



R. L. Harris Hydroelectric Project

FERC No. 2628

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 Peebles – 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 Database¹. 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

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**

Relicensing Review



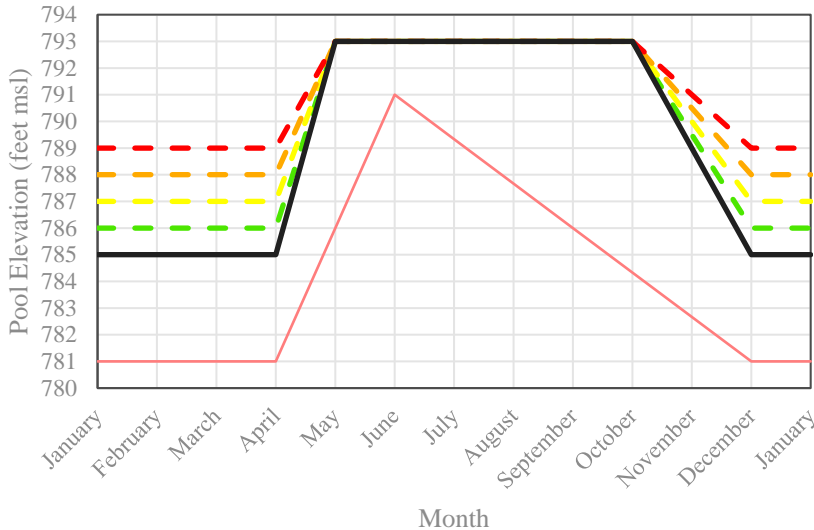
- Much data/reports on Harris Project resources exists – see <https://harrisrelicensing.com>
- Summary level presentation today
 - Reports available for review & comment April 12
 - Read reports for details
- If you have concerns about current operations, contact Alan Peeples in Reservoir Management
 - 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

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



— Drought Contingency Curve — Operating Curve

- Evaluated in increments of 1 foot from 786 feet msl to 789 feet msl

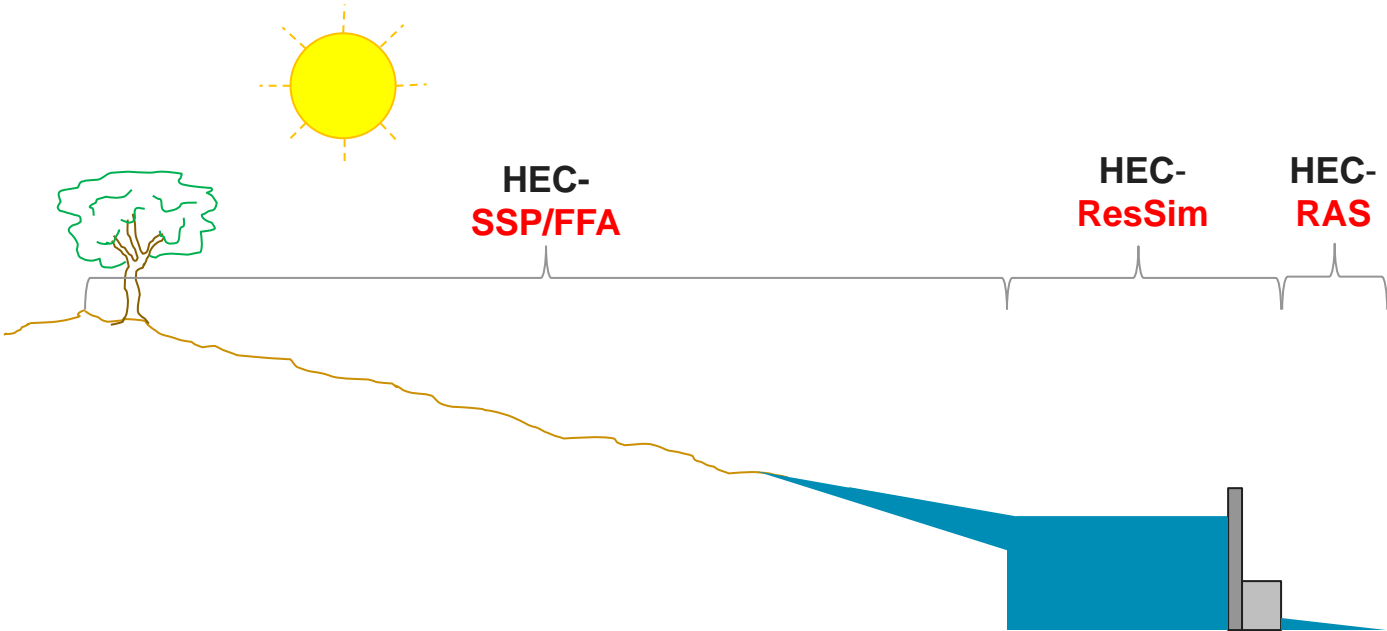
Phase 1

- 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

Hydrologic Models



Operating Curve Effect on Downstream Release Alternatives



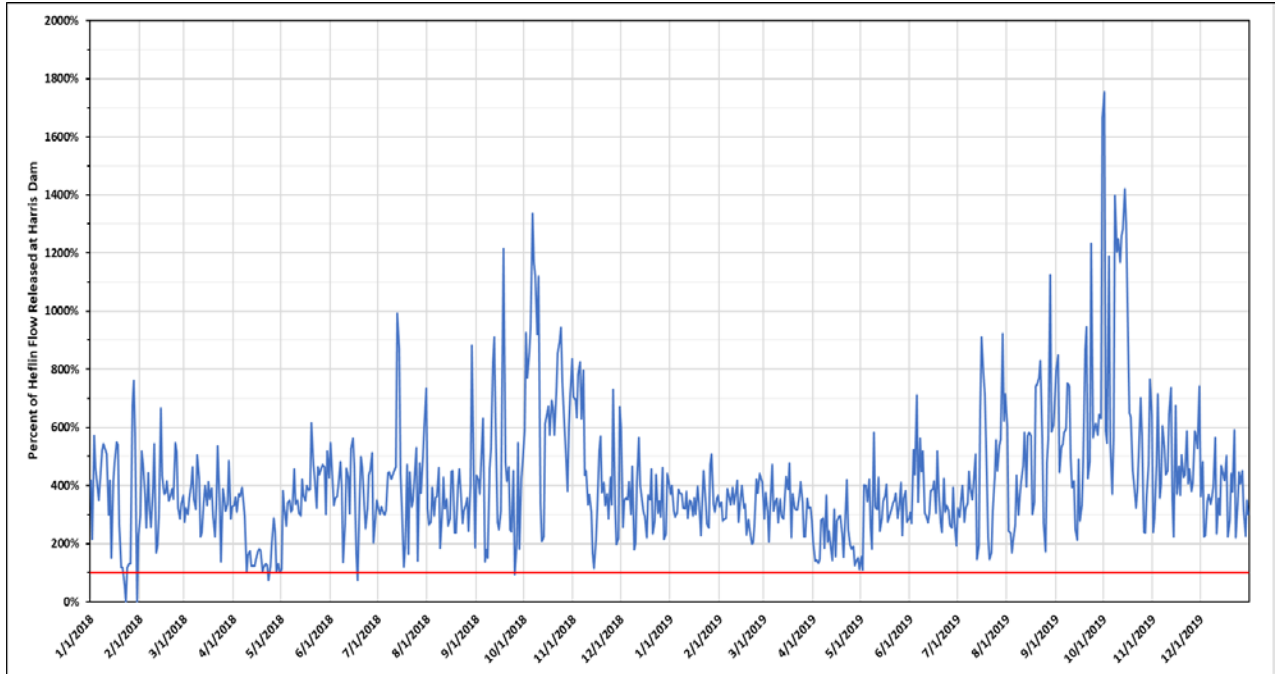
Purpose

- 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

Operating Curve Effect on Downstream Release Alternatives



RELEASES FROM HARRIS DAM IN 2018 AND 2019 COMPARED TO 100% FLOW AT THE USGS HEFLIN GAGE



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

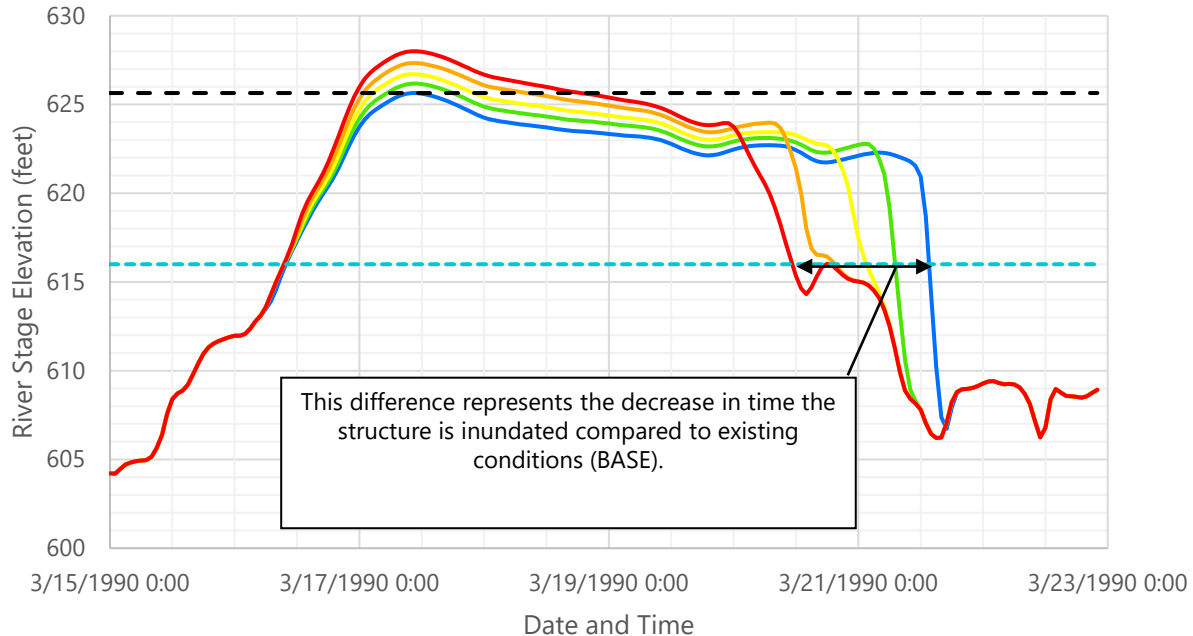
Downstream Structures Analysis



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

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.

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:



Legend

-  Elevation 785 (Base Case)
-  Elevation 786
-  Elevation 787
-  Elevation 788
-  Elevation 789

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

*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.

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

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.