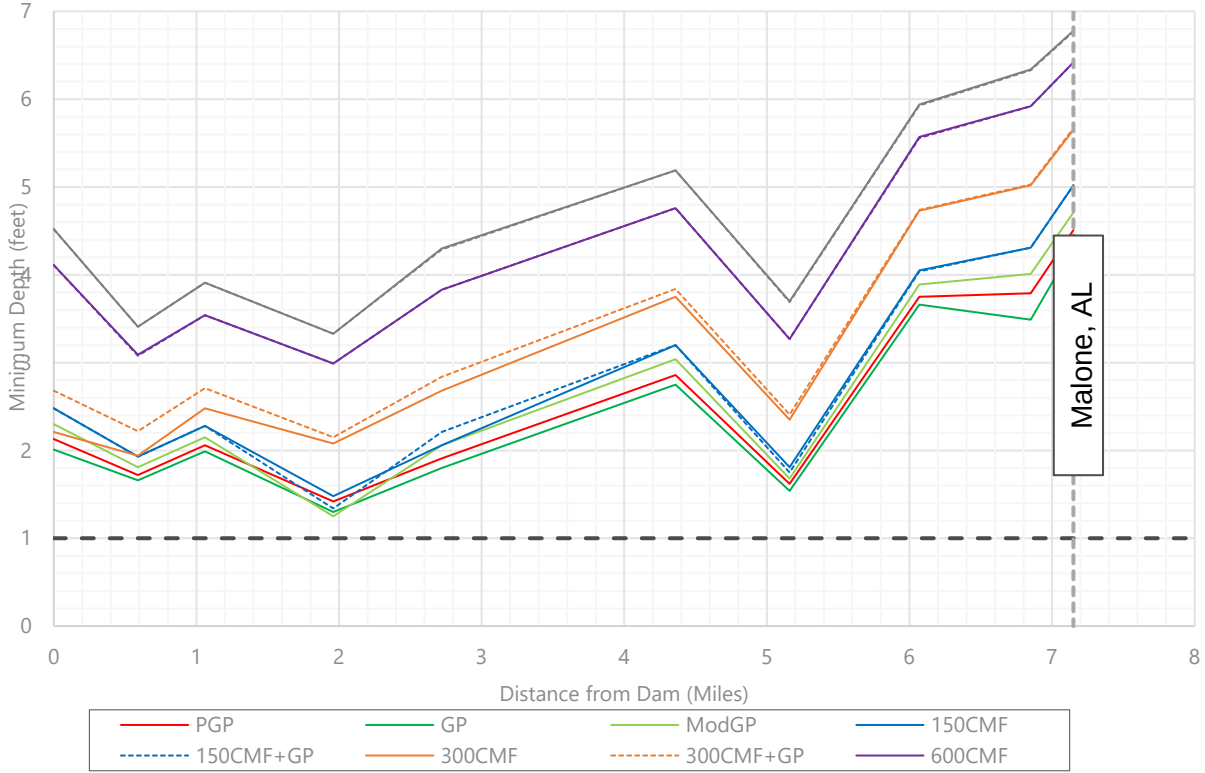
# Recreation Analysis

## Results

- Spring and Fall have the most variation in number of boatable days, with the most annual boatable days occurring with the 300CMF+GP alternative.

| Alternative | Winter | Spring | Summer | Fall | Annual |
|---|---|---|---|---|---|
| PreGP | 27 | 19 | 21 | 30 | 97 |
| GP | 30 | 18 | 23 | 29 | 100 |
| ModGP | 30 | 19 | 31 | 40 | 120 |
| 150CMF | 29 | 19 | 24 | 37 | 109 |
| 300CMF | 32 | 15 | 29 | 61 | 137 |
| 600CMF | 29 | 7 | 27 | 63 | 126 |
| 800CMF | 27 | 4 | 25 | 61 | 117 |
| 150CMF+GP | 34 | 17 | 28 | 43 | 122 |
| 300CMF+GP | 35 | 16 | 31 | 63 | 145 |
| 600CMF+GP | 30 | 11 | 28 | 63 | 132 |
| 800CMF+GP | 26 | 6 | 28 | 62 | 122 |

# Recreation Analysis




**MINIMUM DEPTH (IN FEET) OF THE TALLAPOOSA RIVER FROM HARRIS DAM TO MALONE BASED ON HEC-RAS MODEL OF DOWNSTREAM RELEASE ALTERNATIVES**

# Recreation Analysis

## Methods

- Downstream Navigability
  - For the initial analysis, the minimum flow depth threshold of one foot was achieved if any portion of a cross section measured at least that depth.

  - A one-foot threshold at any one given point on a cross section is not an accurate indicator of river navigability.
    - Therefore, an annual depth analysis was performed to compare change in surface water elevations at particular cross sections.

    - This additional study was performed to depict a single low flow period on a single day (Sept. 9, 2001) at 10 cross sections between Harris Dam and Malone

# Recreation Analysis

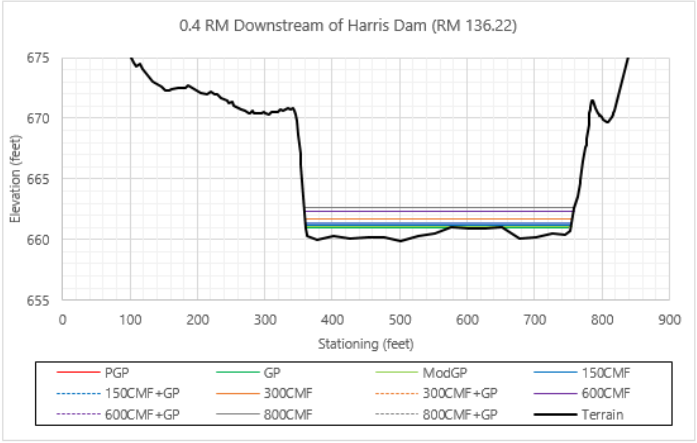
## Results

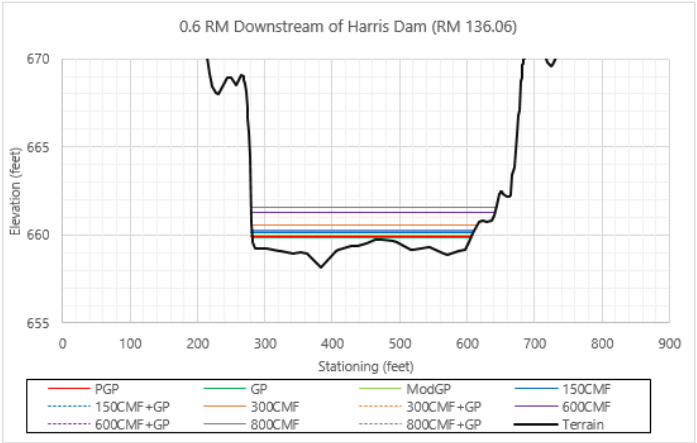
| Alternative | Miles Below Harris Dam | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **0.4** | **0.6** | **0.8** | **1.0** | **1.5** | **2.0** | **2.5** | **3.0** | **4.4** | **6.0** |
| GP | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PreGP | 0.08 | 0.07 | 0.08 | 0.06 | 0.07 | 0.07 | 0.08 | 0.1 | 0.04 | -0.01 |
| 150CMF | 0.28 | 0.28 | 0.33 | 0.29 | 0.31 | 0.3 | 0.36 | 0.48 | 0.28 | 0.19 |
| 150CMF+GP | 0.28 | 0.28 | 0.33 | 0.29 | 0.31 | 0.3 | 0.36 | 0.48 | 0.28 | 0.22 |
| ModGP | 0.18 | 0.17 | 0.2 | 0.17 | 0.19 | 0.18 | 0.21 | 0.29 | 0.15 | 0.12 |
| 300CMF+GP | 0.72 | 0.75 | 0.86 | 0.79 | 0.79 | 0.8 | 0.94 | 1.27 | 0.87 | 0.86 |
| 300CMF | 0.72 | 0.75 | 0.86 | 0.79 | 0.79 | 0.8 | 0.94 | 1.27 | 0.87 | 0.86 |
| 600CMF+GP | 1.38 | 1.43 | 1.57 | 1.54 | 1.48 | 1.49 | 1.76 | 2.42 | 1.74 | 1.5 |
| 600CMF | 1.38 | 1.43 | 1.57 | 1.54 | 1.48 | 1.49 | 1.76 | 2.42 | 1.74 | 1.5 |
| 800CMF+GP | 1.69 | 1.75 | 1.92 | 1.91 | 1.81 | 1.83 | 2.16 | 2.97 | 2.18 | 1.87 |
| 800CMF | 1.69 | 1.75 | 1.92 | 1.91 | 1.81 | 1.83 | 2.16 | 2.97 | 2.18 | 1.87 |

**CHANGE IN WATER SURFACE ELEVATION (IN FEET) IN THE TALLAPOOSA RIVER DOWNSTREAM OF HARRIS DAM BASED ON HEC-RAS MODEL OF DOWNSTREAM RELEASE ALTERNATIVES COMPARED TO BASELINE (GP)**

HARRIS DAM RELICENSING

# Recreation Analysis



# Cultural Resources Analysis

## Methods

- Used existing information (LIDAR, expert opinion) and the models developed for the Phase 1 Report to assess cultural resources

## Results

- Lake Harris
  - No changes from baseline with the PreGP, the 150CMF, the 300 CMF, or the 150 CMF +GP alternatives due to stable water elevations.
  - 600CMF, 800CMF, 300 CMF + GP, 600CMF+GP, 800CMF+GP will impact Harris Reservoir elevations, which will expose the cultural resources in and around Harris Reservoir to additional reservoir fluctuations, wind erosion, and vandalism.

- Downstream
  - The 19 cultural resources downstream of Harris Dam to Horseshoe Bend are inundated 49.4% of the time under existing conditions.

# Cultural Resources Analysis

**NUMBER OF CULTURAL RESOURCE SITES IN THE TALLAPOOSA RIVER BETWEEN HARRIS DAM AND HORSESHOE BEND NATIONAL MILITARY PARK AFFECTED DIFFERENTLY BY DOWNSTREAM RELEASE ALTERNATIVES COMPARED TO GREEN PLAN OPERATIONS**

| Alternative | Number of Cultural Resources Sites Affected Differently Than Baseline (GP) | Percent of Time Inundated Compared to Baseline (GP) |
|---|---|---|
| PreGP | 8 | -0.2 |
| ModGP | 0 | 0.0 |
| 150CMF | 8 | 0.2 |
| 300CMF | 8 | 1.9 |
| 600CMF | 19 | 4.1 |
| 800CMF | 19 | 4.2 |
| 150CMF+GP | 5 | 0.4 |
| 300CMF+GP | 5 | 2.4 |
| 600CMF+GP | 5 | 4.0 |
| 800CMF+GP | 5 | 4.3 |

# HAT 3 - March 31 meeting summary

## APC Harris Relicensing <g2apchr@southernco.com>

Fri 4/16/2021 4:49 PM

**To:** APC Harris Relicensing <harrisrelicensing@southernco.com>
**Bcc:** amy.silvano@dcnr.alabama.gov <amy.silvano@dcnr.alabama.gov>; chris.greene@dcnr.alabama.gov <chris.greene@dcnr.alabama.gov>; damon.abernethy@dcnr.alabama.gov <damon.abernethy@dcnr.alabama.gov>; evan.lawrence@dcnr.alabama.gov <evan.lawrence@dcnr.alabama.gov>; keith.henderson@dcnr.alabama.gov <keith.henderson@dcnr.alabama.gov>; mike.holley@dcnr.alabama.gov <mike.holley@dcnr.alabama.gov>; steve.bryant@dcnr.alabama.gov <steve.bryant@dcnr.alabama.gov>; matthew.marshall@dcnr.alabama.gov <matthew.marshall@dcnr.alabama.gov>; todd.fobian@dcnr.alabama.gov <todd.fobian@dcnr.alabama.gov>; nathan.aycock@dcnr.alabama.gov <nathan.aycock@dcnr.alabama.gov>; ken.wills@jcdh.org <ken.wills@jcdh.org>; arsegars@southernco.com <arsegars@southernco.com>; ammcvica@southernco.com <ammcvica@southernco.com>; dkanders@southernco.com <dkanders@southernco.com>; jcarlee@southernco.com <jcarlee@southernco.com>; jefbaker@southernco.com <jefbaker@southernco.com>; kechandl@southernco.com <kechandl@southernco.com>; tlmills@southernco.com <tlmills@southernco.com>; afleming@southernco.com <afleming@southernco.com>; cggoodma@southernco.com <cggoodma@southernco.com>; clowry@alabamarivers.org <clowry@alabamarivers.org>; mhunter@alabamarivers.org <mhunter@alabamarivers.org>; jwest@alabamarivers.org <jwest@alabamarivers.org>; gjobsis@americanrivers.org <gjobsis@americanrivers.org>; devridr@auburn.edu <devridr@auburn.edu>; irwiner@auburn.edu <irwiner@auburn.edu>; kmo0025@auburn.edu <kmo0025@auburn.edu>; wrighr2@aces.edu <wrighr2@aces.edu>; jhancock@balch.com <jhancock@balch.com>; lgallen@balch.com <lgallen@balch.com>; chris@alaudubon.org <chris@alaudubon.org>; sarah.salazar@ferc.gov <sarah.salazar@ferc.gov>; allan.creamer@ferc.gov <allan.creamer@ferc.gov>; rachel.mcnamara@ferc.gov <rachel.mcnamara@ferc.gov>; monte.terhaar@ferc.gov <monte.terhaar@ferc.gov>; colin.dinken@kleinschmidtgroup.com <colin.dinken@kleinschmidtgroup.com>; jason.moak@kleinschmidtgroup.com <jason.moak@kleinschmidtgroup.com>; kelly.schaeffer@kleinschmidtgroup.com <kelly.schaeffer@kleinschmidtgroup.com>; sandra.wash@kleinschmidtgroup.com <sandra.wash@kleinschmidtgroup.com>; sforehand@russelllands.com <sforehand@russelllands.com>; lgarland68@aol.com <lgarland68@aol.com>; rbmorris222@gmail.com <rbmorris222@gmail.com>; pace.wilber@noaa.gov <pace.wilber@noaa.gov>; mitchell.reid@tnc.org <mitchell.reid@tnc.org>; donnamat@aol.com <donnamat@aol.com>; trayjim@bellsouth.net <trayjim@bellsouth.net>; mhpwedowee@gmail.com <mhpwedowee@gmail.com>; straylor426@bellsouth.net <straylor426@bellsouth.net>; triciastearns@gmail.com <triciastearns@gmail.com>; wmcampbell218@gmail.com <wmcampbell218@gmail.com>; robinwaldrep@yahoo.com <robinwaldrep@yahoo.com>; holliman.daniel@epa.gov <holliman.daniel@epa.gov>; decker.chris@epa.gov <decker.chris@epa.gov>; mayo.lydia@epa.gov <mayo.lydia@epa.gov>; bill_pearson@fws.gov <bill_pearson@fws.gov>; evan_collins@fws.gov <evan_collins@fws.gov>; jeff_powell@fws.gov <jeff_powell@fws.gov>; jennifer_grunewald@fws.gov <jennifer_grunewald@fws.gov>; erin_padgett@fws.gov <erin_padgett@fws.gov>; jeff_duncan@nps.gov <jeff_duncan@nps.gov>

HAT 3,

The meeting summary and presentation from our March 31 meeting can be found on the Harris relicensing website in the HAT 3 - Fish and Wildlife folder.

Thanks,

**Angie Anderegg**
Hydro Services
(205)257-2251
arsegars@southernco.com

**Meeting Summary**
**HAT 3 Meeting**
**March 31, 2021**
**9:00 am to 11:30 am**
**Conference Call**

**Participants:**
Leslie Allen – Balch and Bingham
Angie Anderegg – Alabama Power Company (Alabama Power)
Dave Anderson – Alabama Power
Jeff Baker – Alabama Power
Jason Carlee – Alabama Power
Keith Chandler – Alabama Power
Evan Collins – United States Fish and Wildlife Service (USFWS)
Allan Creamer – Federal Energy Regulatory Commission (FERC)
Jim Crew – Alabama Power
Dennis Devries – Auburn University
Colin Dinken – Kleinschmidt Associates (Kleinschmidt)
Amanda Fleming – Alabama Power
Todd Fobian – Alabama Department of Conservation and Natural Resources (ADCNR)
Chris Goodman – Alabama Power
Jim Hancock – Balch and Bingham
Martha Hunter – Alabama Rivers Alliance (ARA)
Elijah Lamb – Auburn University
Donna Matthews – Downstream Property Owner
Lydia Mayo – Environmental Protection Agency (EPA)
Tina Mills – Alabama Power
Jason Moak – Kleinschmidt
Erin Padgett –USFWS
Sarah Salazar – FERC
Kelly Schaeffer – Kleinschmidt
Ehlana Stell – Auburn University
Jimmy Traylor – Downstream Property Owner
Sandra Wash – Kleinschmidt
Jack West – ARA
Rusty Wright – Auburn University

**Meeting Summary:**
Angie Anderegg (Alabama Power) opened the meeting and reviewed phone etiquette and explained that the purpose of the meeting was to review results of Auburn University's study, which will be filed as an appendix to Final Aquatic Resources Study Report on April 12, 2021.

Jason Moak (Kleinschmidt Associates) reviewed the background and purpose of the Aquatic Resources Study. Jason described the components of the study, which include the desktop

assessment, the temperature assessment of the Tallapoosa River conducted by Kleinschmidt and Alabama Power, and Auburn University's study.

Dr. Dennis Devries (Auburn University) reviewed the four target species and discussed the results of the literature review of temperature preferences and thresholds.

Ehlana Stell (Auburn University) reviewed the temperature analysis of downstream sites and at Heflin. Sarah Salazar (Federal Energy Regulatory Commission (FERC)) asked if a connection would be made between the temperature tolerances of the target species and the temperature regime of the river. Ehlana said that both variables were used to conduct growth simulations using a bioenergetics model. Jimmy Traylor (Downstream Property Owner) asked if it is correct that a 6 °C change is equivalent to a 42 °F change. Ehlana said that a temperature of 6 °C converts to 42 °F, but an increase or decrease in temperature of 6 °C in magnitude is about 11 °F. Dr. Rusty Wright (Auburn University) noted that the effect of temperature fluctuations on fish varies depending on whether the fluctuation is an increase or a decrease. Temperature fluctuations downstream of Harris Dam are greatest in the summer when water released from Harris Dam is cooler than ambient temperatures. Fish are typically more tolerant of sudden temperature decreases compared to sudden increases. Donna Matthews (Downstream Property Owner) asked if it was correct that 6 °C fluctuations never happened at the Heflin site. Ehlana stated that those fluctuations are very rare and noted that the Heflin site is more turbid and more insulated to changes in temperature. Donna asked if all this information was in the report, and Dr. Devries confirmed. Allan Creamer (FERC) stated that his understanding was that the Green Plan consisted of generation releases with pulse releases in between. Angie confirmed, stating that under the Green Plan, peaking occurs during peak generation demand and short pulses occur in between generation releases. Jimmy Traylor asked, regarding target species, which categories or families the Flathead Catfish (*Pylodictis olivaris*), Bowfin (*Amia calva*), carps, and suckers fall into. Dr. Wright stated that there are other kinds of catfish in the river, such as bullhead species, but Channel Catfish (*Ictalurus punctatus*) were chosen as a target species because they are very common. Flathead Catfish are in the family Icatluridae along with other species of catfish; Bowfin are the only living species in the family Amiidae; carps belong in the family Cyprinidae along with minnows; and suckers belong in the family Catostomidae. Elijah Lamb noted that Flathead Catfish seemed common in the river.

Elijah Lamb (Auburn University) reviewed the fish community assessment. Jimmy stated that there were more crayfish in the river before construction of Harris Dam and asked about the variation in crayfish quantity. Dr. Devries said the diet data indicated that fish were eating them and they are therefore available, but pre-dam conditions cannot be used for quantity or density comparison because the data do not exist. Dr. Wright said the two species of black bass (Alabama Bass (*Micropterus henshalli*) and Tallapoosa Bass (*Micropterus tallapoosae*)) often consume crayfish if they are available. Jimmy stated he spent a lot of summers wading in No Business Creek, Cornhouse Creek, and others and said the difference in the ecosystem once you move away from the backflow of the river is noticeable and likely characteristic of what the river looked like before the dam. Dr. Wright said there were limitations on the number of areas they could sample, but creeks are not typically good control sites for mainstem rivers. They are definitely less influenced by the dam but not necessarily less influenced by other factors such as upstream watershed conditions. Sarah asked if Auburn University was able to distinguish between insect orders within the diet data (e.g., Diptera, Ephemeroptera, Plecoptera, and

Tricoptera). Elijah stated they have those data but reported all insects as one diet item in the report to reduce complexity of the figures and that those data could be used in the future for publications; however, order data was used for inputs in the bioenergetics model. Donna stated that maintaining the granularity of those data could be important for future work. Elijah stated that the more detailed diet data is archived at Auburn University. Donna asked what accounts for variation in sample size by location, noting that Auburn had very little control over sample size of fish and that fish movement over large distances of river was seemingly insignificant. She stated that one would assume that in a 40-mile stretch of river that the species would be fairly evenly distributed. Donna asked if there was a statistical procedure that spread the data out over the river so that inferences could be made about the entire system. Elijah stated that catch rates are usually used as indicators of abundance. Lower catch rates of a species indicate lower abundance of that species. Almost half of the species captured were found at all four study sites. Dr. Wright noted that no sampling gear is without bias. The equipment is going to be more efficient in some habitats over others, but sampling is standardized as much as possible to reduce that bias. Dr. Devries noted it would not be accurate to apply data from one site to the entire system as habitat availability could vary by site and river stretch. Jason Moak (Kleinschmidt Associates) asked what the strangest diet item found was, and Elijah stated maybe a seven or eight inch snake. Jimmy asked what the major difference was between Auburn University's study and Elise Irwin's (United States Geological Survey) previous studies. Elijah said Elise's studies used pre-positioned electrofishing grids that sampled shallow water areas roughly the size of a tabletop. The Auburn University study used boat and barge electrofishing to cover various habitats over a greater area. The Auburn University study also included the bioenergetics component.

Ehlana reviewed the respirometry trials and stated that Auburn University wanted to test the more extreme fluctuations seen downstream of Harris Dam, so 5 °C decreases in temperature were used to simulate releases. Evan Collins (United States Fish and Wildlife Service (USFWS)) asked if it was reasonable to conclude that physical refuge and habitat could possibly be more of a limiting factor or be a more important consideration than temperature and water velocity alone. Dr. Wright said that the species of this study could not maintain position in the water column during generation in areas near the dam. Having refuges where fish can get out of high flow events is important, but it would be important to know where fish go on a fine-scale tracking approach (e.g., behind a rock, tree). That information would be needed before refuge availability could be determined. It is evident that fish are not being completely washed downstream because Auburn University found them in the tailrace. Dr. Devries summarized that temperature and velocity are as important as refuge, and while it is not evident where fish are going during high flow events, they appear to be taking refuge. Sarah asked if these studies cover the full range of temperature and dissolved oxygen (DO) seen downstream of Harris Dam based on varying positions of the weir. Ehlana stated that DO was not measured as an independent variable. Angie stated that the skimmer weir has been in the topmost position for years, so it is always releasing from as high as possible in the water column. Ehlana stated that a specific temperature (5 °C) needed to be chosen for trials because the entire range seen downstream of Harris Dam could not be covered in the study. The number of temperatures that could be tested was limited by the sample size and the amount of time available to conduct the study. Jason M. stated that based on what Auburn did test, some inferences could possibly be made about the temperatures in between. Dr. Wright said the effect of temperature on growth is not linear, so the ability to make those inferences is somewhat limited. He also stated that the effects of a temperature decrease on

fish are typically not as negative or harmful as the effects of a temperature increase and that acclimation plays a large role in the temperature tolerances of fish.

Dr. Wright reviewed the bioenergetics modeling and growth simulations and stated that a Bluegill model was used to simulate growth rates of Redbreast Sunfish (*Lepomis auritis*). Jimmy asked how the fish per square mile or acre would vary. Dr. Wright said that they calculated catch-per-effort (CPE). Calculating fish per area is difficult and very intensive, but CPE could possibly be correlated to abundance. Jimmy stated he has fished the river from Harris Dam to below Horseshoe Bend, and that Auburn's data is good, but it does not include the habitat or availability of fish in these areas. Jimmy said the number of species encountered from Harris Dam to Malone is a lot less than around Horseshoe Bend. The water flow is less volatile around Horseshoe Bend, and snakes, bugs, and crayfish are more abundant, there is less bank erosion, and the environment in general is better. Jimmy said the fishing is bad near Malone, that things start to improve further downstream of Harris Dam, and that Auburn University's study is missing a habitat component. Ehlana stated that a habitat analysis was not a component of this study, and Angie stated that there is a robust downstream habitat study that will be released April 12, 2021. Dr. Devries said CPE can provide a picture of fish abundance, but to determine fish per area is extremely intensive. In pond systems for example, ponds are usually drained. In river systems, rotenone can be applied to an area, but the movement of water and habitat variability limits efficacy. Jimmy said the issue is that he is trying to compare the river to the way it was in the 1970s but only getting pieces of the puzzle. Dr. Devries replied that those comparisons could be made if Auburn University had similar data from the 1970s, but those data just don't exist. The data from the Auburn University study and the experience of downstream landowners does not necessarily disagree or differ in value, but making direct comparisons is not possible. Donna asked if data and anecdotes of angler experience could be used to make comparisons to today. Dr. Wright said there have been many studies on the Tallapoosa River downstream of Harris Dam over the years but many of them have taken very different approaches, so direct comparisons between them may not be entirely accurate. Auburn University took an approach that would incorporate the open channel habitats more than previous studies, which mostly sampled shallow water habitat. Dr. Devries said that community data from the pre-positioned electrofishing grids in other studies were representative of shallow water habitats. Colin Dinken (Kleinschmidt Associates) noted that the desktop assessment, which is being revised for the Final *Aquatic Resources Study Report*, contains findings from previous studies on the Tallapoosa River downstream of Harris Dam and reference sites. Some of the fish community findings in the Auburn University study were compared to findings from studies in the desktop assessment, and Auburn University has discussed the limitations of comparing their results to previous studies. Kelly Schaeffer (Kleinschmidt Associates) added that Appendix E of the Final *Recreation Evaluation Study Report* includes information on fishing effort, catch, and harvest by anglers in the Tallapoosa River downstream of Harris Dam. Sarah asked if it was possible to compare the bioenergetics results to those of similar rivers. Ehlana said different rivers could possibly be compared if there are a lot of similarities between the two systems. Dr. Devries said that studies used in the literature review of temperature requirements of the target species came from many different systems and regions (e.g., from ponds versus rivers or northern versus southern regions). Comparisons cannot be reliably made between systems or regions. A bioenergetics model from the northern United States could not be used in the southern United States. Only growth rates can be reliably compared using von Bertalannfy growth curves. Having growth records below Harris Dam would have been very helpful. Allan stated that the outcomes of the

inter-related studies being conducted for relicensing will need to be integrated to draw conclusions about different operating scenarios for Harris Dam. Allan noted the importance of understanding that only data and information from the record can be used for relicensing. If data does not exist for a certain time period, the best that can be done is to qualitatively describe what things may have been like at that time and try to draw some conclusions. Allan expressed concern about models that do not have good data going into them. He acknowledged that anecdotal information can contain inherent biases, and it is not necessarily information that should be used in a model. Angie stated that the pieces are starting to come together and that the purpose of the meeting today was only to present results of the Auburn University study.

Angie thanked everyone for attending the meeting and reiterated that the Auburn University report was sent to HAT 3 about a week prior to the HAT 3 meeting.

# Using Bioenergetics to Address the Effects of Temperature and Flow on Fishes in the Harris Dam Tailrace

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School of Fisheries, Aquaculture and Aquatic Sciences
Auburn University
HAT 3 Fish and Wildlife

5 March 2021

# Project Objectives

1. Summarize the data that are available in the literature concerning temperature requirements for target species, including spawning and hatching temperatures, lethal limits, and thermal optima

2. Summarize the data that are available in reports and from relevant agencies for water temperatures across a gradient downstream from the Harris Dam tailrace and compare those data with similar data from reference sites upstream of Harris Reservoir

# Project Objectives

3. Quantify the fish community across a gradient downstream from the Harris Dam tailrace and in a reference site upstream of Harris Reservoir

4. Quantify effects of temperature and flow variation on target fish species energy budgets using bioenergetics modeling

# Study Species

Channel Catfish

*Ictalurus punctatus*

- Benthic specialist
- Omnivore

Redbreast Sunfish

*Lepomis auritus*

- Lentic Specialist
- Invertivore

Alabama Bass

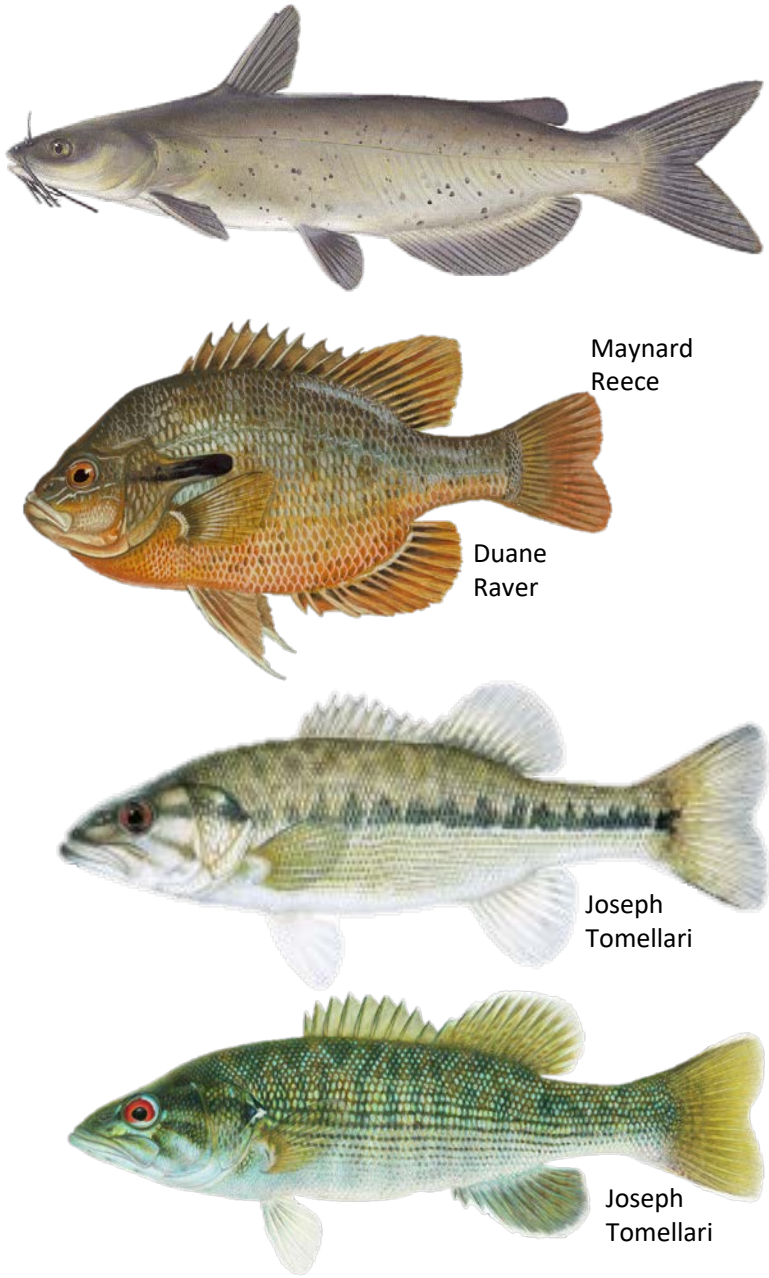
*Micropterus henshalli*

- Habitat generalist
- Omnivore

Tallapoosa Bass

*Micropterus tallapoosae*

- Lotic Specialist
- Omnivore



# Objective 1: Temperature Requirements

- researched via Web of Science and Google Scholar
- data pulled from more than 70 papers

# Channel Catfish

- minima: 0.0-9.8 C
  - depending on acclimation, fluctuating vs. stable
- distribution: 10-32C
- optimal 24-30C
- preferred 18-31C with acclimation,
- preferred 25.2-30.5C w/out acclimation
- spawning: 20-30C
- maxima: 30.9-42.1C, depend on acclimation

# Redbreast Sunfish

- minima: ??<15C??
- distribution: 4-22C
- optimal 25-30C
- preferred 18-32C with acclimation
- preferred 27-29C w/out acclimation
- spawning: 16.8-27.8C
- maxima: 33-41C

# Alabama Bass/Spotted Bass

- minima: <10C
- preferred w/out acclimation: 22.5-32.5C
  - preferred w/acclimation to falling temps: 16.9-32.1C
  - preferred w/acclimation to rising temps: 24.8-31.4C
- distribution: ??
- spawning:
  - 13-20.6C for Alabama Bass
  - 13-23.3C for Spotted Bass
- maxima: 30.76-36C

# Tallapoosa Bass/Redeye Bass/Shoal Bass

- minima: ??
- distribution: ??
- spawning:
  - 16.6-22.8C for Redeye Bass
  - 15-24C for Shoal Bass
- maxima: ??

# Objective 1: Temperature Requirements

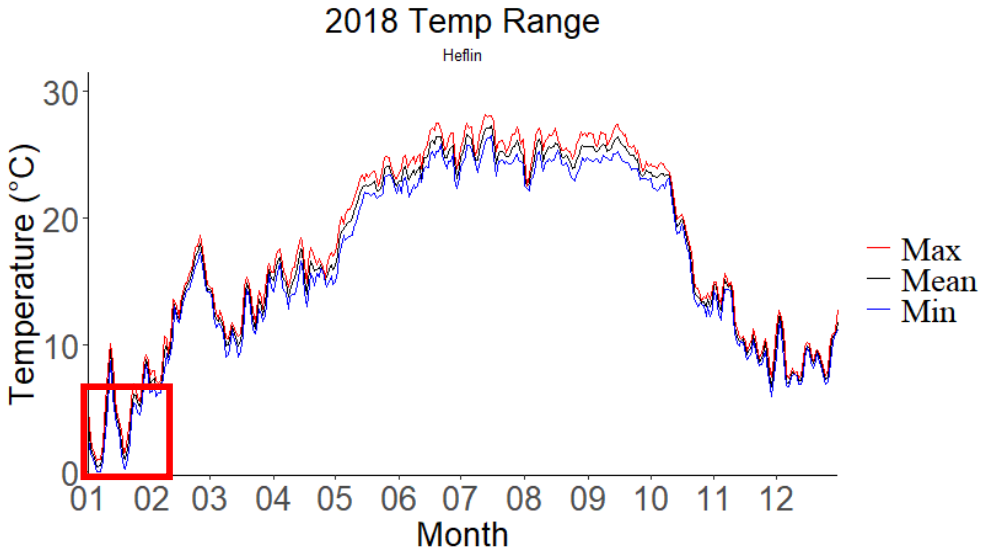
- substantial variation across studies
- acclimation is important (latitudinal variation?)
- diel variation is important
- variation in methods and approaches hampers conclusions

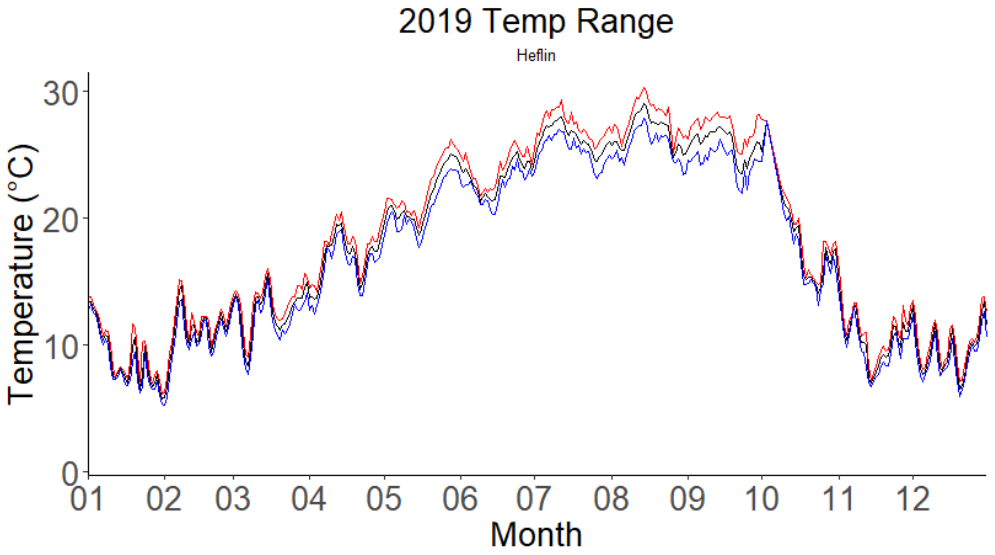
Objective 2: Summarize the data that are available in reports and from relevant agencies for water temperatures across a gradient downstream from the Harris Dam tailrace and compare those data with similar data from reference sites upstream of Harris Reservoir

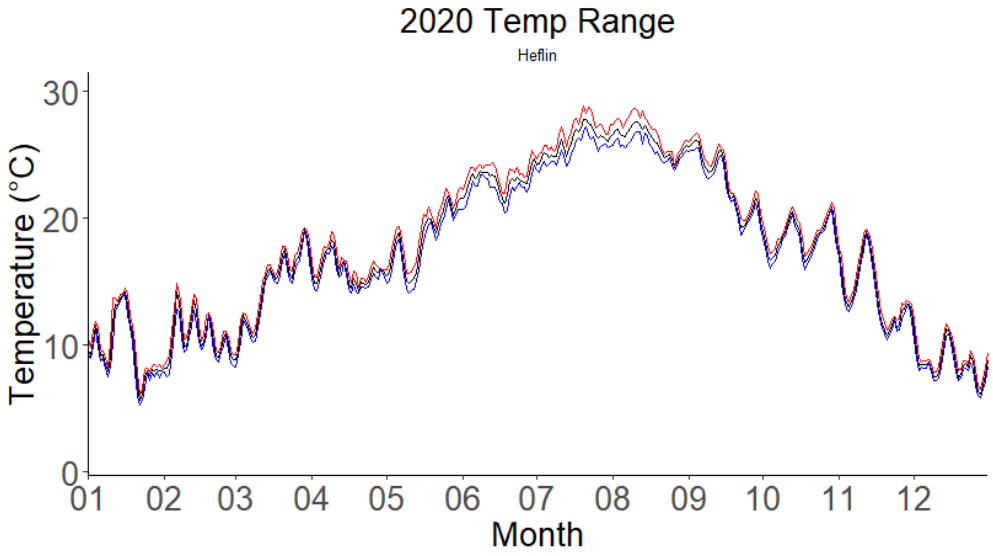
Tailrace, Malone, and Wadley temperature data (2000-2018) presented previously

Reminder:

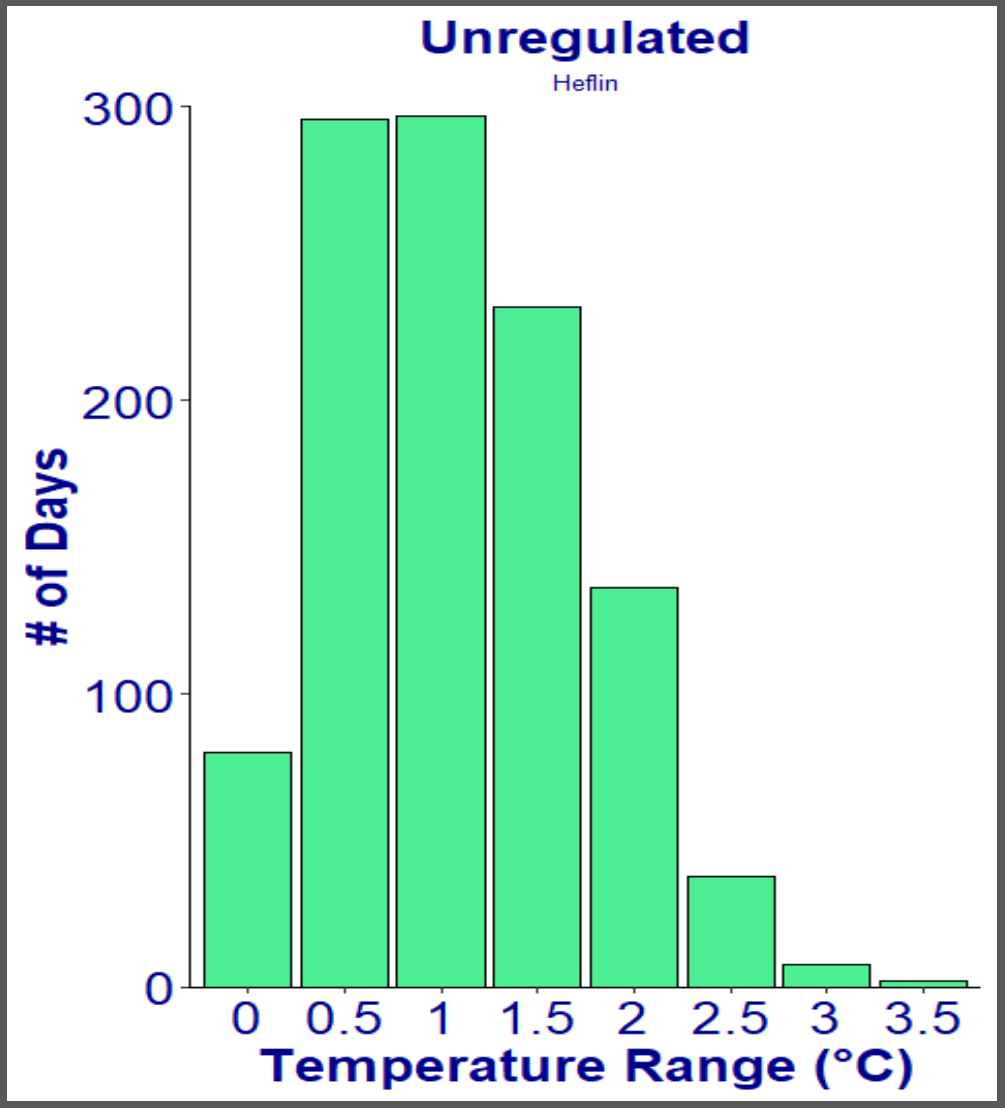
- No significant difference in temperatures before/after green plan
- Large variation in temperature during certain times
- Discharge changes temperature over small-time scales
- Rarely large daily temperature ranges



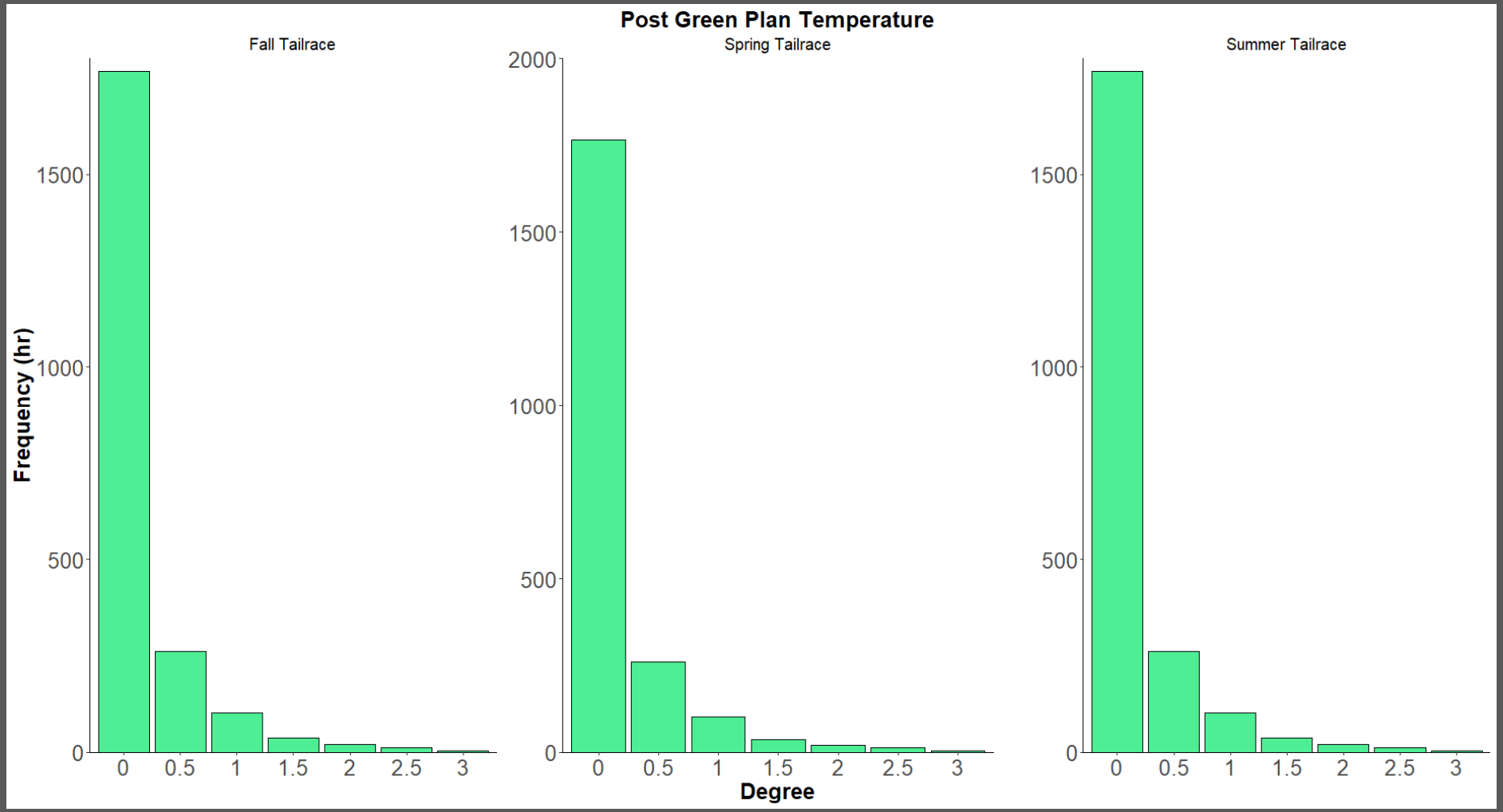




- Very little daily temperature variation
- Water warms and cools quickly between seasons

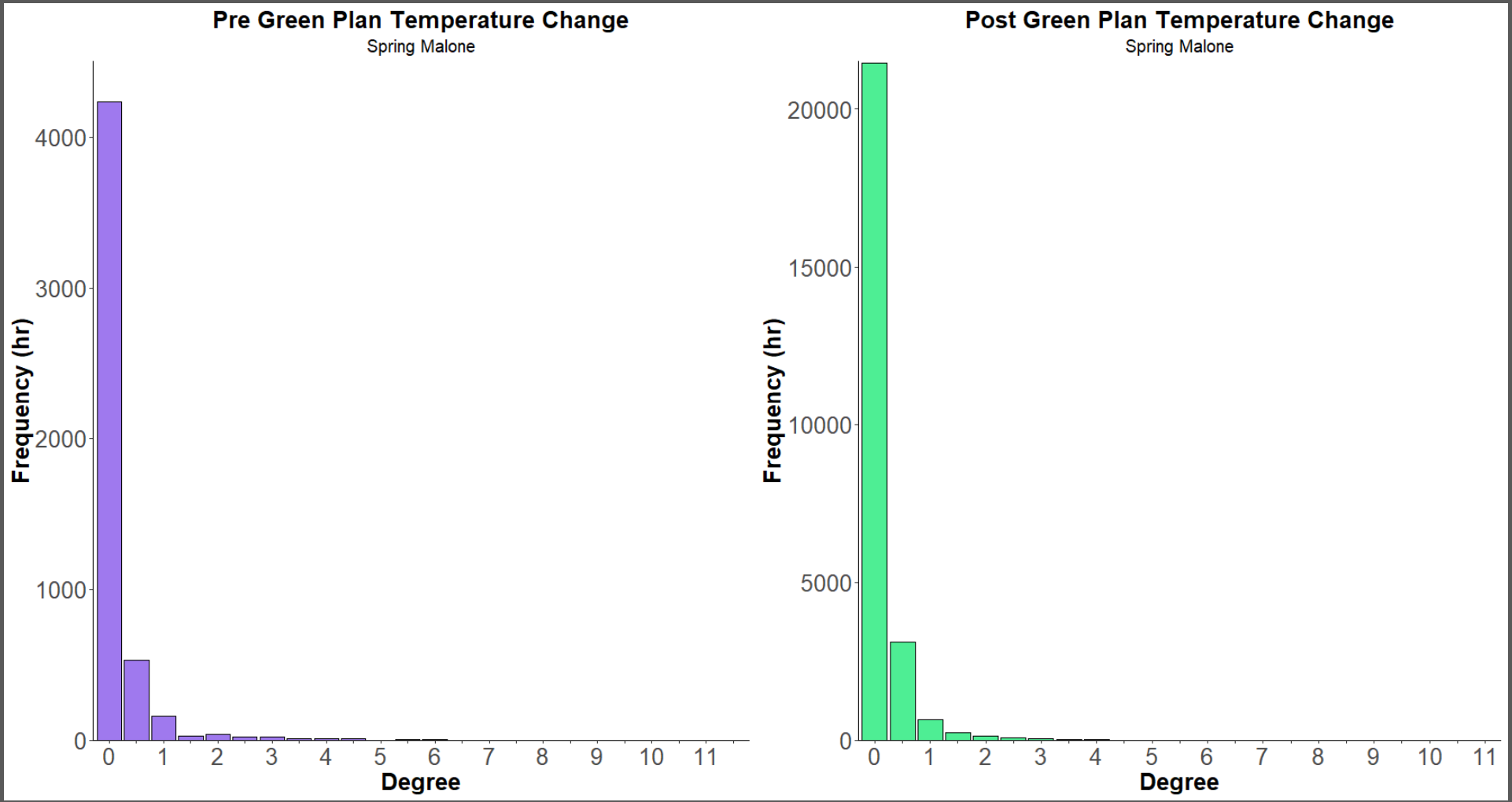



Most days see less than 3 C fluctuation

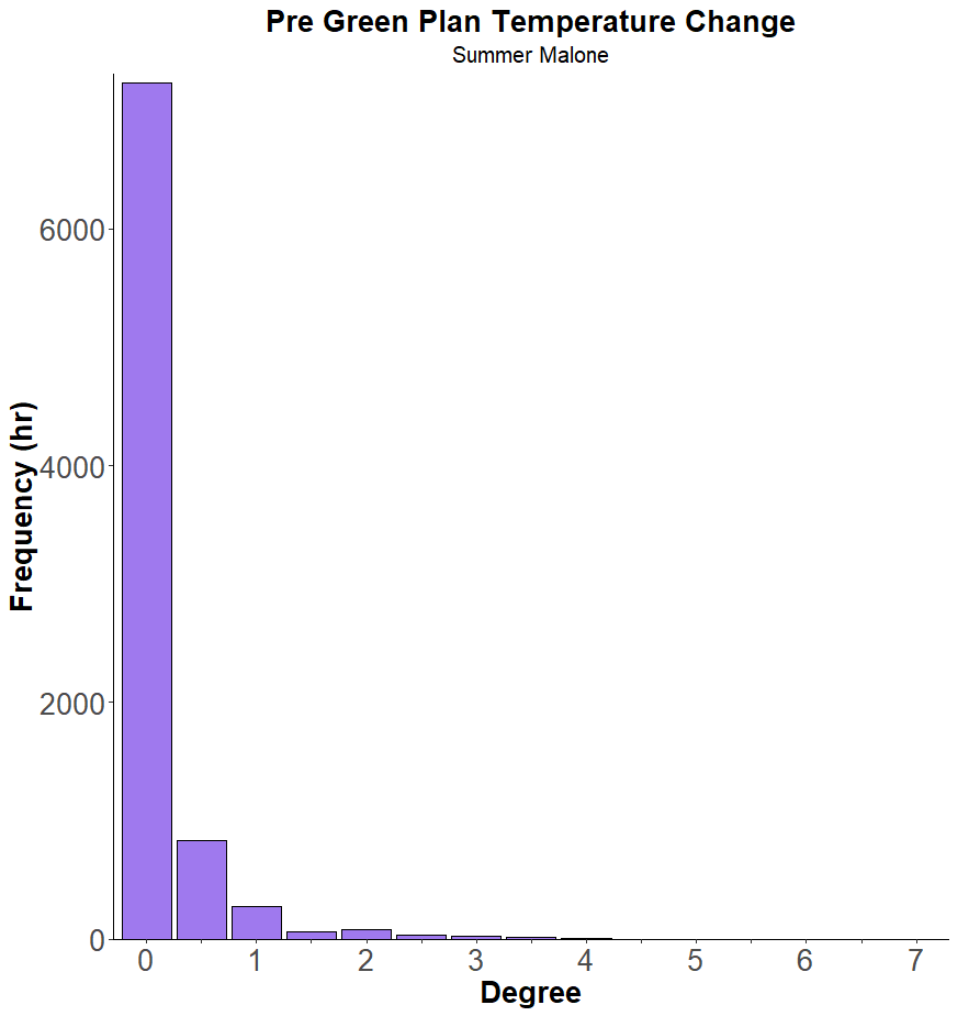
# Hourly temperature fluctuations

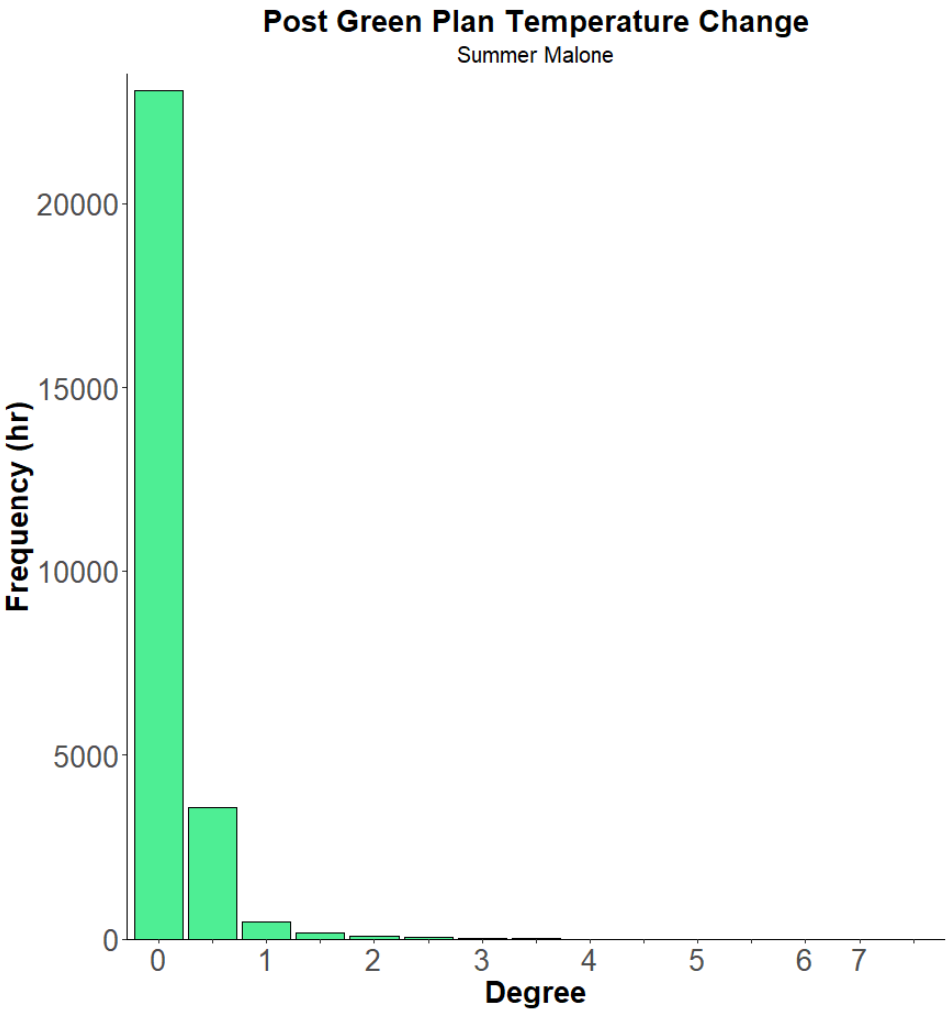


# Average hourly temperature fluctuations

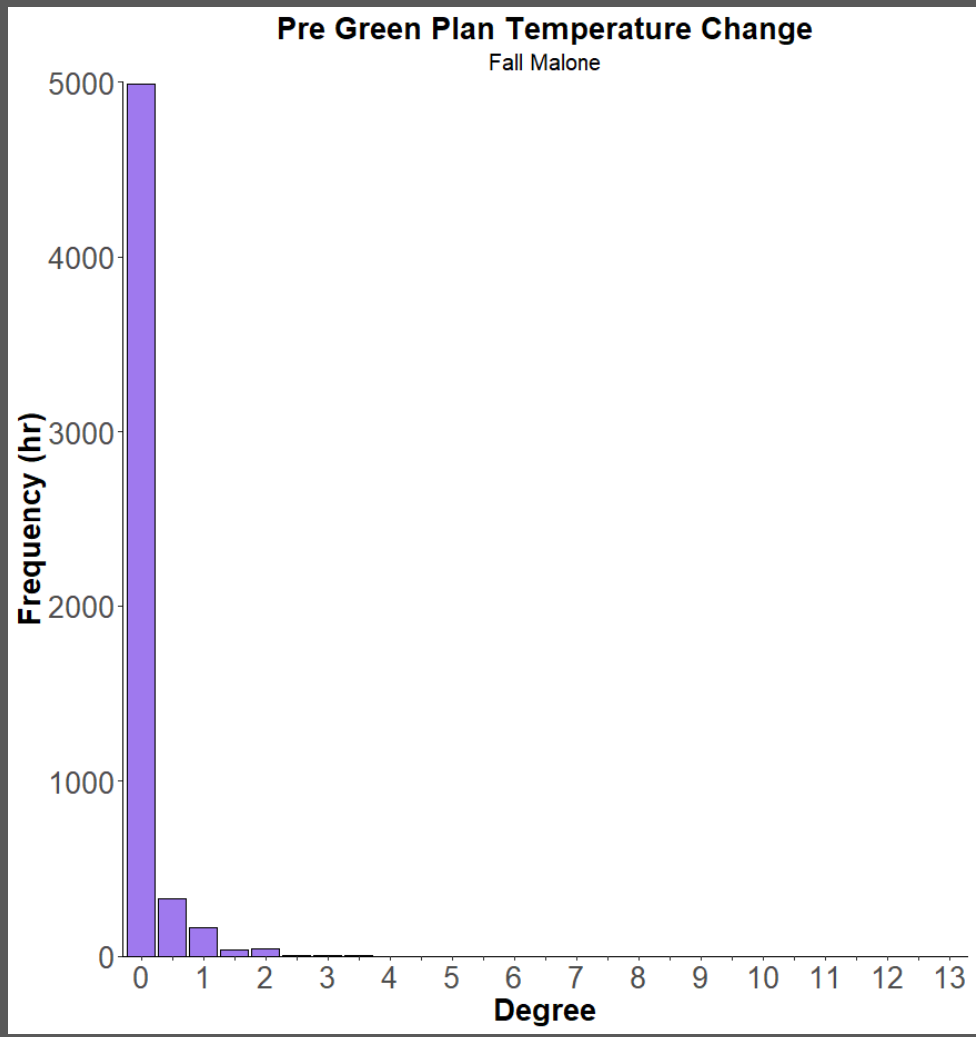


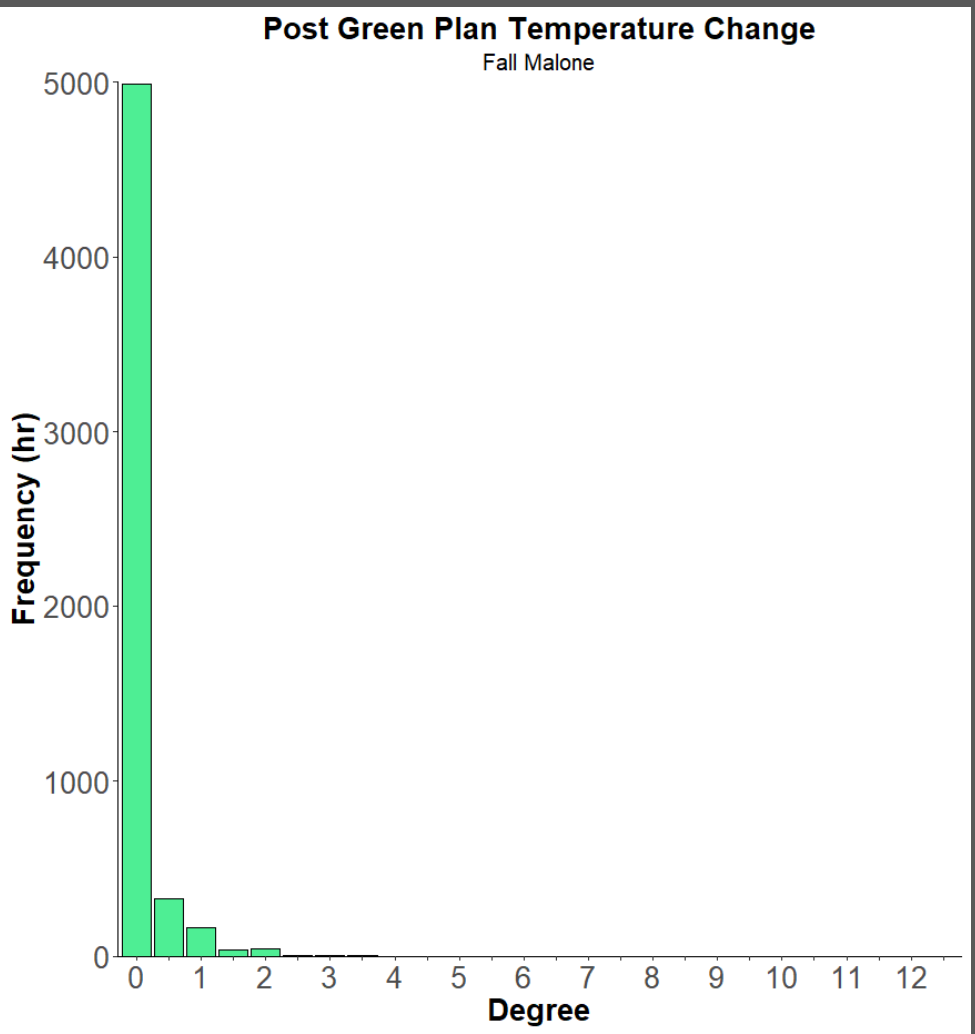
# Average hourly temperature fluctuations



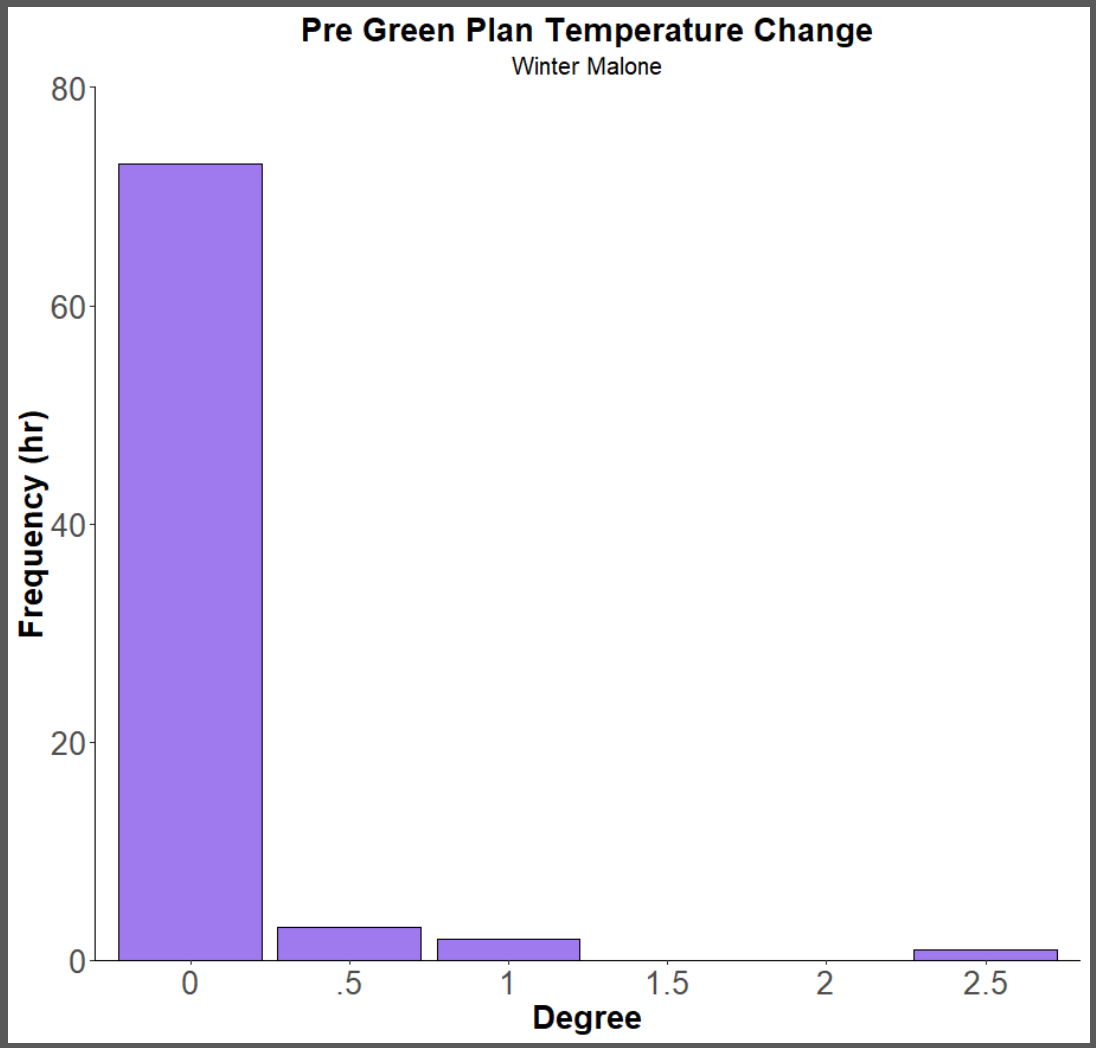



# Average hourly temperature fluctuations

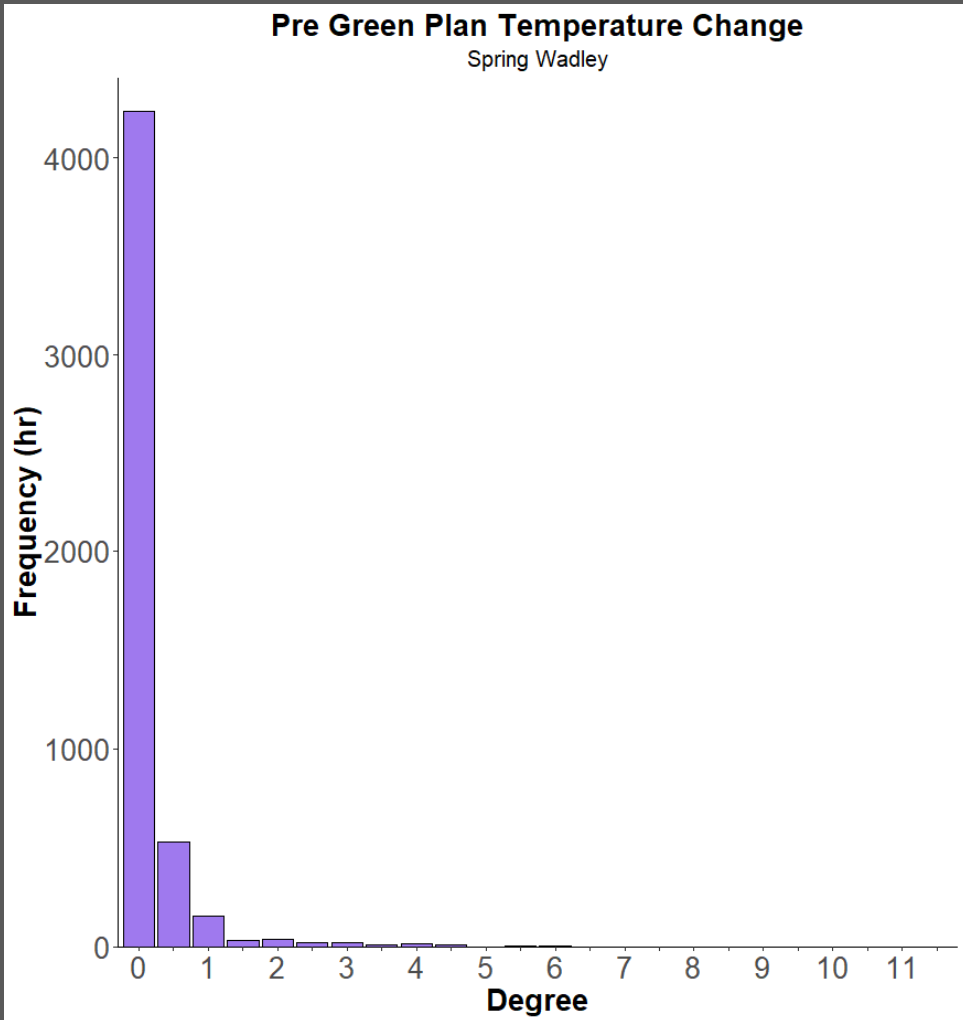


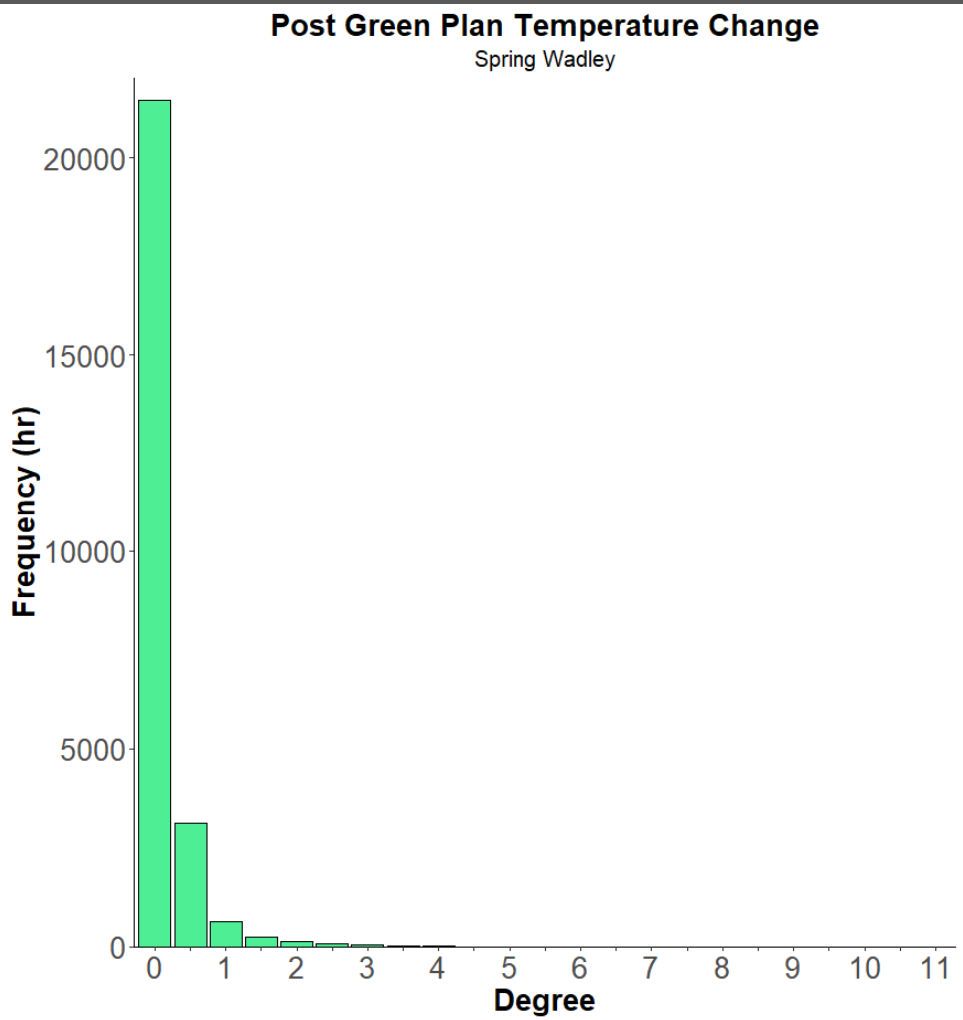



# Average hourly temperature fluctuations

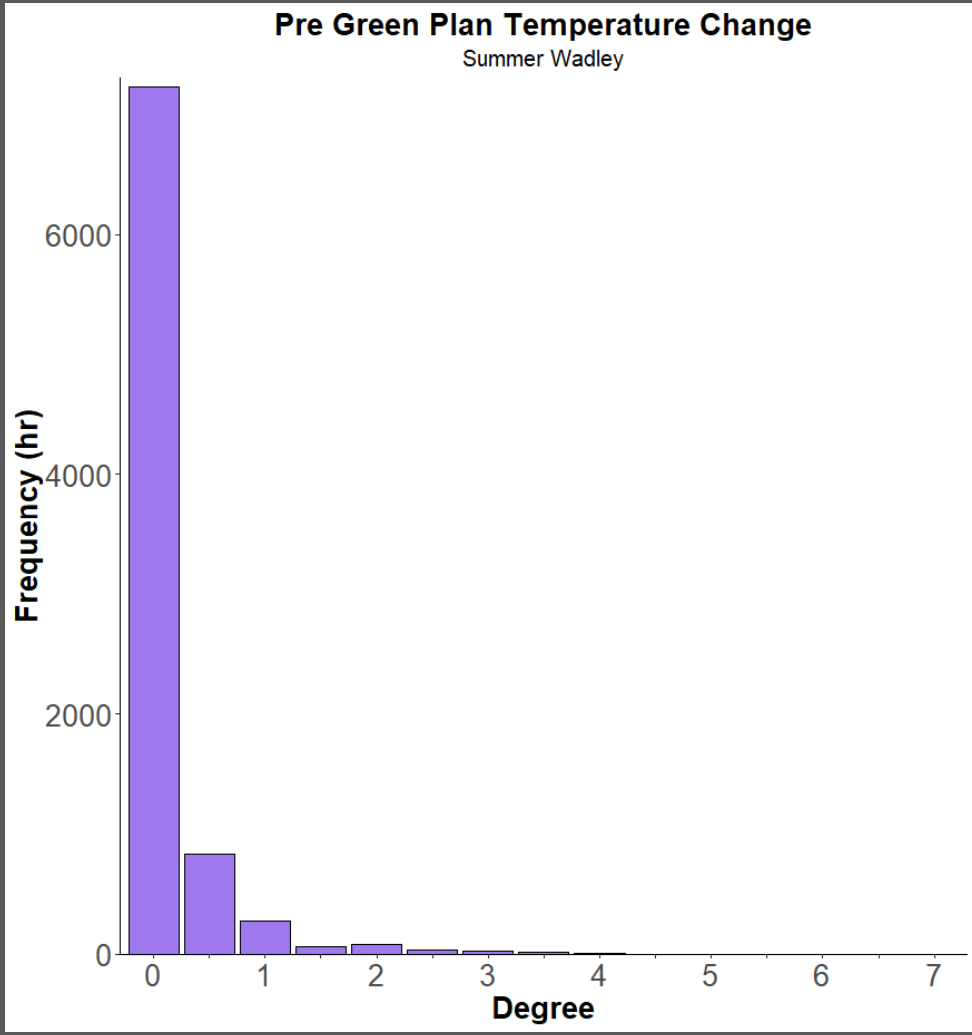


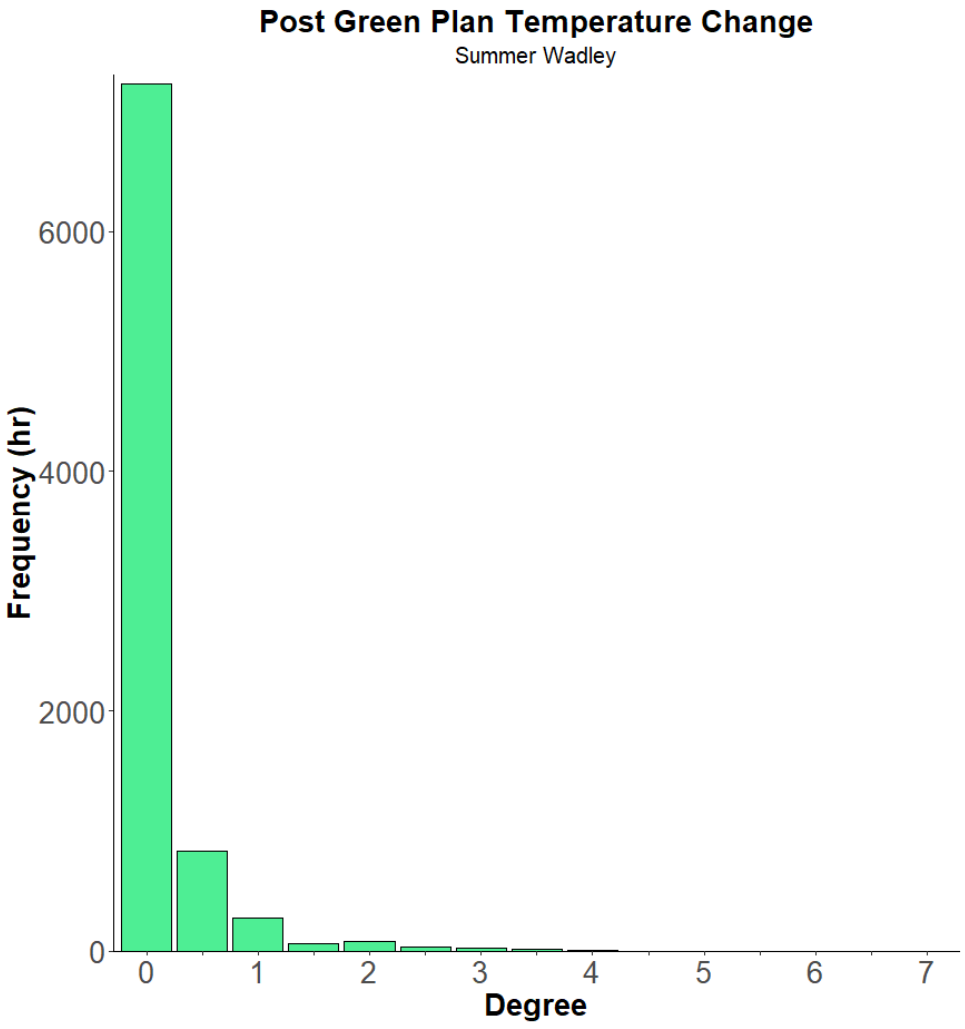
# Average hourly temperature fluctuations



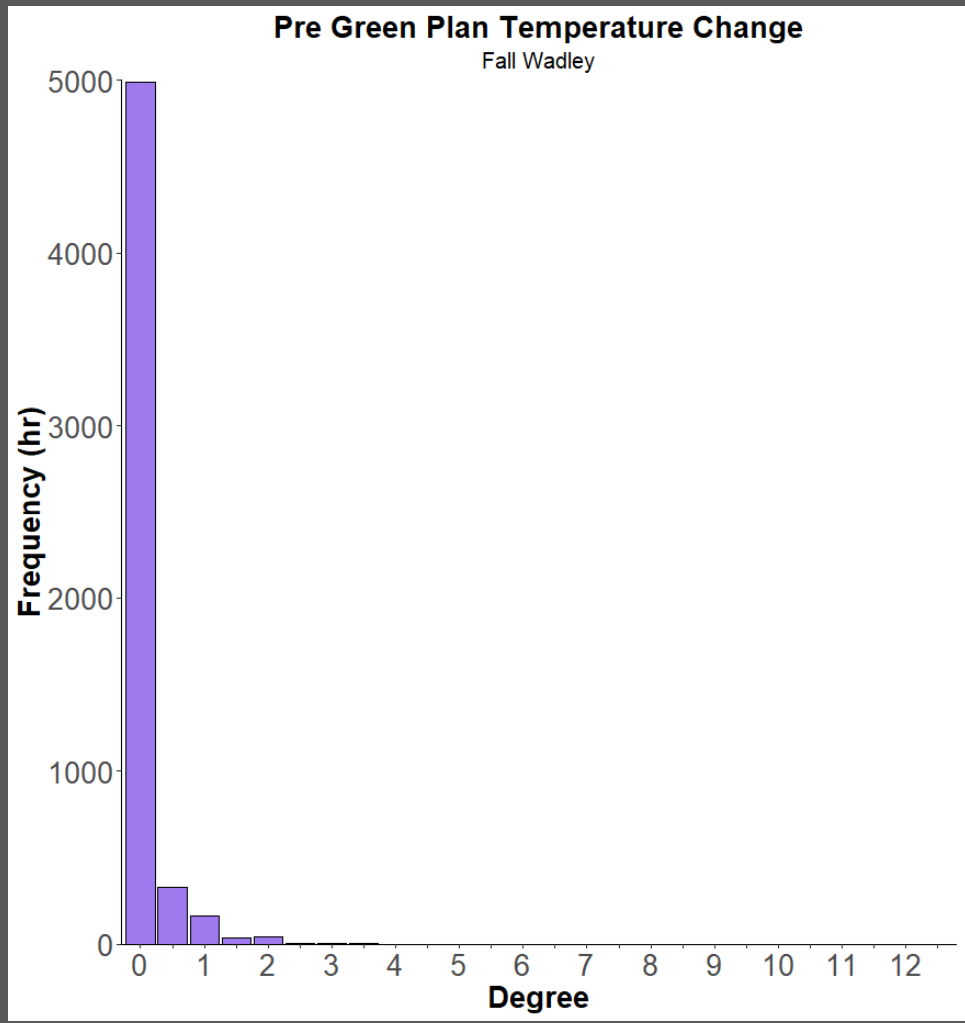



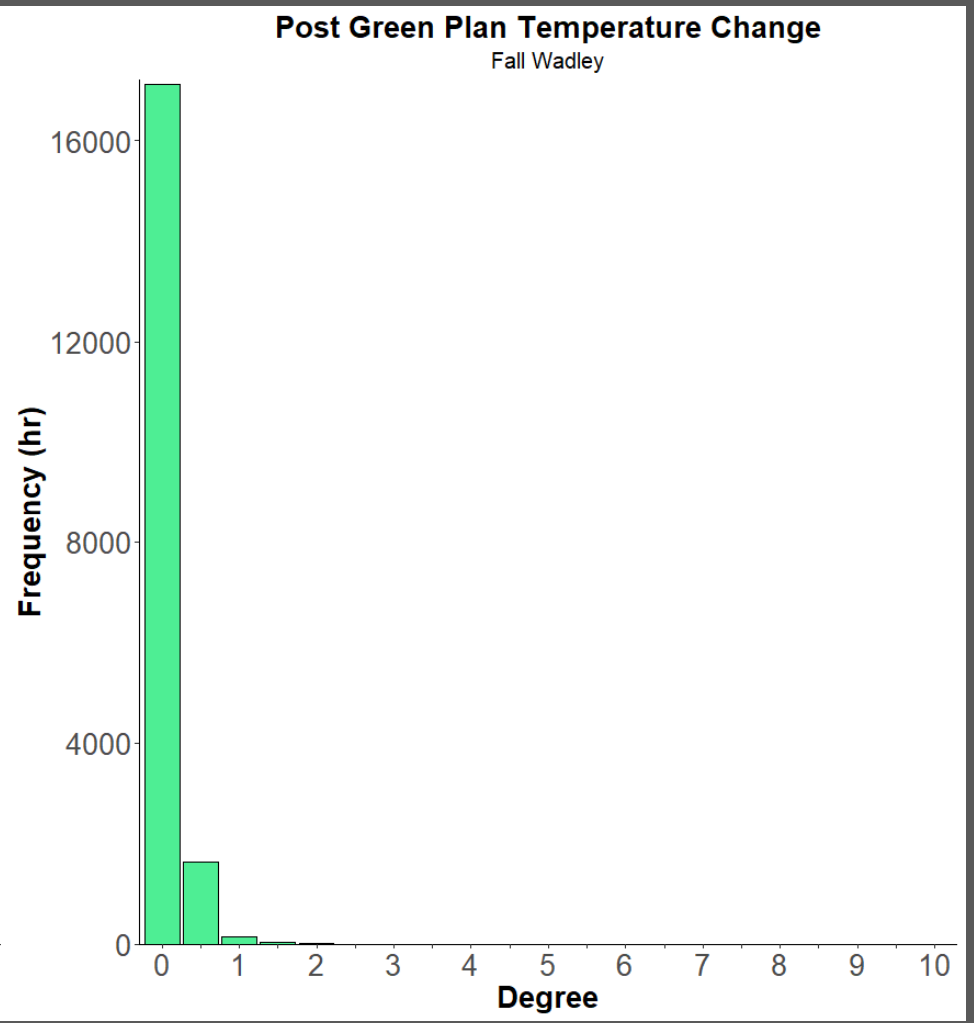
# Average hourly temperature fluctuations

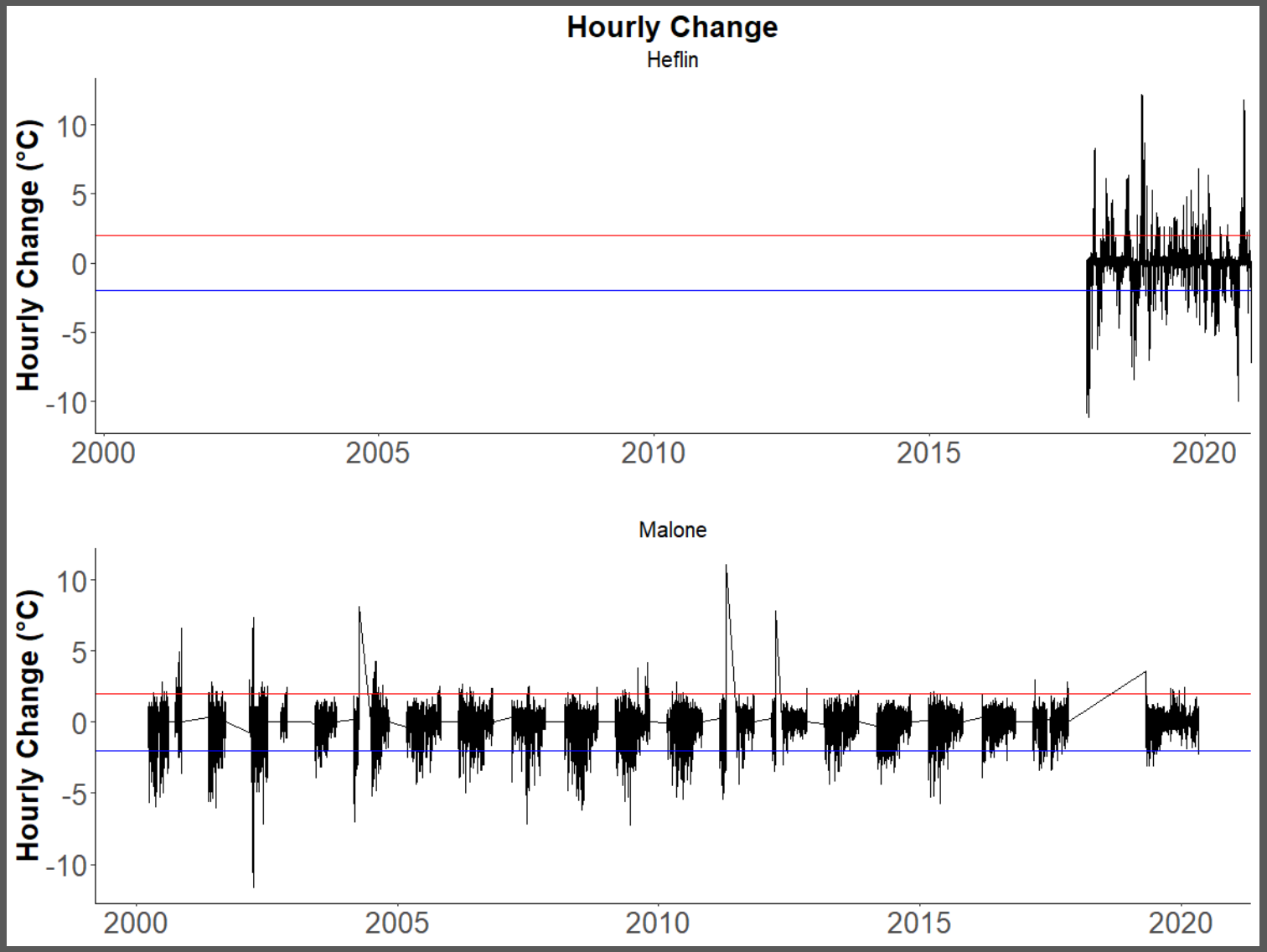


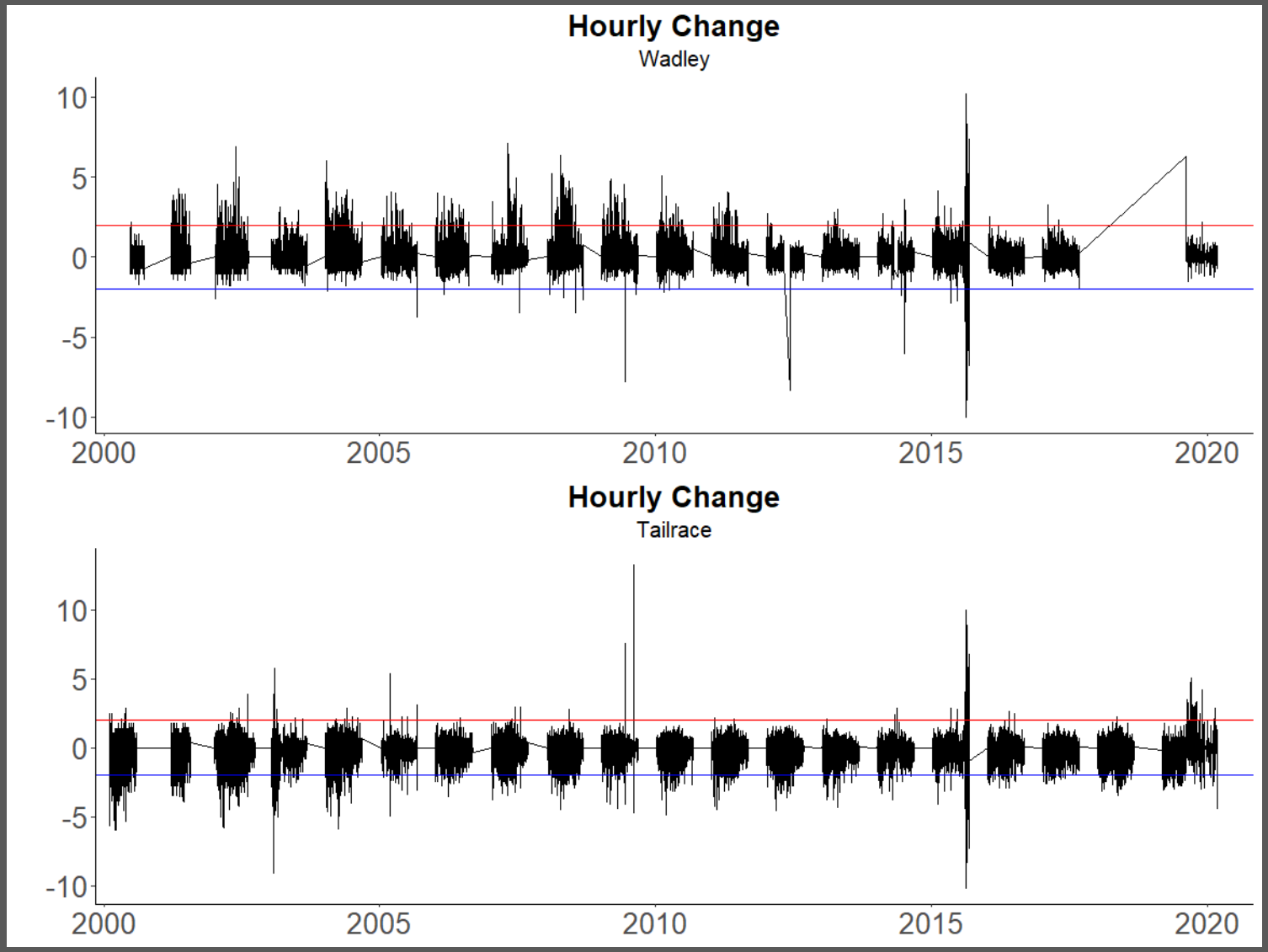
# Average hourly temperature fluctuations





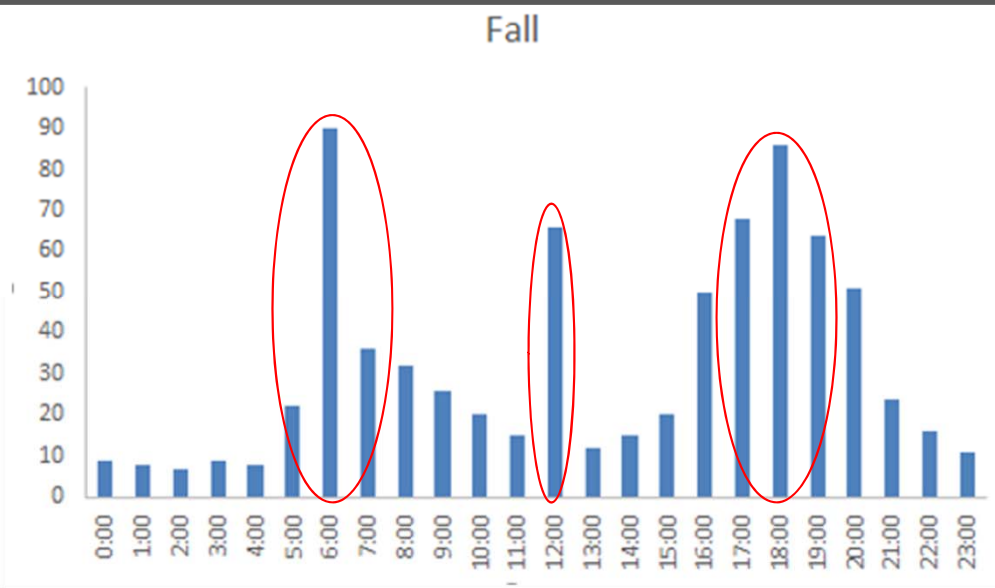

- No data for Heflin available before 2018
- More fluctuations within an hour at Heflin
  - Logger air exposure
- Majority of hourly variation occurs with ± 2 C (red and blue lines)

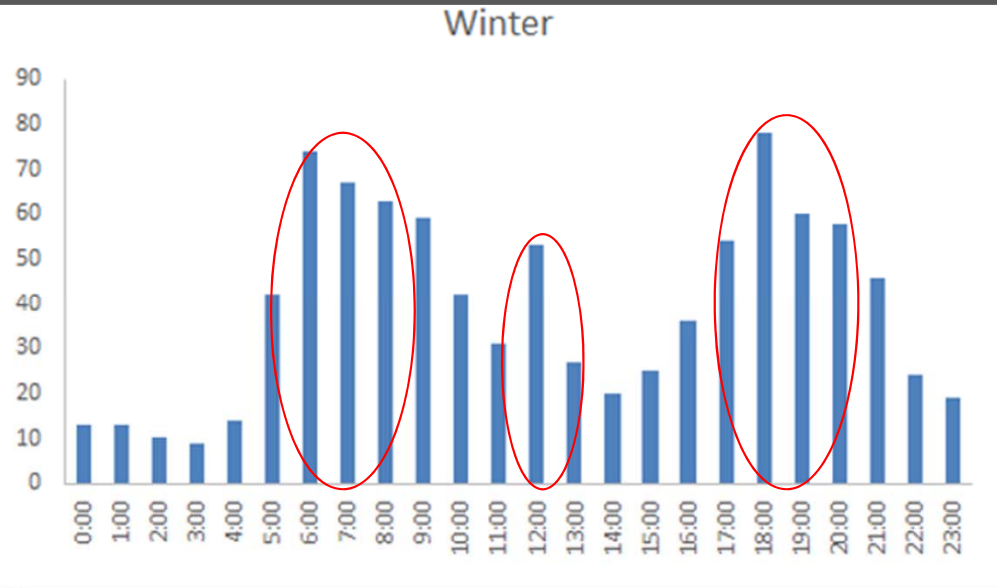


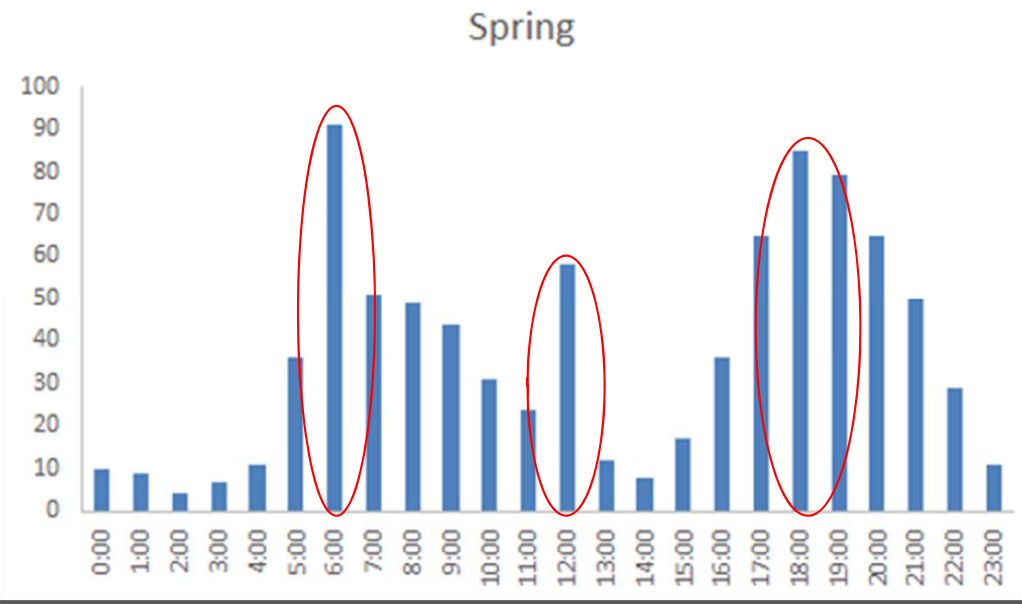

- No data for Wadley 2018 - 2019
- Majority of hourly variation occurs with ± 2 C (red and blue lines)

| | Site | 2 C | | 4 C | | 6 C | | 8 C | | 10 C | | 12+ C | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Pre GP | Post GP | Pre GP | Post GP | Pre GP | Post GP | Pre GP | Post GP | Pre GP | Post GP | Pre GP | Post GP |
| Spring | Heflin | | 0.97 | | 0.005 | | 0.0006 | | | | | | |
| | Tailrace | | 0.99 | | 0.01 | | | | | | | | |
| | Malone | 0.99 | 0.98 | 0.0052 | 0.011 | 0.00048 | 0.0013 | 0.000097 | 0.000038 | 0 | 0 | 0.00019 | 0.000038 |
| | Wadley | 0.97 | 0.99 | 0.019 | 0.011 | 0.0061 | 0.0013 | 0.0014 | 0.000039 | 0.00019 | 0 | 0.00039 | 0.000039 |
| Summer | Heflin | | 0.99 | | 0.0057 | | 0.0006 | | | | | | |
| | Tailrace | | 0.98 | | 0.019 | | | | | | | | |
| | Malone | 0.97 | 0.99 | 0.018 | 0.0066 | 0.0021 | 0.00087 | 0.00023 | 0.00011 | | | | |
| | Wadley | 0.98 | 0.99 | 0.019 | 0.0066 | 0.0021 | 0.00087 | 0.00023 | 0.00011 | | | | |
| Fall | Heflin | | 0.97 | | 0.0058 | | 0.0035 | | 0.0018 | | 0.004 | | |
| | Tailrace | | 0.99 | | 0.0034 | | | | | | | | |
| | Malone | 0.98 | 0.98 | 0.011 | 0.011 | 0.0011 | 0.0011 | 0.00036 | 0.00036 | 0 | 0 | 0.00053 | 0.00053 |
| | Wadley | 0.97 | 0.99 | 0.02 | 0.019 | 0.0061 | 0.0013 | 0.0014 | 0.00049 | 0.00019 | 0.00022 | 0.00039 | 0.000055 |
| Winter | Heflin | | 0.97 | | 0.01 | | 0.004 | | 0.002 | | 0.0024 | | 0.001 |
| | Tailrace | | | | | | | | | | | | |
| | Malone | 0.98 | | 0.013 | | | | | | | | | |
| | Wadley | | | | | | | | | | | | |

# Generation Frequency




Spring
100
90
80
70
60
50
40
30
20
10
0
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
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11:00
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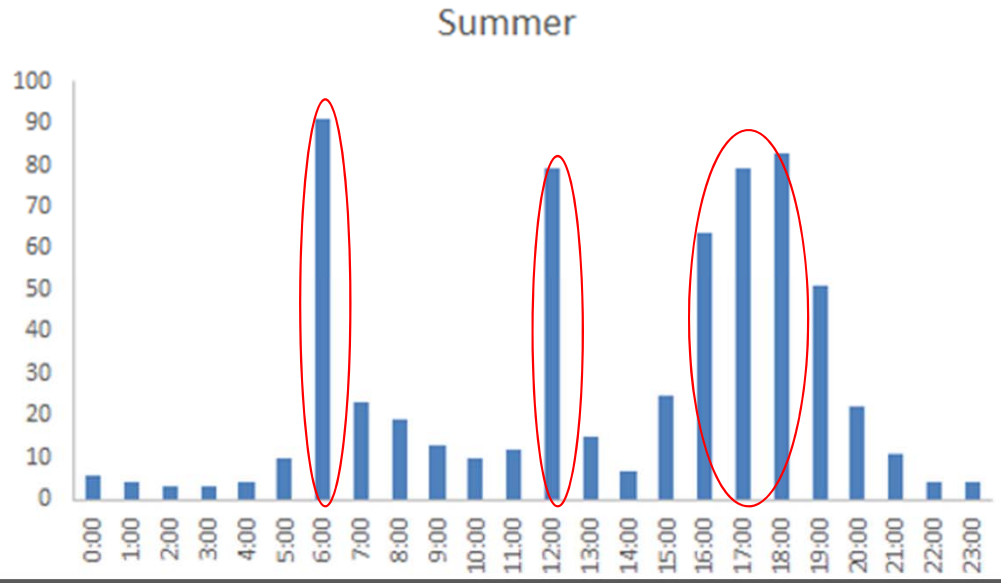
23:00


Summer
100
90
80
70
60
50
40
30
20
10
0
0:00
1:00
2:00
3:00
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5:00
6:00
7:00
8:00
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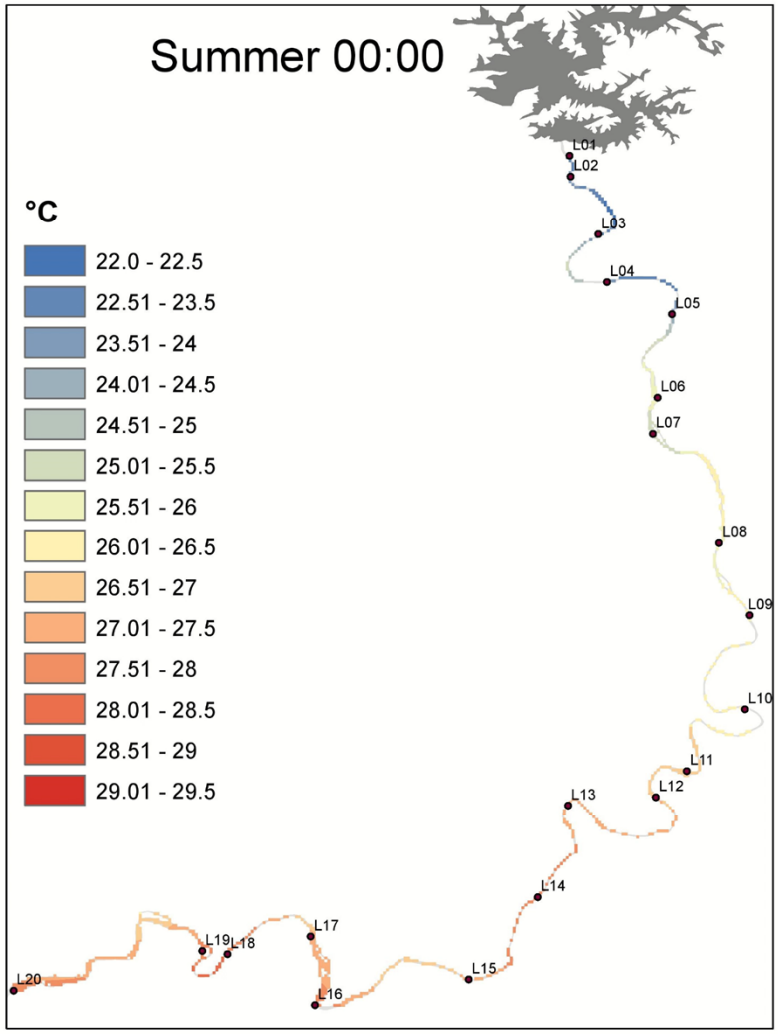
Summer 00:00
°C
22.0 - 22.5
22.51 - 23.5
23.51 - 24
24.01 - 24.5
24.51 - 25
25.01 - 25.5
25.51 - 26
26.01 - 26.5
26.51 - 27
27.01 - 27.5
27.51 - 28
28.01 - 28.5
28.51 - 29
29.01 - 29.5
L01
L02
L03
L04
L05
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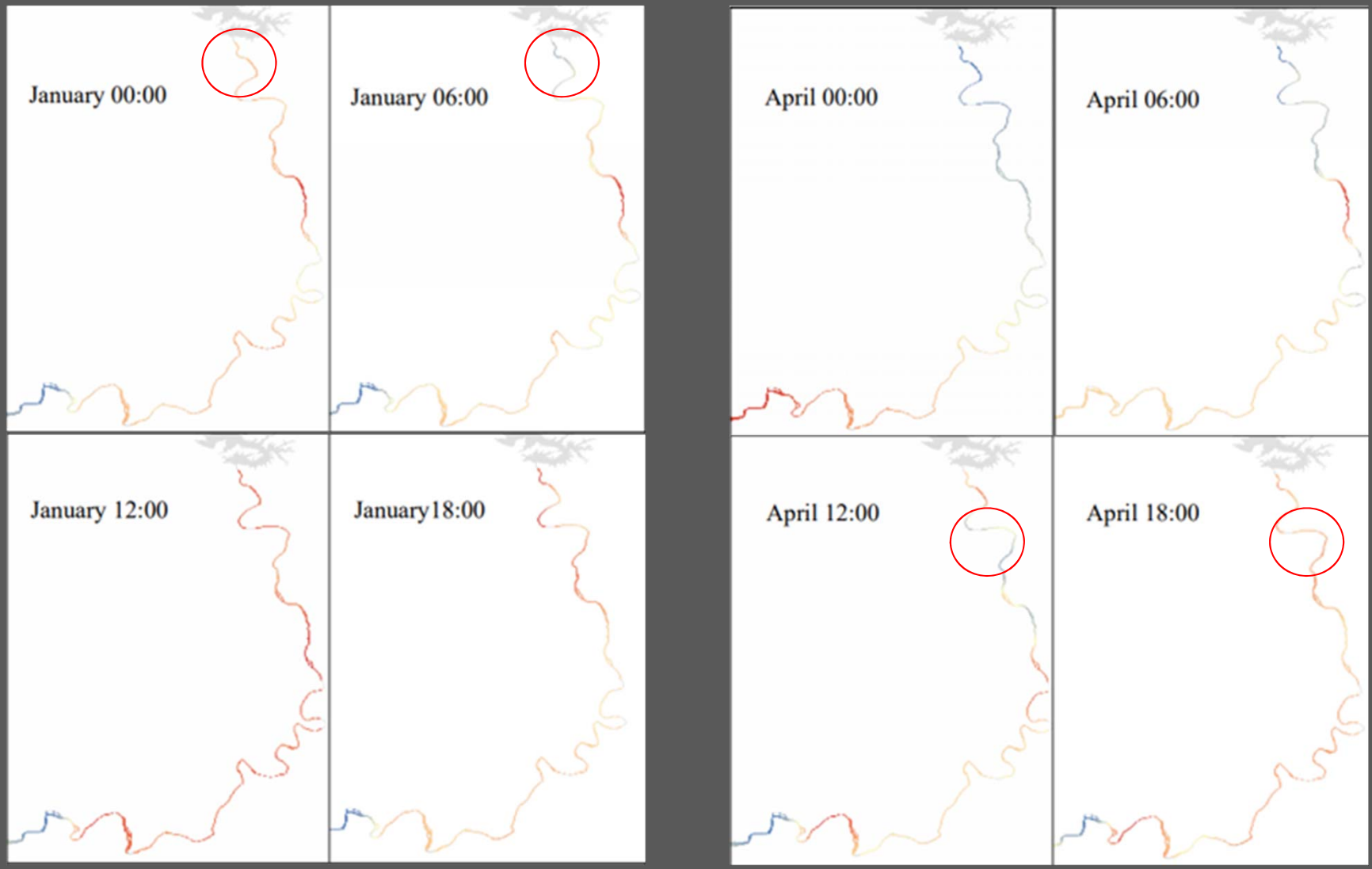
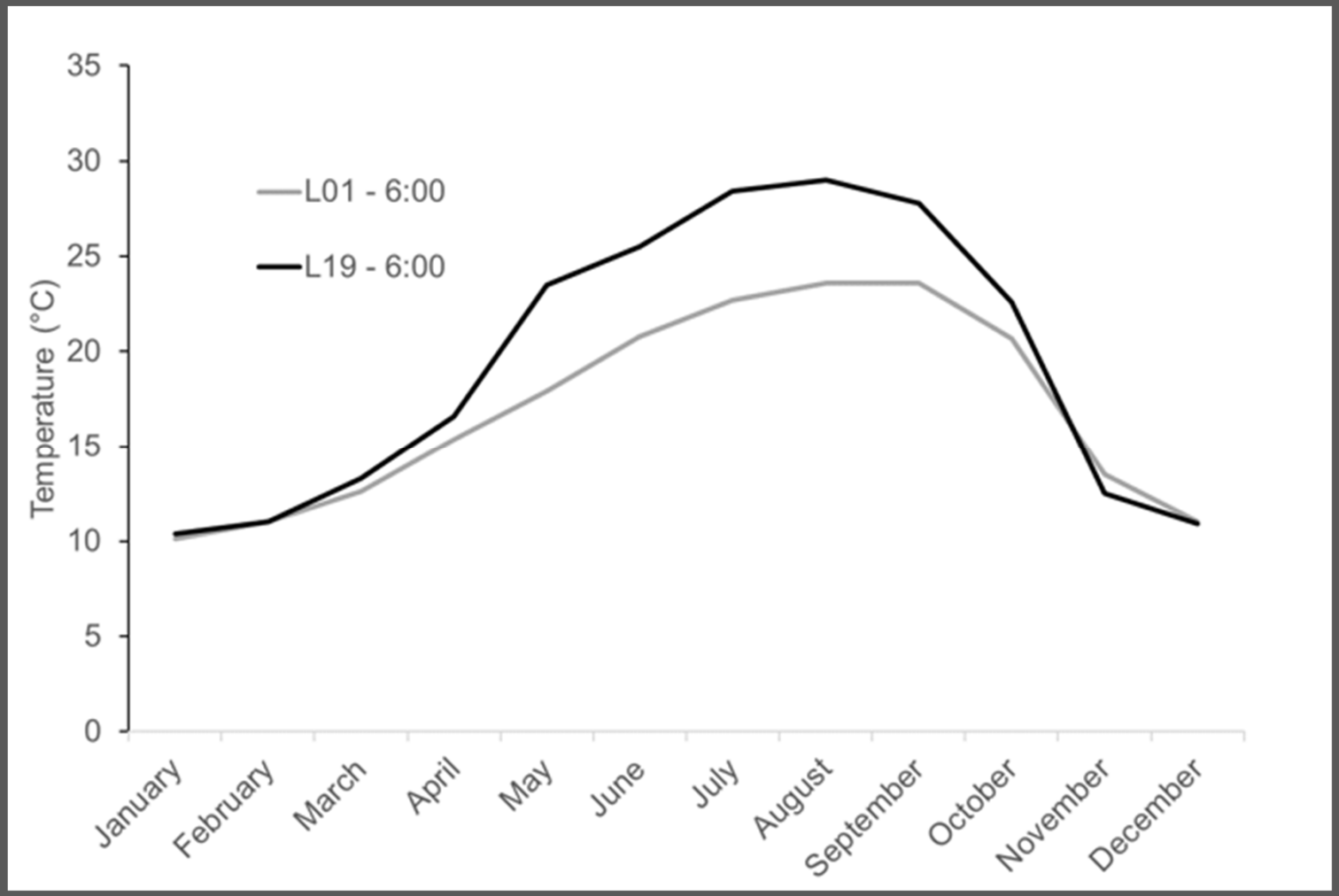

January 00:00
January 06:00
January 12:00
January18:00
April 00:00
April 06:00
April 12:00
April 18:00


35
30
25
20
15
10
5
0
Temperature (°C)
L01 - 6:00
L19 - 6:00
January
February
March
April
May
June
July
August
September
October
November
December

# Conclusions Objective 2

- No significant differences downstream before and after Green Plan
- Temperature fluctuates the most in summer
  - Differences seen downstream
  - Pulses identifiable in temperature data
- Little fluctuation in winter above and below dam
- Hourly temperature fluctuations overwhelmingly less than 2 C on average
  - Can be up to 6 C (12 C changes recorded, but this is likely equipment failures)
  - Most extreme in summer
  - No large hourly fluctuations recorded upstream of dam

Objective 3: Quantify the fish community across a gradient downstream from the Harris Dam tailrace and in a reference site upstream of Harris Reservoir

# Objective 3: Community, Age/Growth, Telemetry

- Community
  - Summary
  - Frequency and CPE
    - By site, season, site x season
- Age and Growth
  - Body condition
  - Age frequency
  - von Bertalanffy curves
- Diet
  - Percent by weight by season
  - Percent by weight by site
- Telemetry
  - Manual tracking
  - Stationary acoustic receivers

# Field Methods

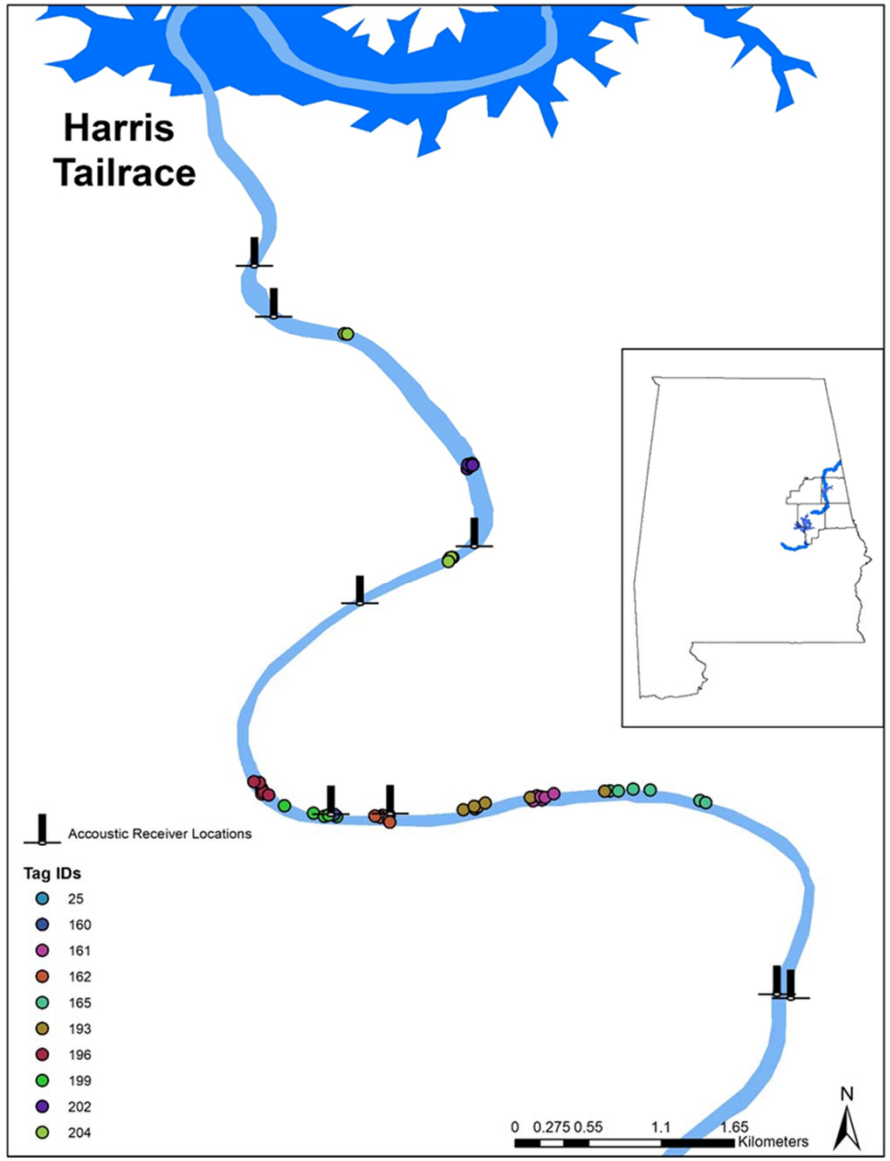
- All sites sampled every-other month
- Standardized boat/barge electrofishing
  - 6, 10-minute transects
  - Barge used in the tailrace
  - All non-target individuals identified, weighed, and measured (and returned to capture site starting July 2020)

# Fish Work-up Methods

- All fish identified to species
- Non-target species
  - 10 of each non-target species weighed/measured
  - Remaining individuals weighed as a group
- Target species
  - Otoliths, gonads, and diets extracted
  - Fin clips collected from Alabama Bass and Tallapoosa Bass
  - Ages estimated, annuli measured

# Telemetry Methods

- 10 stationary acoustic receivers
  - 8 between tailrace and CR 15 in Malone, 2 at AL 77 in Wadley
  - Concrete anchors, cabled to bank
- 16 CART tags deployed
- Manual tracking
  - Tailrace to CR 15 in Malone



# Data Analysis: Community

- Diversity
  - Shannon's H
  - Species richness
  - Family richness
- Abundance
  - CPE by site
  - CPE by season
  - CPE by site x season

# Data Analysis: Age-and-Growth

- Body condition
  - $W_r$ calculated for CCAT, ALAB, TPBA
  - $K_n$ calculated for RBSF
  - ANOVA of body condition by site for each species
- Age and Growth
  - Length standardized to last measured annulus
  - von Bertalanffy parameters estimated using neg. log likelihood

# Data Analysis: Diet

- Weight of each diet item estimated
  - Published length – weight regressions
- Percent-by-weight
  - Percent-by-weight in individual, averaged across individuals in each site x season combination

# Data Analysis: Telemetry

- Data filtering
  - False detections removed
  - Detections of other receivers removed
- Visual assessment
  - Graphs of each detected fish's location
  - Mapped each fish's location during manual tracking
  - Maximum total movement quantified

# Results: Community

| Site | Total Species | Total Families | Shannon's H |
|---|---|---|---|
| Lee's Bridge | 39 | 9 | 2.80 |
| Tailrace | 39 | 7 | 2.60 |
| Wadley | 37 | 7 | 2.90 |
| Horseshoe Bend | 35 | 7 | 2.56 |
| All | 57 | 9 | 3.07 |

# CPE by site

| | CPE | LB CPE | TR CPE | WD CPE | HB CPE |
|---|---|---|---|---|---|
| Amiidae | 0.15 | 0.78 | 0.00 | 0.00 | 0.00 |
| Clupeidae | 2.80 | 6.44 | 0.00 | 2.57 | 3.50 |
| Cyprinidae/Leuciscidae | 29.20 | 22.44 | 21.81 | 40.48 | 32.92 |
| Catostomidae | 16.32 | 21.00 | 2.09 | 32.67 | 14.92 |
| Ictaluridae | 7.06 | 11.56 | 9.39 | 2.29 | 5.17 |
| Fundulidae | 0.49 | 0.11 | 0.51 | 0.48 | 0.75 |
| Moronidae | 0.24 | 1.11 | 0.07 | 0.00 | 0.00 |
| Centrarchidae | 49.17 | 35.00 | 56.32 | 51.52 | 49.50 |
| Percidae | 14.51 | 2.22 | 28.45 | 20.95 | 2.00 |

# Lee's Bridge CPE by season

| | Spring CPE | Summer CPE | Fall CPE | CPE |
|---|---|---|---|---|
| Amiidae | 1.33 | 0.50 | 0.50 | 0.78 |
| Clupeidae | 6.33 | 5.50 | 7.00 | 6.44 |
| Cyprinidae/Leuciscidae | 21.33 | 19.00 | 25.00 | 22.44 |
| Catastomidae | 9.00 | 15.50 | 32.75 | 21.00 |
| Ictaluridae | 10.33 | 15.50 | 10.50 | 11.56 |
| Fundulidae | 0.33 | 0.00 | 0.00 | 0.11 |
| Moronidae | 3.33 | 0.00 | 0.00 | 1.11 |
| Centrarchidae | 23.67 | 33.50 | 44.25 | 35.00 |
| Percidae | 0.33 | 1.00 | 4.25 | 2.22 |

# Tailrace CPE by season

| | Winter CPE | Spring CPE | Summer CPE | Fall CPE | CPE |
|---|---|---|---|---|---|
| Cyprinidae/Leuciscidae | 68.50 | 13.50 | 4.00 | 19.50 | 21.81 |
| Catastomidae | 7.00 | 1.54 | 0.50 | 1.25 | 2.09 |
| Ictaluridae | 8.00 | 5.13 | 9.50 | 16.25 | 9.39 |
| Fundulidae | 2.00 | 0.17 | 0.00 | 0.50 | 0.51 |
| Moronidae | 0.00 | 0.00 | 0.00 | 0.25 | 0.07 |
| Centrarchidae | 49.00 | 61.37 | 29.50 | 66.00 | 56.32 |
| Percidae | 21.50 | 26.50 | 46.00 | 26.00 | 28.45 |

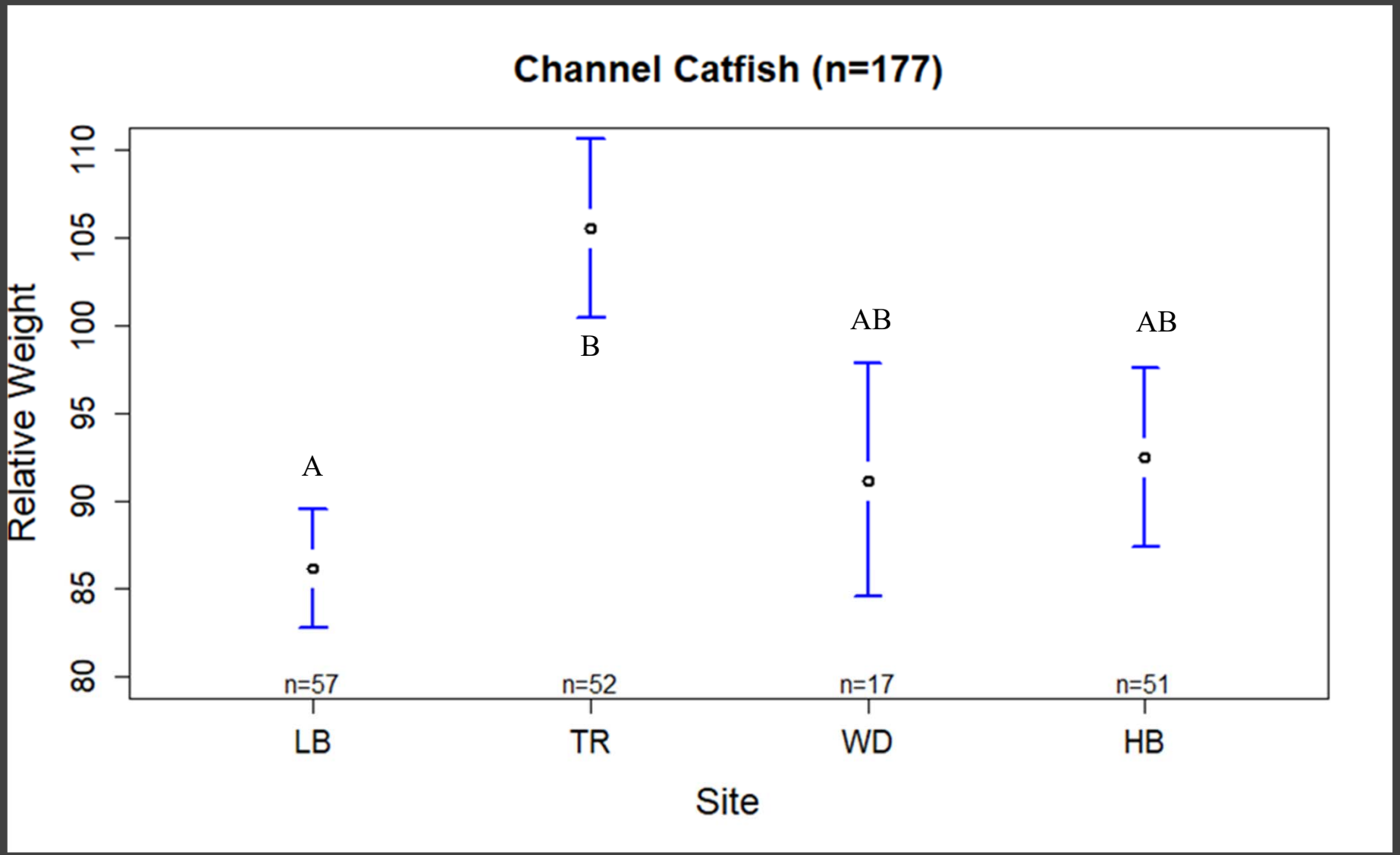
# Wadley CPE by season

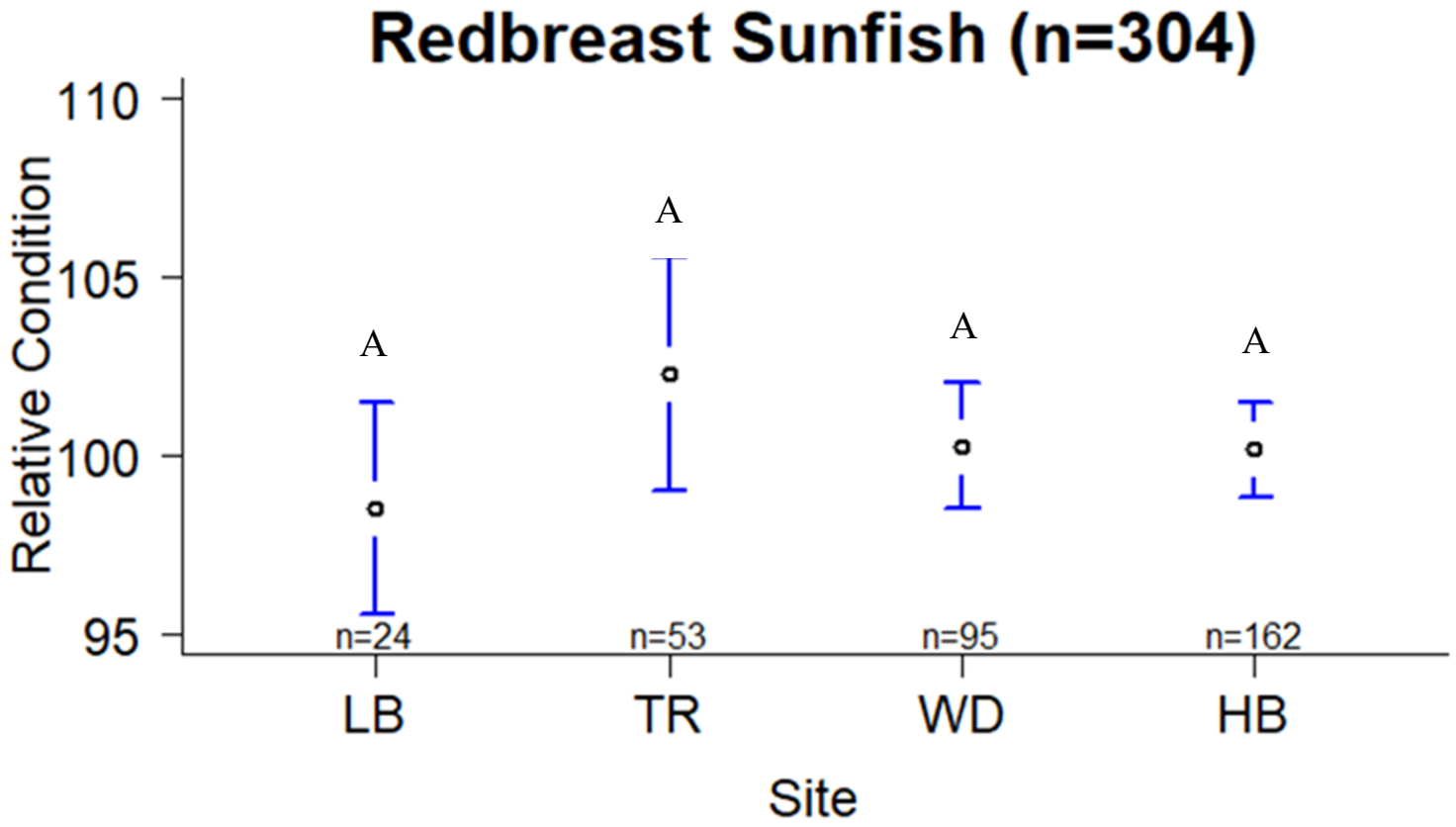
| | Winter CPE | Spring CPE | Summer CPE | Fall CPE | CPE |
|---|---|---|---|---|---|
| Clupeidae | 8.50 | 3.60 | 0.50 | 0.00 | 2.57 |
| Cyprinidae/Leuciscidae | 35.00 | 50.00 | 46.00 | 34.50 | 40.48 |
| Catastomidae | 29.50 | 28.40 | 31.00 | 37.75 | 32.67 |
| Ictaluridae | 0.50 | 0.00 | 3.00 | 4.25 | 2.29 |
| Fundulidae | 0.50 | 0.40 | 1.50 | 0.00 | 0.48 |
| Centrarchidae | 17.50 | 38.80 | 93.50 | 55.50 | 51.52 |
| Percidae | 0.50 | 13.20 | 25.00 | 34.00 | 20.95 |

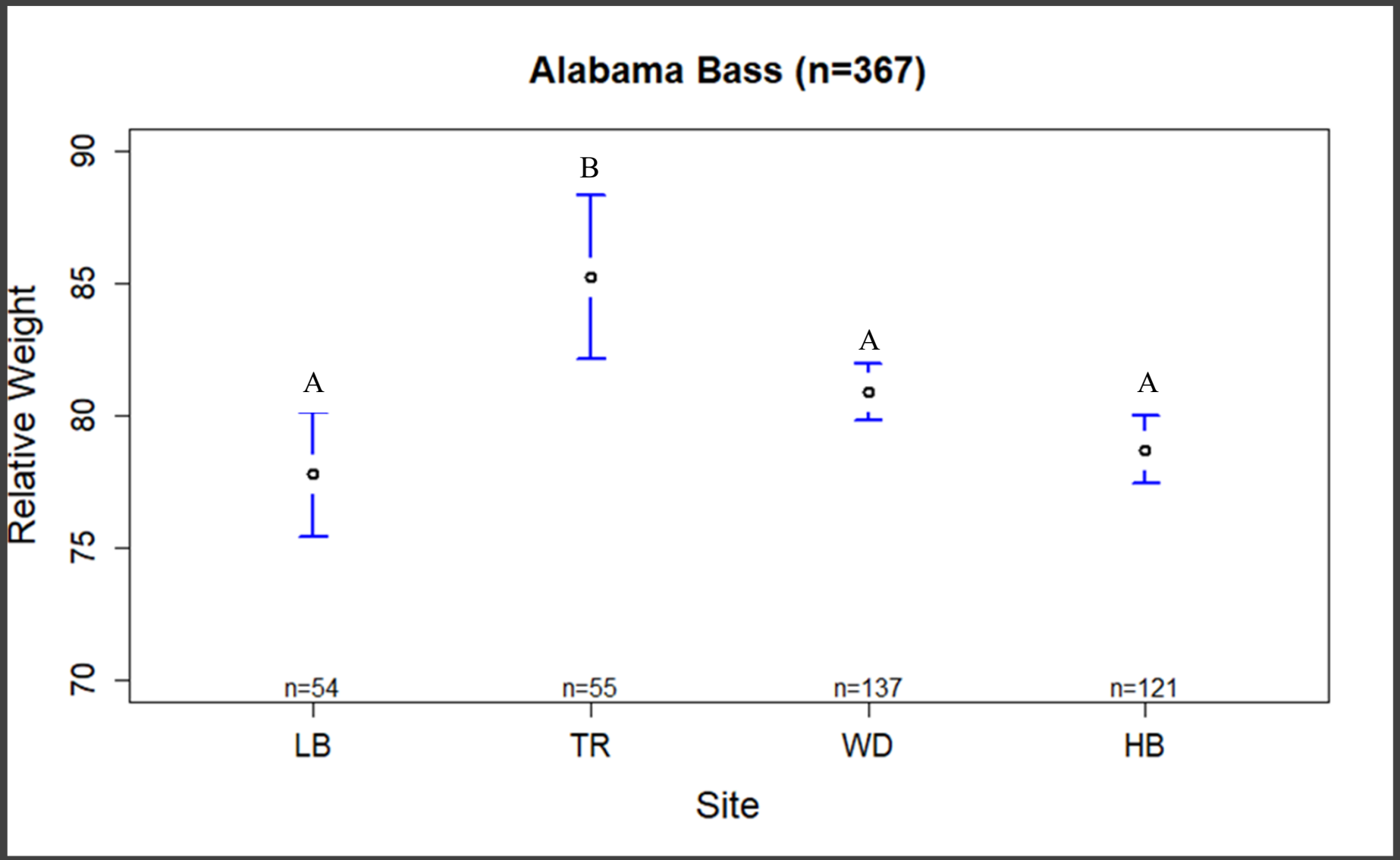
# Horseshoe Bend CPE by season

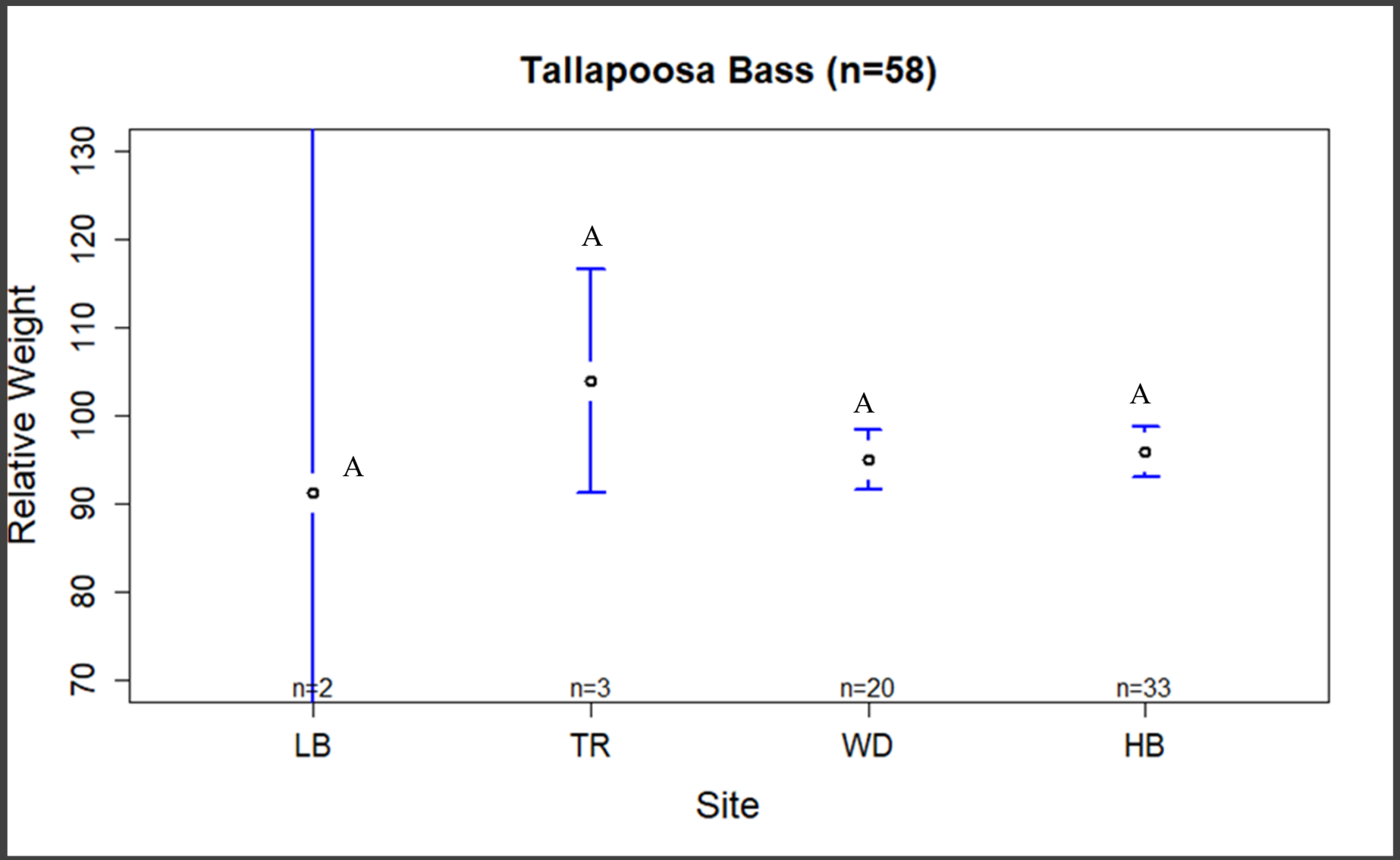
| | Winter CPE | Spring CPE | Summer CPE | Fall CPE | CPE |
|---|---|---|---|---|---|
| Clupeidae | 16.00 | 0.75 | 0.00 | 1.75 | 3.50 |
| Cyprinidae/Leuciscidae | 49.50 | 51.75 | 6.00 | 19.25 | 32.92 |
| Catastomidae | 13.00 | 15.25 | 13.00 | 16.50 | 14.92 |
| Ictaluridae | 1.00 | 3.00 | 8.50 | 7.75 | 5.17 |
| Fundulidae | 1.00 | 1.50 | 0.00 | 0.25 | 0.75 |
| Centrarchidae | 28.50 | 55.75 | 49.50 | 53.75 | 49.50 |
| Percidae | 0.00 | 5.00 | 1.50 | 0.25 | 2.00 |

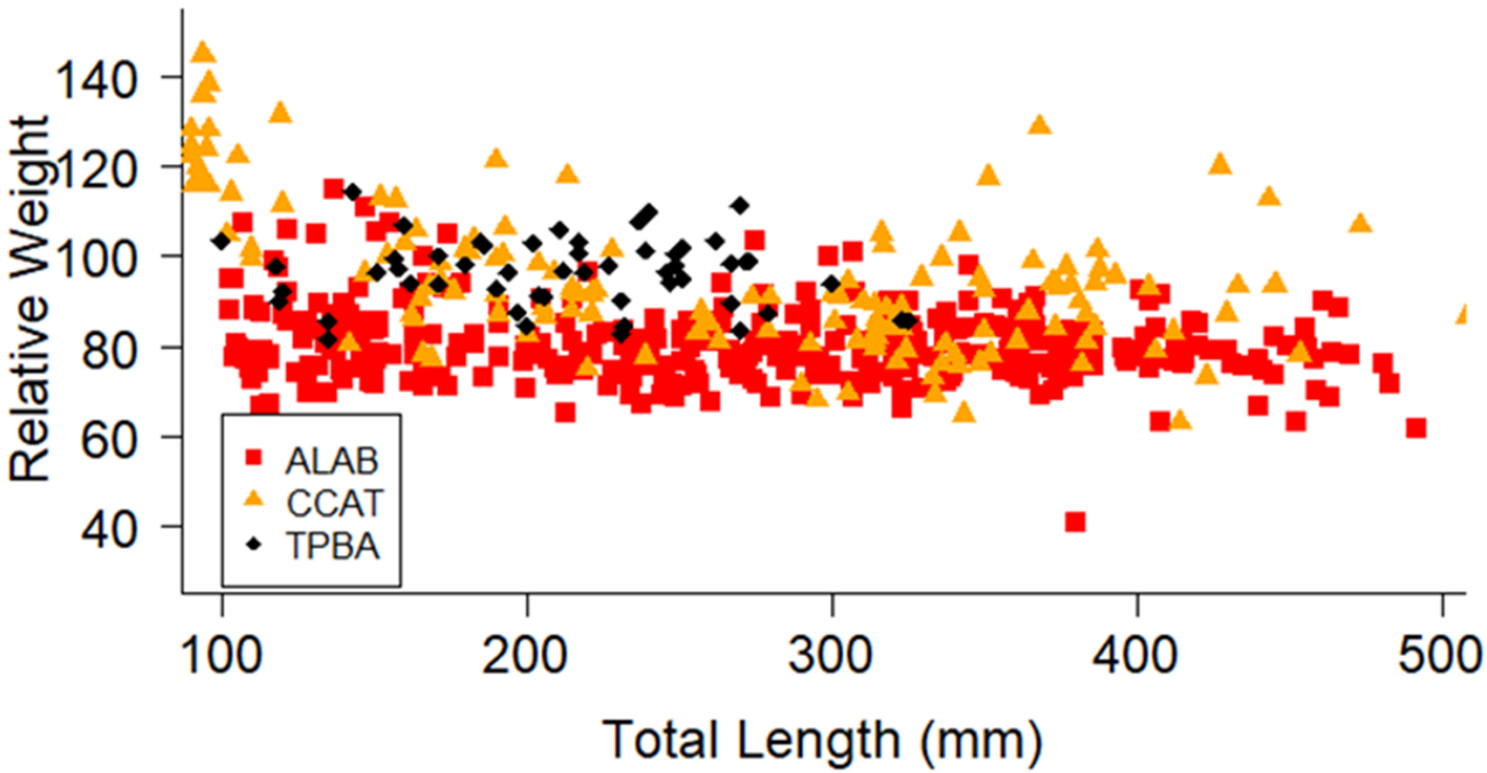
# Results: age-and-growth

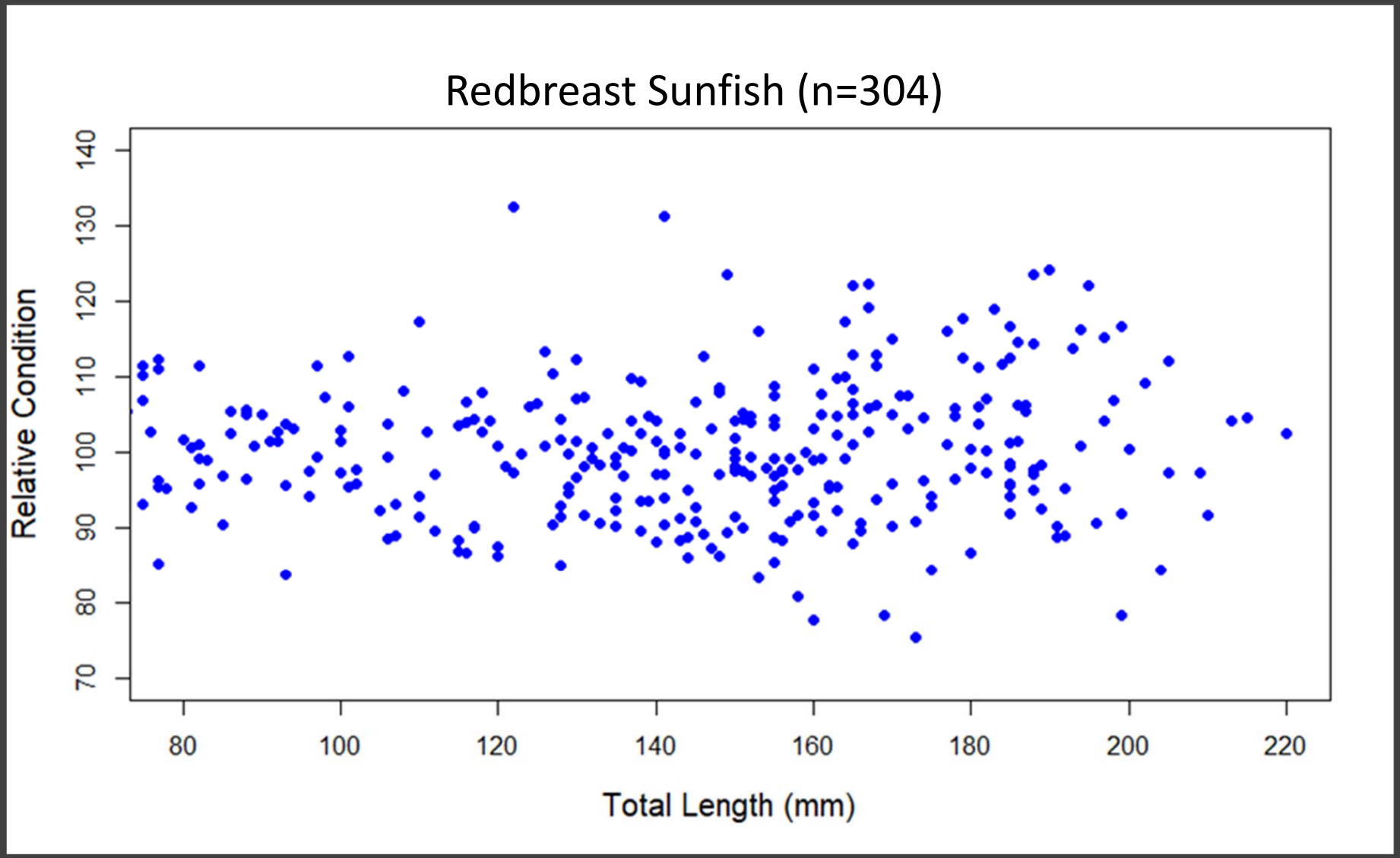

Channel Catfish (n=177)
Relative Weight
80
85
90
95
100
105
110
A
B
AB
AB
n=57
n=52
n=17
n=51
LB
TR
WD
HB
Site

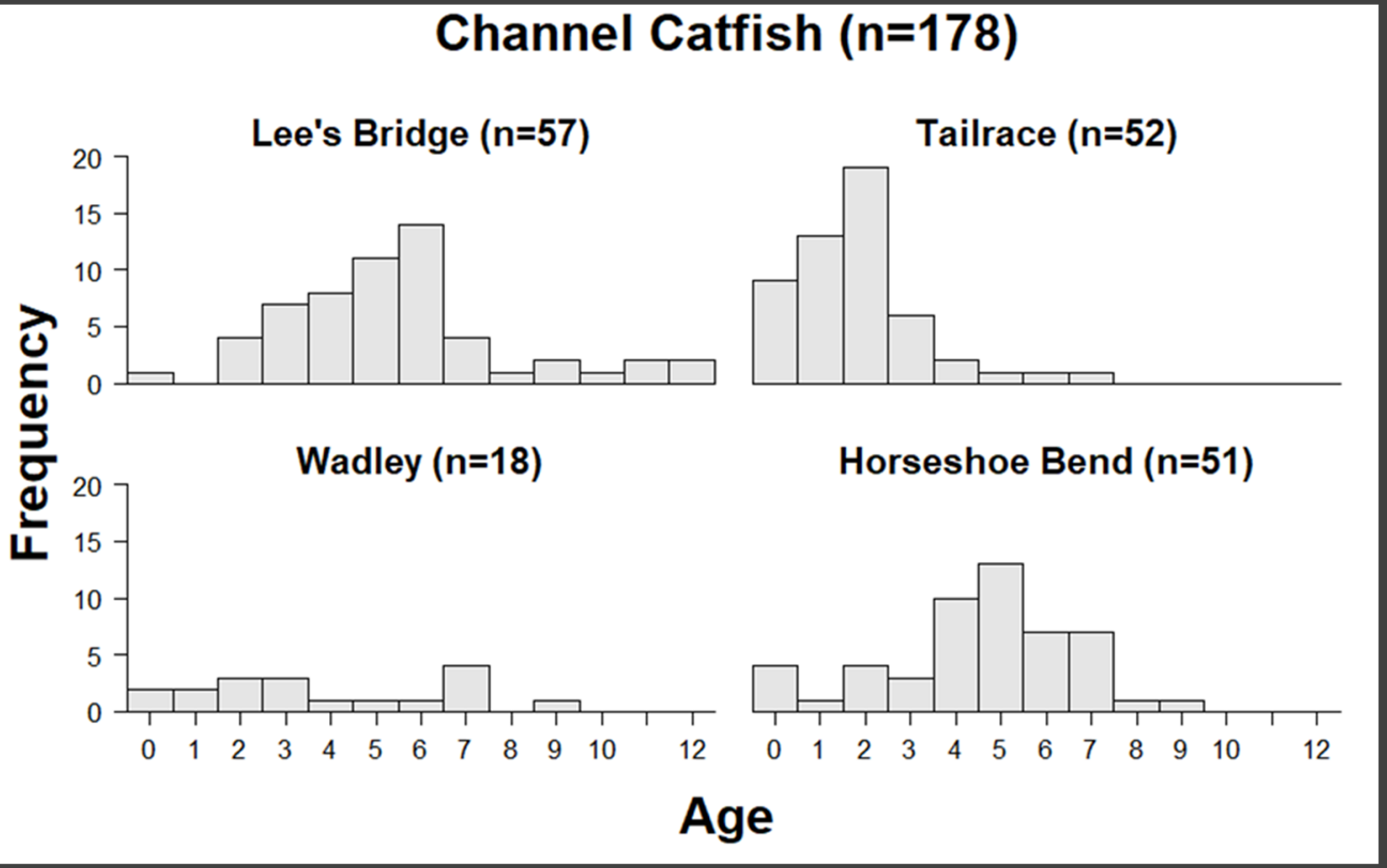

Redbreast Sunfish (n=304)
Relative Condition
110
105
100
95
A
A
A
A
n=24
n=53
n=95
n=162
LB
TR
WD
HB
Site

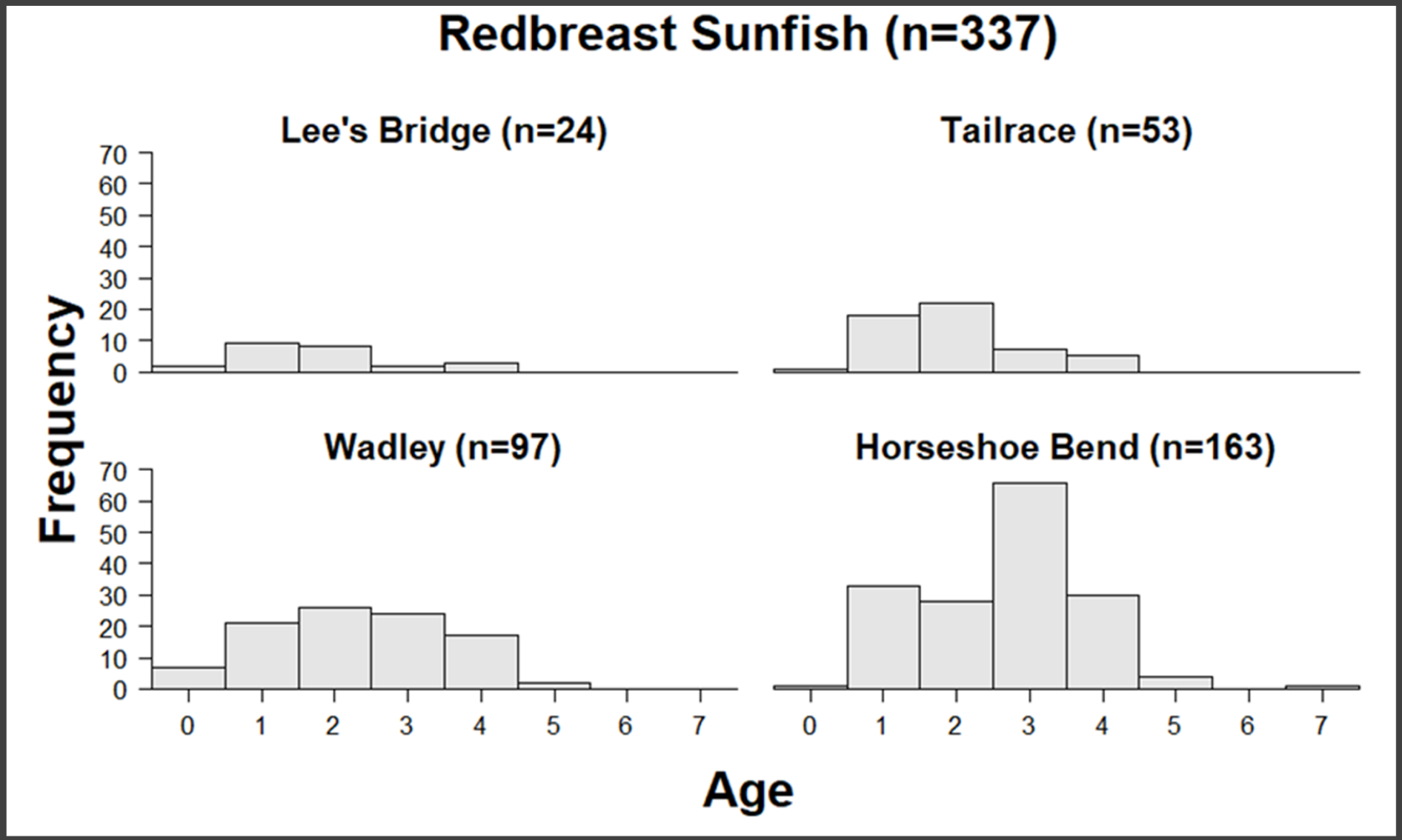

Alabama Bass (n=367)
Relative Weight
90
85
80
75
70
A
B
A
A
n=54
n=55
n=137
n=121
LB
TR
WD
HB
Site

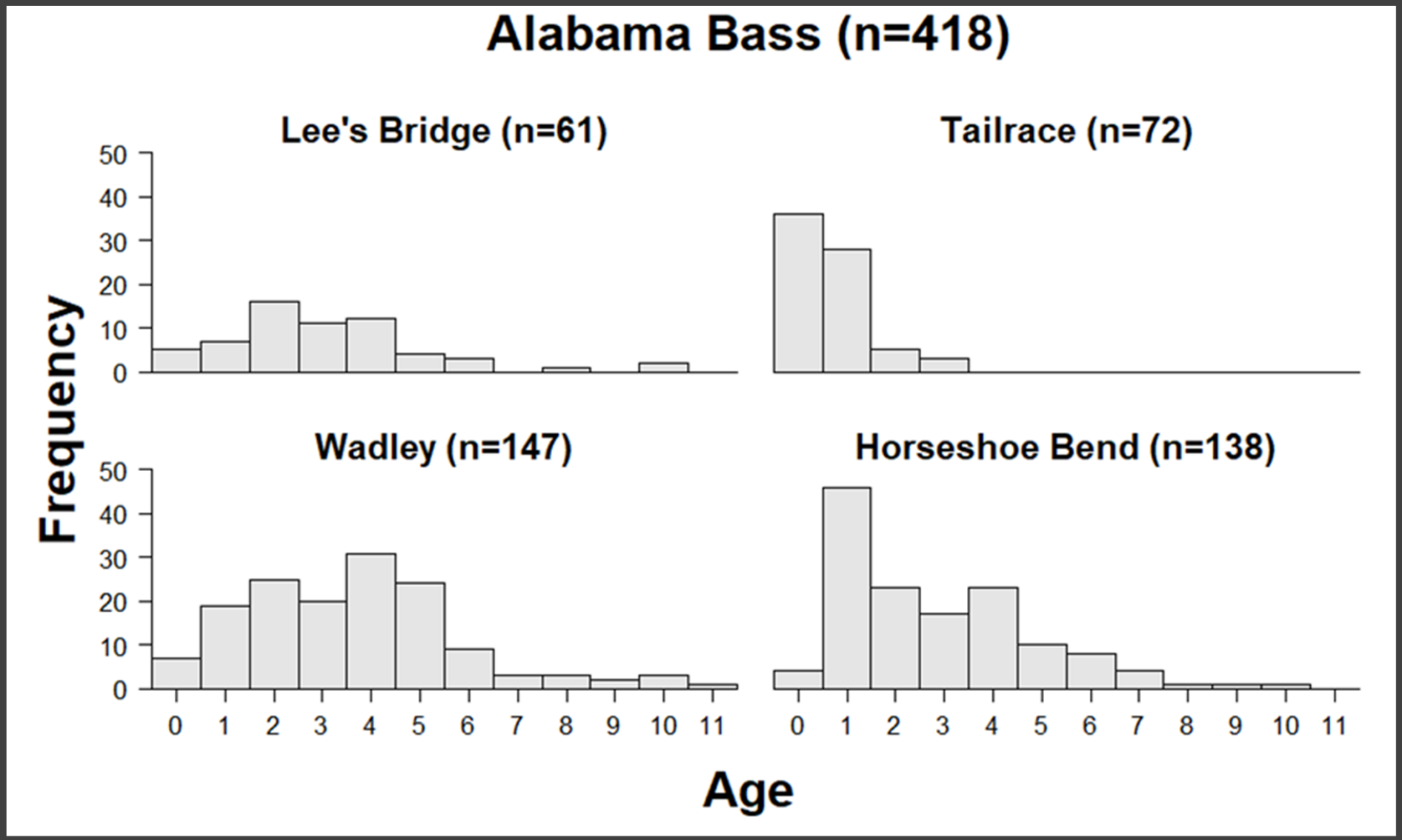

Tallapoosa Bass (n=58)
Relative Weight
70
80
90
100
110
120
130
A
A
A
A
n=2
n=3
n=20
n=33
LB
TR
WD
HB
Site

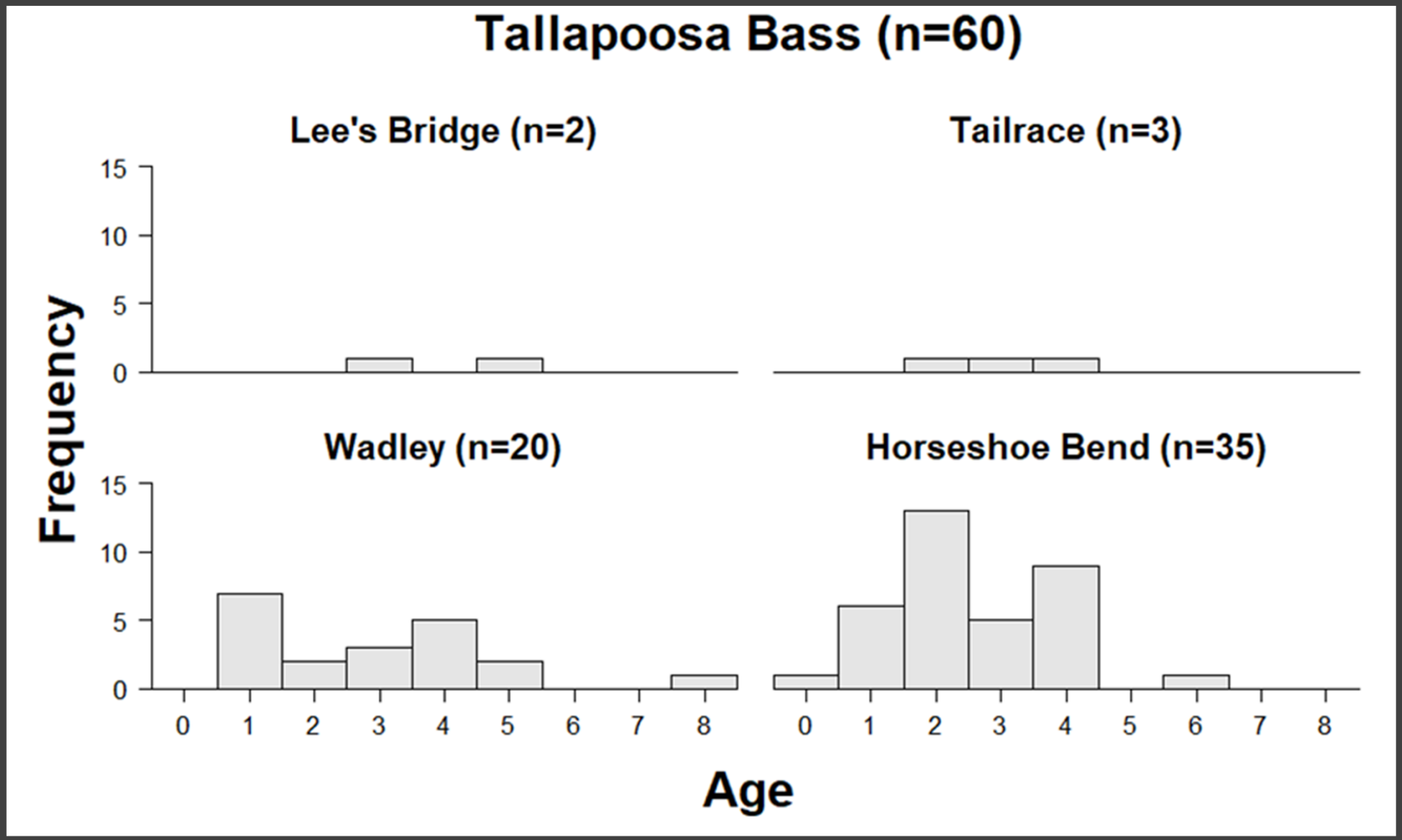

Relative Weight
140
120
100
80
60
40
ALAB
CCAT
TPBA
100
200
300
400
500
Total Length (mm)

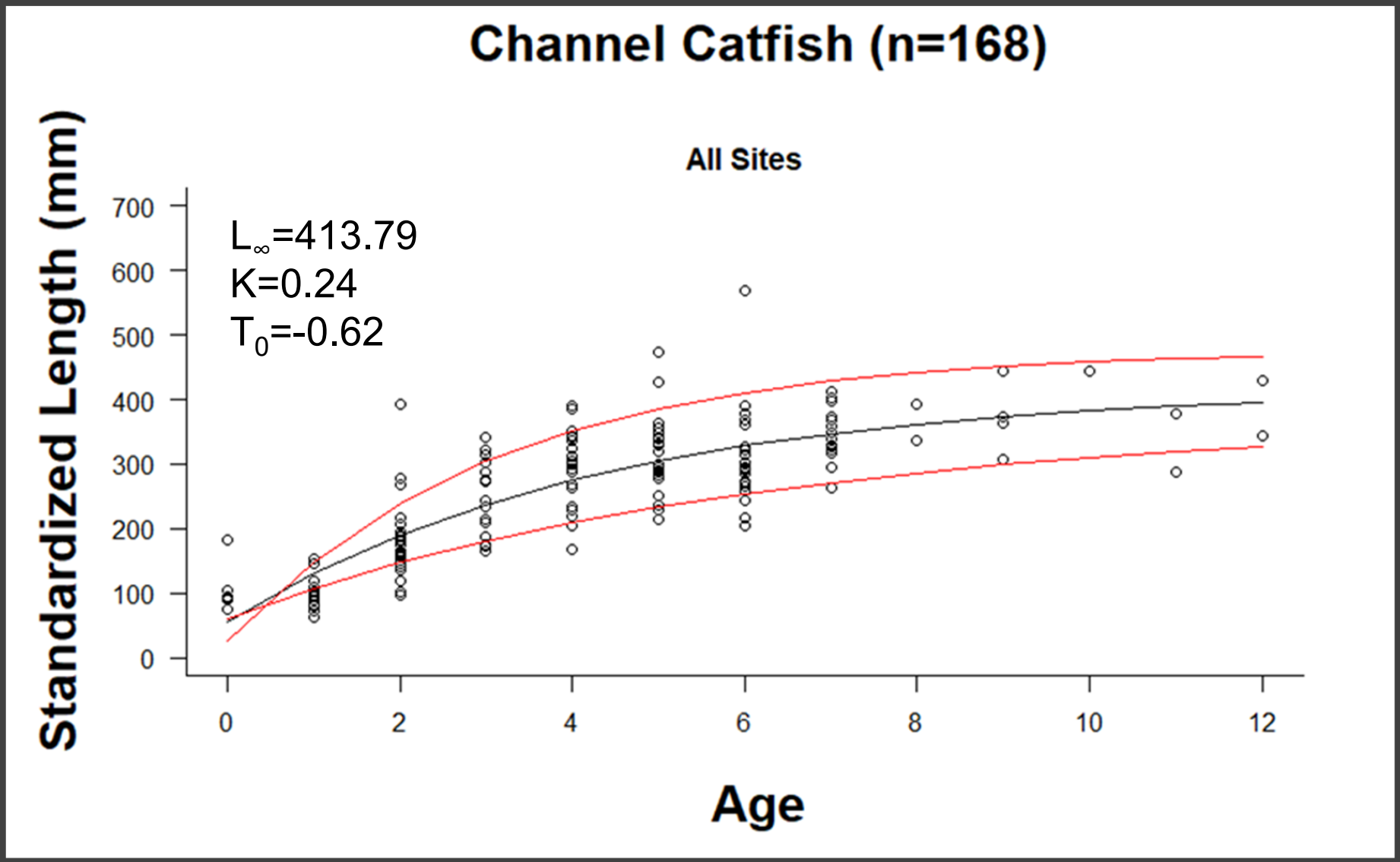

Redbreast Sunfish (n=304)
Relative Condition
70
80
90
100
110
120
130
140
80
100
120
140
160
180
200
220
Total Length (mm)

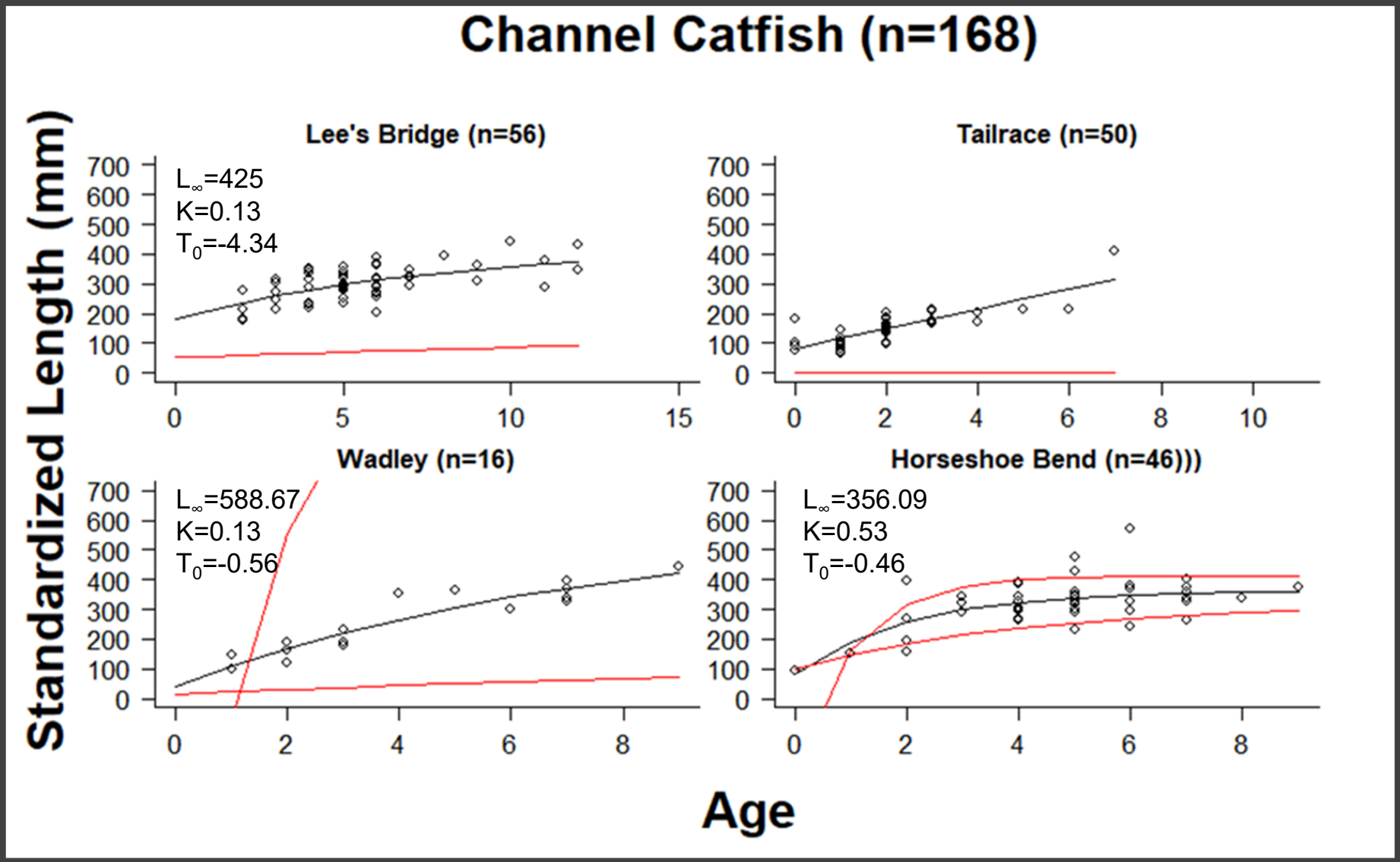

Channel Catfish (n=178)
Lee's Bridge (n=57)
Tailrace (n=52)
Wadley (n=18)
Horseshoe Bend (n=51)
Frequency
Age
0
5
10
15
20
0 1 2 3 4 5 6 7 8 9 10 12

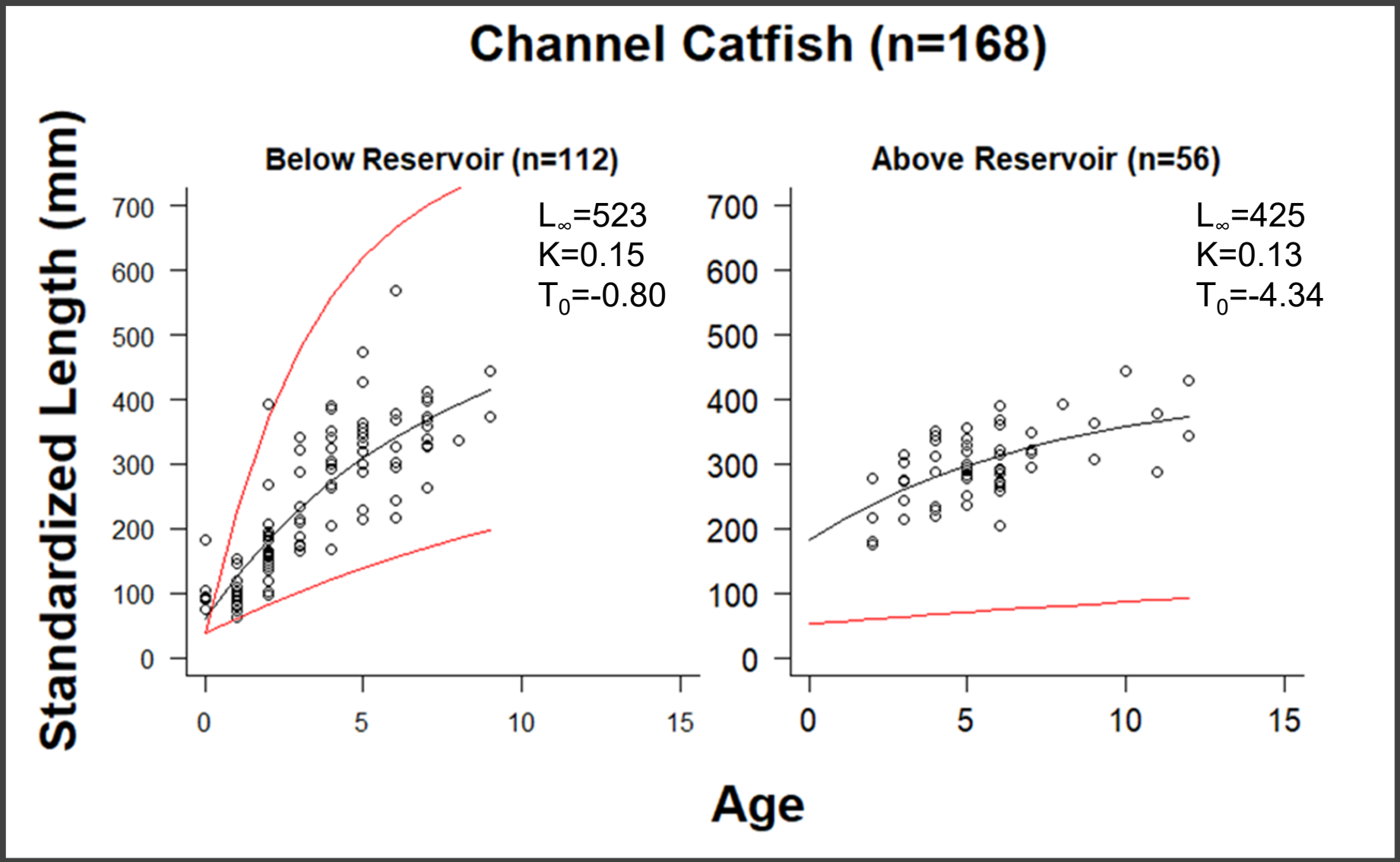

Redbreast Sunfish (n=337)
Lee's Bridge (n=24)
Tailrace (n=53)
Wadley (n=97)
Horseshoe Bend (n=163)
Frequency
Age
0
10
20
30
40
50
60
70
0
1
2
3
4
5
6
7

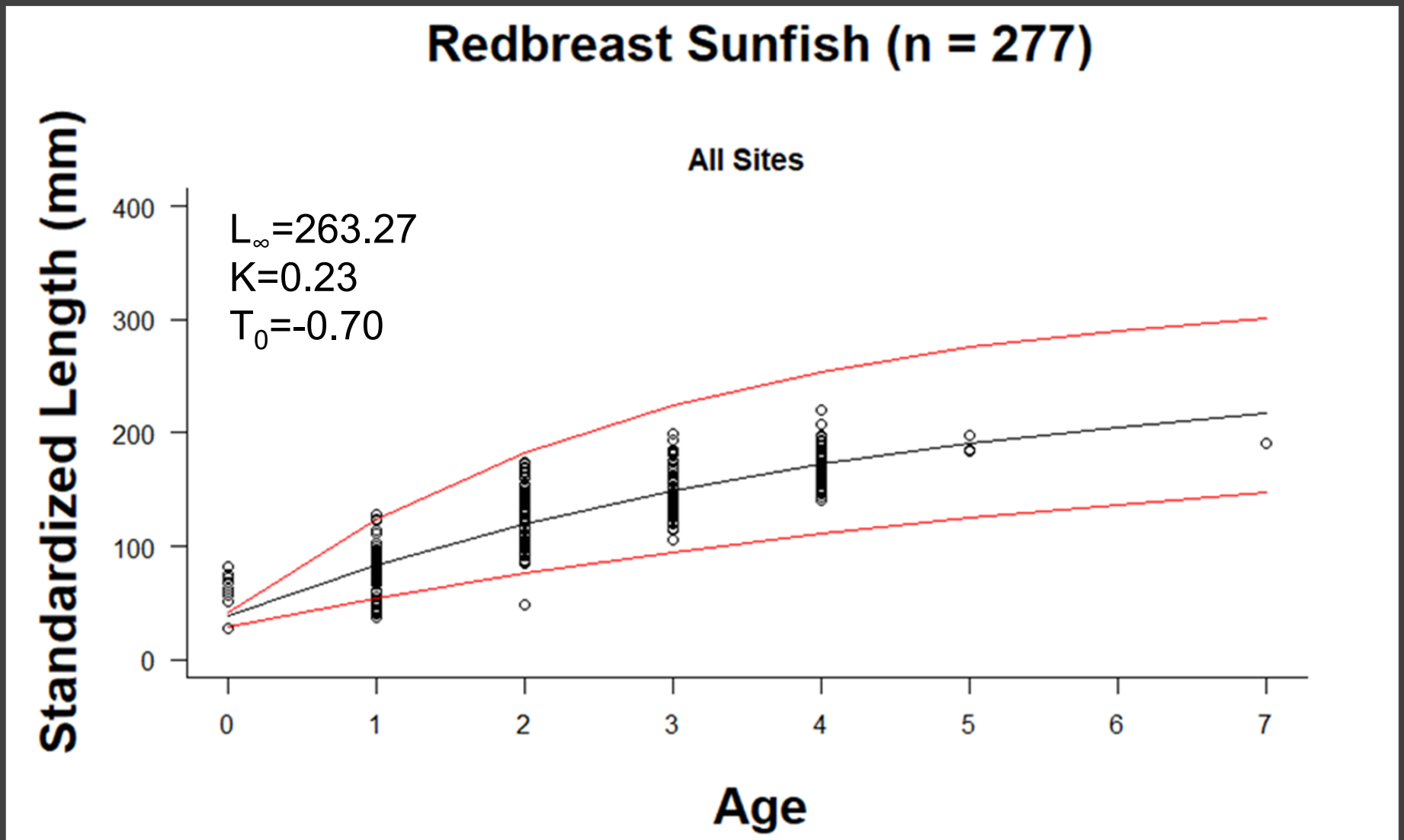

Alabama Bass (n=418)
Lee's Bridge (n=61)
Tailrace (n=72)
Wadley (n=147)
Horseshoe Bend (n=138)
Frequency
Age
0
10
20
30
40
50
0 1 2 3 4 5 6 7 8 9 10 11

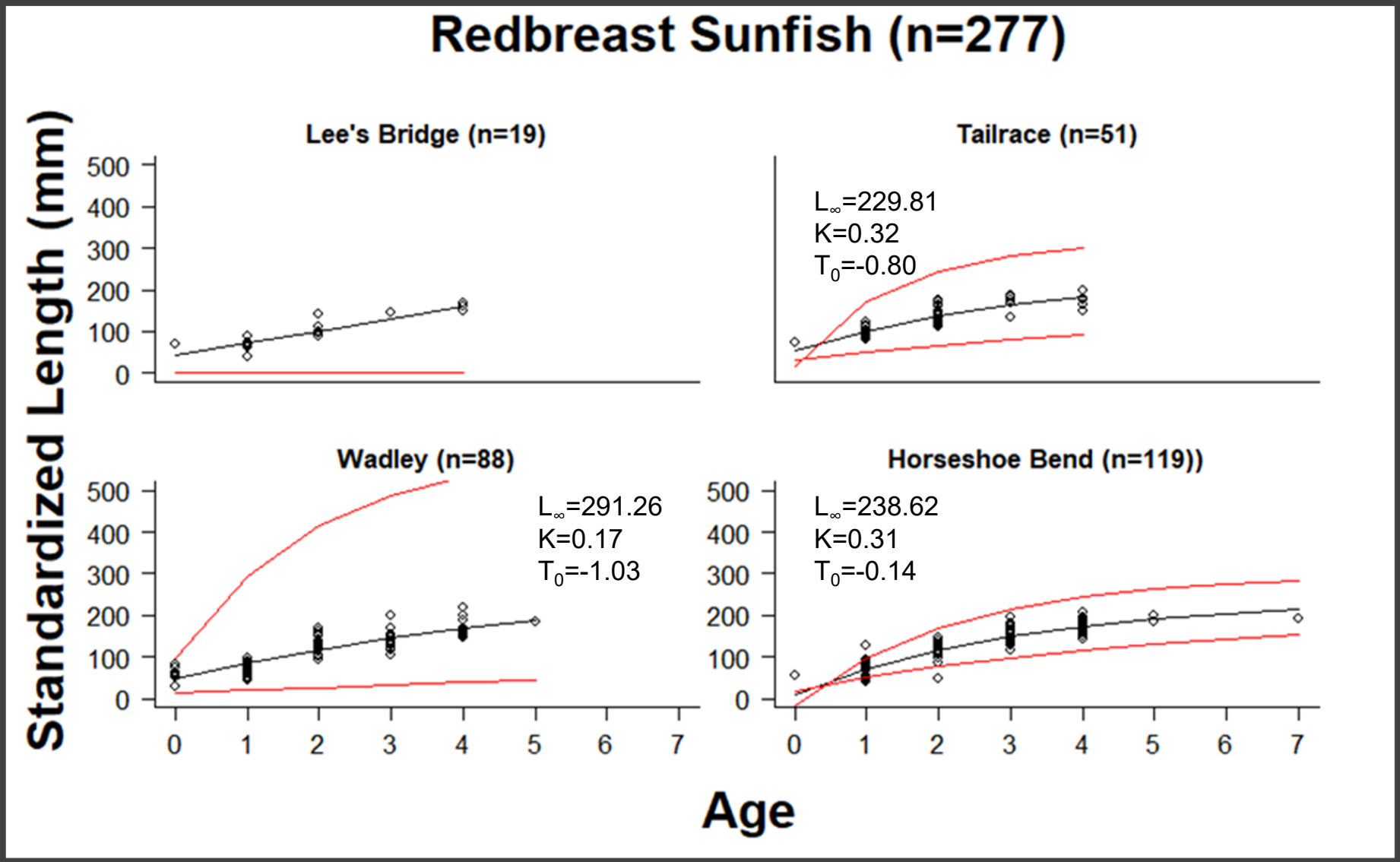

Tallapoosa Bass (n=60)
Lee's Bridge (n=2)
Tailrace (n=3)
Wadley (n=20)
Horseshoe Bend (n=35)
Frequency
Age
0
5
10
15
0
1
2
3
4
5
6
7
8


Channel Catfish (n=168)
All Sites
Standardized Length (mm)
$L_\infty$=413.79
K=0.24
$T_0$=-0.62
700
600
500
400
300
200
100
0
0
2
4
6
8
10
12
Age

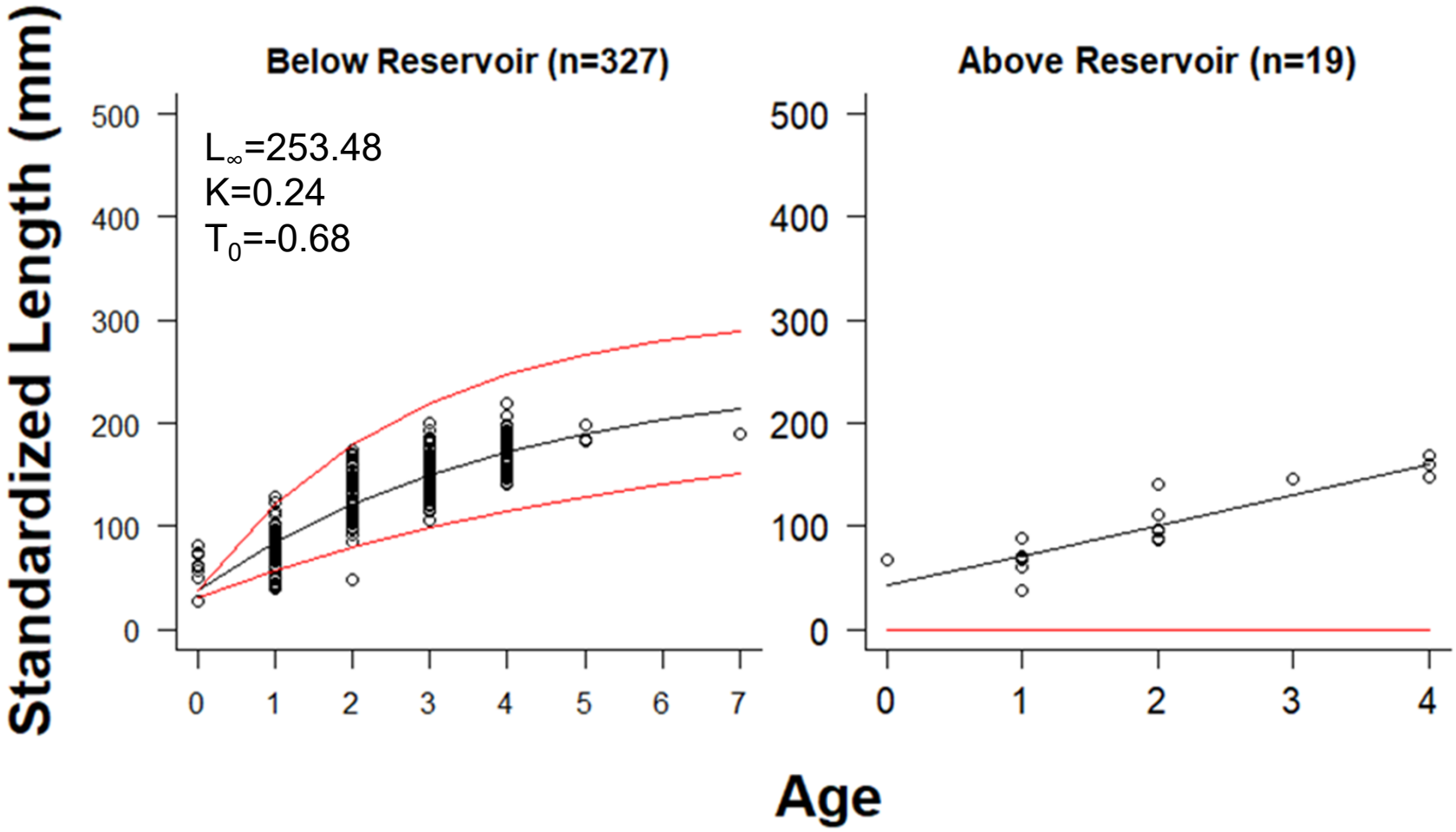

Channel Catfish (n=168)
Standardized Length (mm)
Lee's Bridge (n=56)
L∞=425
K=0.13
T0=-4.34
Tailrace (n=50)
Wadley (n=16)
L∞=588.67
K=0.13
T0=-0.56
Horseshoe Bend (n=46)))
L∞=356.09
K=0.53
T0=-0.46
Age

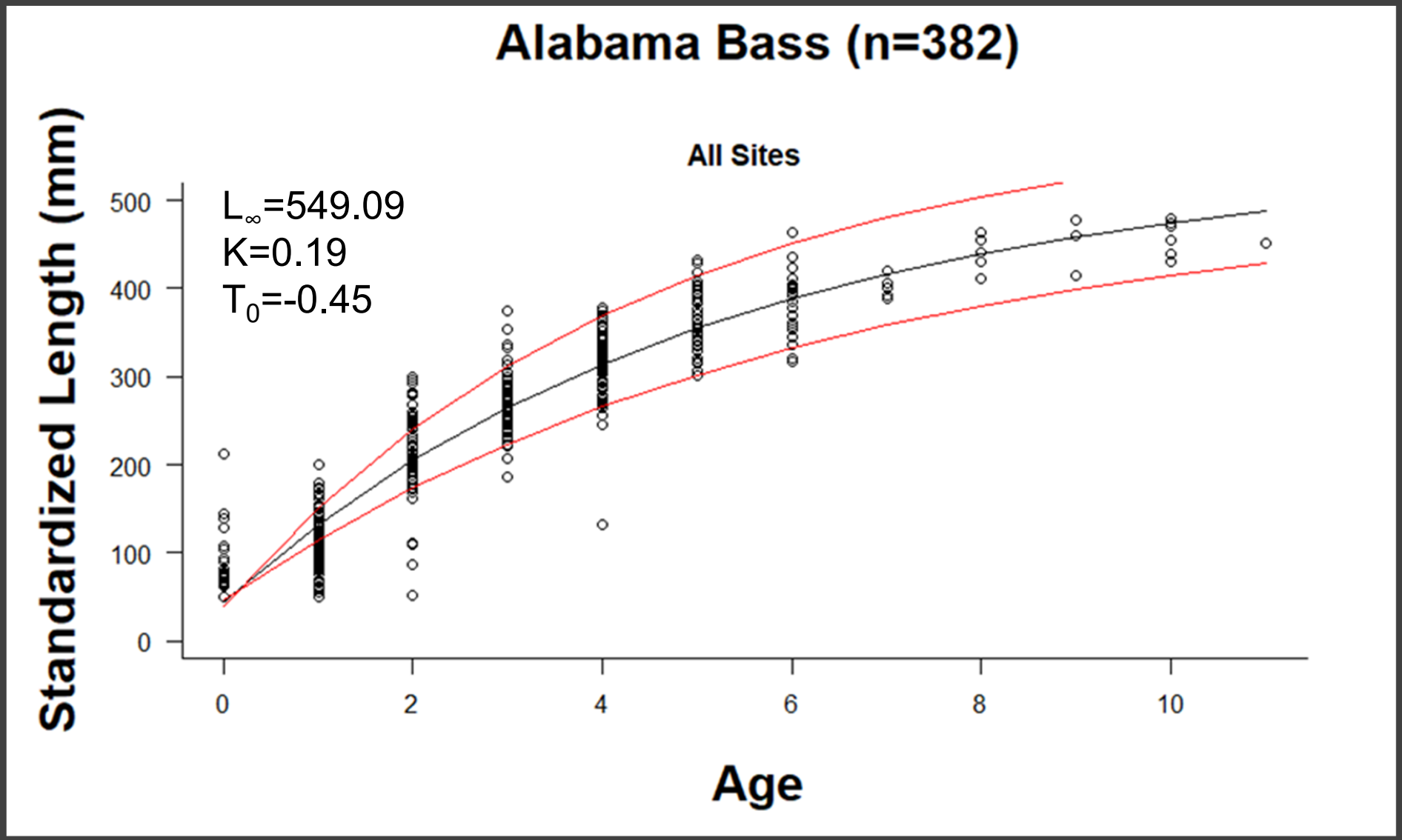

Channel Catfish (n=168)
Standardized Length (mm)
Below Reservoir (n=112)
$L_\infty$=523
K=0.15
$T_0$=-0.80
Above Reservoir (n=56)
$L_\infty$=425
K=0.13
$T_0$=-4.34
0
100
200
300
400
500
600
700
0
5
10
15
Age

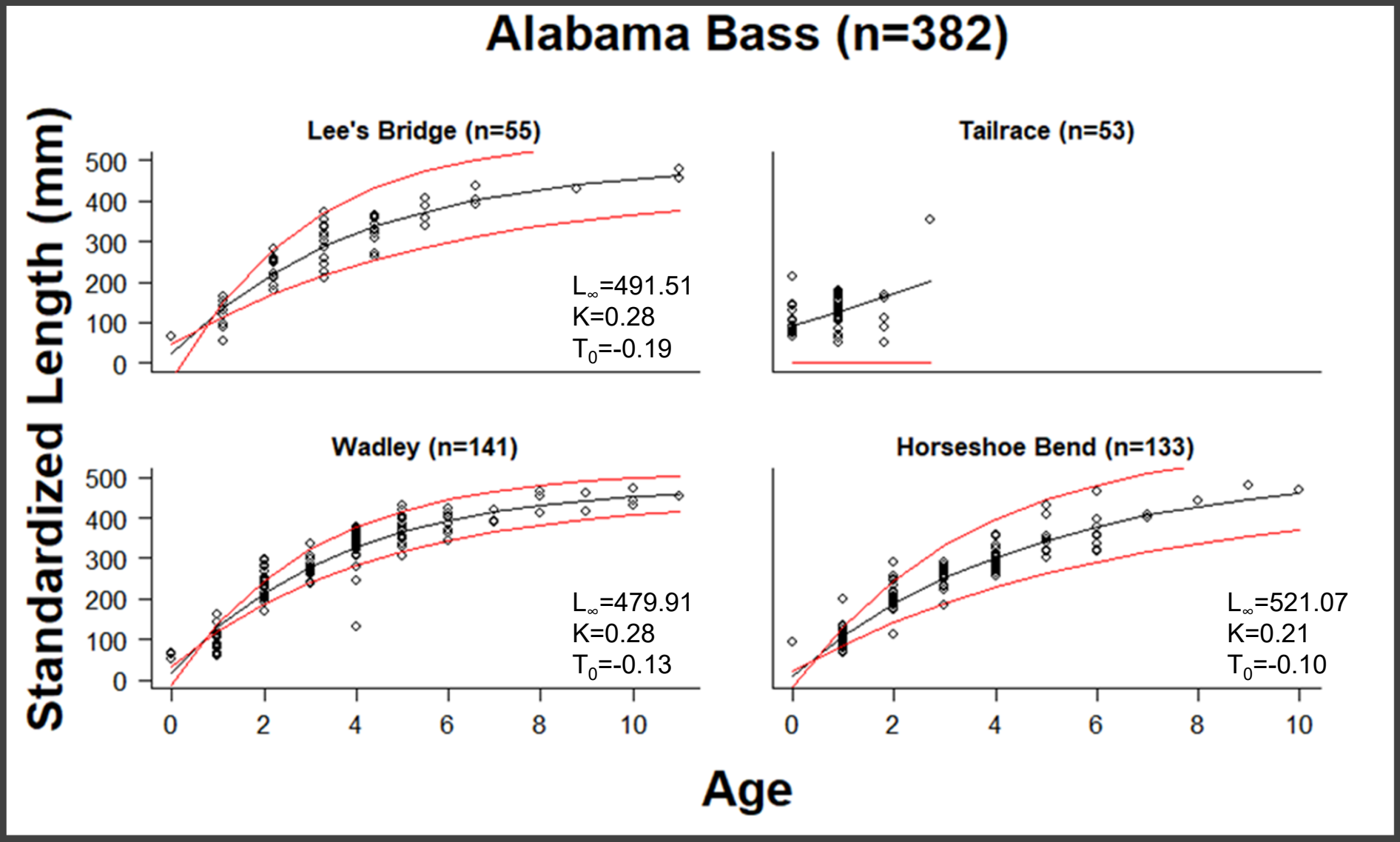

Redbreast Sunfish (n = 277)
All Sites
$L_\infty$=263.27
K=0.23
$T_0$=-0.70
Standardized Length (mm)
0
100
200
300
400
0
1
2
3
4
5
6
7
Age

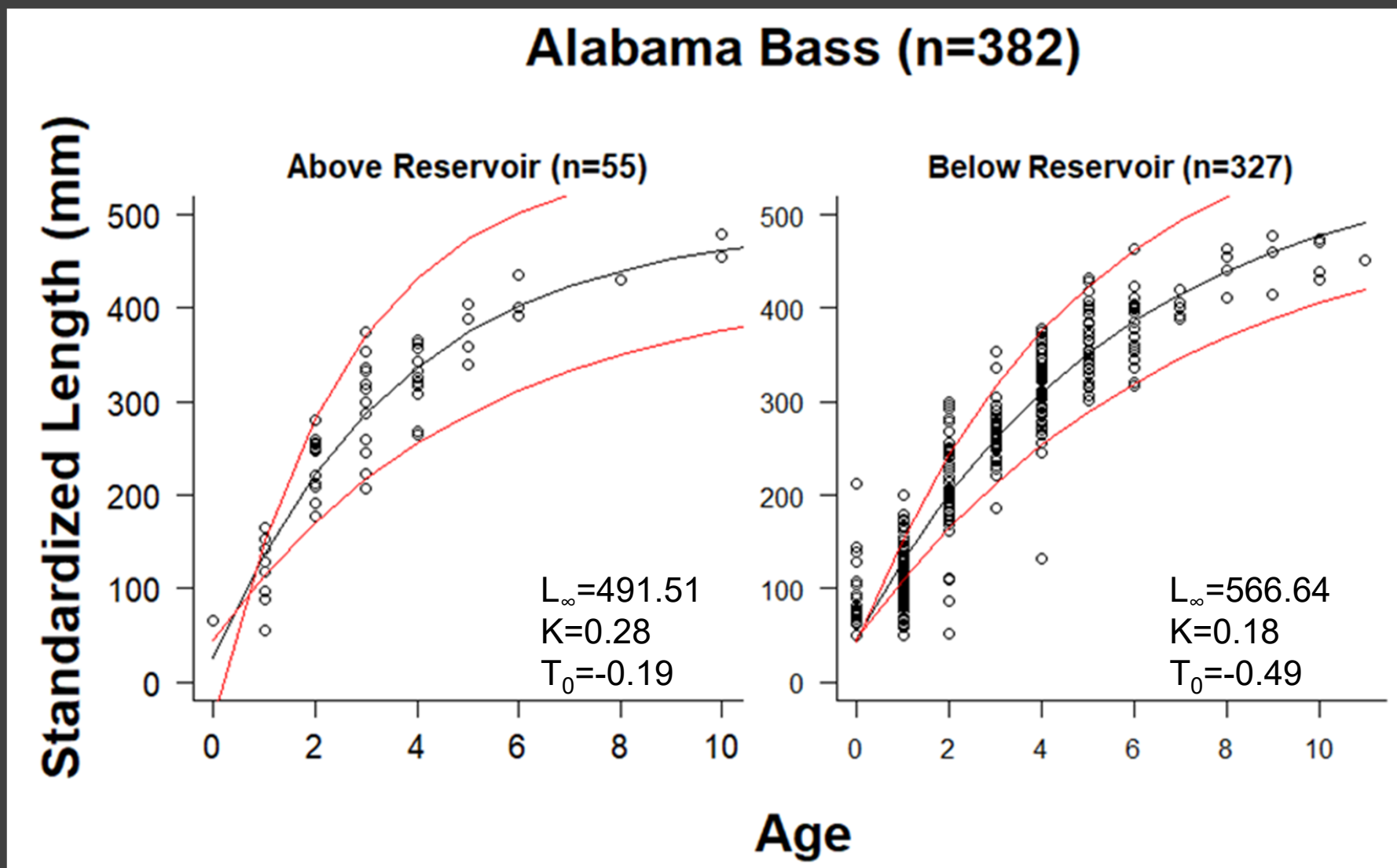

Redbreast Sunfish (n=277)
Standardized Length (mm)
Lee's Bridge (n=19)
Tailrace (n=51)
L∞=229.81
K=0.32
T0=-0.80
Wadley (n=88)
L∞=291.26
K=0.17
T0=-1.03
Horseshoe Bend (n=119))
L∞=238.62
K=0.31
T0=-0.14
0
100
200
300
400
500
0
1
2
3
4
5
6
7
Age

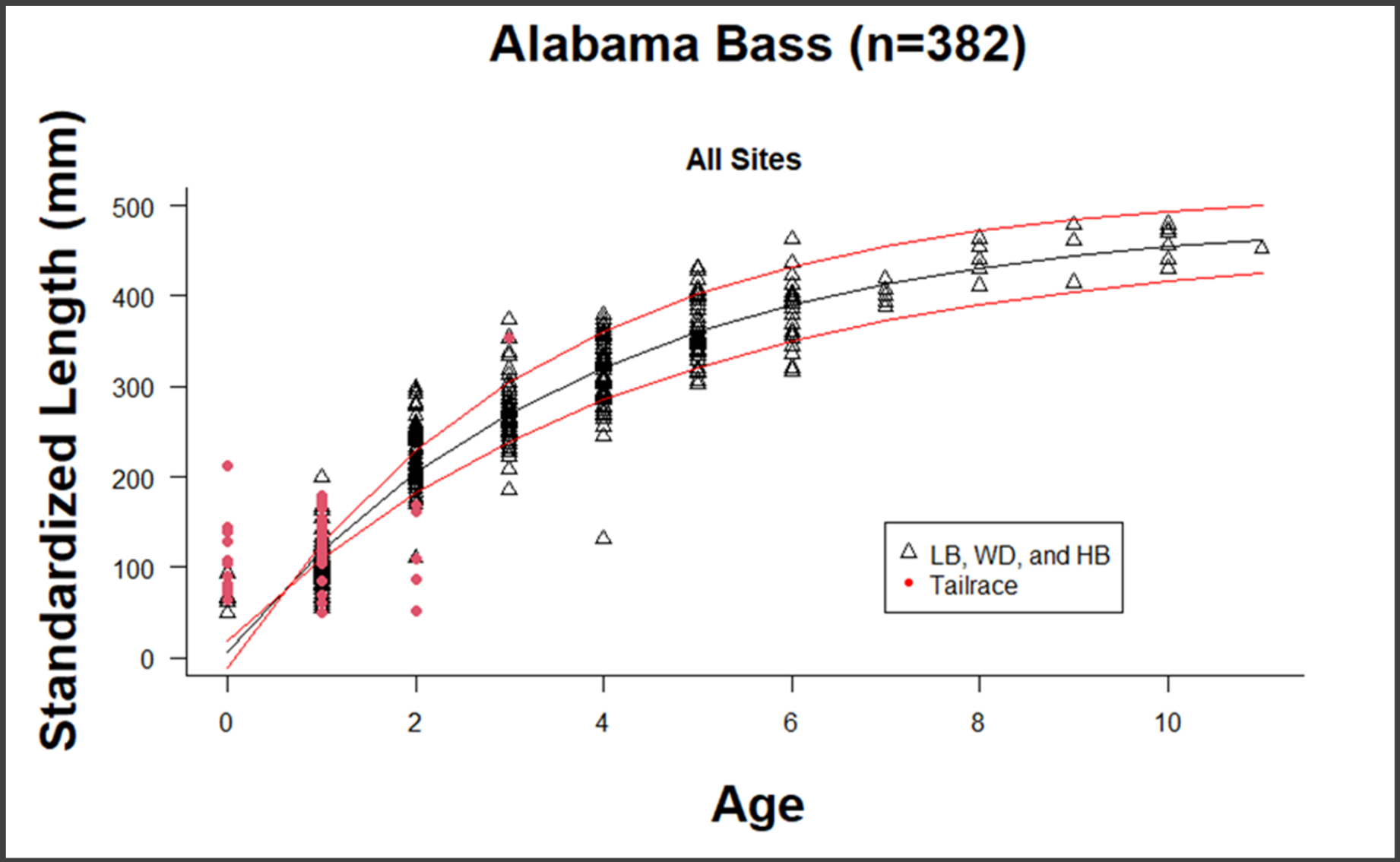
# Redbreast Sunfish (n=277)

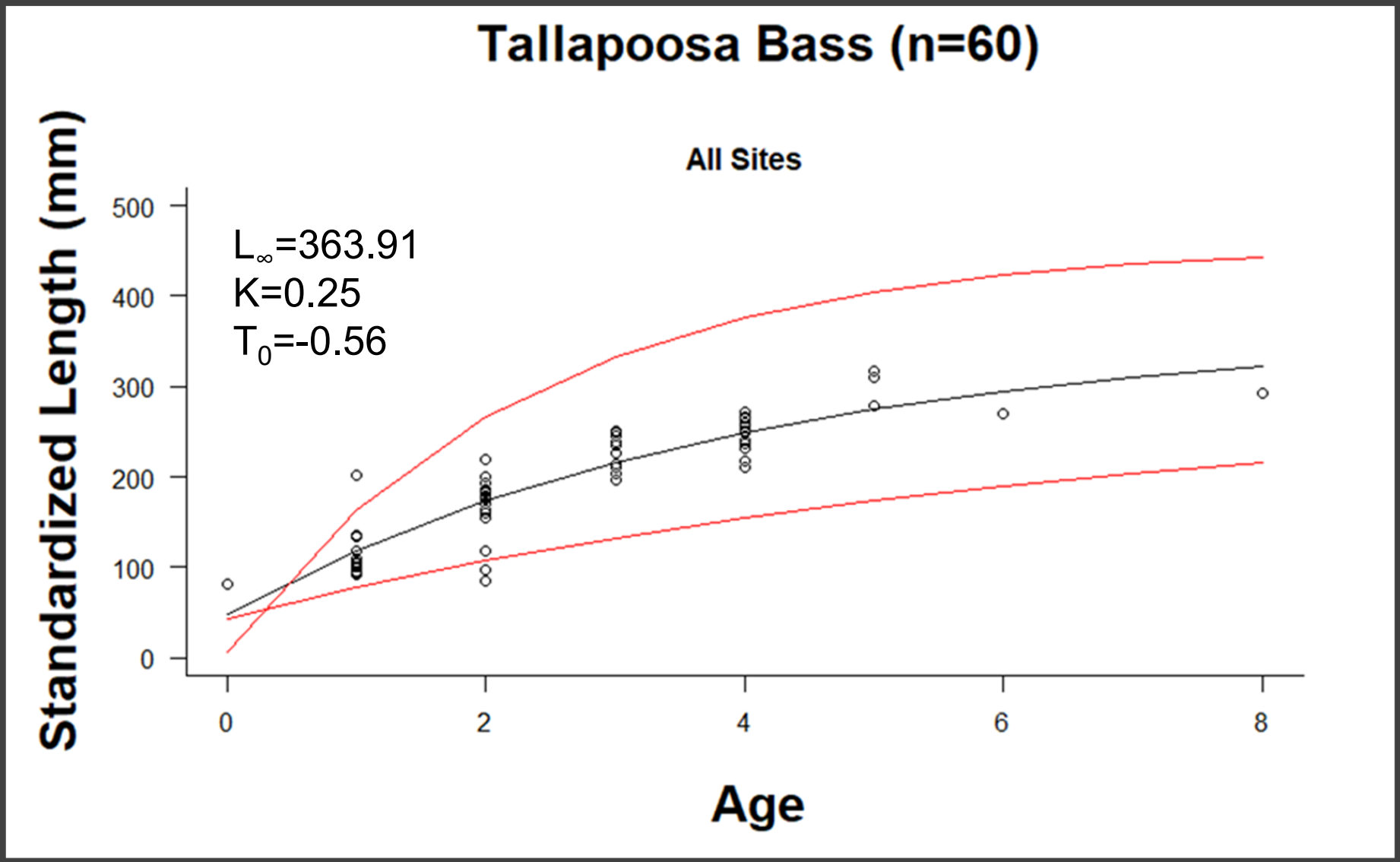


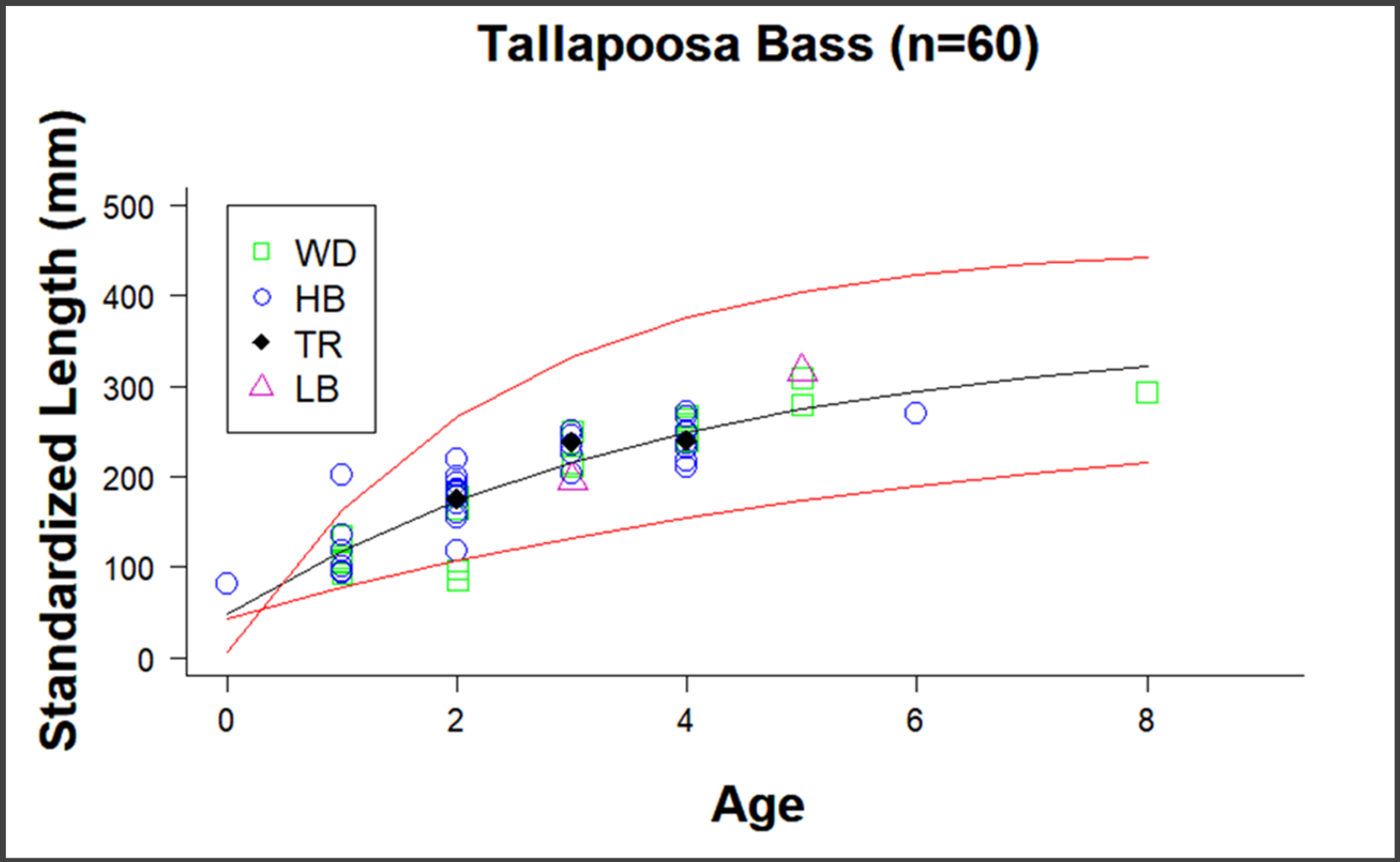

Alabama Bass (n=382)
All Sites
$L_\infty$=549.09
K=0.19
$T_0$=-0.45
Standardized Length (mm)
0
100
200
300
400
500
0
2
4
6
8
10
Age


Alabama Bass (n=382)
Standardized Length (mm)
Lee's Bridge (n=55)
L∞=491.51
K=0.28
T0=-0.19
Tailrace (n=53)
Wadley (n=141)
L∞=479.91
K=0.28
T0=-0.13
Horseshoe Bend (n=133)
L∞=521.07
K=0.21
T0=-0.10
0
100
200
300
400
500
0
2
4
6
8
10
Age

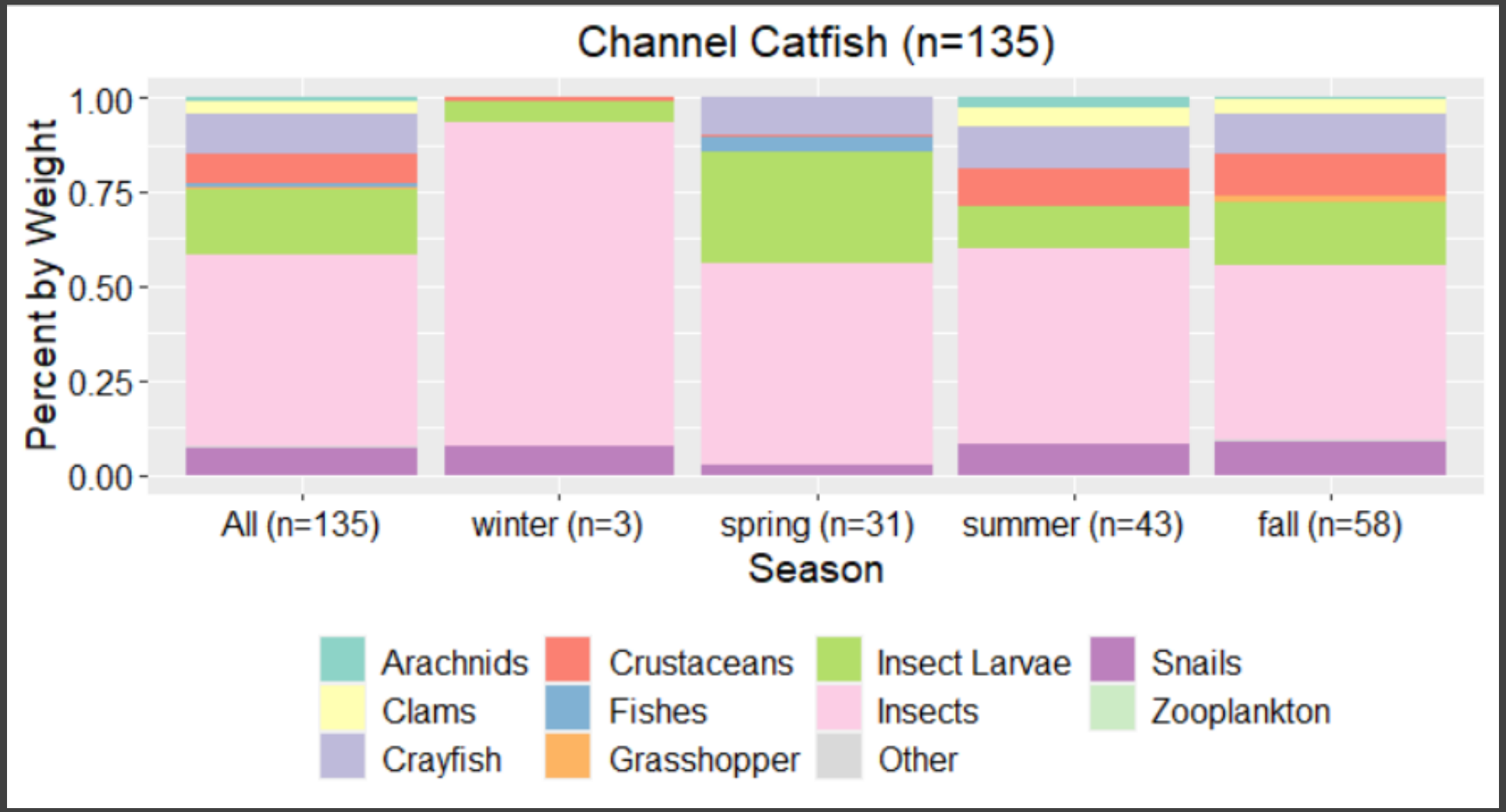

Alabama Bass (n=382)
Above Reservoir (n=55)
Below Reservoir (n=327)
Standardized Length (mm)
Age
0
100
200
300
400
500
0
2
4
6
8
10
L∞=491.51
K=0.28
T0=-0.19
L∞=566.64
K=0.18
T0=-0.49

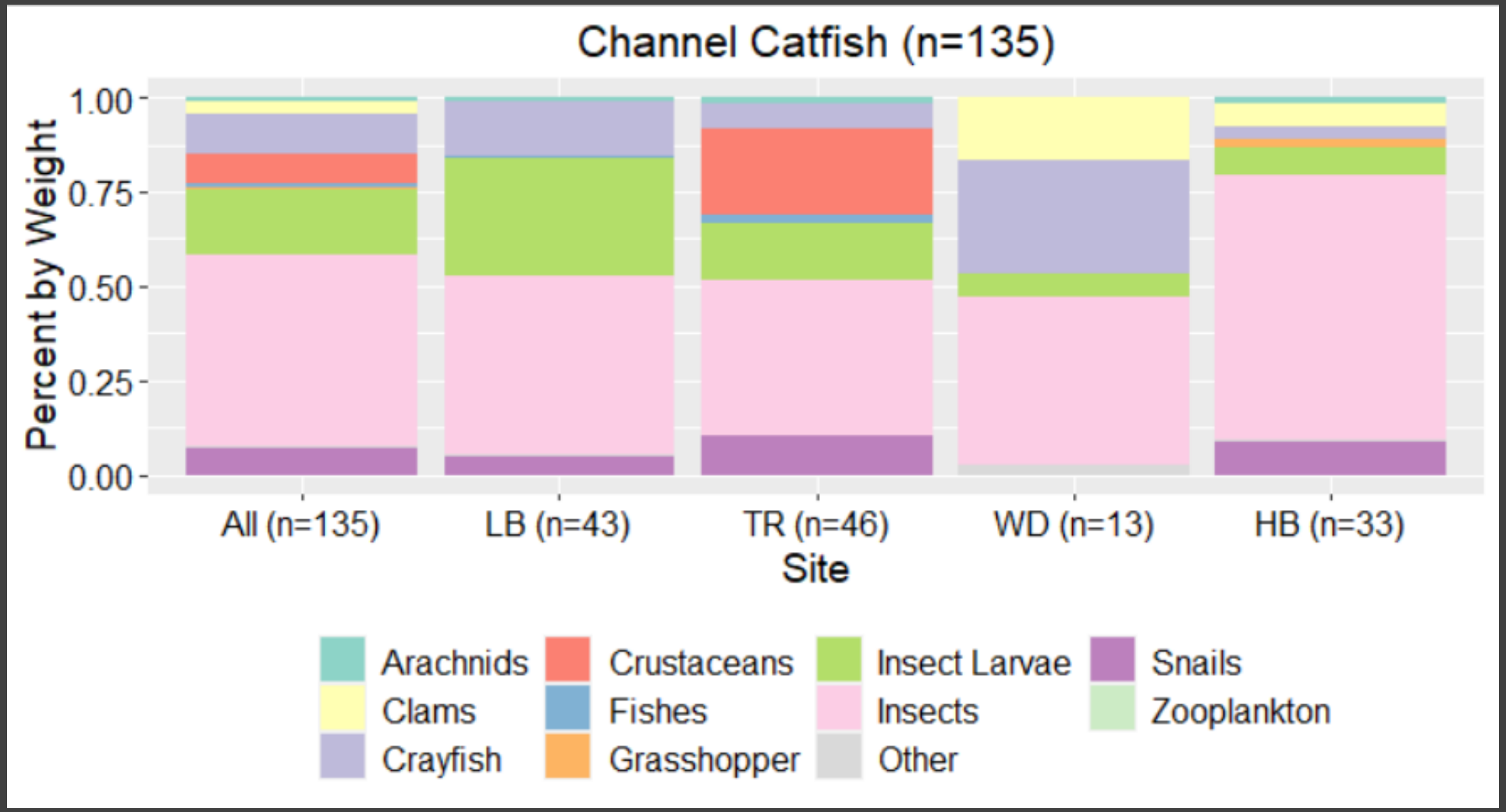

Alabama Bass (n=382)
All Sites
Standardized Length (mm)
500
400
300
200
100
0
0
2
4
6
8
10
Age
LB, WD, and HB
Tailrace

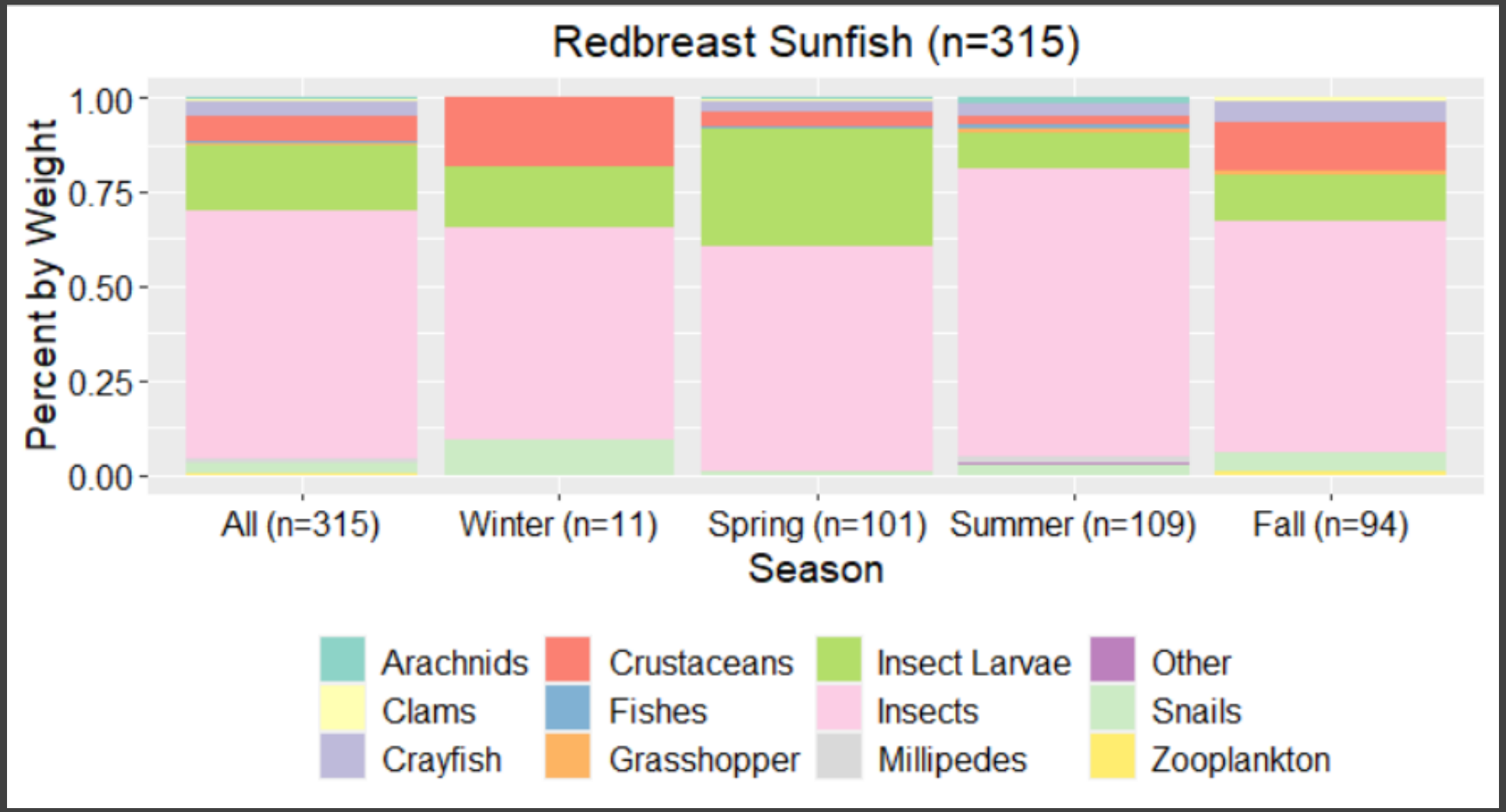

Tallapoosa Bass (n=60)
All Sites
$L_\infty$=363.91
K=0.25
$T_0$=-0.56
Standardized Length (mm)
500
400
300
200
100
0
0
2
4
6
8
Age

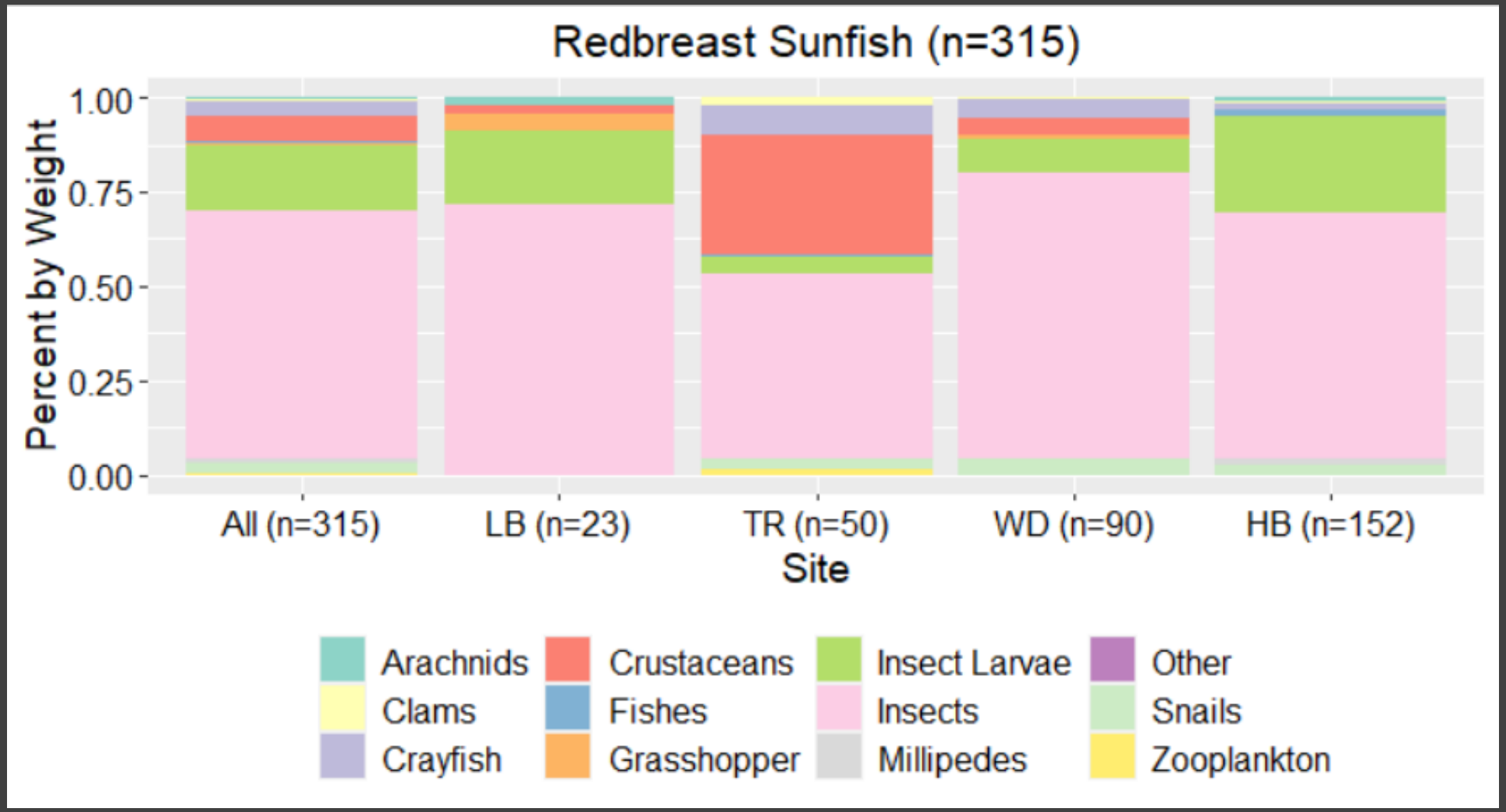

Tallapoosa Bass (n=60)
Standardized Length (mm)
500
400
300
200
100
0
WD
HB
TR
LB
0
2
4
6
8
Age

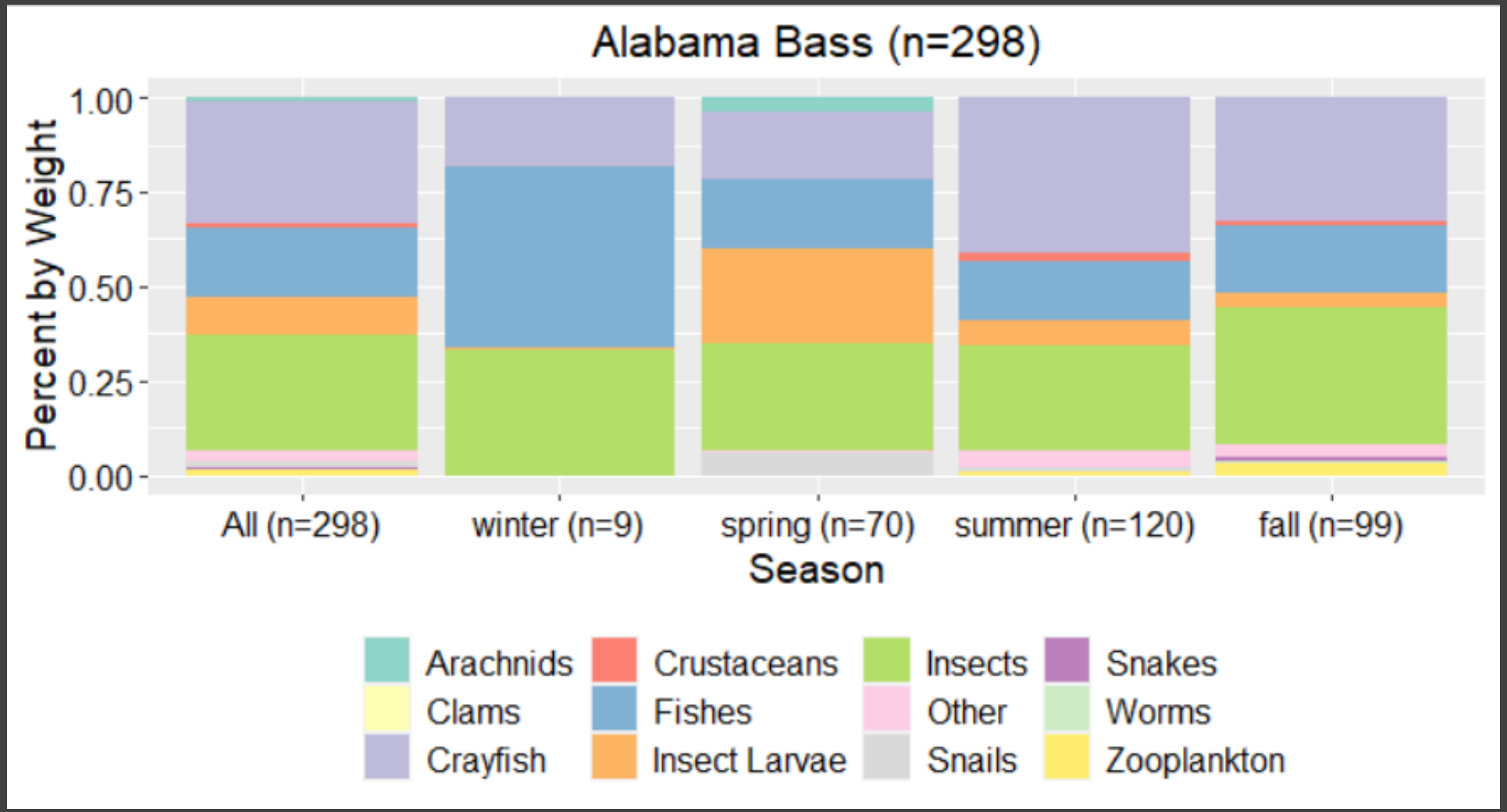
# Results: diet

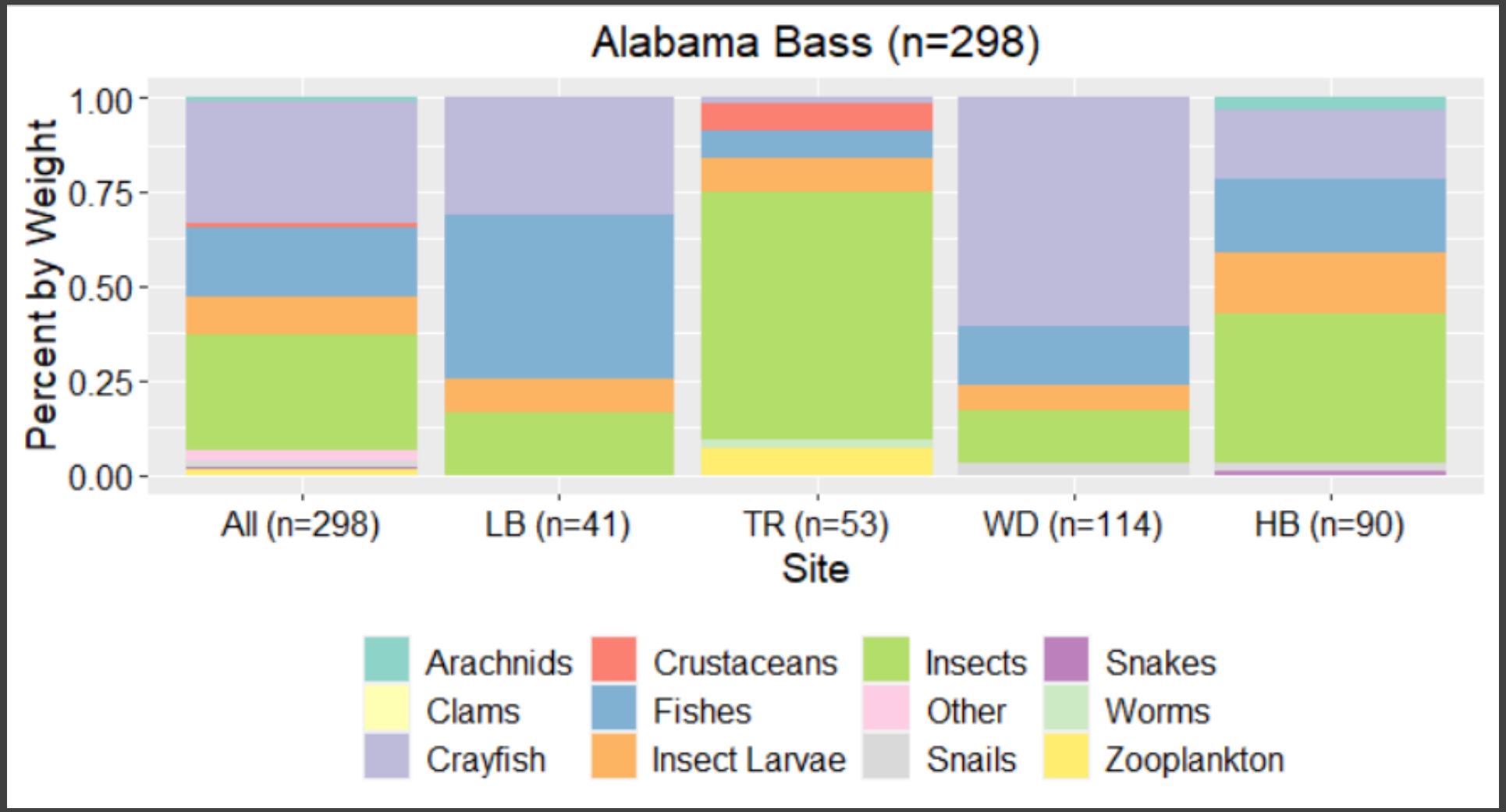

Channel Catfish (n=135)
Percent by Weight
1.00
0.75
0.50
0.25
0.00
All (n=135)
winter (n=3)
spring (n=31)
summer (n=43)
fall (n=58)
Season
Arachnids
Clams
Crayfish
Crustaceans
Fishes
Grasshopper
Insect Larvae
Insects
Other
Snails
Zooplankton

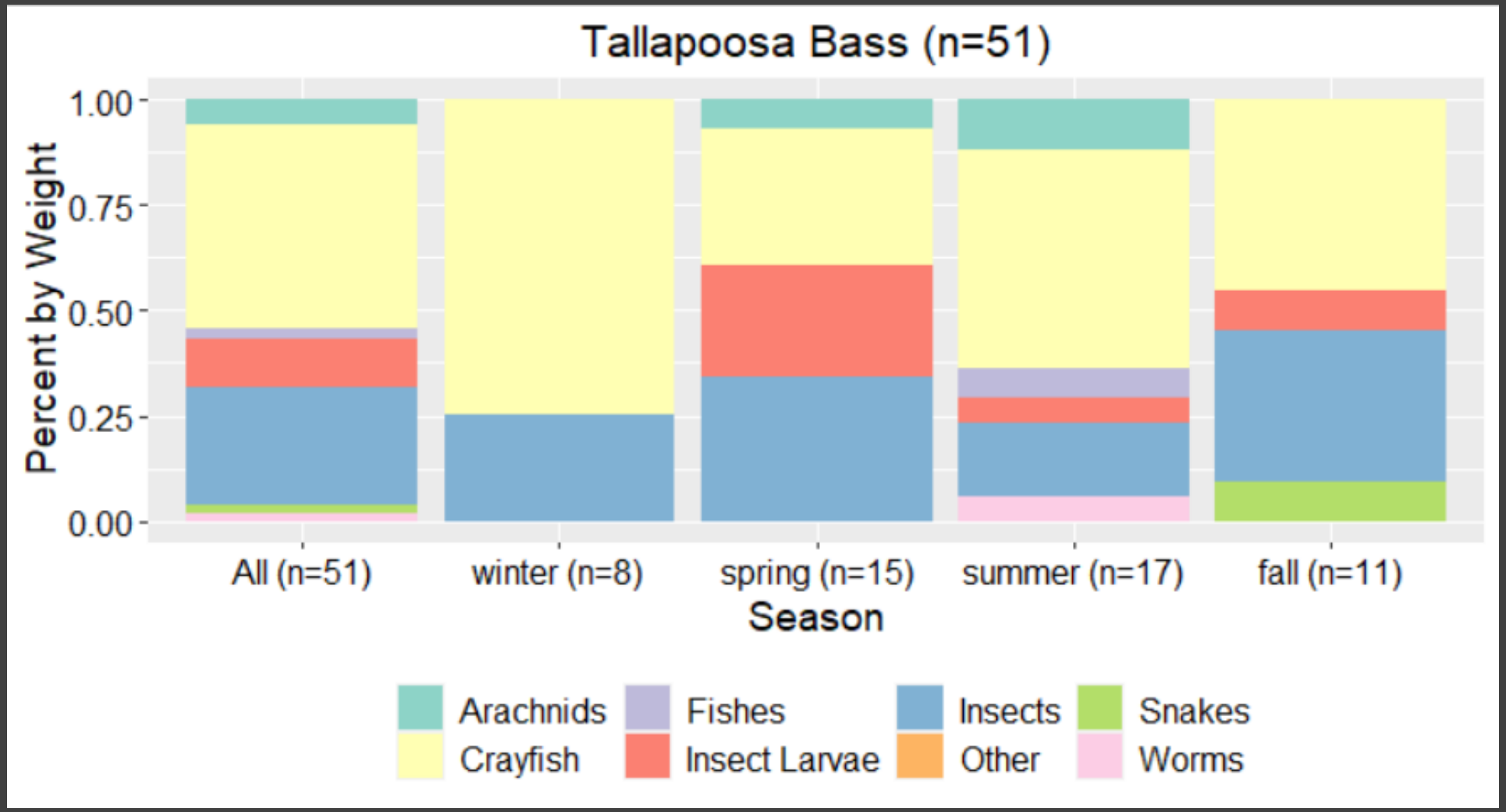

Channel Catfish (n=135)
Percent by Weight
1.00
0.75
0.50
0.25
0.00
All (n=135)
LB (n=43)
TR (n=46)
WD (n=13)
HB (n=33)
Site
Arachnids
Clams
Crayfish
Crustaceans
Fishes
Grasshopper
Insect Larvae
Insects
Other
Snails
Zooplankton

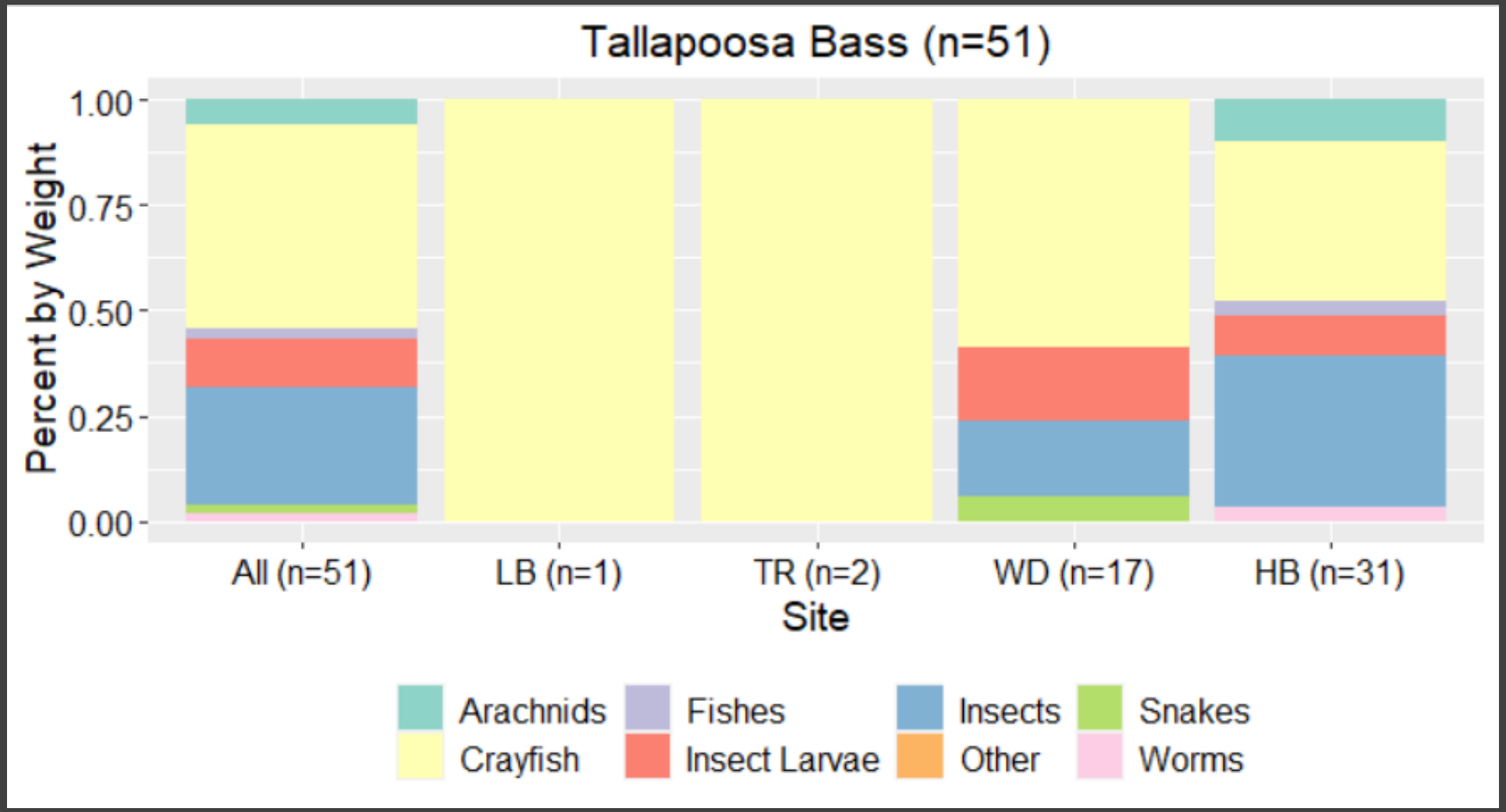

Redbreast Sunfish (n=315)
Percent by Weight
1.00
0.75
0.50
0.25
0.00
All (n=315)
Winter (n=11)
Spring (n=101)
Summer (n=109)
Fall (n=94)
Season
Arachnids
Clams
Crayfish
Crustaceans
Fishes
Grasshopper
Insect Larvae
Insects
Millipedes
Other
Snails
Zooplankton


Redbreast Sunfish (n=315)
Percent by Weight
1.00
0.75
0.50
0.25
0.00
All (n=315)
LB (n=23)
TR (n=50)
WD (n=90)
HB (n=152)
Site
Arachnids
Clams
Crayfish
Crustaceans
Fishes
Grasshopper
Insect Larvae
Insects
Millipedes
Other
Snails
Zooplankton

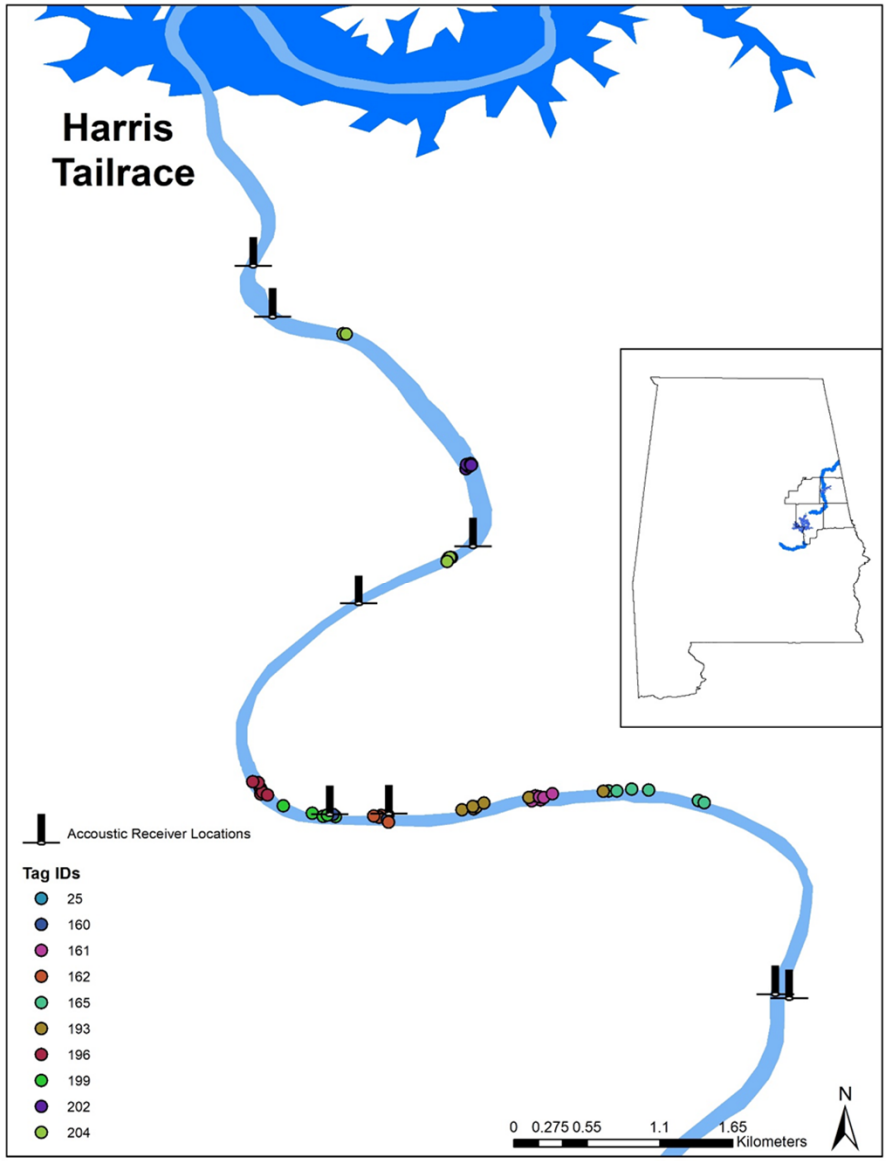

Alabama Bass (n=298)
Percent by Weight
1.00
0.75
0.50
0.25
0.00
All (n=298)
winter (n=9)
spring (n=70)
summer (n=120)
fall (n=99)
Season
Arachnids
Clams
Crayfish
Crustaceans
Fishes
Insect Larvae
Insects
Other
Snails
Snakes
Worms
Zooplankton

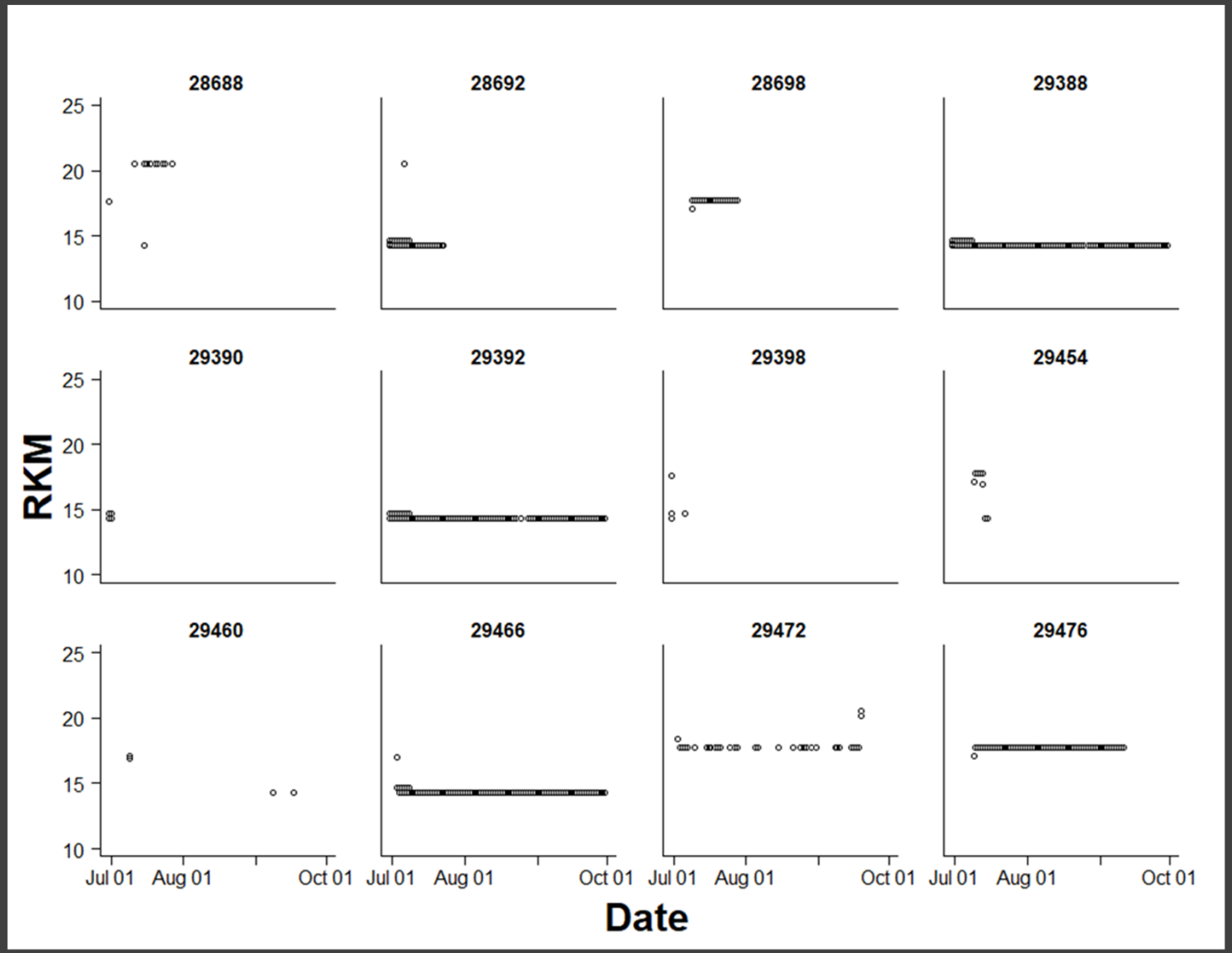

Alabama Bass (n=298)
Percent by Weight
1.00
0.75
0.50
0.25
0.00
All (n=298)
LB (n=41)
TR (n=53)
WD (n=114)
HB (n=90)
Site
Arachnids
Clams
Crayfish
Crustaceans
Fishes
Insect Larvae
Insects
Other
Snails
Snakes
Worms
Zooplankton


Tallapoosa Bass (n=51)
Percent by Weight
1.00
0.75
0.50
0.25
0.00
All (n=51)
winter (n=8)
spring (n=15)
summer (n=17)
fall (n=11)
Season
Arachnids
Crayfish
Fishes
Insect Larvae
Insects
Other
Snakes
Worms


Tallapoosa Bass (n=51)
Percent by Weight
1.00
0.75
0.50
0.25
0.00
All (n=51)
LB (n=1)
TR (n=2)
WD (n=17)
HB (n=31)
Site
Arachnids
Crayfish
Fishes
Insect Larvae
Insects
Other
Snakes
Worms

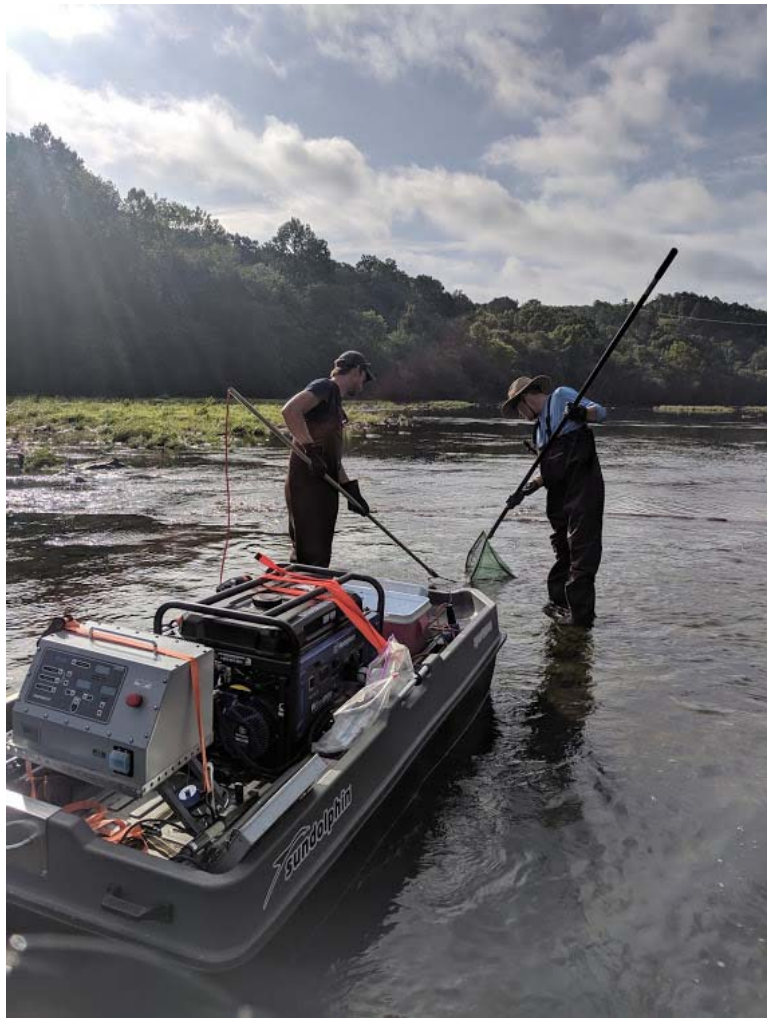
# Results: telemetry


Harris
Tailrace
Accoustic Receiver Locations
Tag IDs
25
160
161
162
165
193
196
199
202
204
0 0.275 0.55 1.1 1.65
Kilometers
N


28688
28692
28698
29388
29390
29392
29398
29454
29460
29466
29472
29476
RKM
25
20
15
10
Jul 01
Aug 01
Oct 01
Date

# Discussion: community

- Findings agree with previous literature
  - Seasonal variation in catch rates
  - Sunfishes and minnows most common
  - No dramatic upstream-downstream diversity shifts
  - Native darter and minnow species persist in regulated stretch
  - Centrarchid catch rates remain high below Harris Dam
  - Catastomids and centrarchids still dominant above Harris

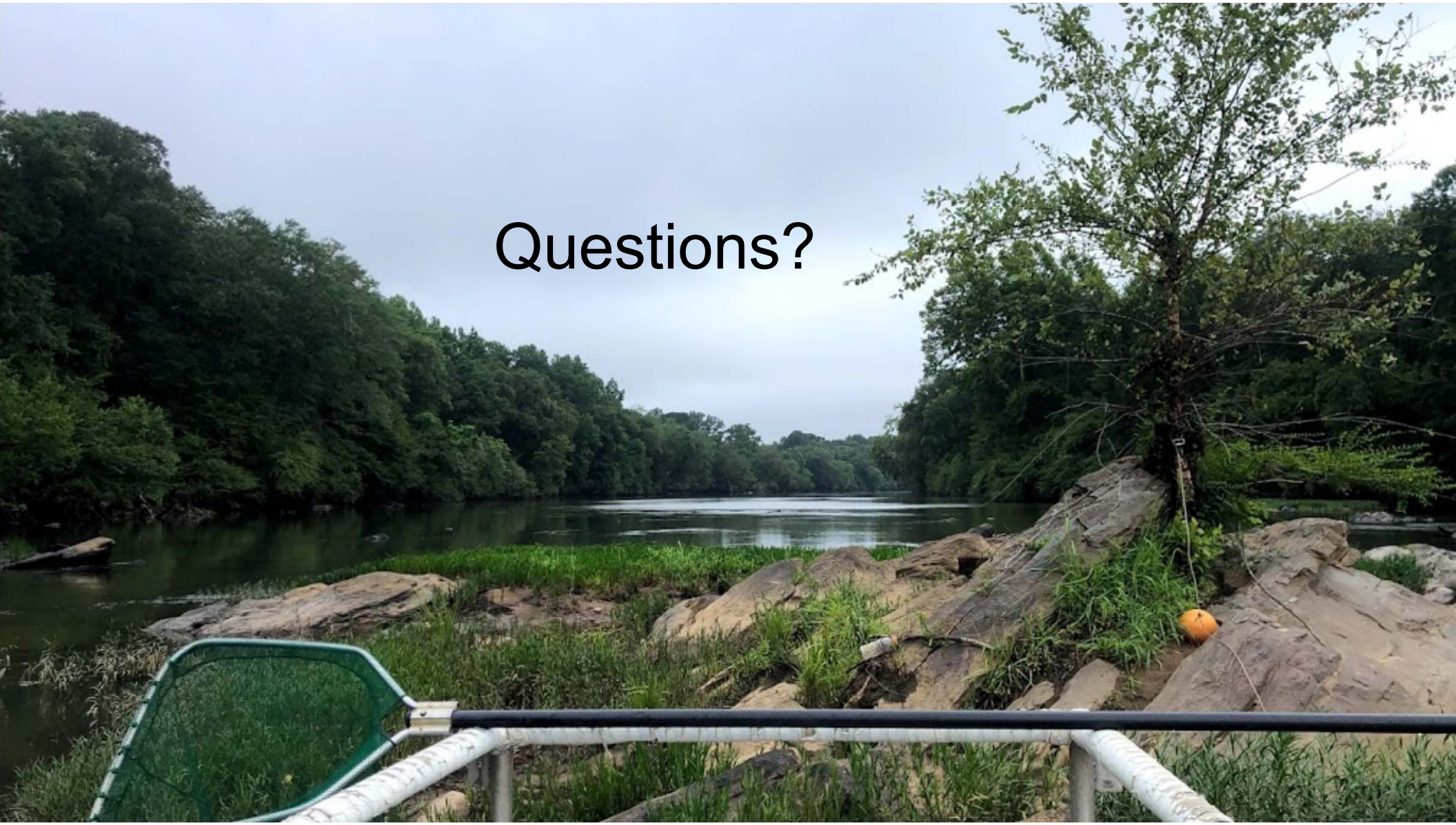


# Discussion: age-and-growth

- Body condition
  - Higher in the tailrace
    - Not related to TL
- Length-at-age
  - von Bertalanffy parameters similar to published estimates
  - Calculation of site-specific parameters limited
- Diet
  - Variation by site and season
  - Similar to previous studies

# Discussion: telemetry

- Stationary acoustic receivers
  - Black basses not displaced by peaking flows
  - Agrees with previous findings with the same/similar species
- Manual tracking
  - Fish regularly detected within a few hundred meters of previous location


Questions?

# Objective 4

- Quantify effects of temperature and flow variation on target fish species energy budgets using bioenergetics modeling
  - Part 1: Respirometry
    - Static Respirometry
    - Swimming Respirometry

# Static Respirometry

- 8 chamber system (Loligo)
  - Medium chambers: ~600 ml
  - Large chambers: ~2600 ml
- Intermittent flow respirometry
  - Automated
- Temperature controlled
- Oxygen measured electronically

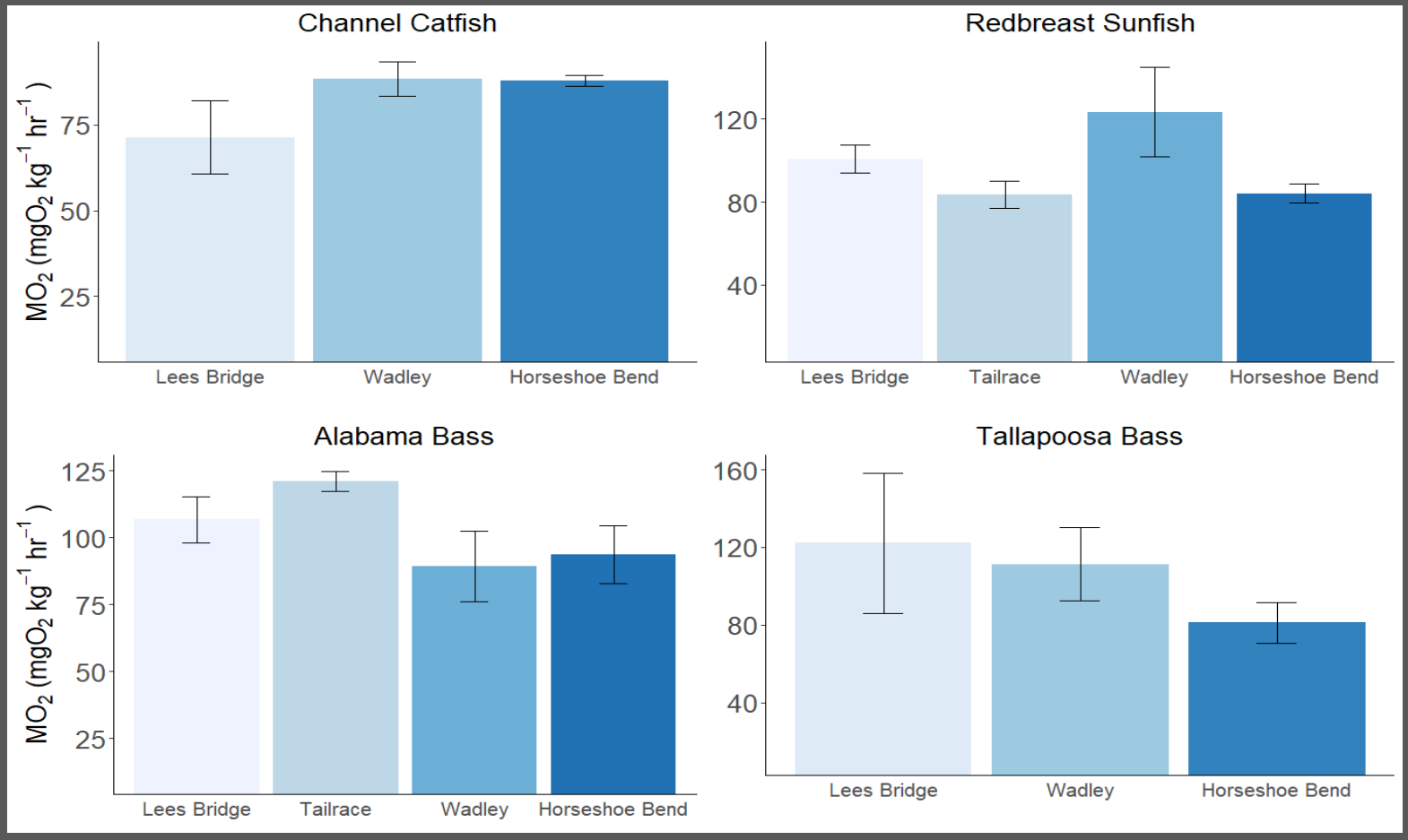
# Static Respirometry

- Fish weighed
- Acclimated in chamber
  - 12 hr + 1
  - Intermittent flow respirometry
    - 1200/180 s
- Closed respirometry

# Static Respirometry

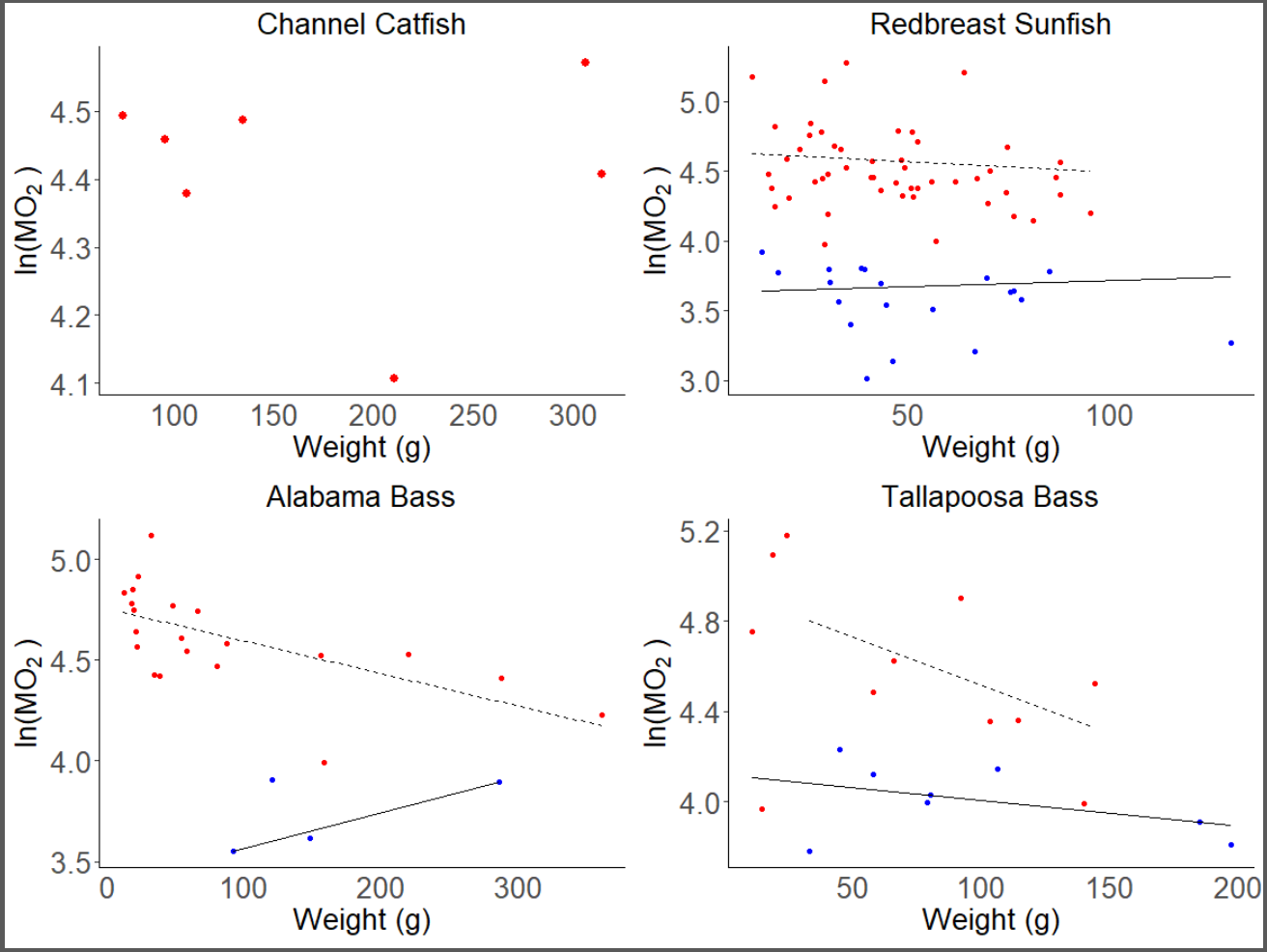
- 10 C
  - Channel Catfish (n=2)
  - Alabama Bass (n=11)
  - Redbreast Sunfish (n=21)
  - Tallapoosa Bass (n=14)
- 21 C
  - Channel Catfish (n=9)
  - Alabama Bass (n=28)
  - Redbreast Sunfish (n=51)
  - Tallapoosa Bass (n=12)
- 28 C
  - Alabama Bass (n=1)
  - Redbreast Sunfish (n=8)

# Static Respirometry 21°C



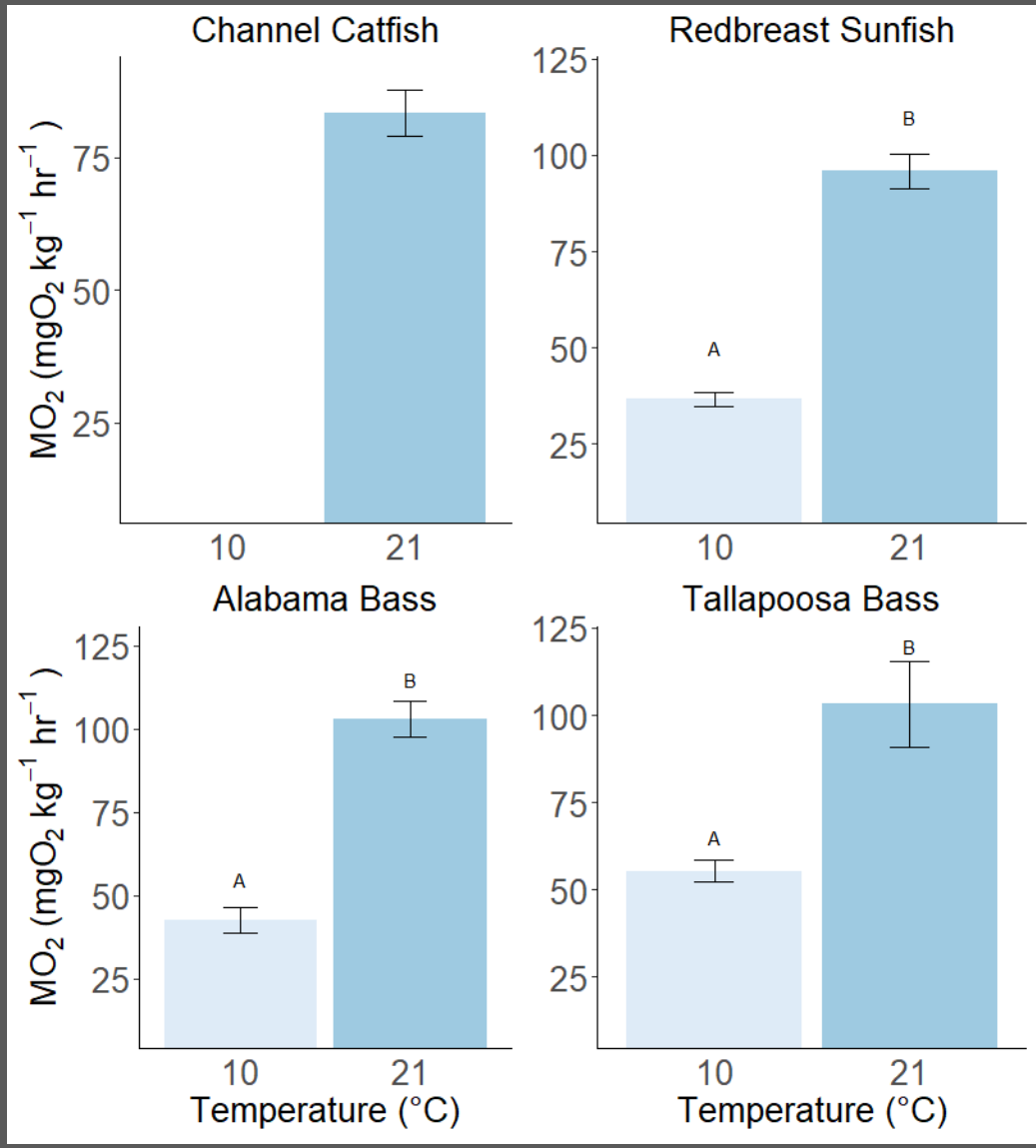
# Static Respirometry

## weight and metabolic rate



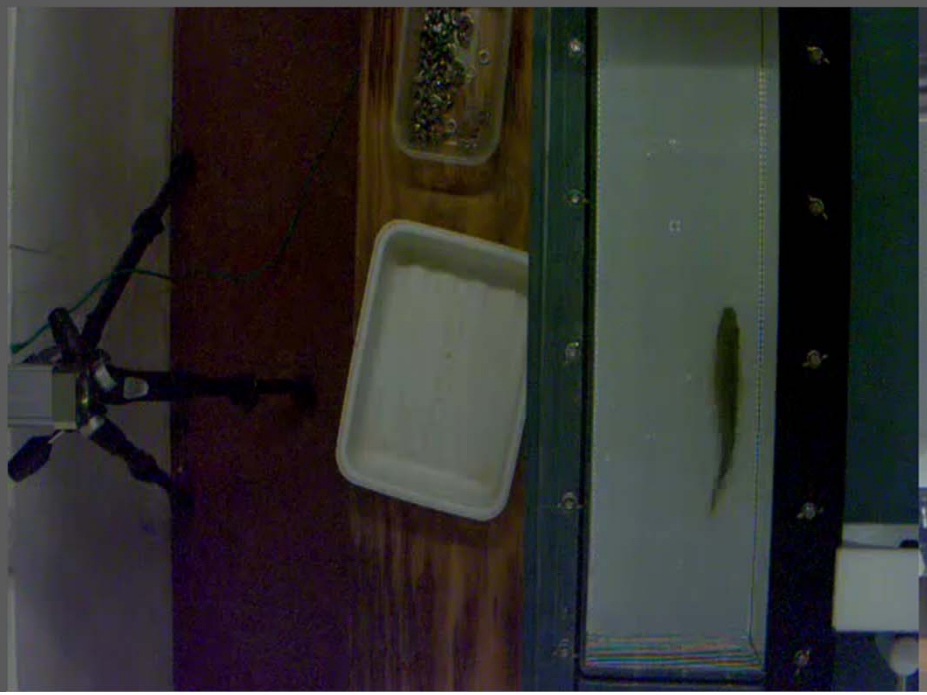

- No relationship for Channel Catfish
- Blue = 10 C
- Red = 21 C
- Biased toward smaller individuals

# Static Respirometry at 10 and 21 C



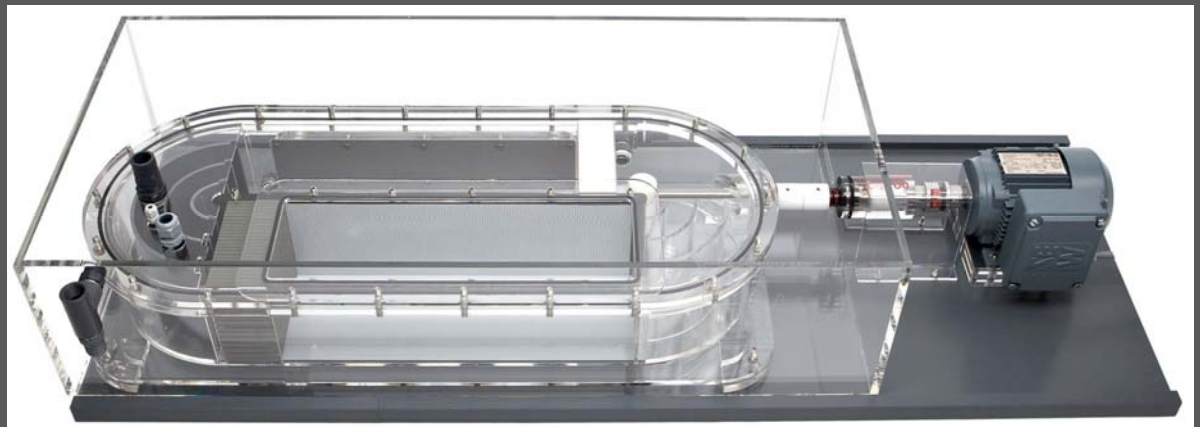
# Swimming Respirometry & Performance

- Active metabolic rates
  - Metabolic rate of fish at given swimming speed
- Swimming performance
  - Critical swimming speed

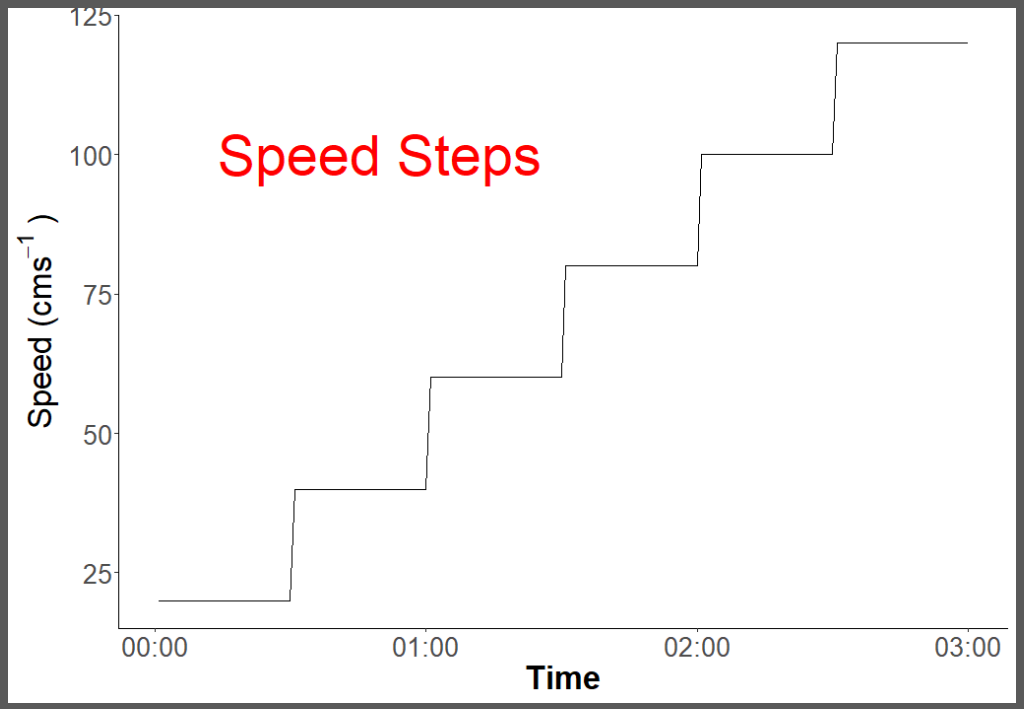


# Swimming Respirometry & Performance

- 90 L Loligo swimming respirometer
- Temperature controlled
  - Water reservoirs
- Oxygen measured electronically
- Speed control automated

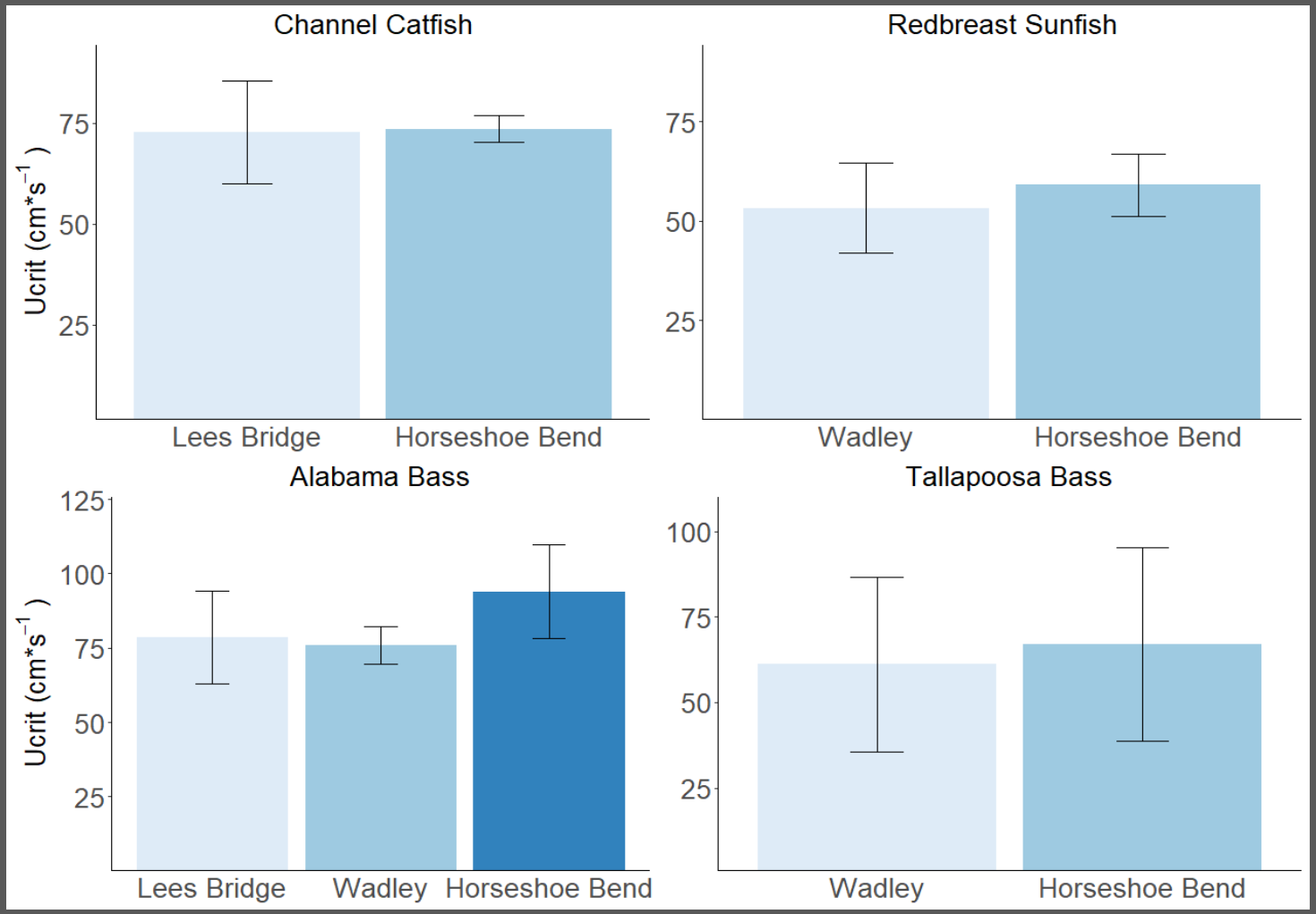


# Swimming Performance

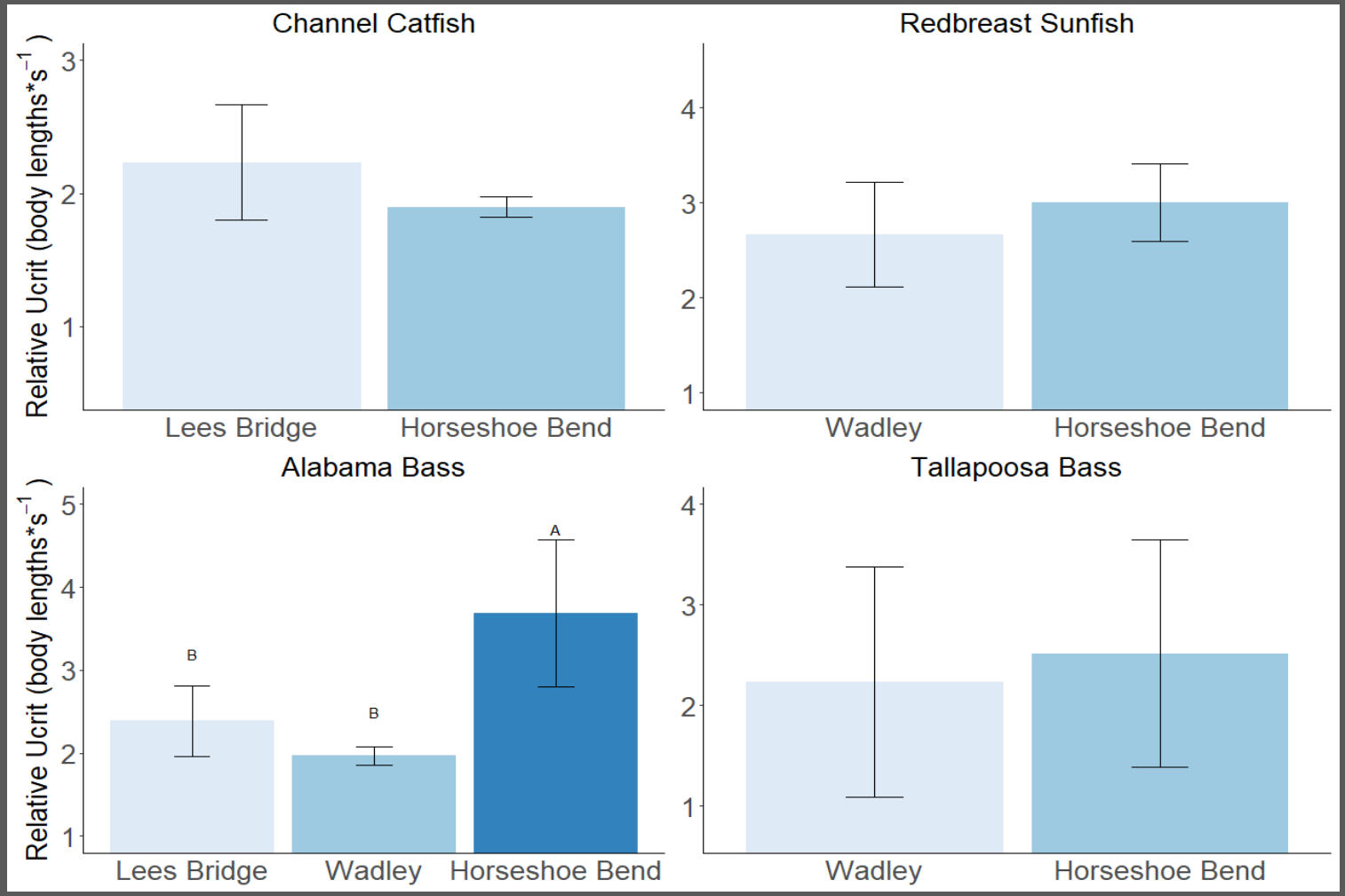



- Critical Swimming Speed
- $U_{crit} = U_1 + U_2(\frac{t_1}{t_2})$
  - $U_1$ - last completed bout
  - $U_2$ - velocity increment
  - $\frac{t_1}{t_2}$ - proportion of time at last step
- Bass – 30 min
- Redbreast Sunfish – 45 min
- Channel Catfish – 30 min

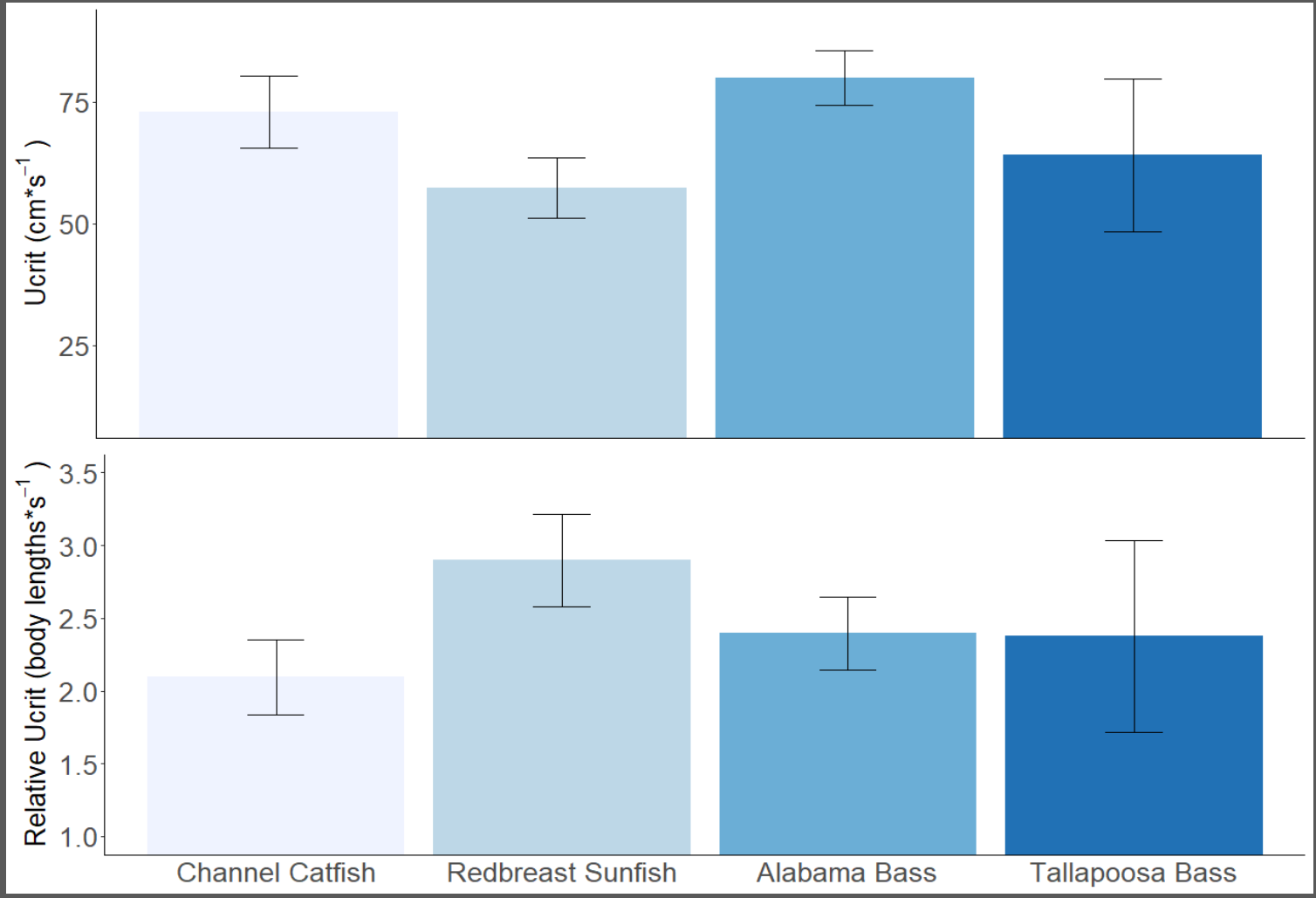
# Critical Swimming Speed



# Relative Critical Swimming Speed

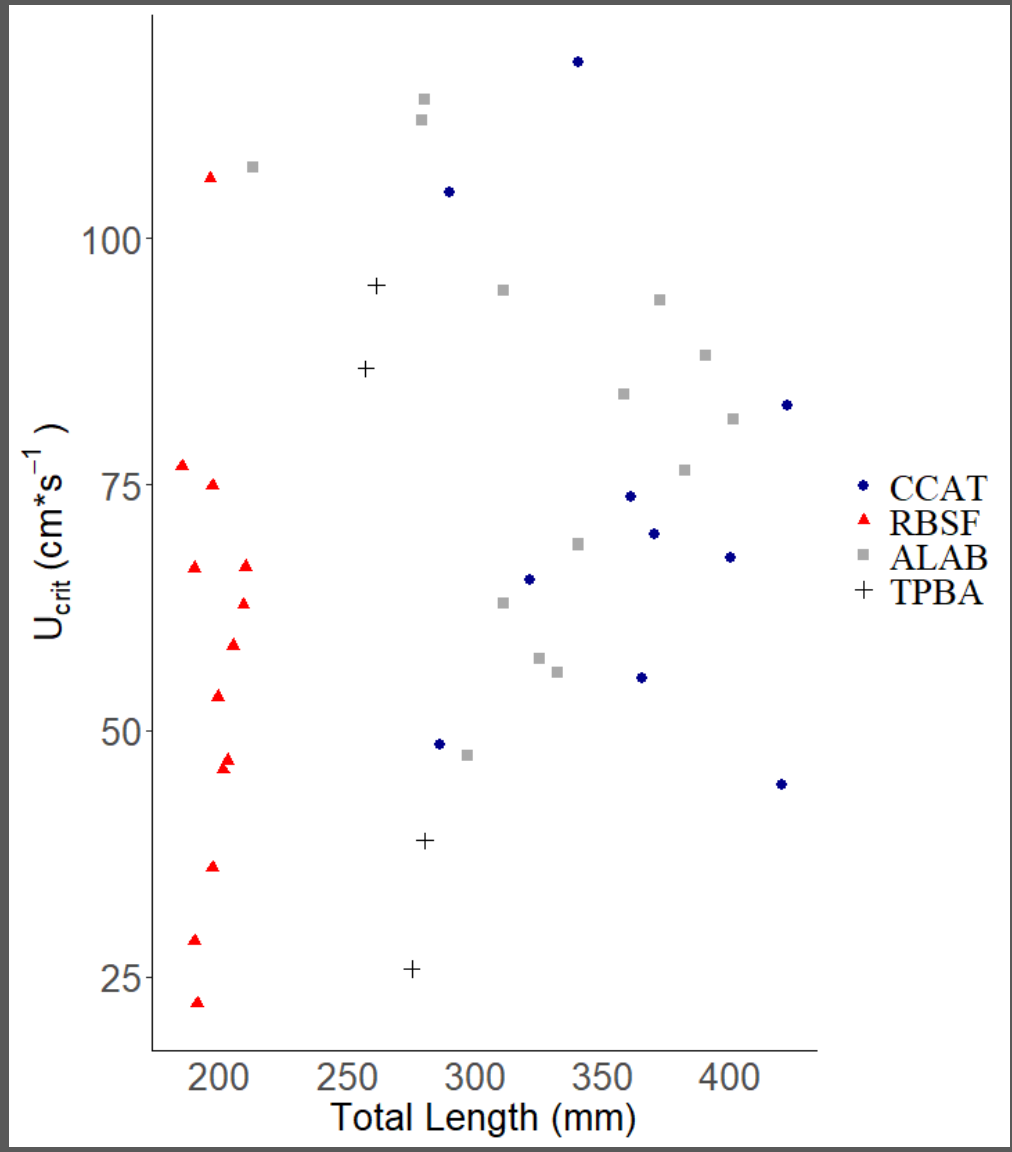


# Critical Swimming Speed of grouped species

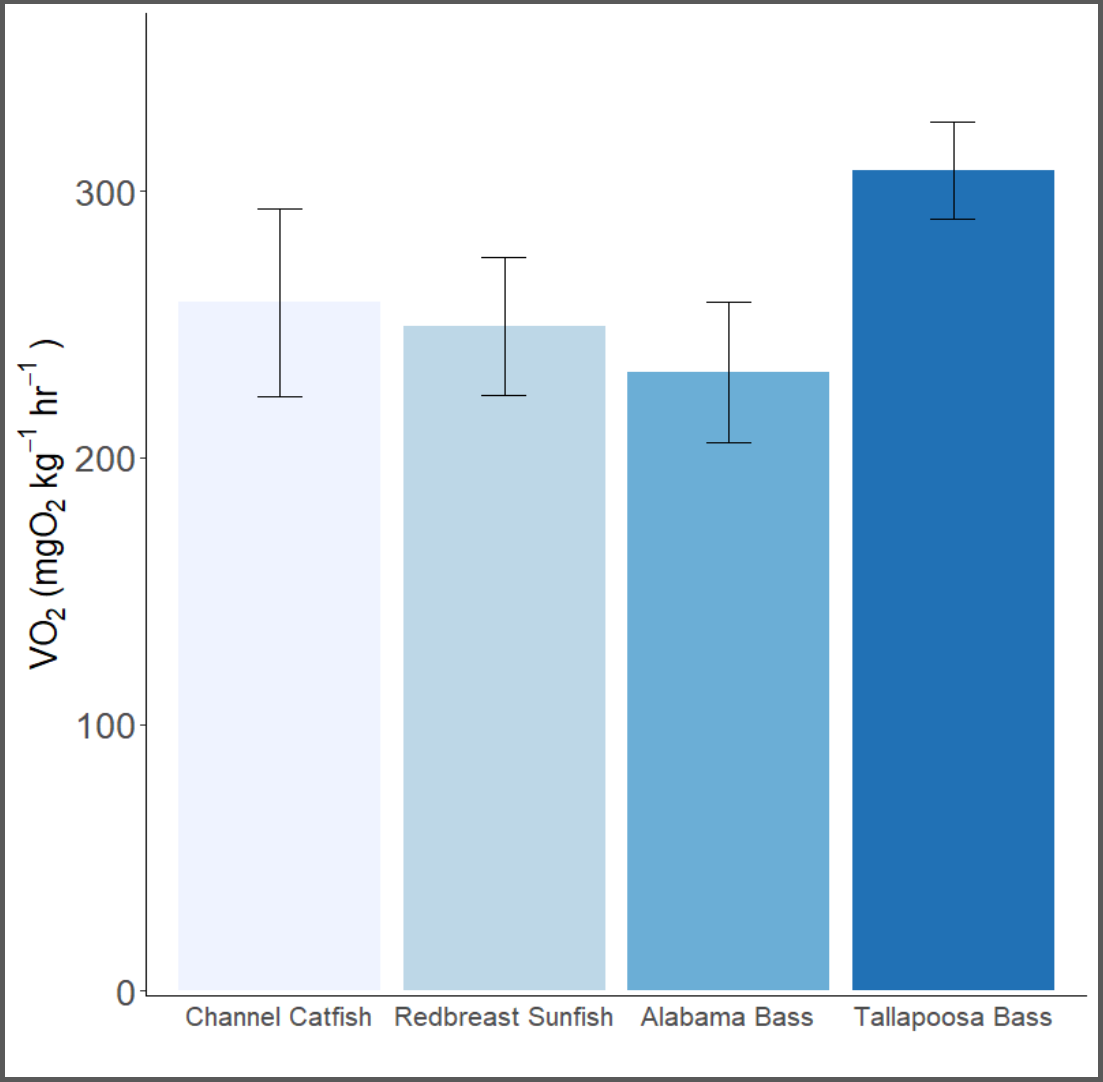


## Relationship between length and $U_{crit}$

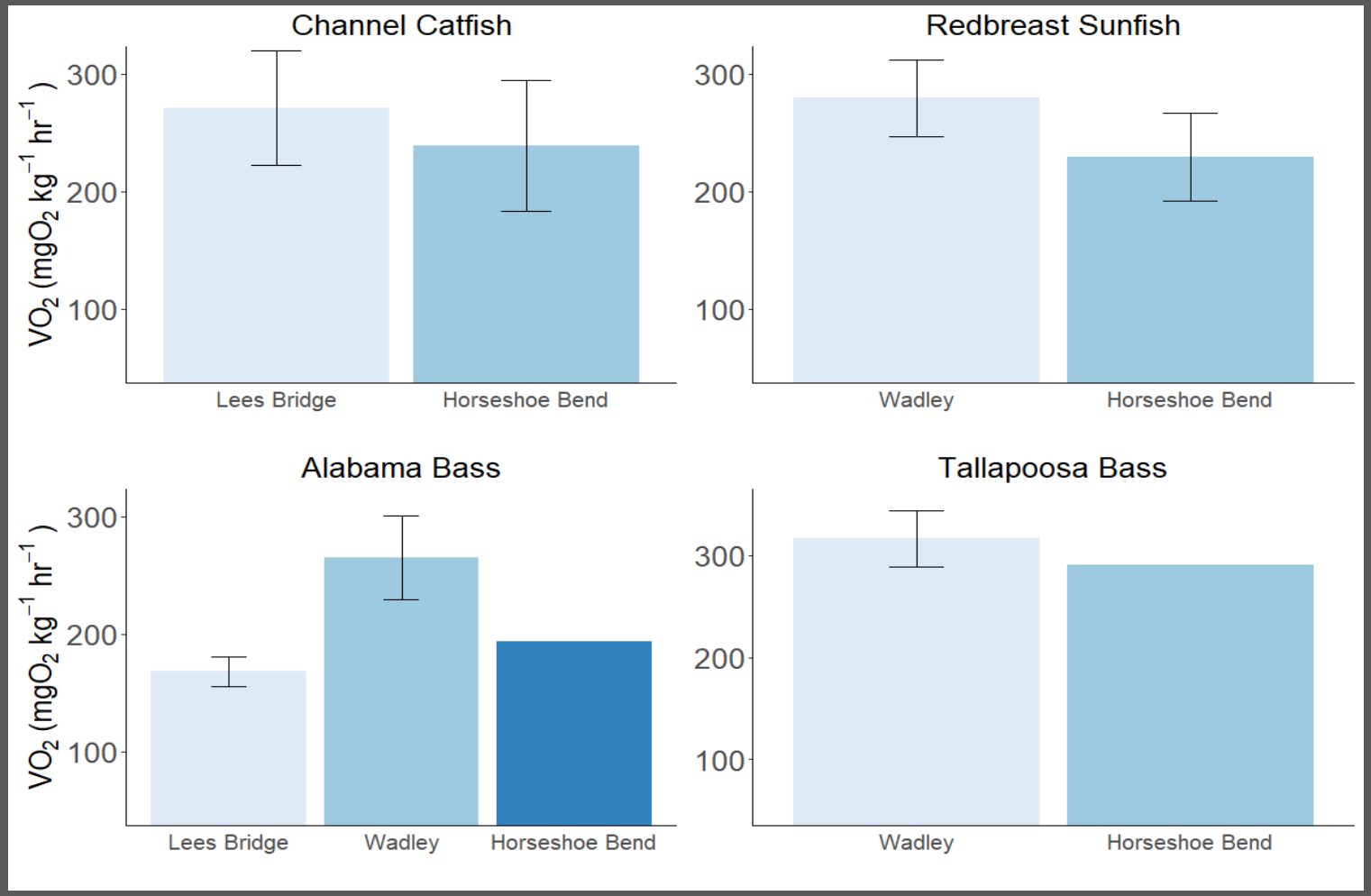
- Size range limited for RBSF and TPBA



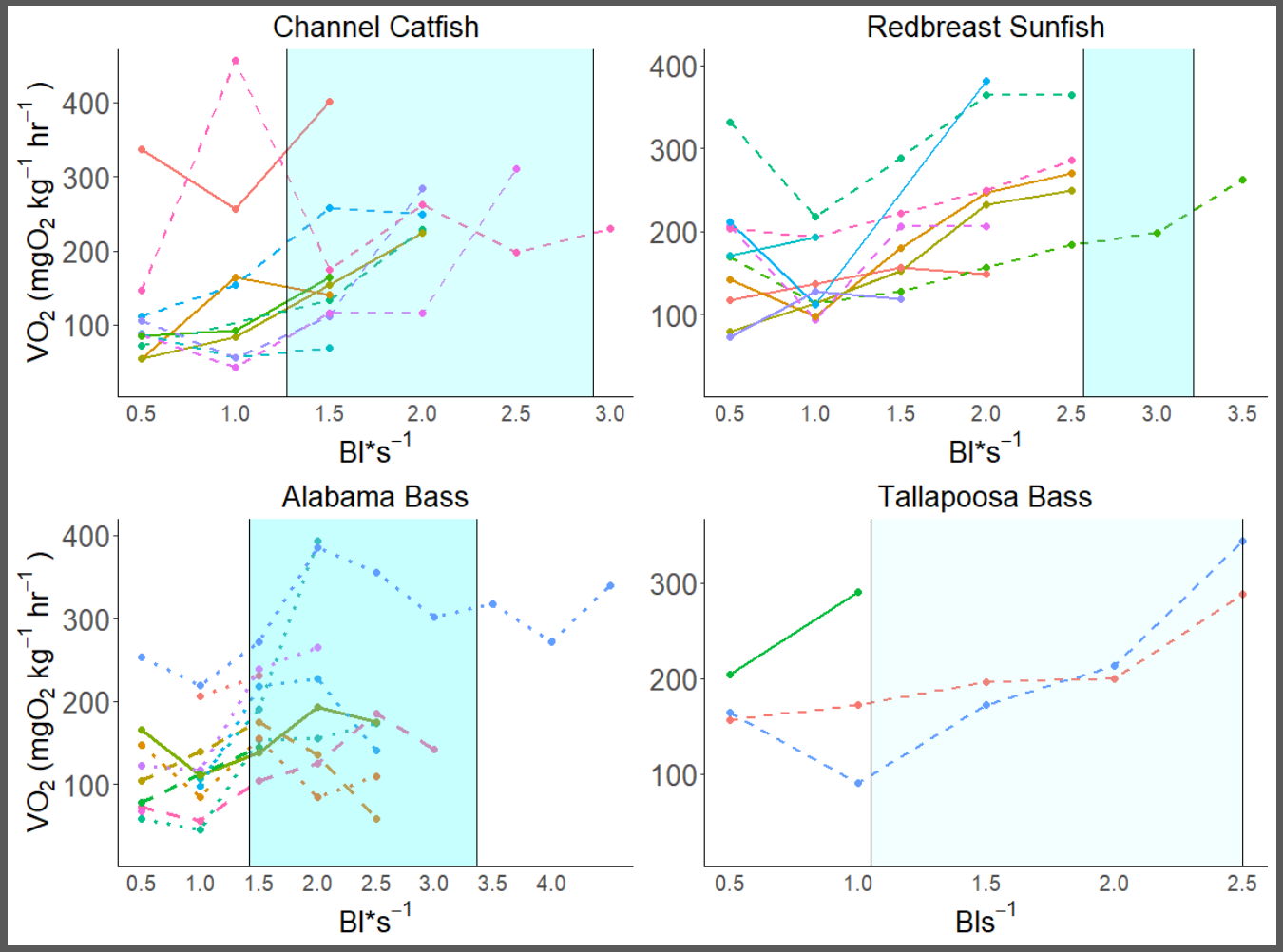
# Average MMR


300
200
100
0
$VO_2$ ($mgO_2$ $kg^{-1}$ $hr^{-1}$)
Channel Catfish
Redbreast Sunfish
Alabama Bass
Tallapoosa Bass

# Average MMR for each species and site

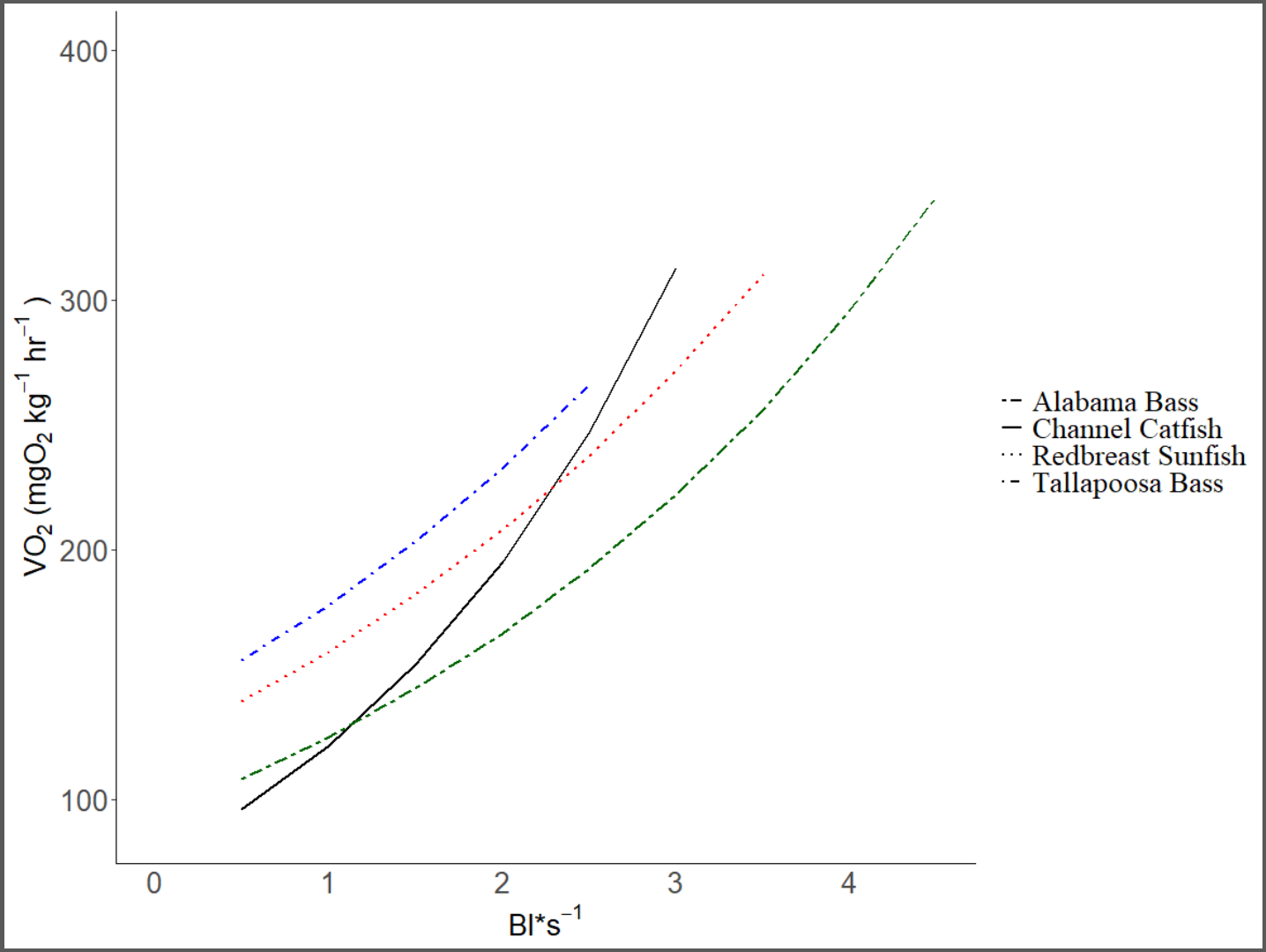


# AMR for each relative speed

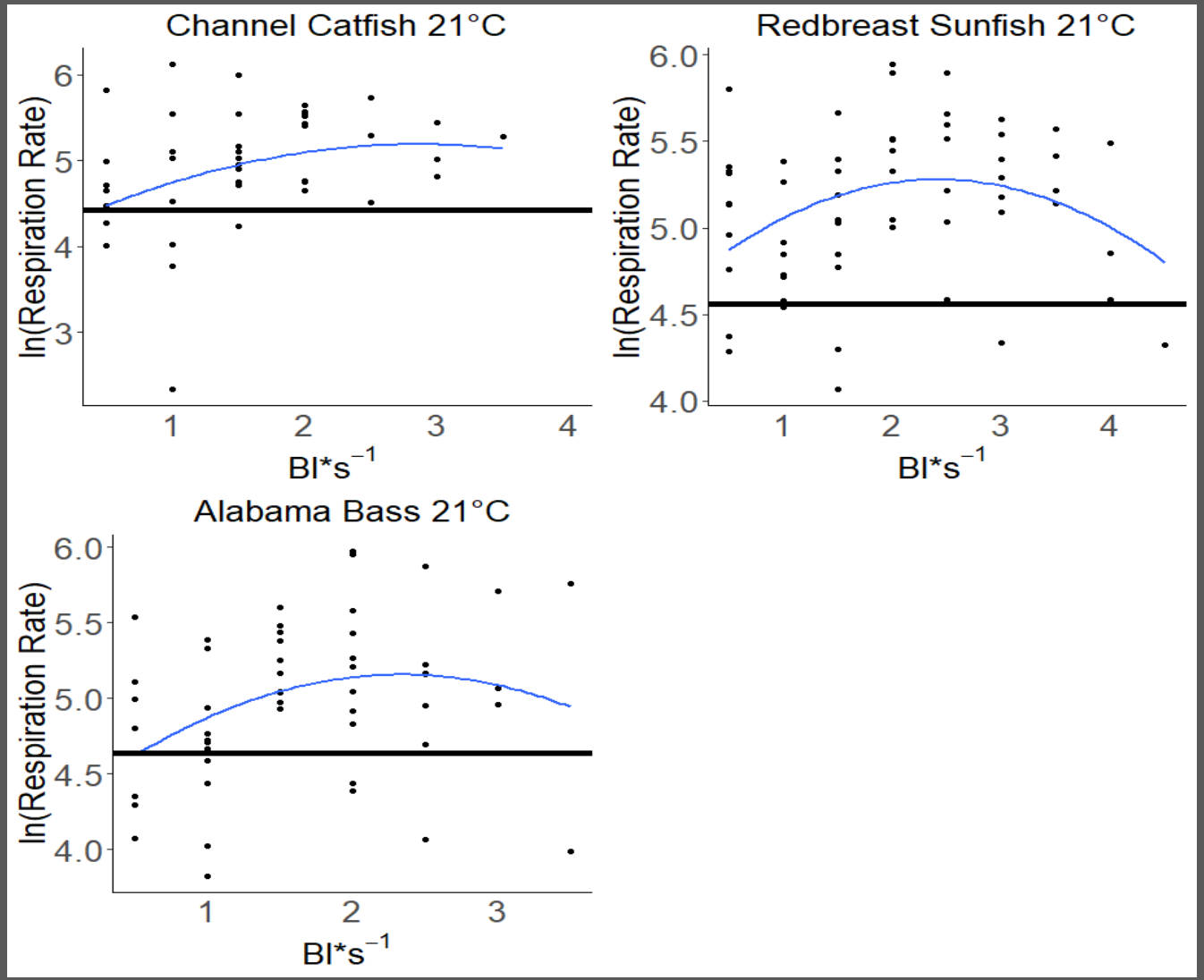



- Blue boxes are average $U_{crit}$ ± 1 SD

Prediction curves for each species at a given relative speed



# Aerobic Scope

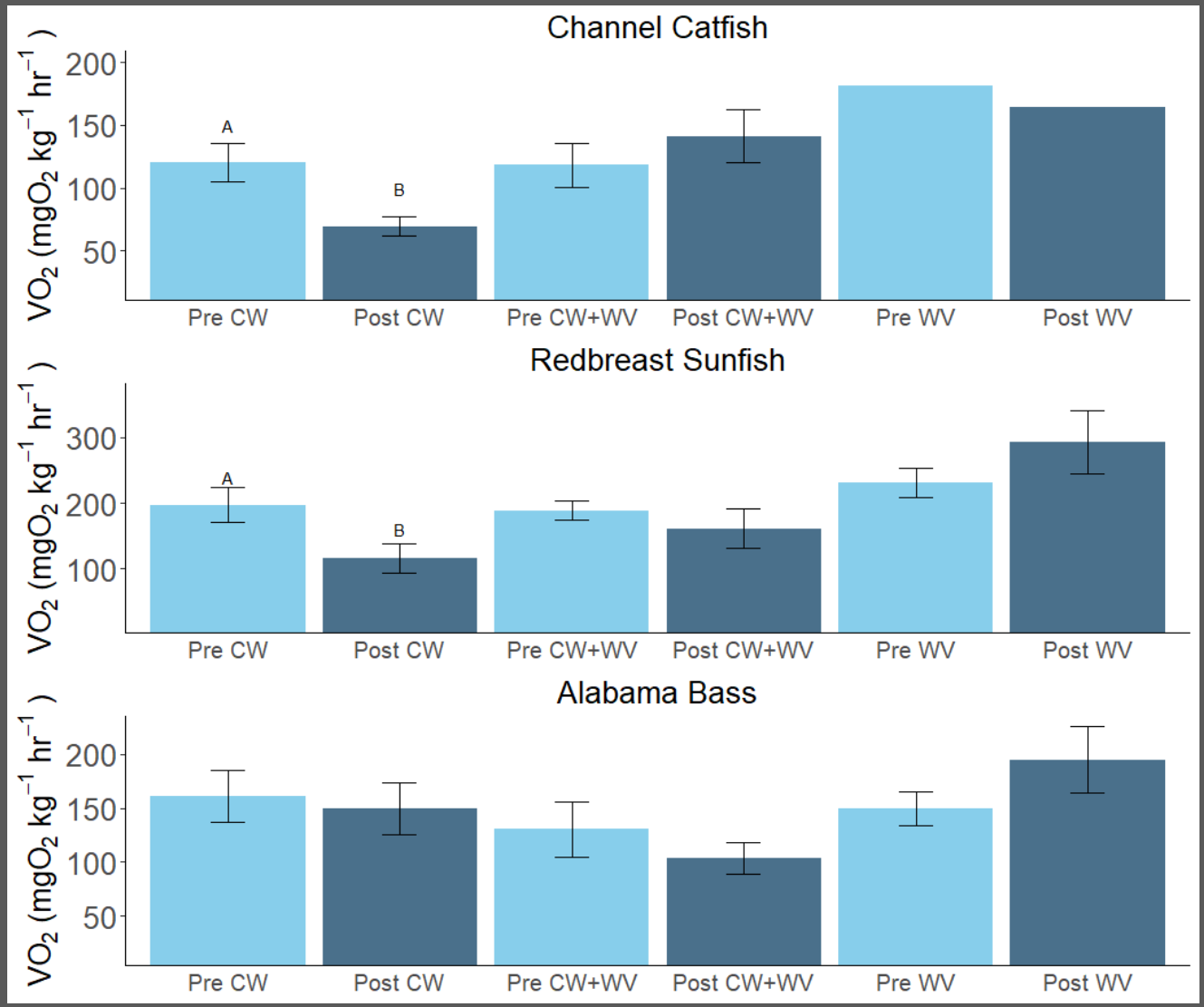


# Water changes

- 3 conditions:
  - Speed maintained at 0.5 $U_{crit}$, temperature decreased from 24 to 19 C
  - Speed increased from 0.5 $U_{crit}$ to $U_{crit}$, temperature decreased from 24 to 19 C
  - Speed increased from 0.5 $U_{crit}$ to $U_{crit}$, temperature maintained at 24 C
- Water exchanged after 2 hours
  - Respiration rate recorded pre and post water exchange
  - Water exchanged and velocity increased over 5-8 minutes

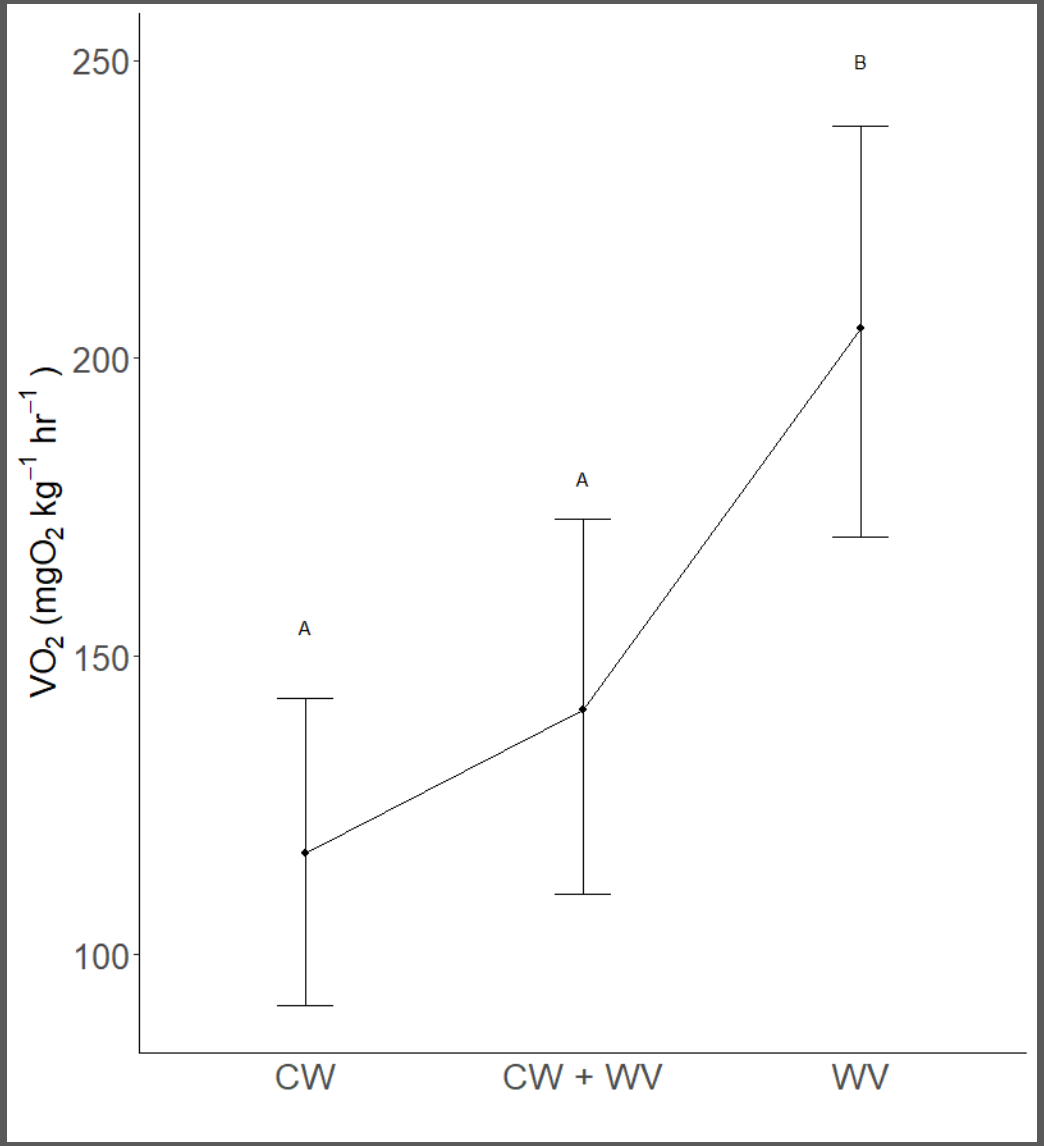
# Water changes

CW: cold water exchange
WV: water velocity increase



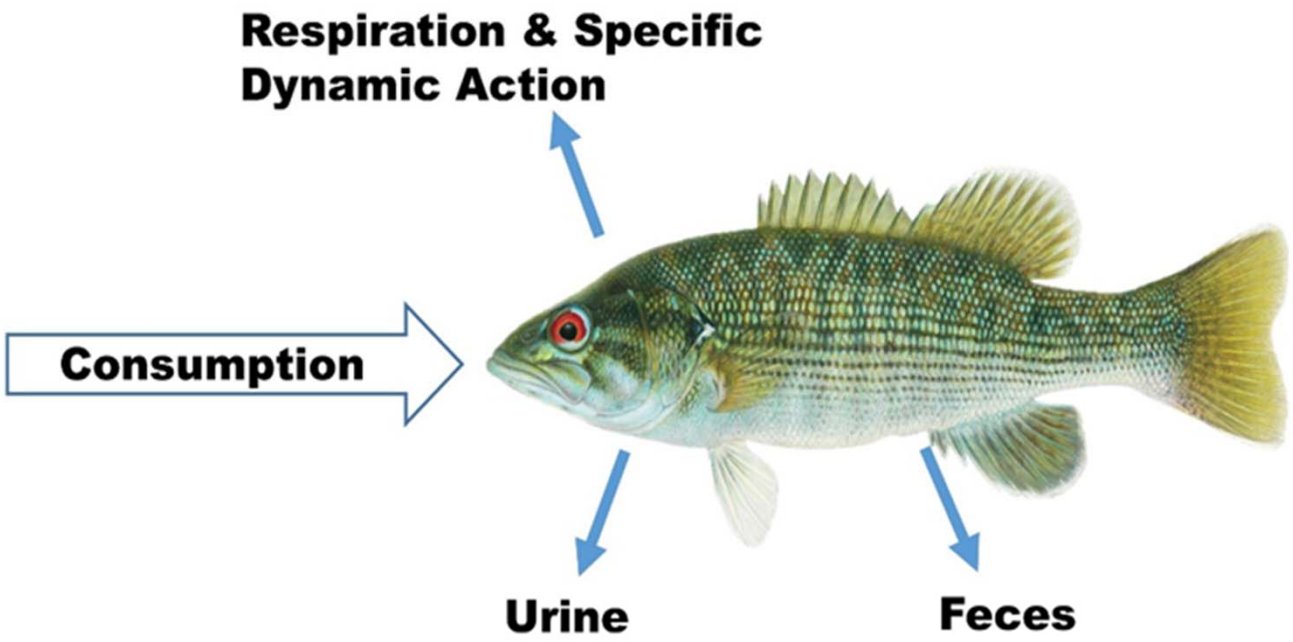
# Water changes

- Pre exchange respiration rate is covariate
  - all species grouped together

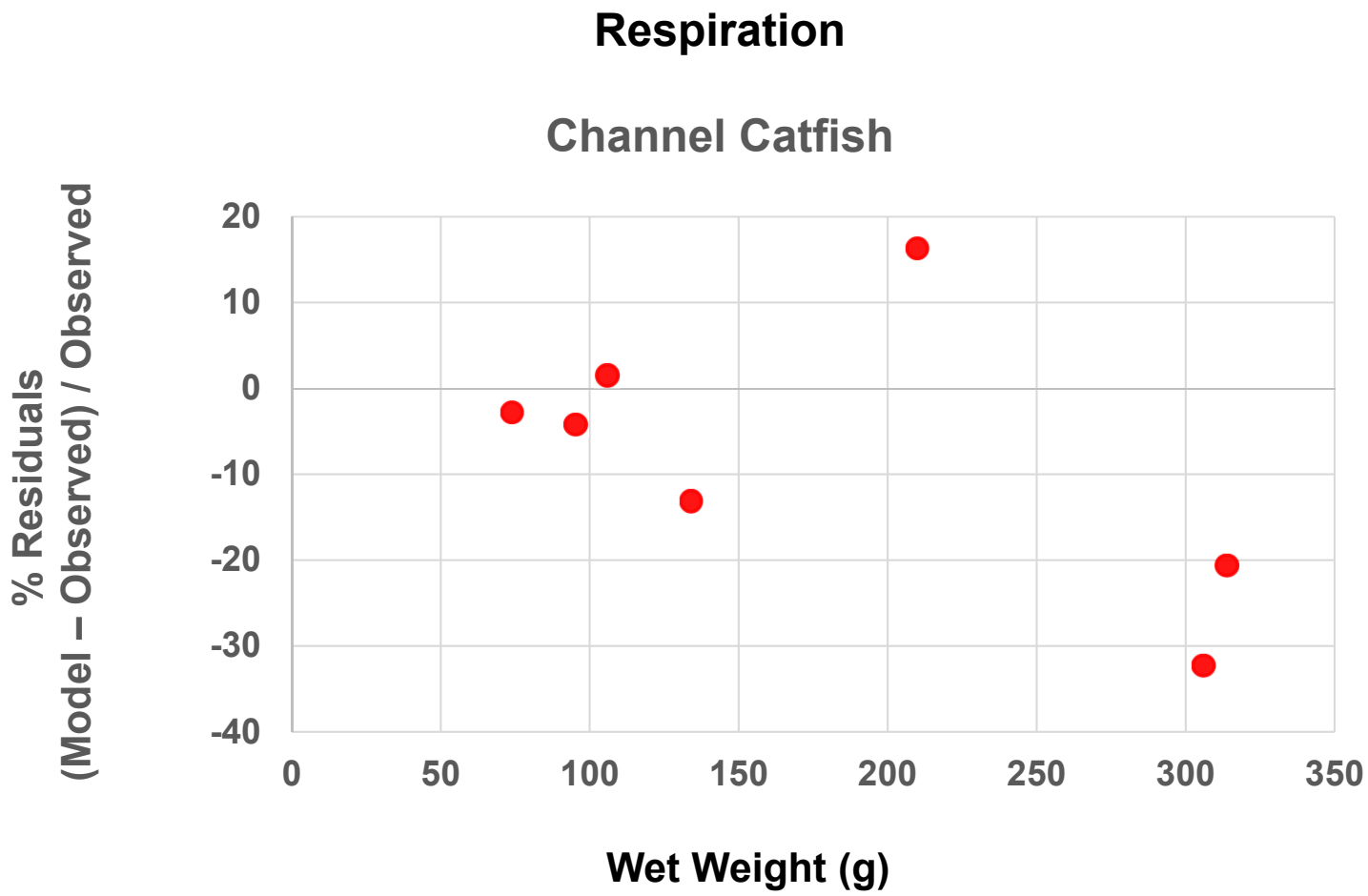


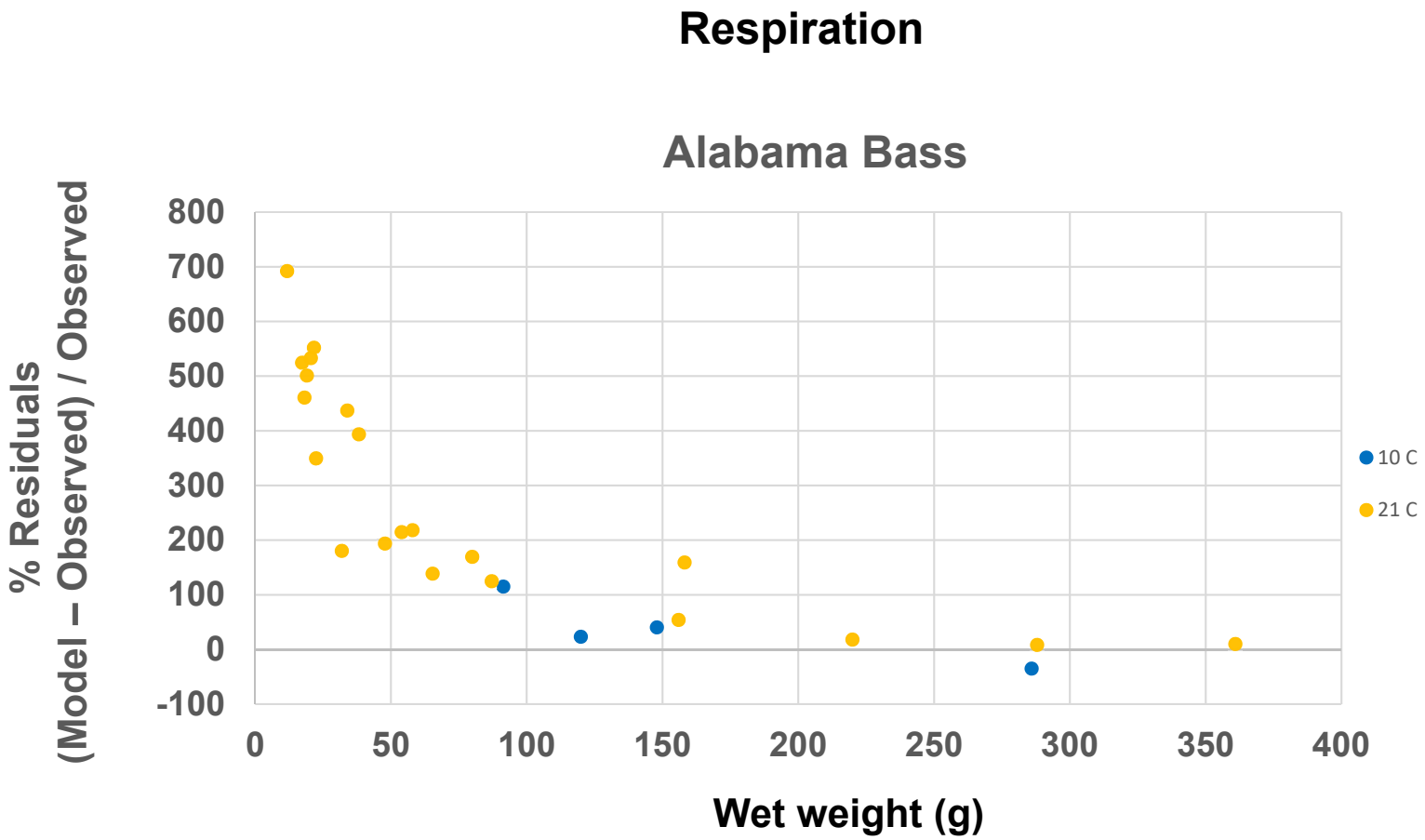
# Objective 4a Conclusions

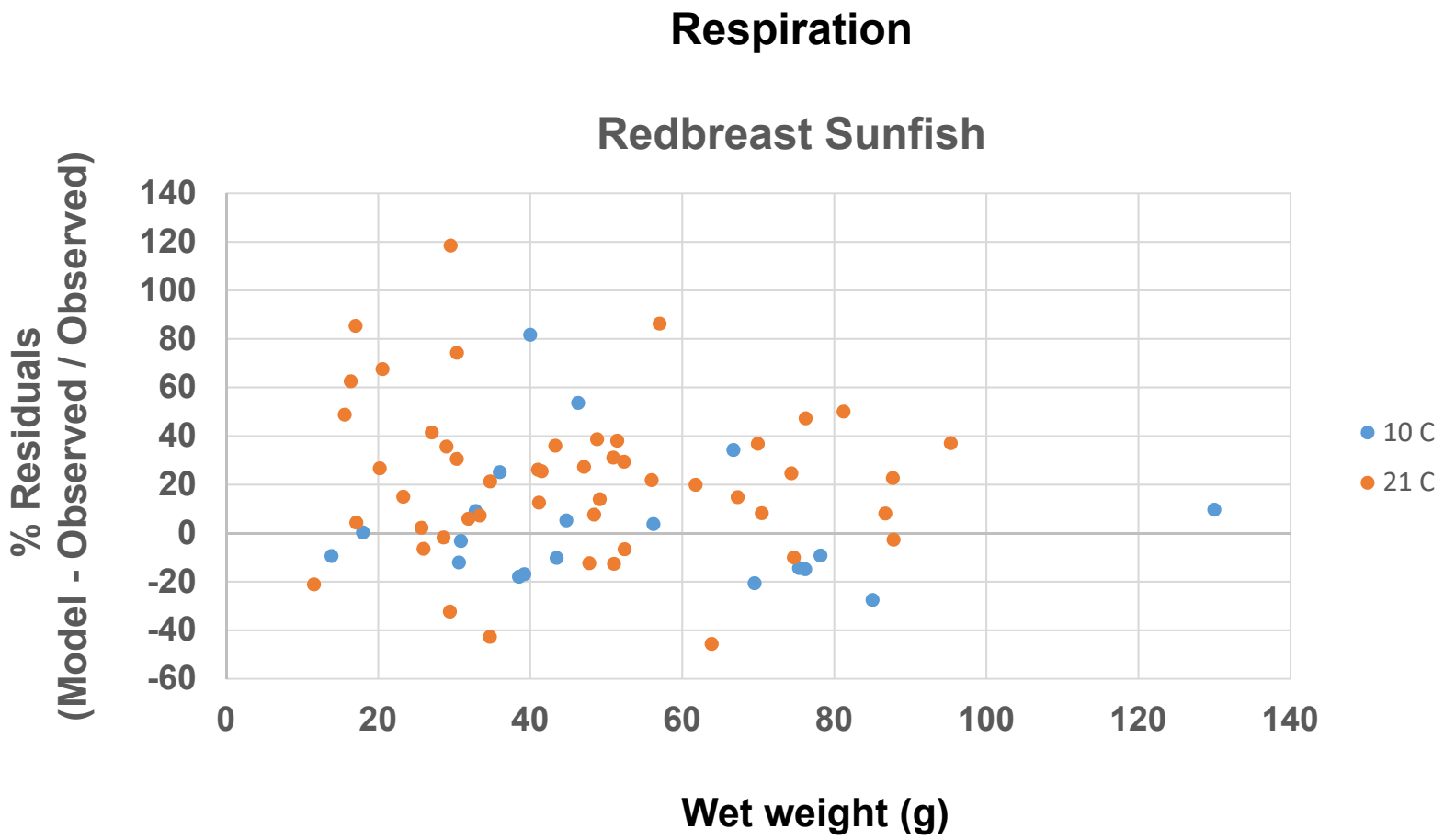
- Fish may be incapable of swimming at water velocities generated in the tailrace
  - Implications: must seek refuge habitats
- No differences in $MO_2$ across sites within species
- Max $VO_2$ corresponds with $U_{crit}$
- AMR is influenced by both temperature and water velocity. Decreased temperature limits fish response to increasing water velocity by lowering AMR
  - Implications: fish may not be able to compensate effectively for increased muscular demand at colder temperatures




**Growth = Consumption - (R + F + U + SDA)**

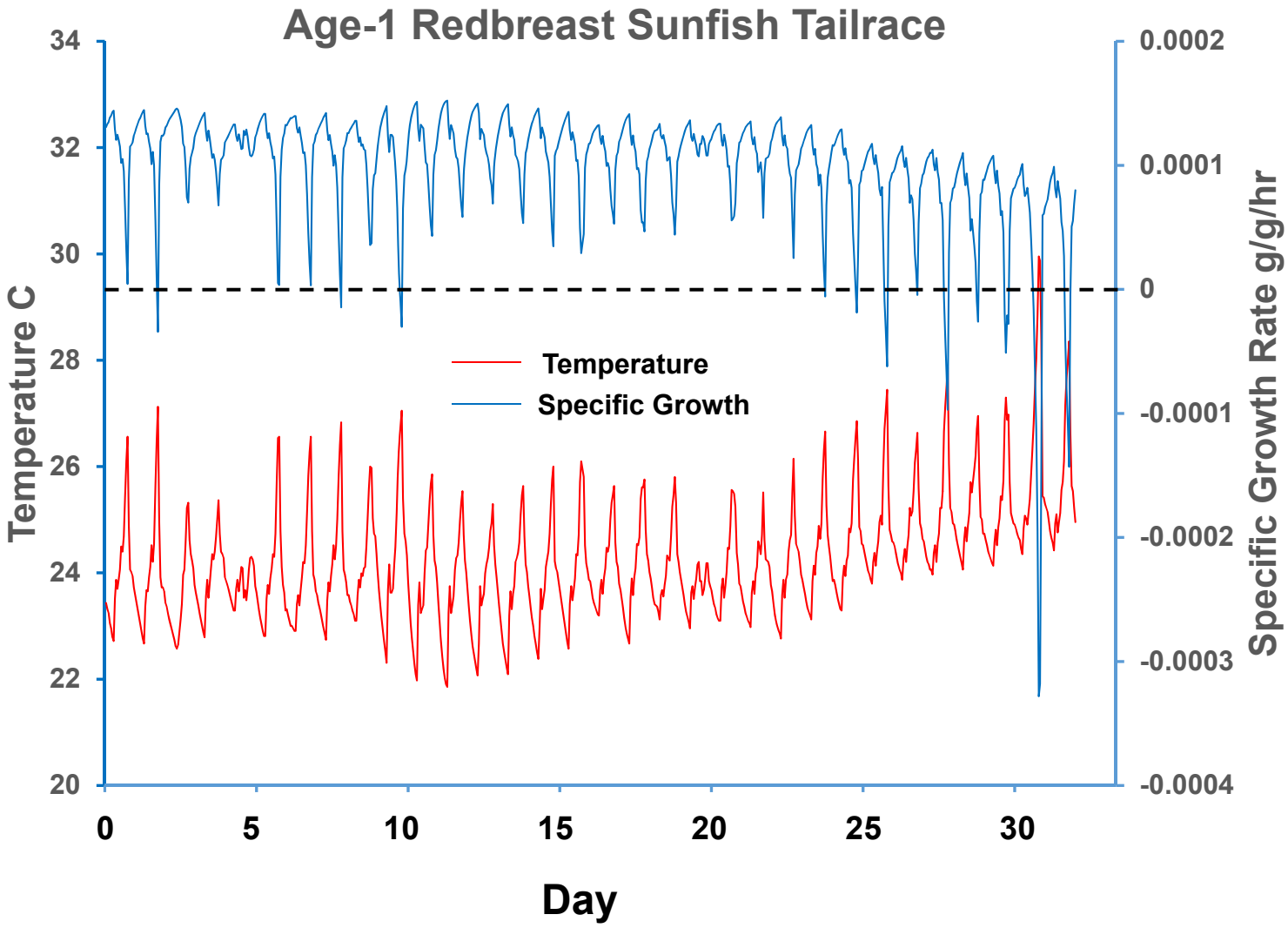

Respiration
Channel Catfish
% Residuals
(Model – Observed) / Observed
20
10
0
-10
-20
-30
-40
0
50
100
150
200
250
300
350
Wet Weight (g)

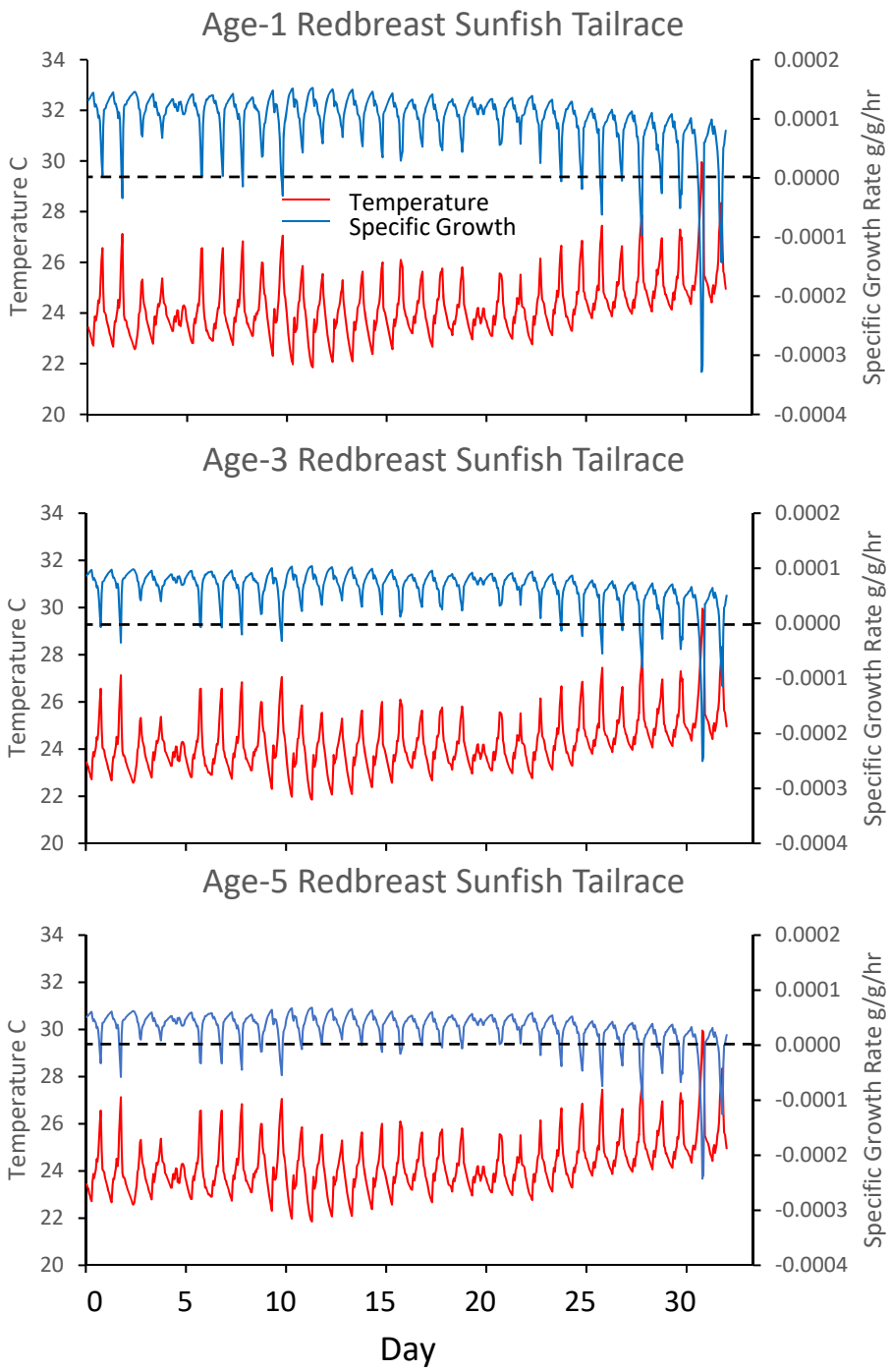

Respiration
Alabama Bass
% Residuals
(Model – Observed) / Observed
800
700
600
500
400
300
200
100
0
-100
0
50
100
150
200
250
300
350
400
Wet weight (g)
10 C
21 C

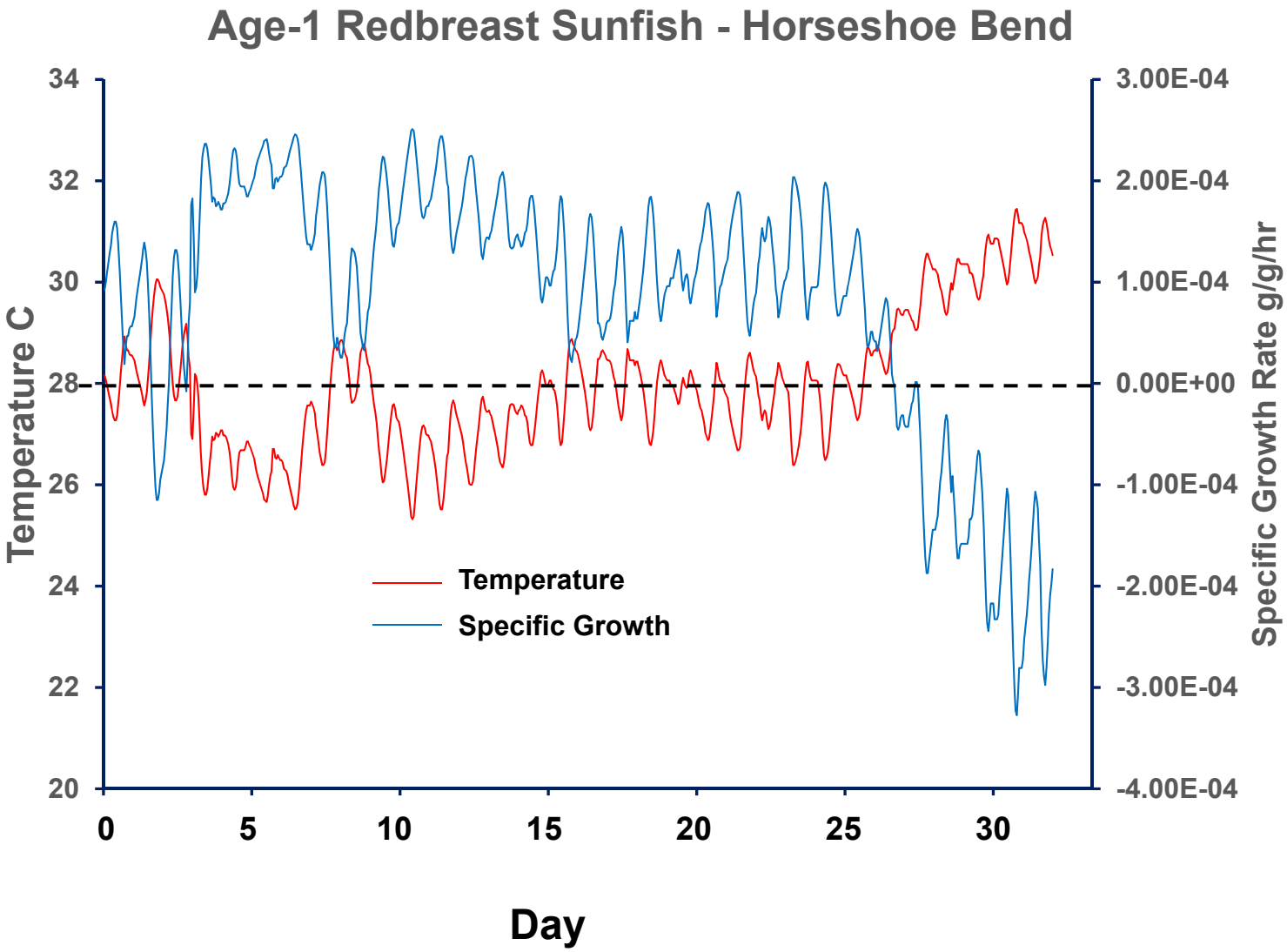

Respiration
Redbreast Sunfish
% Residuals
(Model - Observed / Observed)
140
120
100
80
60
40
20
0
-20
-40
-60
0
20
40
60
80
100
120
140
Wet weight (g)
10 C
21 C

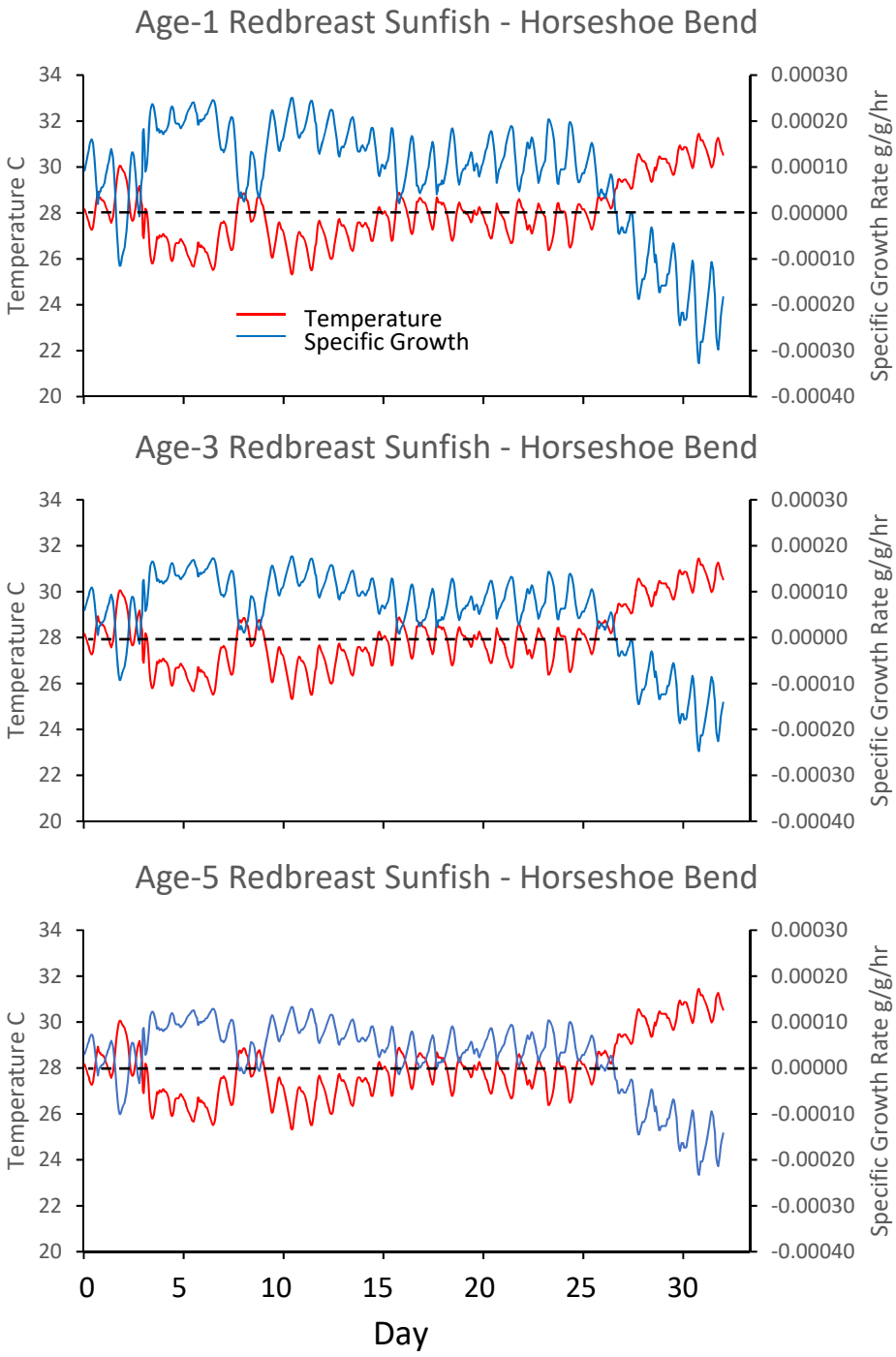
# Redbreast Sunfish Bioenergetics Simulations

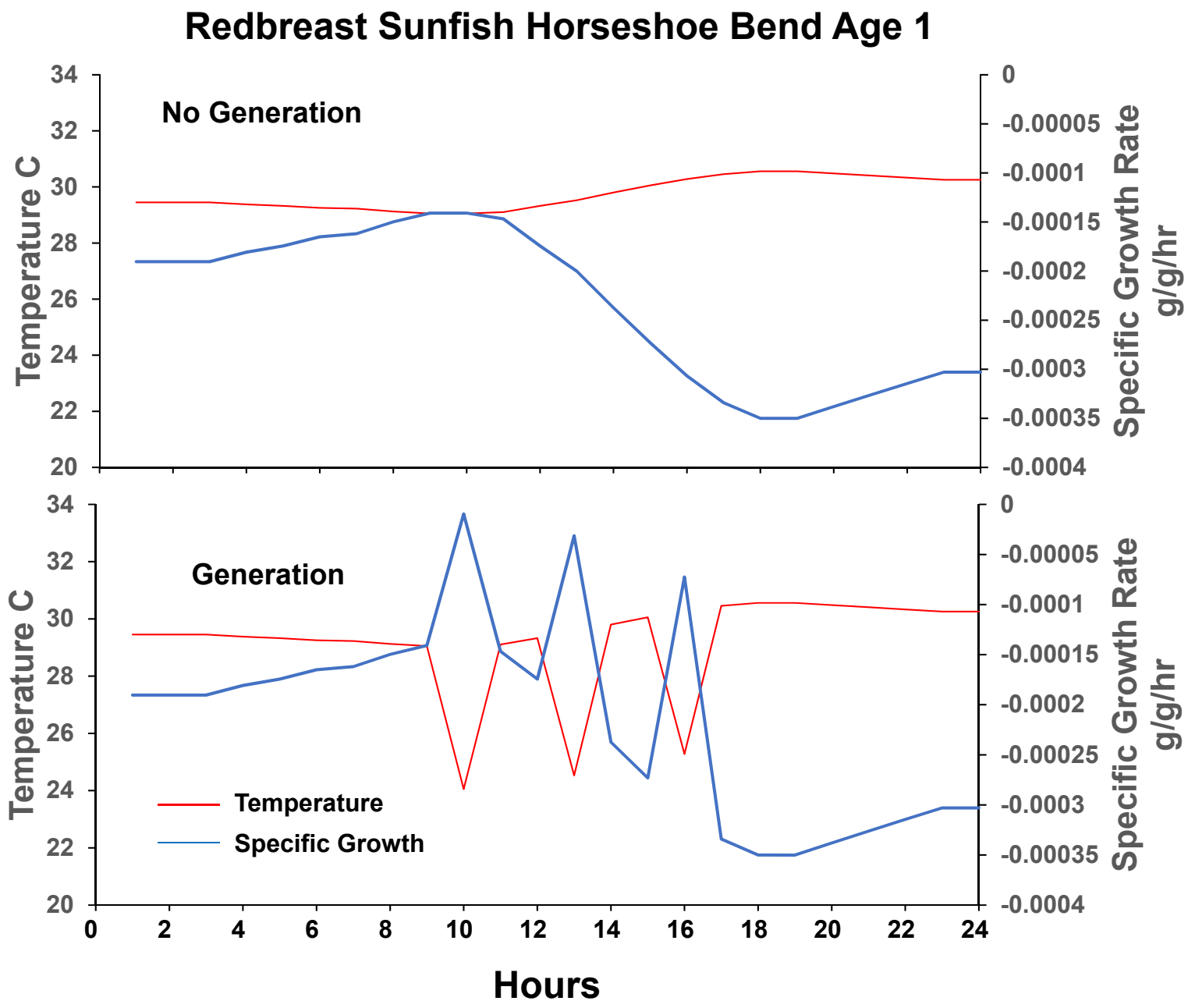
| Initial and final weights from von Bertalanffy equations and P-value (proportion of maximum consumption) produced for model runs for July 15 – August 15 at the tailrace and Horseshoe Bend. | | | | |
|---|---|---|---|---|
| | **Initial Weight (g)** | **Final Weight (g)** | **P-value for tailrace** | **P-value for Horseshoe Bend** |
| **Age 1** | **14.27** | **15.16** | **0.357** | **0.395** |
| **Age 3** | **65.98** | **68.61** | **0.397** | **0.436** |
| **Age 5** | **130.16** | **132.64** | **0.395** | **0.44** |
| | | | | |
| **hours simulated** | **768** | | | |

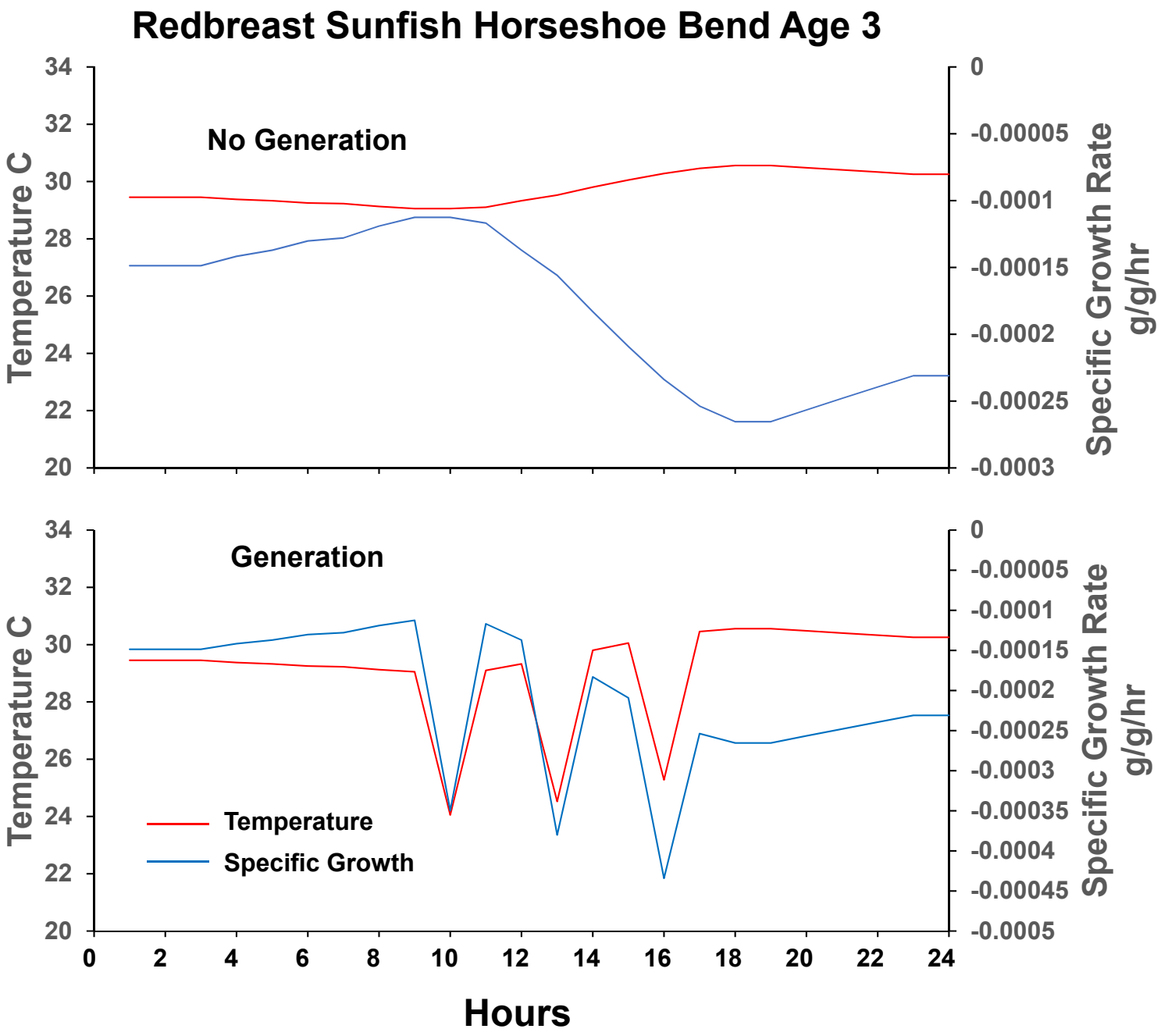

Age-1 Redbreast Sunfish Tailrace
Temperature C
Specific Growth Rate g/g/hr
Day
Temperature
Specific Growth
34
32
30
28
26
24
22
20
0.0002
0.0001
0
-0.0001
-0.0002
-0.0003
-0.0004
0
5
10
15
20
25
30

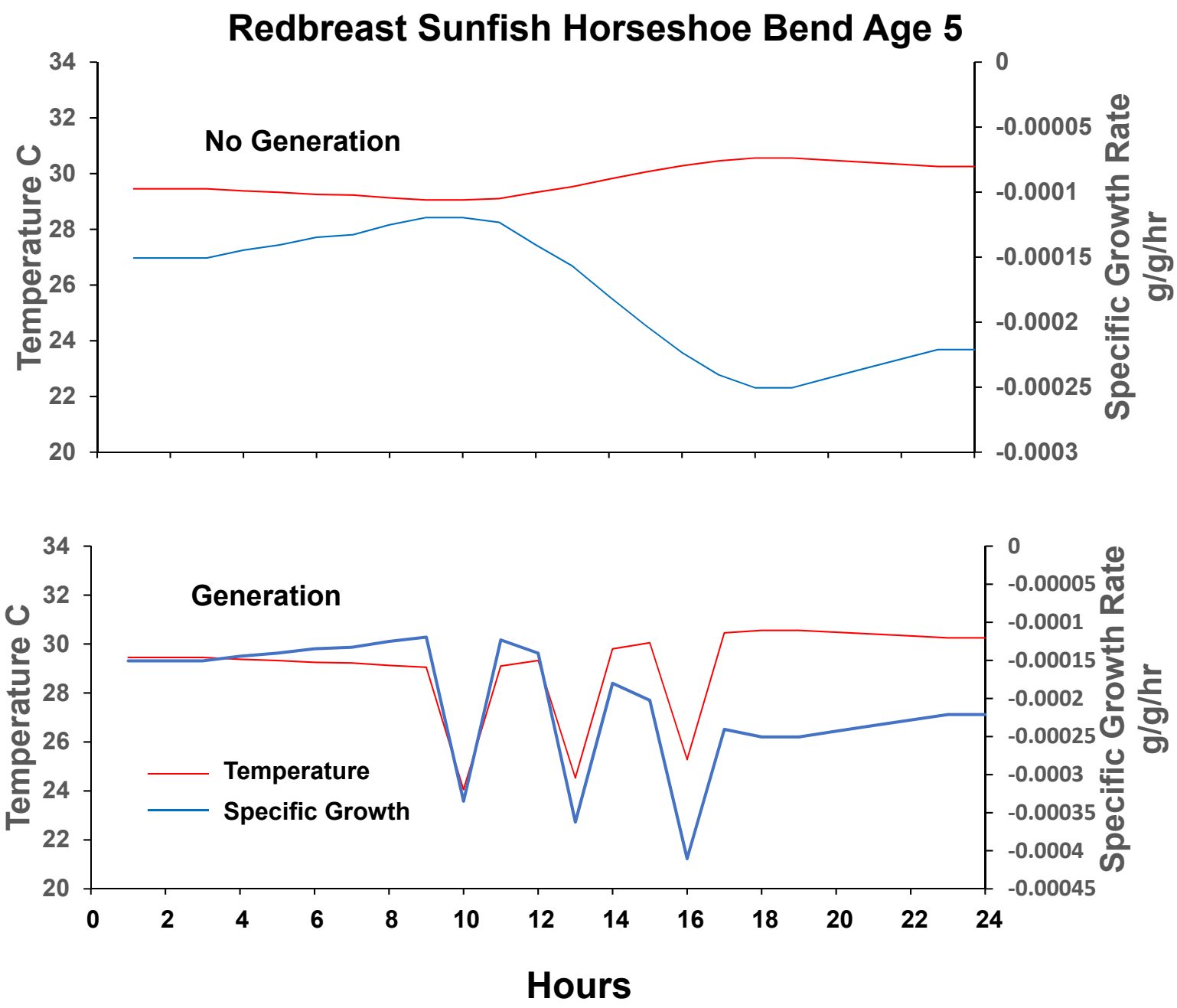

Age-1 Redbreast Sunfish Tailrace
Temperature C
Specific Growth Rate g/g/hr
Temperature
Specific Growth
34
32
30
28
26
24
22
20
0.0002
0.0001
0.0000
-0.0001
-0.0002
-0.0003
-0.0004
Age-3 Redbreast Sunfish Tailrace
Age-5 Redbreast Sunfish Tailrace
0
5
10
15
20
25
30
Day


Age-1 Redbreast Sunfish - Horseshoe Bend
Temperature C
Specific Growth Rate g/g/hr
Day
Temperature
Specific Growth
34
32
30
28
26
24
22
20
3.00E-04
2.00E-04
1.00E-04
0.00E+00
-1.00E-04
-2.00E-04
-3.00E-04
-4.00E-04
0
5
10
15
20
25
30


Age-1 Redbreast Sunfish - Horseshoe Bend
Temperature C
Specific Growth Rate g/g/hr
Temperature
Specific Growth
Age-3 Redbreast Sunfish - Horseshoe Bend
Temperature C
Specific Growth Rate g/g/hr
Age-5 Redbreast Sunfish - Horseshoe Bend
Temperature C
Specific Growth Rate g/g/hr
Day


Redbreast Sunfish Horseshoe Bend Age 1
No Generation
Generation
Temperature C
Specific Growth Rate g/g/hr
Temperature
Specific Growth
Hours
34
32
30
28
26
24
22
20
0
-0.00005
-0.0001
-0.00015
-0.0002
-0.00025
-0.0003
-0.00035
-0.0004
0
2
4
6
8
10
12
14
16
18
20
22
24


Redbreast Sunfish Horseshoe Bend Age 3
No Generation
Generation
Temperature C
Specific Growth Rate g/g/hr
Temperature
Specific Growth
Hours
34
32
30
28
26
24
22
20
0
-0.00005
-0.0001
-0.00015
-0.0002
-0.00025
-0.0003
-0.00035
-0.0004
-0.00045
-0.0005
0
2
4
6
8
10
12
14
16
18
20
22
24


Redbreast Sunfish Horseshoe Bend Age 5
No Generation
Temperature C
Specific Growth Rate g/g/hr
34
32
30
28
26
24
22
20
0
-0.00005
-0.0001
-0.00015
-0.0002
-0.00025
-0.0003
Generation
Temperature
Specific Growth
-0.00035
-0.0004
-0.00045
0
2
4
6
8
10
12
14
16
18
20
22
24
Hours

# Bioenergetics simulations for Redbreast Sunfish

| Weight loss in simulations over 24 hr | | |
|---|---|---|
| **Age** | **No Generation** | **Generation** |
| Age-1 | -0.43% | -0.41% |
| Age-3 | -0.33% | -0.39% |
| Age-5 | -0.33% | -0.38% |

# Summary of Bioenergetics Model Simulations

- Only the Redbreast Sunfish model had reasonable fits to measured respiration. Catfish and black bass models were not adequate.
- Water temperatures downstream were high enough in late summer to predict reduced growth in Redbreast Sunfish
- Simulated pulses of generation in late summer produced slight declines in growth in age-3 and 5 Redbreast Sunfish due to increased activity cost in downstream warmer water.
- From an energetics perspective, pulses of increased flow would have the greatest impact on fish growth during the warmer periods (higher respiration rates)

# Project Summary

- Given few reliable temperature thresholds (i.e. minimum, maximum, spawning temperatures, etc.) for our target species were available, testing of fish from this system in controlled laboratory setting would be required.
- Analysis of the historical temperature data supports that variation has been similar during pre- versus post-Green Plan periods.
- Relative weight and body condition were not compromised in the tailrace relative to downstream sites for the target species.
- To our knowledge, these data represent the first comprehensive sampling effort of the Harris Dam tailrace fish community. With these data, species diversity and richness varied little among sites, although the most common species varied by site and season.

# Project Summary (con't)

- Our results suggest that high flow rates, including that from hydroelectric peaking generation, can exceed the prolonged swimming capability of our target species.
  - Riverine fishes may seek refuge during high flow.
  - Fine scale tracking in the field or experimental lab trials to determine the behavioral responses to increased flow for species of differing body size and vagility would be necessary to identify, maintain, or even enhance refuge habitats.
- Bioenergetic simulations and respirometry patterns suggest that temperature and the interaction of temperature and flow can significantly influence growth conditions for fishes in the Tallapoosa River. Cooler water in the tailrace appears to improve growth conditions for Redbreast Sunfish with uncertain influence on swimming performance.
- Similar work with species not targeted in this project may be warranted to determine impacts of flow and temperature fluctuations on the broader fish community.

**From:** Barry Morris <rbmorris222@gmail.com>
**Sent:** Monday, April 19, 2021 8:03 PM
**To:** Anderegg, Angela Segars
**Subject:** Re: Operating Curve analysis question



Thanks Angie. That helps clear it up. And don't worry, we're looking at all impacts of the winter level, in the lake and downstream. Barry

On April 19, 2021, at 11:59 AM, "Anderegg, Angela Segars" <ARSEGARS@southernco.com> wrote:

Hi Barry,

In the context of this analysis, “inundated” means that if the modeled flood elevation at that location (cross section) exceeds the elevation of the ground at the structure’s location (based on LIDAR), then that structure is “inundated.” Or, more simply put, it means that it has water over it from an elevation standpoint.

Keep in mind that this structure impacts analysis is only one component of the overall resource impacts analysis. We have to consider the entire flooding impacts analysis done in Phase 1 of the study, as well as consider impacts to all the other resources.

Thanks,

**Angie Anderegg**
Hydro Services
(205)257-2251
arsegars@southernco.com

**From:** Barry Morris <rbmorris222@gmail.com>
**Sent:** Saturday, April 17, 2021 11:25 AM
**To:** Anderegg, Angela Segars <ARSEGARS@southernco.com>
**Subject:** Operating Curve analysis question



Hello Angie: In studying the Operating Curve analysis, I cannot find a definition of the term "inundated" referring to flooding of downstream structures (table 3.3). Can your team please define "inundated" for me. Is it just over the front door sill? A foot of water in the main level? Up to the eaves?

In looking at the winter pool change to +1' and +2', it appears the only additional serious flooding is one single family structure that would be "inundated" at +2'. While the LWPOA isn't ready to throw one homeowner under the bus (or in front of the torrent), it would be nice to have the lake a couple of feet higher in the winter. Yes, I am discounting the other three structures that seem of very limited value.

The LWPOA wants to maintain cordial relations with the folks downstream, but having the lake two feet higher in the winter would seem to have a serious economic upside.

Thanks in advance for your help. Barry

Barry Morris
Chairman, LWPOA 2020/21
404 449 3452

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**From:** Anderegg, Angela Segars
**Sent:** Monday, April 19, 2021 12:06 PM
**To:** erin_padgett@fws.gov; 'Evan Collins'; Holbrook, Shannon
**Cc:** Chandler, Keith Edward; Fleming, Amanda; Carlee, Jason; Baker, Jeffery L.; Mills, Tina L.
**Subject:** Meeting notes for March 2021 calls with USFS to discuss WMP and bat language
**Attachments:** 2021-March USFWS calls on WMP and bat language.pdf

Good afternoon,

For your records, attached are meeting summaries from our last two discussions on the Harris Wildlife Management Plan.

Thanks,

**Angie Anderegg**
Hydro Services
(205)257-2251
arsegars@southernco.com

**Meeting Notes**
**Harris Relicensing – Draft WMP – Bat language**
**March 1, 2021, 9:00 am – TEAMS meeting with USFWS**

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**Attendees:**
Keith Chandler, Alabama Power
Amanda Fleming, Alabama Power
Jason Carlee, Alabama Power
Jeff Baker, Alabama Power
Angie Anderegg, Alabama Power
Tina Mills, Alabama Power
Evan Collins, USFWS
Erin Padgett, USFWS

**Meeting Notes:**
*These notes summarize the major items discussed during the meeting and are not intended to be a transcript or analysis of the meeting.*

Angie Anderegg opened the meeting by thanking everyone for their participation. A draft Wildlife Management Plan (WMP) was emailed to USFWS on February 8, and USFWS provided informal comments on the draft on February 17. The purpose of the call is to discuss USFWS's informal comments.

Keith Chandler provided an overview of the draft WMP, specifically the language regarding timber management practices and protections for listed bat species. Keith explained that Skyline has steep terrain that makes winter harvesting not feasible. Keith added that Alabama Power uses a holistic approach to harvesting timber and generally harvest 100-200 acres per year at Skyline. Jeff Baker explained that Alabama Power's goal is to include language in the draft WMP that would result in a "no affect" or a "not likely to adversely affect" determination by USFWS and that Alabama Power would like to work with USFWS regarding a level of retention with which both are comfortable. Evan Collins stated that the threshold for a likely to adversely affect determination is an adverse effect on one individual and that bats are particularly complicated in that a roost tree could be unknowingly harvested. Keith Chandler stated that there are currently no known roost trees within the Harris Project Boundary at Skyline. The group discussed that locating roost trees is particularly difficult and requires a tracking transmitter on the animal. Evan asked whether any acoustic surveys had been previously conducted at Skyline, and Jeff stated not to Alabama Power's knowledge. The group discussed that the Northern Long Eared bat is fairly well accounted for and that current practices are compatible with the published 4 (d) rule for this species. The difficulty lies in that the Indiana bat uses similar habitat. Jeff Baker asked whether a practice that evaluates stands for roost trees and retains those of highest quality would be adequate. Evan stated that it would make sense to evaluate a plot and identify those trees with characteristics most recently attributed to roost trees and retain those trees. The group discussed that identification of every tree is possible on a smaller scale but difficult at Skyline. Additionally, timber harvest during the winter months to avoid impacts is not feasible at Skyline due to steep terrain that results in access issues during the

non-roosting period. The group further discussed possible practices that would evaluate a plot for potential habitat. If found, mist netting could be conducted to determine absence or presence. If presence is found, the required buffer zones would be implemented to avoid impacts. Evan stated that he would like to have a follow-up call including Shannon Holbrook (USFWS) to discuss further. Evan explained further that USFWS wants to apply bat recommendations consistently across the state and that Shannon could provide insight as to the practices implemented by the US Forest Service as well as other private companies.

The group then discussed the draft language regarding timber management practices within the Harris Project Boundary at Harris Reservoir. Jeff Baker stated that the lake area did not present as many challenges, because hardwoods are not generally harvested in the vicinity of the lake. Generally, each tree is marked before a sale, and only pines are harvested in this area. Although pines that are broken and damaged may provide suitable habitat for listed species, these are typically not marked for harvest as they are not merchantable timber. The group further discussed that the understory in the stands at the lake is generally thick and unlikely to be good habitat.

In conclusion, the group committed to a second call including Shannon Holbrook to discuss further.

**Meeting Notes**
**Harris Relicensing – Draft WMP – Bat language**
**March 10, 2021, 2:00 pm – TEAMS meeting with USFWS**

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**Attendees:**
Keith Chandler, Alabama Power
Amanda Fleming, Alabama Power
Jason Carlee, Alabama Power
Jeff Baker, Alabama Power
Angie Anderegg, Alabama Power
Tina Mills, Alabama Power
Evan Collins, USFWS
Erin Padgett, USFWS
Shannon Holbrook, USFWS

**Meeting Notes:**
*These notes summarize the major items discussed during the meeting and are not intended to be a transcript or analysis of the meeting.*

Angie Anderegg opened the meeting by thanking everyone for their participation. A draft Wildlife Management Plan (WMP) was emailed to USFWS on February 8, and USFWS provided informal comments on the draft on February 17. A conference call was held on March 1, 2021 to discuss USFWS' informal comments. The purpose of this call is to further discuss USFWS' comments on proposed timber management practices and protections for listed bat species.

Keith Chandler reminded everyone of the discussion during the March 1, 2021 call regarding the challenges at Skyline. Keith reiterated that Alabama Power's goal is to include timber management practices in the draft WMP that allow for protections at a habitat level as well as results in a no affect or a not likely to adversely affect determination. Keith then recapped that the group discussed during the previous call the following:

- Due to terrain at Skyline, harvesting timber during the wet season (non-roosting period) is not feasible.
- Possible practices at Skyline could include marking trees in advance of harvesting that would meet specifications for roost trees and avoid these trees

Shannon Holbrook stated that the language needs to address how to get to an insignificant level of impact. If considering 9" dbh trees and below, these trees could be used by bats as stop over or alternate roosts. For these size trees, USFWS could be comfortable with a minimum percentage left during harvest. When considering larger trees, it becomes more difficult. If a tree with a maternity roost is taken, it could kill an entire maternity colony. With the larger trees, it is not possible to say that these could be harvested during summer months and avoid potential impact. The group discussed the possibility of conducting mist netting and if results are positive, incorporating buffer zones for suitable trees while harvesting the rest. However, if mist netting results are positive, it is still not known which tree is a roost tree. Jason Carlee clarified that

Alabama Power is not proposing to clear cut at Skyline. The group then discussed possible practices and that identifying roost trees can be difficult. Shannon asked whether Alabama Power was against formal consultation, and Keith Chandler stated no. He explained that Alabama Power had conducted formal consultation on many occasions and is not opposed to doing so for this project. He added that Alabama Power and the USFWS have also conducted numerous successful informal consultations on other projects by including language that supported a "no affect" or "not likely to adversely affect" determination and would like to approach the bats this way as well if possible. Shannon stated that USFWS would like to evaluate the proposed practices in writing. The group then discussed the various processes and practices used by other property owners. Shannon stated that USFWS works with US Forest Service and NRCS often, and she stated that the USFWS would send to Jeff Baker examples of the various documents used by these groups.

Regarding the draft WMP at this time, Alabama Power stated that it would revise the draft to include a statement that Alabama Power will continue working with USFWS to develop timber management practices that include protections for listed bat species. The draft to be provided to HAT 4 will include this statement, and it can be later revised once the timber practices language is firm.

Further, Alabama Power and USFWS will continue to work towards language to include in the draft WMP that may result in a "no affect" or a "not likely to adversely affect" determination.

**From:** McVicar, Ashley M
**Sent:** Tuesday, April 20, 2021 11:13 AM
**To:** Anderegg, Angela Segars; Chandler, Keith Edward; Fleming, Amanda
**Subject:** Fwd: Harris WQ Report

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**From:** McVicar, Ashley M <AMMcVica@southernco.com>
**Sent:** Tuesday, April 20, 2021 11:13:01 AM
**To:** Haslbauer, Jennifer <jhaslbauer@adem.alabama.gov>
**Cc:** Moore, David <djmoore@adem.alabama.gov>
**Subject:** Re: Harris WQ Report

Thanks so much for sending and for your careful review! I will pass this along.
Ashley

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**From:** Haslbauer, Jennifer <jhaslbauer@adem.alabama.gov>
**Sent:** Tuesday, April 20, 2021 10:21:32 AM
**To:** McVicar, Ashley M <AMMcVica@southernco.com>
**Cc:** Moore, David <djmoore@adem.alabama.gov>
**Subject:** Harris WQ Report

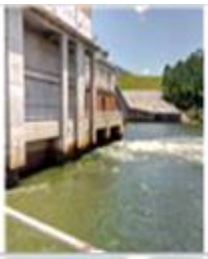


---

Hi Ashely,

We have found a discrepancy in the Harris Final WQ Report in regards to ADEM data collection. On page 460 of the report, the first paragraph states: “The site immediately downstream of Harris Dam (MARE-12) was sampled monthly in 2018 from April to October, and in 2020 from June to October during periods of non-generation.”

In our Field Activities Report for MARE-12, we have the note “Below Harris Dam, samples should only be collected when dam is generating”, but for some reason we didn’t collect during generation in 2018 but did in 2020. I think APC needs to revise that part of the final report because we did collect during generation in 2020 (screenshots below).

| | | |
|---|---|---|
|  | 06/02/2020 | Upstream; generating |
|  | 06/02/2020 | Downstream; generating |
|  | 07/27/2020 | Upstream; generating |
|  | 07/27/2020 | Downstream; generating |

Printed 4-14-21 4:01 PM

# Field Activities Report for MARE-12



Station:**MARE-12, 7-27-20 1212**
Sampling Trip:**MGY 8_SW_JULY2020**
Status:**Complete - Turnaround:65 Days**

Comments: **Collected samples from right bank, D/S of Harris Dam. Dam was generating during sampling.**
Geomean: No
EcoRef:

## Field Measurements

| Measure Date | Value | Unit | Media | Field Act ivity |
|---|---|---|---|---|
| 7-27-20 1212 | CY20 NON-WADEABLE | | | 7-27-20 1212 29 |
| Seth Wood, Liberty A Dobbs | | | | |
| T-Air | 34.4 | C | NONE | |
| Sonde # | 684945 | NONE | NONE | |
| D-Btm (MP) | 2.8 | M | WATER | |
| Chl a Vol Fil | 350 | ML | WATER | |
| Turb Meter # | 14207 | NONE | NONE | |
| Rel Coll Depth | Surface | NONE | NONE | |
| Turb-Field | 2.1 | NTU | WATER | |

## Datalogger

29

Seth Wood, Liberty A Dobbs

7-27-20 1212 29

| Measure Date | Depth M | Water Temp C | Conductivity Res µmhos/cm | Dis Oxygen MG/L | pH SU | DO %Sat % | Turbidity NTU | CritDpth |
|---|---|---|---|---|---|---|---|---|
| 07-27-20 1212 | 0.297 | 23.59 | 34.1201 | 6.71 | 6.13 | 80.33 | 1.24 | |
| 07-27-20 1212 | 1.093 | 23.58 | 33.6413 | 6.63 | 6.11 | 79.51 | 382.66 | |
| 07-27-20 1213 | 1.577 | 23.75 | 36.6368 | 6.56 | 6.03 | 78.99 | | Y |
| 07-27-20 1214 | 2.054 | 23.81 | 33.0398 | 6.45 | 6.00 | 77.82 | 2,296.10 | |
| 07-27-20 1216 | 2.888 | 23.96 | 33.7385 | 6.41 | 5.87 | 77.46 | 55.01 | |

Thanks,
Jennifer

# HAT 1 meeting - BESS study

APC Harris Relicensing <g2apchr@southernco.com>

Thu 4/22/2021 5:38 PM

**To:** APC Harris Relicensing <harrisrelicensing@southernco.com>
**Bcc:** damon.abernethy@dcnr.alabama.gov <damon.abernethy@dcnr.alabama.gov>; nathan.aycock@dcnr.alabama.gov <nathan.aycock@dcnr.alabama.gov>; steve.bryant@dcnr.alabama.gov <steve.bryant@dcnr.alabama.gov>; todd.fobian@dcnr.alabama.gov <todd.fobian@dcnr.alabama.gov>; chris.greene@dcnr.alabama.gov <chris.greene@dcnr.alabama.gov>; keith.henderson@dcnr.alabama.gov <keith.henderson@dcnr.alabama.gov>; mike.holley@dcnr.alabama.gov <mike.holley@dcnr.alabama.gov>; evan.lawrence@dcnr.alabama.gov <evan.lawrence@dcnr.alabama.gov>; matthew.marshall@dcnr.alabama.gov <matthew.marshall@dcnr.alabama.gov>; brian.atkins@adeca.alabama.gov <brian.atkins@adeca.alabama.gov>; tom.littlepage@adeca.alabama.gov <tom.littlepage@adeca.alabama.gov>; jhaslbauer@adem.alabama.gov <jhaslbauer@adem.alabama.gov>; cljohnson@adem.alabama.gov <cljohnson@adem.alabama.gov>; mlen@adem.alabama.gov <mlen@adem.alabama.gov>; fal@adem.alabama.gov <fal@adem.alabama.gov>; alockwood@adem.alabama.gov <alockwood@adem.alabama.gov>; djmoore@adem.alabama.gov <djmoore@adem.alabama.gov>; arsegars@southernco.com <arsegars@southernco.com>; dkanders@southernco.com <dkanders@southernco.com>; wtanders@southernco.com <wtanders@southernco.com>; jefbaker@southernco.com <jefbaker@southernco.com>; jcarlee@southernco.com <jcarlee@southernco.com>; kechandl@southernco.com <kechandl@southernco.com>; mcoker@southernco.com <mcoker@southernco.com>; afleming@southernco.com <afleming@southernco.com>; cggoodma@southernco.com <cggoodma@southernco.com>; sgraham@southernco.com <sgraham@southernco.com>; ammcvica@southernco.com <ammcvica@southernco.com>; tlmills@southernco.com <tlmills@southernco.com>; cmnix@southernco.com <cmnix@southernco.com>; abnoel@southernco.com <abnoel@southernco.com>; kodom@southernco.com <kodom@southernco.com>; alpeeple@southernco.com <alpeeple@southernco.com>; scsmith@southernco.com <scsmith@southernco.com>; twstjohn@southernco.com <twstjohn@southernco.com>; Rasberry, Jennifer S. <JSRASBER@southernco.com>; mhunter@alabamarivers.org <mhunter@alabamarivers.org>; clowry@alabamarivers.org <clowry@alabamarivers.org>; jwest@alabamarivers.org <jwest@alabamarivers.org>; gjobsis@americanrivers.org <gjobsis@americanrivers.org>; kmo0025@auburn.edu <kmo0025@auburn.edu>; devridr@auburn.edu <devridr@auburn.edu>; irwiner@auburn.edu <irwiner@auburn.edu>; wrighr2@aces.edu <wrighr2@aces.edu>; lgallen@balch.com <lgallen@balch.com>; jhancock@balch.com <jhancock@balch.com>; allan.creamer@ferc.gov <allan.creamer@ferc.gov>; rachel.mcnamara@ferc.gov <rachel.mcnamara@ferc.gov>; sarah.salazar@ferc.gov <sarah.salazar@ferc.gov>; monte.terhaar@ferc.gov <monte.terhaar@ferc.gov>; gene@wedoweelakehomes.com <gene@wedoweelakehomes.com>; colin.dinken@kleinschmidtgroup.com <colin.dinken@kleinschmidtgroup.com>; chris.goodell@kleinschmidtgroup.com <chris.goodell@kleinschmidtgroup.com>; jason.moak@kleinschmidtgroup.com <jason.moak@kleinschmidtgroup.com>; kelly.schaeffer@kleinschmidtgroup.com <kelly.schaeffer@kleinschmidtgroup.com>; sandra.wash@kleinschmidtgroup.com <sandra.wash@kleinschmidtgroup.com>; jessecunningham@msn.com <jessecunningham@msn.com>; mdollar48@gmail.com <mdollar48@gmail.com>; drheinzen@charter.net <drheinzen@charter.net>; sforehand@russelllands.com <sforehand@russelllands.com>; 1942jthompson420@gmail.com <1942jthompson420@gmail.com>; nancyburnes@centurylink.net <nancyburnes@centurylink.net>; sandnfrench@gmail.com <sandnfrench@gmail.com>; lgarland68@aol.com <lgarland68@aol.com>; rbmorris222@gmail.com <rbmorris222@gmail.com>; irapar@centurytel.net <irapar@centurytel.net>; mitchell.reid@tnc.org <mitchell.reid@tnc.org>; richardburnes3@gmail.com <richardburnes3@gmail.com>; eilandfarm@aol.com <eilandfarm@aol.com>; athall@fujifilm.com <athall@fujifilm.com>; ebt.drt@numail.org <ebt.drt@numail.org>; georgettraylor@centurylink.net <georgettraylor@centurylink.net>; beckyrainwater1@yahoo.com <beckyrainwater1@yahoo.com>; dbronson@charter.net <dbronson@charter.net>; wmcampbell218@gmail.com <wmcampbell218@gmail.com>; jec22641@aol.com <jec22641@aol.com>; robinwaldrep@yahoo.com <robinwaldrep@yahoo.com>; sonjahollomon@gmail.com <sonjahollomon@gmail.com>; butchjackson60@gmail.com <butchjackson60@gmail.com>; donnamat@aol.com <donnamat@aol.com>; goxford@centurylink.net <goxford@centurylink.net>; mhpwedowee@gmail.com <mhpwedowee@gmail.com>; jerrelshell@gmail.com <jerrelshell@gmail.com>; bsmith0253@gmail.com <bsmith0253@gmail.com>; inspector_003@yahoo.com <inspector_003@yahoo.com>; paul.trudine@gmail.com <paul.trudine@gmail.com>; lindastone2012@gmail.com <lindastone2012@gmail.com>; granddadth@windstream.net <granddadth@windstream.net>; trayjim@bellsouth.net <trayjim@bellsouth.net>; straylor426@bellsouth.net <straylor426@bellsouth.net>; robert.a.allen@usace.army.mil <robert.a.allen@usace.army.mil>; randall.b.harvey@usace.army.mil <randall.b.harvey@usace.army.mil>; james.e.hathorn.jr@sam.usace.army.mil <james.e.hathorn.jr@sam.usace.army.mil>; lewis.c.sumner@usace.army.mil <lewis.c.sumner@usace.army.mil>; jonas.white@usace.army.mil <jonas.white@usace.army.mil>; gordon.lisa-perras@epa.gov <gordon.lisa-perras@epa.gov>; holliman.daniel@epa.gov <holliman.daniel@epa.gov>; mayo.lydia@epa.gov <mayo.lydia@epa.gov>; jennifer_grunewald@fws.gov <jennifer_grunewald@fws.gov>; erin_padgett@fws.gov <erin_padgett@fws.gov>; jeff_powell@fws.gov <jeff_powell@fws.gov>; jeff_duncan@nps.gov

<jeff_duncan@nps.gov>; Martindale, Lisa (LMARTIND@southernco.com) <LMARTIND@southernco.com>; Crew, James F. <JFCREW@southernco.com>

HAT 1,

We are going to have a HAT 1 meeting on May 3rd, 2:00-3:00, to walk through the BESS study results and answer any questions you may have. Teams meeting information is below.

Thanks

**Angie Anderegg**
Hydro Services
(205)257-2251
arsegars@southernco.com

# Microsoft Teams meeting

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**From:** Jack West <jwest@alabamarivers.org>
**Sent:** Friday, April 23, 2021 8:42 AM
**To:** Anderegg, Angela Segars
**Cc:** Sarah Salazar
**Subject:** Re: Next Week's Harris Updated Study Report Meeting



Hi Angie,

Thanks for sharing the draft agenda, and with all there is to get through next Tuesday, I agree that a separate meeting to discuss the BESS report makes sense. Thank you for setting that up. The Synapse guys will join for that one but will likely not be attending the meeting on Tuesday.

I look forward to the meeting Tuesday. Have a great weekend.

On Thu, Apr 22, 2021 at 5:30 PM Anderegg, Angela Segars <ARSEGARS@southernco.com> wrote:

> Hi Jack,
>
> Below is the agenda for the USR meeting. On Monday, I'm going to send this out to all stakeholders, along with the call in information and a link to the meeting presentation. You are welcome to forward the meeting invite to the Synapse folk and we'll make sure to capture them in the attendee list for the meeting. If they would like to be added to the overall stakeholder list, or any of the HATs, just ask them to forward me their contact info.
>
> Because we will be walking through where we are with all of the studies, we won't spending a ton of time on BESS on Tuesday. However, I do think it's a good idea to have a HAT 1 meeting specific to the BESS study, so stakeholders have more opportunity to ask questions. I'm going to send out a meeting notice for a HAT 1 meeting for Monday, May 3rd at 2:00.
>
> 9 AM – Introduction, Roll Call, Safety Moment
>
> 9:15 AM – USR Summary by Study
>
> - Operating Curve Change Feasibility Analysis
> - Downstream Release Alternatives
> - Battery Energy Storage System
> - Water Quality
> - Erosion and Sedimentation

- Aquatic Resources
- Downstream Aquatic Habitat
- Threatened and Endangered Species
- Project Lands Evaluation
- Recreation Evaluation
- Cultural Resources

Review any Action Items

Adjourn

Thanks!

**Angie Anderegg**

Hydro Services

(205)257-2251

arsegars@southernco.com

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**From:** Jack West <jwest@alabamarivers.org>
**Sent:** Wednesday, April 21, 2021 3:50 PM
**To:** Anderegg, Angela Segars <ARSEGARS@southernco.com>
**Cc:** Sarah Salazar <sarah.salazar@ferc.gov>
**Subject:** Next Week's Harris Updated Study Report Meeting



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Hi Angie,

I hope you're doing well. We are preparing for the Updated Study Report meeting on Tuesday, and I wanted to check with you to see if an agenda is available for that meeting. I know a lot will be compressed into three hours. We have engaged a consulting firm, Synapse Energy Economics, to advise on the battery storage study report, and they will be joining for part of the meeting. I can provide you names and email addresses of attendees if you need to update an invite list, or I can simply share the meeting link with them if that is easier.

If a draft agenda is available, it would be helpful to let them know the structure of the meeting and what parts are relevant to them.

Thanks, and we look forward to attending next week.

Best,

--

Jack West, Esq.

Policy and Advocacy Director

Alabama Rivers Alliance

2014 6th Ave N, Suite 200

Birmingham, AL 35203

205-322-6395

www.alabamarivers.org [alabamarivers.org]

**Celebrating more than 20 years of protecting Alabama's 132,000 miles of rivers and streams!**

--
Jack West, Esq.
Policy and Advocacy Director
Alabama Rivers Alliance
2014 6th Ave N, Suite 200
Birmingham, AL 35203
205-322-6395
www.alabamarivers.org [alabamarivers.org]

**Celebrating more than 20 years of protecting Alabama's 132,000 miles of rivers and streams!**

# Harris Relicensing - Updated Study Report Meeting

Anderegg, Angela Segars <ARSEGARS@southernco.com>

Mon 4/26/2021 2:53 PM

**To:** APC Harris Relicensing <g2apchr@southernco.com>

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Harris relicensing stakeholders,

The presentation for tomorrow's Updated Study Report meeting is available on the Harris relicensing website (Relicensing Documents). Microsoft Teams call-in information is below.

I look forward to talking with you tomorrow.

Thanks,

**Angie Anderegg**
Hydro Services
(205)257-2251
arsegars@southernco.com

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**From:** APC Harris Relicensing
**Sent:** Monday, April 12, 2021 1:47 PM
**To:** APC Harris Relicensing <harrisrelicensing@southernco.com>
**Subject:** Harris Relicensing - Updated Study Report

Harris relicensing stakeholders,

Pursuant to FERC's Integrated Licensing Process, Alabama Power filed its Harris Project Updated Study Report (USR) today. Concurrent with the USR filing, Alabama Power filed three draft study reports, four final study reports and the results of a Botanical Inventory at Flat Rock Park. Stakeholders may access the USR and the study reports on FERC's website (http://www.ferc.gov) by going to the "eLibrary" link and entering the docket number (P-2628). The USR and study reports are also available on the Project relicensing website at http://harrisrelicensing.com.

The Updated Study Report meeting will be held on **April 27, 2021**. Please hold this date from 9:00 am to 12:00 pm central time. Call in information for the meeting can be found below. The purpose of the meeting is to provide an opportunity to review the contents of the USR.

Alabama Power will file a summary of the USR meeting by **May 12, 2021**. Stakeholders will have until **June 11, 2021** to file written comments with FERC on the USR Meeting Summary.

Thanks,

**Angie Anderegg**
Hydro Services
(205)257-2251
arsegars@southernco.com

# Microsoft Teams meeting

**Join on your computer or mobile app**
**Click here to join the meeting**

Video Conference ID: 112 301 635 7
Alternate VTC dialing instructions
**Or call in (audio only)**
+1 470-705-0860,,168184661# United States, Atlanta
Phone Conference ID: 168 184 661#
Find a local number |

# Updated Study Report (USR) Meeting

# R.L. Harris Dam Relicensing
# FERC No. 2628

April 27, 2021

# Meeting Etiquette

- ❑ Be patient with technology issues
- ❑ Follow the facilitator's instructions
- ❑ Phones will be muted during presentations
- ❑ Turn off cameras to avoid bandwidth issues
- ❑ Meeting will be recorded to assist with preparing the meeting summary
- ❑ Follow along with PDF of presentations
- ❑ Facilitator will ask for participant questions at designated times during presentation; chat feature also available for questions
- ❑ Clearly state name and organization when asking questions

HARRIS DAM
RELICENSING

# Safety and Roll Call


Source: USCG Recreational Boating Report

## Accidents happen!

Be prepared while on the water:

- PFDs
- Inspected fire extinguisher
- First aid kit
- Tool kit with flashlight
- Float plan
- Check the weather

# Harris Relicensing Milestones

**April 12, 2021** FERC Filing

- ❖Updated Study Report
- ❖Draft Reports
  - Downstream Release Alternatives Phase 2
  - Operating Curve Change Feasibility Analysis Phase 2
  - Battery Energy Storage System (BESS)
- ❖Final Reports
  - Aquatic Resources
  - Erosion and Sedimentation
  - Downstream Aquatic Habitat
  - Water Quality
  - A Botanical Inventory of a 35-Acre Parcel at Flat Rock Park, Blake's Ferry, Alabama

- Stakeholder comments on Draft Reports - May 11, 2021
- USR Meeting Summary - May 12, 2021
- USR Meeting Summary comments - June 11, 2021
- Preliminary Licensing Proposal (PLP) - by July 3, 2021
  - 90-day comment period
- Final License Application (FLA) and 3 Final Reports – by November 30, 2021

# USR Meeting Purpose

**Pursuant to 18 C.F.R. § 5.15(f)**

- Overall study progress, including data collected
- Any variance from the study plan or schedule
- Remaining activities or study modifications, if any

HARRIS DAM RELICENSING

# Summary of HAT Meetings – Post ISR

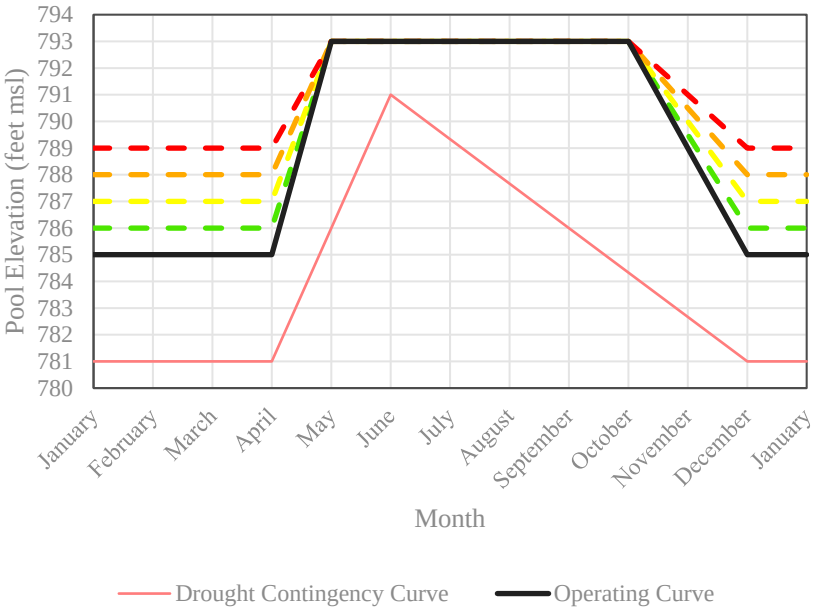
| Meeting | Description | Date |
|---|---|---|
| Initial Study Report | Alabama Power presented information on the progress of each study including applicable study results, variances requested, and any additional studies or requested study modifications. | 04/28/2020 |
| HAT 3 | Auburn University presented research to date and informed the HAT of remaining work on the Aquatic Resources Study. | 06/02/2020 |
| HAT 1 and 5 | Alabama Power presented the methodology for:<br>• analyzing the number of usable recreation structures on Lake Harris at the current winter operating curve and the alternatives<br>• analyzing how structures located downstream of Harris Dam might be affected by a change in the winter operating curve during a 100-year flood event | 06/04/2020 |
| HAT 4 | Alabama Power reviewed the goals and objectives of the Project Lands EvaluationStudy and discussed the Shoreline Management Plan and the Wildlife Management Plan outline. | 10/19/2020 |
| HAT 5 | Alabama Power discussed the Phase 2 analyses for the recreation component of the Downstream Release Alternatives study including the definition for boatable flows, as well as potential recreation PME measures. | 10/19/2020 |
| HAT 3 | Alabama Power presented modeling results on the Downstream Aquatic Habitat Study and discussed Auburn University's progress to date on the Aquatic Resources Study. | 11/05/2020 |
| Selected HAT 6 | Alabama Power and OAR presented a virtual cultural resources overview of Skyline. Selected HAT 6 participants attended due to the privileged nature of material. | 03/04/2021 |
| HAT 3 | Alabama Power and Auburn University presented results of the Downstream Fish Population Study for the Aquatic Resources Study. | 03/31/2021 |
| HAT 1 | Alabama Power presented results of the Phase 2 Operating Curve Change Feasibility Analysis Study and the Phase 2 Downstream Release Alternatives Study. | 04/01/2021 |

# Agenda

| Harris Relicensing Studies |
| --- |
| • Operating Curve Change Feasibility Analysis |
| • Downstream Release Alternatives |
| • Battery Energy Storage System (BESS) |
| • Water Quality |
| • Erosion and Sedimentation |
| • Aquatic Resources |
| • Downstream Aquatic Habitat |
| • Threatened and Endangered (T&E) Species |
| • Project Land Evaluation |
| • Recreation Evaluation |
| • Cultural Resources |

HARRIS DAM RELICENSING

# Harris Operating Curve and Operating Alternatives




- Evaluated in increments of 1 foot from 786 feet msl to 789 feet msl

## Phase 1

- Modeling to evaluate potential impacts of winter operating curve change on:
  - generation
  - flood control
  - navigation
  - drought operations
  - Green Plan flows
  - downstream release alternatives

## Phase 2

- quantitative and qualitative evaluations of potential resource impacts

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# Operating Curve Change Feasibility Analysis Study

## Study Progress:

- Used existing information, relicensing studies, and Phase 1 analysis
- Phase 2 Analysis analyzed operating curve effects on Project resource areas

- HAT 1 Meetings - June 4, 2020, and April 1, 2021

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# Operating Curve Change Feasibility Analysis Study

| Resource | +1 Foot | +2 Feet | +3 Feet | + 4 Feet |
|---|---|---|---|---|
| Hydro Generation | $(19,400) | $(40,600) | $(52,100) | $(124,900) |
| Harris Reservoir Elevations | Over the period of record, increasing the winter pool elevation did not affect the amount of time the reservoir was at or above the full summer pool elevation of 793 feet msl. | | | |
| Downstream Effects of 100-Year Design Flood | 298 acres (4.9%) | 485 acres (7.9%) | 686 acres (11.2%) | 889 acres (14.6%) |
| Spillway Operation | 12 (0.1%) | 13 (0.1%) | 20 (0.1%) | 37 (0.2%) |
| Turbine Capacity Operation | 15 (0.0%) | 29 (0.1%) | 54 (0.1%) | 103 (0.3%) |
| Navigation | No Effect | | | |
| Drought Operations | No Effect | | | |
| Green Plan Flows | No Effect | | | |
| Downstream Release Alternatives | No Effect | | | |
| Structures Downstream of Harris Dam | 0 | 4 | 4 | 9 |
| Water Quality – Harris Reservoir | No Effect | | | |
| Water Quality – Harris Dam Discharge | No Effect | | | |
| Water Use – Harris Reservoir | Minor Beneficial Effect | | | |
| Water Use – Tallapoosa River | No Effect | | | |

# Operating Curve Change Feasibility Analysis Study

| Resource | +1 Foot | +2 Feet | +3 Feet | + 4 Feet |
|---|---|---|---|---|
| Erosion – Harris Reservoir | No Effect | | | |
| Sedimentation – Harris Reservoir | Adverse Effect | | | |
| Erosion – Tallapoosa River | Minor Adverse Effect | | | |
| Sedimentation – Tallapoosa River | No Effect | | | |
| Aquatic Resources – Harris Reservoir | Beneficial Effect | | | |
| Aquatic Resources – Tallapoosa River | No Effect | | | |
| Wildlife – Harris Reservoir | Beneficial Effect | | | |
| Wildlife – Tallapoosa River | No Effect | | | |
| T&E Species – Harris Reservoir and Tallapoosa River | No Effect | | | |
| Terrestrial Wetlands – Harris Reservoir | Beneficial Effect | | | |
| Terrestrial Wetlands – Tallapoosa River | No Effect | | | |
| Recreation – Harris Reservoir | 9.1% | 17.8% | 31.3% | 41.4% |
| Recreation – Tallapoosa River | Minor Adverse Effect | | | |
| Cultural Resources – Harris Reservoir | Minor Beneficial Effect | | | |
| Cultural Resources – Tallapoosa River | Potential Adverse Effect | | | |

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# Operating Curve Change Feasibility Analysis Study

## Variances:

- Historic photos of Lake Harris could not be used to assess the effects of the winter pool alternatives due to the limited resolution to assess individual erosion areas.

- Provided qualitative information (rather than quantitative information noted in the Study Plan) regarding cultural resources on Lake Harris
  - analysis of cultural resources is ongoing.

## Remaining Activities

- Stakeholder comments on the Draft Phase 2 Study Report

- Present the operating proposal and PME measures in PLP

# Review of Downstream Release Alternatives Analyzed in Phase 2

| Name/Description | Abbreviation |
|---|---|
| Green Plan (baseline or existing condition) – pulsing flows as described in the Green Plan release criteria | GP |
| Pre-Green Plan (peaking only; no pulsing or continuous minimum flow) | PreGP or PGP |
| Modified Green Plan | ModGP |
| 150 cfs continuous minimum flow (CMF) | 150CMF |
| 300 cfs continuous minimum flow | 300CMF |
| 600 cfs continuous minimum flow | 600CMF |
| 800 cfs continuous minimum flow | 800CMF |
| A hybrid Green Plan that incorporates both a base minimum flow of 150 cfs and the pulsing described in the existing Green Plan release criteria | 150CMF+GP |
| A hybrid Green Plan that incorporates both a base minimum flow of 300 cfs and the pulsing described in the existing Green Plan release criteria | 300CMF+GP |
| A hybrid Green Plan that incorporates both a base minimum flow of 600 cfs and the pulsing described in the existing Green Plan release criteria | 600CMF+GP |
| A hybrid Green Plan that incorporates both a base minimum flow of 800 cfs and the pulsing described in the existing Green Plan release criteria | 800CMF+GP |

# Operations Model Assumptions

- A rule for peaking operations is included in all simulations.
- The minimum elevation for Harris Reservoir is 770.5 feet msl.
- Pre-Green Plan: The release criteria from the Green Plan contained in the model were removed.
- Continuous Minimum Flows: A new continuous release rule replaces the current Green Plan release rule. The releases were reduced to 85 cfs when the flows at the Heflin gage drop below 50 cfs. This is the drought cutback in the current Green Plan.
- Continuous Minimum Flows + Green Plan: A new continuous release rule is added with the current Green Plan release rule. Both rules reduce their releases to 85 cfs when the flows at the Heflin gage drop below 50 cfs. This is the drought cutback in the current Green Plan.
- A theoretical minimum flow unit that uses same intake as existing Harris unit to produce power.

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# Downstream Release Alternatives Study

## Study Progress

- Phase 2 Analysis:
  - Outflow hydrographs from HEC-ResSim were routed downstream using HEC-RAS to assess effects of the downstream release alternatives on Project resources

- HAT 1 Meeting - April 1

# Downstream Release Alternatives Study

| Resource | PreGP | ModGP | 150CMF | 300CMF | 600CMF | 800CMF | 150CMF+GP | 300CMF+GP | 600CMF+GP | 800CMF+GP |
|---|---|---|---|---|---|---|---|---|---|---|
| Harris Reservoir Elevations | = | = | = | = | - | - | = | - | - | - |
| Hydro Generation | + | - | - | - | - | - | - | - | - | - |
| Flood Control | = | = | = | = | = | = | = | = | = | = |
| Navigation | = | = | = | = | = | = | = | = | = | = |
| Drought Operations | = | = | = | = | = | = | = | = | = | = |
| Martin Conditional Fall Ext. | + | = | + | + | - | - | - | - | - | - |
| Water Quality - Reservoir | = | = | = | = | - | - | = | - | - | - |
| Water Quality – Tallapoosa | = | = | = | = | = | = | = | = | = | = |
| Water Use – Reservoir | = | = | = | = | = | - | = | = | - | - |
| Water Use – Tallapoosa | = | = | = | = | = | = | = | = | = | = |
| Erosion – Reservoir | = | = | = | = | = | = | = | = | = | = |
| Erosion – Tallapoosa | - | + | + | + | + | + | + | + | + | + |
| Aquatic Resources – Reservoir | = | = | = | = | - | - | = | - | - | - |
| Aquatic Resources – Fish Entrainment | = | = | = | = | = | = | = | = | = | = |

# Downstream Release Alternatives Study

| Resource | PreGP | ModGP | 150CMF | 300CMF | 600CMF | 800CMF | 150CMF+GP | 300CMF+GP | 600CMF+GP | 800CMF+GP |
|---|---|---|---|---|---|---|---|---|---|---|
| Downstream Aquatic Habitat – Tallapoosa | - | + | + | + | + | + | + | + | + | + |
| Downstream Temperature Fluctuation – Tallapoosa | - | + | + | + | + | + | + | + | + | + |
| Wildlife – Reservoir | = | = | = | = | - | - | = | - | - | - |
| Wildlife – Tallapoosa | - | + | + | + | + | + | + | + | + | + |
| T&E Species – Reservoir | = | = | = | = | = | = | = | = | = | = |
| T&E Species – Tallapoosa | = | = | = | = | = | = | = | = | = | = |
| Recreation – Reservoir | = | = | = | = | - | - | = | - | - | - |
| Recreation – Tallapoosa | - | + | + | + | + | + | + | + | + | + |
| Cultural Resources – Reservoir | = | = | = | = | - | - | = | - | - | - |
| Cultural Resources – Tallapoosa | + | = | - | - | - | - | - | - | - | - |

# Downstream Release Alternatives Study

## Variance

- No variances from the study plan or schedule

## Remaining Activities

- Stakeholder comments on the Draft Phase 2 Study Report
- Present the operating proposal and PME measures in PLP

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# Battery Energy Storage System (BESS) Study

## Study Progress

- Evaluated 2 BESS release alternatives:
  - 50% reduction in peak releases associated with installing one 60 MW battery unit (Option A)
  - A proportionately smaller reduction in peak releases associated with installing a smaller MW battery unit (Option B)

- Developed costs for installing a BESS

- Structural changes including changes in turbine generator units and costs for implementing each battery storage type

- Effects on recreation and aquatic resources at Harris Project

- Upcoming HAT 1 Meeting on May 3

HARRIS DAM RELICENSING

# Battery Energy Storage System (BESS) Study

## Study Results

❖BESS Costs Over 40-Year License Term

| | Option A | Option B |
|---|---|---|
| Total Installed Cost (2025$) | $96.6M ($1,610 / kW) | $39.0M ($1,950 / kW) |
| Fixed O&M (including augmentation) (2025-2044) | $1.77M * 20 years | $0.597 * 20 years |
| Total Replacement Cost (2025$) | $56.4M ($941 / kW) | $19.7M ($984 / kW) |
| Fixed O&M (including augmentation) (2045-2064) | $1.94M * 20 years | $0.647M * 20 years |
| Turbine Replacement Cost | Undetermined | $20M |
| Interconnection O&M (based on current OATT rate and subject to periodic adjustments) | $173,000 * 40 years | $173,000 * 40 years |

❖Existing turbines are not designed to operate at flows lower than best gate

# Battery Energy Storage System (BESS) Study

## Study Results

- Recreation – Lake Harris
  - No effect to recreation if BESS would result in releasing same daily volume of water as current operations
  - Adverse impact on recreation if BESS affected ability to maintain operating curve

- Recreation – Tallapoosa River downstream of Harris Dam
  - Option A – under certain assumptions, may benefit recreationists launching in tailrace and for the first few miles below Harris Dam
  - Option B – recreation based activities would still occur as they do under current operations, although peak release would be smaller

- Aquatic Resources – Tallapoosa River downstream of Harris Dam
  - Option A – could potentially benefit aquatic resources first 7 miles downstream
  - Option B – would not have same benefits as Option A as peak is still required; similar to Pre-Green Plan operations

# Battery Energy Storage System (BESS) Study

## Variance

- The BESS was evaluated separately from the other downstream release alternatives and results of the analysis are presented in a separate report.
  - Due to constraints of existing model rules
  - Not considered a reasonable alternative

## Remaining Activities

- Stakeholders comment on the Draft BESS Report

# Water Quality Study

## Study Progress

| Location | Source | Description | Period |
|---|---|---|---|
| Lake Harris | ADEM | Vertical profiles and discrete chemistry samples at six locations | April - October 2018; June, July, September, & October 2020 |
| | Alabama Power | Vertical profiles in the forebay | March - October 2017 – 2020 |
| | Alabama Water Watch | Surface samples at six locations | monthly to semi-monthly, 2011 – 2019 |
| | ADEM | Monthly measurements and discrete samples at Tailrace, Malone, Wadley, and Horseshoe Bend | 2018 – 2020 (no measurements collected at Tailrace in 2019) |
| Tallapoosa River, Harris Dam to Horseshoe Bend | ADEM | Continuous (15-minute interval) monitoring at Malone | May 2018 - November 2019; April – November 2020 |
| | Alabama Power | Continuous (15-minute interval) monitoring during generation (approximately 800 ft downstream of dam) | June - October 2017 – 2020 |
| | Alabama Power | Continuous (15-minute interval) monitoring (approximately 0.5 miles downstream of dam) | March - October 2019; May – October 2020 |
| | Alabama Water Watch | Surface samples at Horseshoe Bend | 1993, 2007, & 2014 – 2017 |

# Water Quality Study

## Variance

- No variances from the study plan or schedule

## Remaining Activities

- Alabama Power will prepare the 401 Water Quality Certification application and submit to ADEM after the FLA is filed with FERC.

# Erosion and Sedimentation Study

## Study Progress:

- No additional erosion data was collected downstream

- Conducted additional reconnaissance at identified sedimentation sites on Lake Harris during full (summer) pool conditions to determine if any nuisance aquatic vegetation was present.

## Variance

- Alabama Power provided the results of the Nuisance Aquatic Vegetation Survey Report in Appendix F of the Final Erosion and Sedimentation Study Report rather than providing to HAT 3 in the form of a technical memorandum.

## Remaining Activities

- No additional studies proposed and no remaining activities.

# Aquatic Resources Study

## Study Progress:

❖Desktop Assessment characterizes aquatic resources and temperature in the Study Area

❖Auburn University:

- Conducted a literature review of temperature requirements of target species
- Temperature analysis
- Fish community sampling - continued sampling through January 2021
  - Tagged and tracked fish with acoustic/radio (CART tags) during the summer of 2020
- Conducted static respirometry tests and measured active metabolic rates
- Respirometry and bioenergetics modeling: effects of Harris operations (flow and temperature) on energy expenditures of target species

❖HAT 3 Meetings - June 2, 2020, November 5, 2020, and March 31, 2021

# Auburn University Study

## Temperature Results:

- No differences found between pre- and post-Green Plan Temperatures
- 99.71% of hourly temperature fluctuations were within 2 ℃
- Extreme hourly fluctuations(≥10 ℃) were rare and could possibly be attributed to exposure of a logger to air or direct sunlight for a prolonged period followed by re-submersion
- Lowest daily range in temperatures at Heflin
- Temperature tended to increase with increasing distance from the dam but, in winter, temperature was typically warmer near the dam

# Auburn University Study

## Fish Community Results

- Diversity was lower than Travnichek and Maceina (1994), but overall trends in diversity upstream and downstream were similar
- Relative contribution of centrarchids lower than 1996 rotenone sample; combined contribution of cyprinids and castostomids similar to 1951 rotenone sample
- Channel Catfish and Alabama Bass had greater body condition in the tailrace. Several factors could cause this potentially including cooler temperatures (temp not reaching thermal maximum for growth) and/or diet
- Fewer older, larger fish captured in tailrace attributed to less available shelter from flows and/or sampling gear (barge instead of boat electrofisher)
- Lipstick Darter were abundant in tailrace, likely due to ideal habitat

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# Auburn University Study

## Bioenergetics and Growth Simulations:

- Growth simulations could only be run for Redbreast Sunfish (using respiration rate parameters from published Bluegill data)

- Other species had insufficient sample sizes or models that did not accurately estimate respiration rates

## Bioenergetics Results:

- Releases could slightly increase growth rate of age-1 Redbreast Sunfish

- Release could slightly decrease growth rate of age-3 and age-5 Redbreast Sunfish due o the increased energy expenditure of swimming during releases; Model assumes that fish do not seek shelter during releases

- Model used activity rates around Horseshoe Bend and assumes releases decrease temperature 5℃, but temperature fluctuations of that magnitude likely occur further upstream (tailrace to Malone)

# Aquatic Resources Study

## Variance

- Auburn University did not use the 30+2 sampling method as it was determined in the field to not be feasible/effective for sampling the sites

- Instead, shallow areas were sampled using boat and barge electrofishing equipment, which were found to be effective in sampling shallow areas within the study sites.

- The boat method used was a modification of the recently developed non-wadeable index of biological integrity (IBI). Sampling intensity was modified to accommodate available habitat, sampling frequency, and therefore IBI scores were not calculated.

## Remaining Activities

- No additional studies proposed and no remaining activities.

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# Downstream Aquatic Habitat Study

## Study Progress

- Collected level logger data at 20 locations in the Tallapoosa River below Harris Dam through June 2020

- HAT 3 Meetings - June 2, 2020, November 5, 2020, and March 31, 2021

## Variance

- No variances from the study plan or schedule

## Remaining Activities

- No additional studies proposed and no remaining activities.

# Threatened and Endangered Species Study

## Study Progress

- Alabama Power completed field surveys at Lake Harris and Skyline to determine if T&E species are located within the Project Boundary.

- Filed the final report on January 29, 2021
  - Included the Desktop Analysis and results of all field investigations

- HAT 3 Meetings - June 2, 2020, November 5, 2020, and March 31, 2021

## Variance

- No variances from the study plan or schedule

## Remaining Activities

- No additional studies proposed and no remaining activities.

# Project Land Evaluation

## Study Progress

- Samford University conducted a botanical survey on an additional 35 acres of land adjacent to the previously surveyed area at Flat Rock Park.
  - This additional botanical inventory report was filed on April 12, 2021

- HAT 4 Meeting - October 19, 2020

## Variance:

- No variances from the study plan or schedule

## Remaining activities:

- Alabama Power will file a Wildlife Management Plan and Shoreline Management Plan with the FLA.

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# Recreation Evaluation

## Study Progress

- Filed the Final Recreation Evaluation on November 24, 2020.

- HAT 5 Meetings - June 4, 2020 and October 19, 2020.

## Variance

- No additional variances from the study plan or schedule

## Remaining Activities

- No additional studies proposed and no remaining activities.

# Cultural Resources Study

## Study Progress

- February 2021 - Concluded cultural resources assessments for the sites identified during the Lake Harris preliminary archeological and completed cultural resource assessments for Skyline

- March 4, 2021 - Held a virtual site visit of Skyline for applicable tribes and the Alabama Historical Commission

- April 2021 – Complete TCP identification process with the Muscogee (Creek) Nation

# Cultural Resources Study

## Variance

- Alabama Power will complete the TCP identification process with the Muscogee (Creek) Nation in April 2021 (rather than February 2021 as noted in the Study Plan)

## Remaining Activities

- Complete eligibility assessments for known cultural resources
- Issue determination of effect on historic properties
- Develop a Draft Historic Properties Management Plan (HPMP) for the Harris Project to be filed concurrently with the PLP
- Upcoming Selected HAT 6 Meeting- May 5, 2021. Selected due to sensitive nature of meeting material.

**From:** The Stones, REMAX Lakefront Grady & Linda <lindastone2012@gmail.com>
**Sent:** Monday, April 26, 2021 9:47 AM
**To:** Anderegg, Angela Segars
**Cc:** APC Harris Relicensing
**Subject:** Re: Harris Relicensing - Updated Study Report Meeting

Received, thank you.

Linda

On Mon, Apr 26, 2021 at 9:54 AM Anderegg, Angela Segars <ARSEGARS@southernco.com> wrote:

> Harris relicensing stakeholders,
>
> The presentation for tomorrow's Updated Study Report meeting is available on the Harris relicensing website (Relicensing Documents [harrisrelicensing.com]). Microsoft Teams call-in information is below.
>
> I look forward to talking with you tomorrow.
>
> Thanks,
>
> **Angie Anderegg**
>
> Hydro Services
>
> (205)257-2251
>
> arsegars@southernco.com
>
> ---
>
> **From:** APC Harris Relicensing
> **Sent:** Monday, April 12, 2021 1:47 PM
> **To:** APC Harris Relicensing <harrisrelicensing@southernco.com>
> **Subject:** Harris Relicensing - Updated Study Report
>
> Harris relicensing stakeholders,

Pursuant to FERC's Integrated Licensing Process, Alabama Power filed its Harris Project Updated Study Report (USR) today. Concurrent with the USR filing, Alabama Power filed three draft study reports, four final study reports and the results of a Botanical Inventory at Flat Rock Park. Stakeholders may access the USR and the study reports on FERC's website (http://www.ferc.gov [ferc.gov]) by going to the "eLibrary" link and entering the docket number (P-2628). The USR and study reports are also available on the Project relicensing website at http://harrisrelicensing.com [harrisrelicensing.com].

The Updated Study Report meeting will be held on **April 27, 2021**. Please hold this date from 9:00 am to 12:00 pm central time. Call in information for the meeting can be found below. The purpose of the meeting is to provide an opportunity to review the contents of the USR.

Alabama Power will file a summary of the USR meeting by **May 12, 2021**. Stakeholders will have until **June 11, 2021** to file written comments with FERC on the USR Meeting Summary.

Thanks,

**Angie Anderegg**

Hydro Services

(205)257-2251

arsegars@southernco.com

# Microsoft Teams meeting

**Join on your computer or mobile app**

Click here to join the meeting

Video Conference ID: 112 301 635 7

Alternate VTC dialing instructions [webex.com]

**Or call in (audio only)**

+1 470-705-0860,,168184661# United States, Atlanta

Phone Conference ID: 168 184 661#

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*The Stones*
*Grady & Linda*
***RE/MAX Lakefront***
*Selling Lake Wedowee*
*678-429-7924 Grady*
*678-429-4556 Linda*

*www.**lindastone**.**remax-alabama**.com [lindastone.remax-alabama.com]*

# HAT 1 - Draft Operations Reports

## APC Harris Relicensing <g2apchr@southernco.com>

Wed 4/28/2021 3:17 PM

**To:** APC Harris Relicensing <harrisrelicensing@southernco.com>
**Bcc:** damon.abernethy@dcnr.alabama.gov <damon.abernethy@dcnr.alabama.gov>; nathan.aycock@dcnr.alabama.gov <nathan.aycock@dcnr.alabama.gov>; steve.bryant@dcnr.alabama.gov <steve.bryant@dcnr.alabama.gov>; todd.fobian@dcnr.alabama.gov <todd.fobian@dcnr.alabama.gov>; chris.greene@dcnr.alabama.gov <chris.greene@dcnr.alabama.gov>; keith.henderson@dcnr.alabama.gov <keith.henderson@dcnr.alabama.gov>; mike.holley@dcnr.alabama.gov <mike.holley@dcnr.alabama.gov>; evan.lawrence@dcnr.alabama.gov <evan.lawrence@dcnr.alabama.gov>; matthew.marshall@dcnr.alabama.gov <matthew.marshall@dcnr.alabama.gov>; brian.atkins@adeca.alabama.gov <brian.atkins@adeca.alabama.gov>; tom.littlepage@adeca.alabama.gov <tom.littlepage@adeca.alabama.gov>; jhaslbauer@adem.alabama.gov <jhaslbauer@adem.alabama.gov>; cljohnson@adem.alabama.gov <cljohnson@adem.alabama.gov>; mlen@adem.alabama.gov <mlen@adem.alabama.gov>; fal@adem.alabama.gov <fal@adem.alabama.gov>; alockwood@adem.alabama.gov <alockwood@adem.alabama.gov>; djmoore@adem.alabama.gov <djmoore@adem.alabama.gov>; arsegars@southernco.com <arsegars@southernco.com>; dkanders@southernco.com <dkanders@southernco.com>; wtanders@southernco.com <wtanders@southernco.com>; jefbaker@southernco.com <jefbaker@southernco.com>; jcarlee@southernco.com <jcarlee@southernco.com>; kechandl@southernco.com <kechandl@southernco.com>; mcoker@southernco.com <mcoker@southernco.com>; afleming@southernco.com <afleming@southernco.com>; cggoodma@southernco.com <cggoodma@southernco.com>; sgraham@southernco.com <sgraham@southernco.com>; ammcvica@southernco.com <ammcvica@southernco.com>; tlmills@southernco.com <tlmills@southernco.com>; cmnix@southernco.com <cmnix@southernco.com>; abnoel@southernco.com <abnoel@southernco.com>; kodom@southernco.com <kodom@southernco.com>; alpeeple@southernco.com <alpeeple@southernco.com>; scsmith@southernco.com <scsmith@southernco.com>; twstjohn@southernco.com <twstjohn@southernco.com>; Rasberry, Jennifer S. <JSRASBER@southernco.com>; mhunter@alabamarivers.org <mhunter@alabamarivers.org>; clowry@alabamarivers.org <clowry@alabamarivers.org>; jwest@alabamarivers.org <jwest@alabamarivers.org>; gjobsis@americanrivers.org <gjobsis@americanrivers.org>; kmo0025@auburn.edu <kmo0025@auburn.edu>; devridr@auburn.edu <devridr@auburn.edu>; irwiner@auburn.edu <irwiner@auburn.edu>; wrighr2@aces.edu <wrighr2@aces.edu>; lgallen@balch.com <lgallen@balch.com>; jhancock@balch.com <jhancock@balch.com>; allan.creamer@ferc.gov <allan.creamer@ferc.gov>; rachel.mcnamara@ferc.gov <rachel.mcnamara@ferc.gov>; sarah.salazar@ferc.gov <sarah.salazar@ferc.gov>; monte.terhaar@ferc.gov <monte.terhaar@ferc.gov>; gene@wedoweelakehomes.com <gene@wedoweelakehomes.com>; colin.dinken@kleinschmidtgroup.com <colin.dinken@kleinschmidtgroup.com>; chris.goodell@kleinschmidtgroup.com <chris.goodell@kleinschmidtgroup.com>; jason.moak@kleinschmidtgroup.com <jason.moak@kleinschmidtgroup.com>; kelly.schaeffer@kleinschmidtgroup.com <kelly.schaeffer@kleinschmidtgroup.com>; sandra.wash@kleinschmidtgroup.com <sandra.wash@kleinschmidtgroup.com>; jessecunningham@msn.com <jessecunningham@msn.com>; mdollar48@gmail.com <mdollar48@gmail.com>; drheinzen@charter.net <drheinzen@charter.net>; sforehand@russelllands.com <sforehand@russelllands.com>; 1942jthompson420@gmail.com <1942jthompson420@gmail.com>; nancyburnes@centurylink.net <nancyburnes@centurylink.net>; sandnfrench@gmail.com <sandnfrench@gmail.com>; lgarland68@aol.com <lgarland68@aol.com>; rbmorris222@gmail.com <rbmorris222@gmail.com>; irapar@centurytel.net <irapar@centurytel.net>; mitchell.reid@tnc.org <mitchell.reid@tnc.org>; richardburnes3@gmail.com <richardburnes3@gmail.com>; eilandfarm@aol.com <eilandfarm@aol.com>; athall@fujifilm.com <athall@fujifilm.com>; ebt.drt@numail.org <ebt.drt@numail.org>; georgettraylor@centurylink.net <georgettraylor@centurylink.net>; beckyrainwater1@yahoo.com <beckyrainwater1@yahoo.com>; dbronson@charter.net <dbronson@charter.net>; wmcampbell218@gmail.com <wmcampbell218@gmail.com>; jec22641@aol.com <jec22641@aol.com>; robinwaldrep@yahoo.com <robinwaldrep@yahoo.com>; sonjahollomon@gmail.com <sonjahollomon@gmail.com>; butchjackson60@gmail.com <butchjackson60@gmail.com>; donnamat@aol.com <donnamat@aol.com>; goxford@centurylink.net <goxford@centurylink.net>; mhpwedowee@gmail.com <mhpwedowee@gmail.com>; jerrelshell@gmail.com <jerrelshell@gmail.com>; bsmith0253@gmail.com <bsmith0253@gmail.com>; inspector_003@yahoo.com <inspector_003@yahoo.com>; paul.trudine@gmail.com <paul.trudine@gmail.com>; lindastone2012@gmail.com <lindastone2012@gmail.com>; granddadth@windstream.net <granddadth@windstream.net>; trayjim@bellsouth.net <trayjim@bellsouth.net>; straylor426@bellsouth.net <straylor426@bellsouth.net>; robert.a.allen@usace.army.mil <robert.a.allen@usace.army.mil>; randall.b.harvey@usace.army.mil <randall.b.harvey@usace.army.mil>; james.e.hathorn.jr@sam.usace.army.mil <james.e.hathorn.jr@sam.usace.army.mil>; lewis.c.sumner@usace.army.mil <lewis.c.sumner@usace.army.mil>; jonas.white@usace.army.mil <jonas.white@usace.army.mil>; gordon.lisa-perras@epa.gov <gordon.lisa-perras@epa.gov>; holliman.daniel@epa.gov <holliman.daniel@epa.gov>; mayo.lydia@epa.gov <mayo.lydia@epa.gov>; jennifer_grunewald@fws.gov <jennifer_grunewald@fws.gov>; erin_padgett@fws.gov <erin_padgett@fws.gov>; jeff_powell@fws.gov <jeff_powell@fws.gov>; jeff_duncan@nps.gov <jeff_duncan@nps.gov>; Martindale, Lisa (LMARTIND@southernco.com) <LMARTIND@southernco.com>

HAT 1,

Due to the length and complexity of these reports, Alabama Power would like to provide additional time for your review and comment. Please submit any comments you may have on the draft Operating Curve Feasibility Analysis Phase 2 Report, draft Downstream Release Alternatives Phase 2 Report and draft BESS Report by **May 26, 2021**.

Thanks,

**Angie Anderegg**
Hydro Services
(205)257-2251
arsegars@southernco.com

HAT 1,

The draft Operating Curve Feasibility Analysis Phase 2 Report, draft Downstream Release Alternatives Phase 2 Report and draft BESS Report are available for your review on the Harris relicensing website in the HAT 1 folder. These reports can also be found on FERC's website (http://www.ferc.gov) by going to the "elibrary" link and entering docket number P-2628.

Please submit your comments on these reports to Alabama Power at harrisrelicensing@southernco.com by **May 11, 2021**.

Thanks,

**Angie Anderegg**
Hydro Services
(205)257-2251
arsegars@southernco.com

**From:** Collins, Evan R <evan_collins@fws.gov>
**Sent:** Wednesday, April 28, 2021 11:57 AM
**To:** Anderegg, Angela Segars
**Cc:** Chandler, Keith Edward; Baker, Jeffery L.; Fleming, Amanda; Padgett, Erin R; Carlee, Jason; Mills, Tina L.
**Subject:** Re: [EXTERNAL] RE: Meeting to discuss bats with FERC



Thanks, Angie!
I wouldn't expect we'd need more than 1 hour. My availability currently is as follows:

May 10: all day
May 11: after 10am
May 12: after 10 am
May 13: after 2pm
May 14: all day

May 17: after 11 am
May 18: after 10 am
May 19: all day
May 20: after 3 pm
May 21: not available

-Evan

--
Evan Collins
Fish and Wildlife Biologist
U.S. Fish and Wildlife Service
Alabama Ecological Services Field Office
1208-B Main Street
Daphne, AL 36526
251-441-5837 (phone)
251-441-6222 (fax)
evan_collins@fws.gov



**From:** Anderegg, Angela Segars <ARSEGARS@southernco.com>
**Sent:** Wednesday, April 28, 2021 10:06 AM
**To:** Collins, Evan R <evan_collins@fws.gov>
**Cc:** Chandler, Keith Edward <KECHANDL@SOUTHERNCO.COM>; Baker, Jeffery L. <JEFBAKER@southernco.com>; Fleming, Amanda <afleming@southernco.COM>; Padgett, Erin R <erin_padgett@fws.gov>; Carlee, Jason <JCARLEE@southernco.com>; Mills, Tina L. <tlmills@southernco.com>
**Subject:** [EXTERNAL] RE: Meeting to discuss bats with FERC

Hi Evan,

I agree that it would be good for us all to meet to make sure we're on the same page. And I can definitely set something up. Could you let me know your availability the weeks of May 10th and May 17th? And how long do you think we'll need for the meeting?

**Angie Anderegg**
Hydro Services
(205)257-2251
arsegars@southernco.com

---

**From:** Collins, Evan R <evan_collins@fws.gov>
**Sent:** Tuesday, April 27, 2021 1:18 PM
**To:** Anderegg, Angela Segars <ARSEGARS@southernco.com>; Chandler, Keith Edward <KECHANDL@SOUTHERNCO.COM>; Baker, Jeffery L. <JEFBAKER@southernco.com>; Fleming, Amanda <afleming@southernco.COM>; Padgett, Erin R <erin_padgett@fws.gov>
**Subject:** Meeting to discuss bats with FERC



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Hi, Angie.

Considering Sarah's comment regarding bats in today's meeting, I think it may be worth having another meeting to make sure we are all on the same page on how we are considering timber management and bats. As FERC's non-federal representative for this action, Alabama Power's involvement is related to the informal consultation process and providing information for a formal consultation. As the action agency, the ultimate responsibility for section 7 obligations remains with FERC. So, if they feel how the timber management component is being analyzed is not in agreement with the federal action, we'll want to make sure we correct that. As FERC's non-federal representative, I feel like it would be most appropriate to coordinate the meeting through you. Would you be able to set up a meeting with appropriate FERC contact (I assume Sarah Salazar) for this discussion? Let me know if you'd rather I set up that meeting.

Thanks!

Evan

--
Evan Collins
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U.S. Fish and Wildlife Service
Alabama Ecological Services Field Office
1208-B Main Street
Daphne, AL 36526
251-441-5837 (phone)

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evan_collins@fws.gov

**From:** Anderegg, Angela Segars
**Sent:** Wednesday, April 28, 2021 4:50 PM
**To:** Sarah Salazar
**Cc:** 'Evan Collins'
**Subject:** Meeting to discuss Harris T&E consultation

Hi Sarah,

We were thinking it would be a good idea for the three of us (FERC, FWS and APC) to get together to make sure we're all on the same page on the Harris relicensing T&E consultation, specifically with regard to how we're considering timber management and bats.

Would you happen to be available on either 5/17 after 1:00 pm. (central) or 5/18 after 2:00 pm (central) for a 1 hour meeting? FWS is available during both of these times. Let me know what works for you and if we need to look at another day/time and I can send out Teams meeting info.

Thanks!

**Angie Anderegg**
Hydro Services
(205)257-2251
arsegars@southernco.com

**From:** Jack West <jwest@alabamarivers.org>
**Sent:** Friday, April 30, 2021 3:30 PM
**To:** Anderegg, Angela Segars
**Subject:** Re: Comment Deadline Extension
**Attachments:** Questions on Initial Harris Dam BESS Report.docx



Angie,

In preparation for Monday's HAT 1 meeting to discuss the battery storage study, I've attached a list of questions our consultants put together. It may not be necessary to go through each one, but I thought I would share in case your internal battery folks want to look these over in advance. The guys from Synapse Energy Economics who will be joining the call are Max Chang, David White, and Andrew Takasugi.

Thanks for putting together the meeting. Have a great weekend.

On Wed, Apr 28, 2021 at 2:45 PM Anderegg, Angela Segars <ARSEGARS@southernco.com> wrote:

> Hi Jack,
>
> I was talking with someone about in-person meetings today. I haven't heard of any guidance from FERC, but I do know that I'll have to get approval internally before hosting a large meeting. My fingers are crossed that by this summer it won't be a problem.
>
> Talk to you Monday!
>
> **Angie Anderegg**
>
> Hydro Services
>
> (205)257-2251
>
> arsegars@southernco.com
>
> **From:** Jack West <jwest@alabamarivers.org>
> **Sent:** Wednesday, April 28, 2021 2:24 PM

**To:** Anderegg, Angela Segars <ARSEGARS@southernco.com>
**Subject:** Comment Deadline Extension

**EXTERNAL MAIL: Caution Opening Links or Files**

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Hi Angie,

Thank you for extending the stakeholder comment deadline to May 26th for the draft reports. There is certainly a lot of material to go through, and we appreciate the extra few weeks.

I'm just curious if there is any guidance internally or from FERC about when in-person meetings might resume? I know it's still months away, but I hope that there will be some in-person meetings after the PLP is filed in July.

See you on Monday for the HAT 1 meeting.

--

Jack West, Esq.

Policy and Advocacy Director

Alabama Rivers Alliance

2014 6th Ave N, Suite 200

Birmingham, AL 35203

205-322-6395

www.alabamarivers.org [alabamarivers.org]

**Celebrating more than 20 years of protecting Alabama's 132,000 miles of rivers and streams!**

--

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205-322-6395
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**Celebrating more than 20 years of protecting Alabama's 132,000 miles of rivers and streams!**

## Synapse Questions for Alabama Power regarding RL Harris Project BESS Study – 4/29/21

1. How do the daily hydro operational rules change between the current Green Plan and BESS options A & B?
2. How does the operational mode of the Harris Project specifically change under these plans:
    a. Historical
    b. Green Plan
    c. Option A
    d. Option B
3. What does "no peak release" mean in the context of Option A? Does this mean that only one turbine operates in peak hours or something else? Are two turbines ever operating at the same time?
4. How long was the simulation period used for the BESS analysis and what were the sources of the data that was used?
5. What is the change in the hourly generation under various generation conditions ranging from daily capacity factors from 5 to 25 percent for BESS options A & B?
6. What is the charge/discharge cycle of the battery system under those range of conditions?
7. What values are used for the hourly energy prices in the analysis?
8. Could the BESS be charged using power from the grid during off-peak hours and subsequently dispatched during on-peak hours in order to bridge any gaps in charging potential due to changes in flow at the dam?
9. Was the battery system allowed to charge off the grid when there was insufficient hydro generation to take advantage of energy arbitrage?
10. Were other benefits of a battery system beyond energy storage considered such as, but not limited to: various ancillary services such as voltage regulation, frequency control?
11. How were the overhead costs associated with Option A and Option B estimated?
12. Why was 10% chosen as a contingency adder for Options A and B?
13. Why does the deferred generation credit fall with the installation of the BESS?
14. Would the battery storage at another location be more beneficial to utility operations?
15. We would like to receive a copy of the ResSim/RAS hourly and daily models along with the outputs.