Low Impact Hydropower Institute's (LIHI) Stage II Recertification Review for Smoky Mountain Hydroelectric Project (LIHI #18)

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1. BACKGROUND

The Smoky Mountain Hydroelectric Project (SMHP or Project), formerly known as the Tapoco Project (LIHI #18), consists of four developments licensed with the Federal Energy Regulatory Commission (FERC) as FERC Project No. 2169 and owned by Brookfield Smoky Mountain Hydro, L.P. (BSMH)[1], a subsidiary of Brookfield Renewable Partners (BRP). The four developments combined have a capacity of 385.5 MW.

The Santeetlah development is located at the outlet of Lake Santeetlah at river mile (RM) 9.3 on the Cheoah River in Graham County, North Carolina. There are no dams upstream of the Santeetlah development on the Cheoah River.

The Cheoah development is located downstream of the Santeetlah development at RM 0.0 of the Cheoah River where it joins the Little Tennessee River at RM 51.2 in the Town of Tapoco, Swain County, North Carolina. The Fontana Dam, owned by the Tennessee Valley Authority (TVA) is upstream of the Cheoah development at RM 60 on the Little Tennessee River. The TVA manages releases from Fontana Dam to control water releases on the Little Tennessee River. However, no downstream fish passage is provided at that dam.

The Calderwood development is located eight miles downstream of the Cheoah development at RM 43.2 on the Little Tennessee River in Maryville, Blount County, Tennessee. The Chilhowee development is located about another ten miles downstream of the Calderwood development at RM 33.6 on the Little Tennessee River in Tallassee, Monroe County, Tennessee. The releases from Chilhowee flow downstream into the Tellico Dam at RM 0.0 where the Little Tennessee River joins the Tennessee River. The Tellico Dam does not provide any upstream fish passage.

The FERC issued a 40-year major license for the Project to Alcoa Power Generating Inc. (APG) on January 25, 2005, effective March 1, 2005, expiring on February 28, 2045[2]. The FERC license contains a Section 401 Water Quality Certificate (WQC) for the Santeetlah and Cheoah developments issued by the North Carolina Department of Environmental and Natural Resources (NCDENR) on November 8, 2004[3] and subsequently amended on June 27, 2014[4] to allow for flexibility in scheduling high flow events and creating additional recreational opportunities. Additionally, the license contains a WQC for the Calderwood and Chilhowee developments issued by the Tennessee Department of Environment and Conservation (TDEC) on April 29, 2004[5] that was a revision of the original February 11, 2004 WQC.

On July 31, 2012, an application for the transfer of Project ownership from AEG to BSMH was filed with FERC.[6] On November 4, 2012, FERC filed order approving transfer of ownership to BSMH.[7]

[1] Mr. Ashley Thomas, Compliance Manager, 304-442-5120 (Work), 865-306-3069 (Cell), Brookfield Renewable, 326 3rd Avenue, Suite 201, Montgomery, West Virginia, 25136 - Ashley.Thomas@brookfieldrenewable.com
[2] FERC License - https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=10382034
[3] See page 75 of FERC license.
[4] See page 75 of FERC license.
[5] See page 66 of FERC license.
[6] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=13038416
[7] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=13081337

The Project has an authorized installed capacity of 385.5 megawatts (MW) that produced an average annual generation (AAG) of 1,560,636 megawatt-hours (MWh) for calendar years 2017 through 2019, which corresponds to an annual plant factor of 46.2%.

BSMH submitted an LIHI recertification application for the Project (LIHI#18) on March 19, 2020. The prior LIHI certification expired on March 20, 2020. LIHI extended certification until August 20, 2020 and again until October 31, 2020. On April 29, 2020, LIHI notified BSMH that the intake review for the Project was complete. The intake review found that no additional information was needed to conduct the full review. On May 27, 2020, I was selected to perform the full review and the public comment period was opened. The public comment period ended on July 26, 2020.

2. LITTLE TENNESEE RIVER BASIN

The Tennessee River is the largest tributary of the Ohio River, approximately 652 miles long, that drains 40,876 square miles (SQMI). The Tennessee River is formed at the confluence of the Holston and French Broad Rivers in Knoxville, Tennessee. From Knoxville, it flows southwest into Chattanooga, Tennessee before crossing into Alabama. It travels through Huntsville and Decatur, Alabama and eventually forms a small part of the state's border with Mississippi, before turning north and returning into Tennessee, then into Kentucky where it eventually empties into the Ohio River at Paducah, Kentucky.

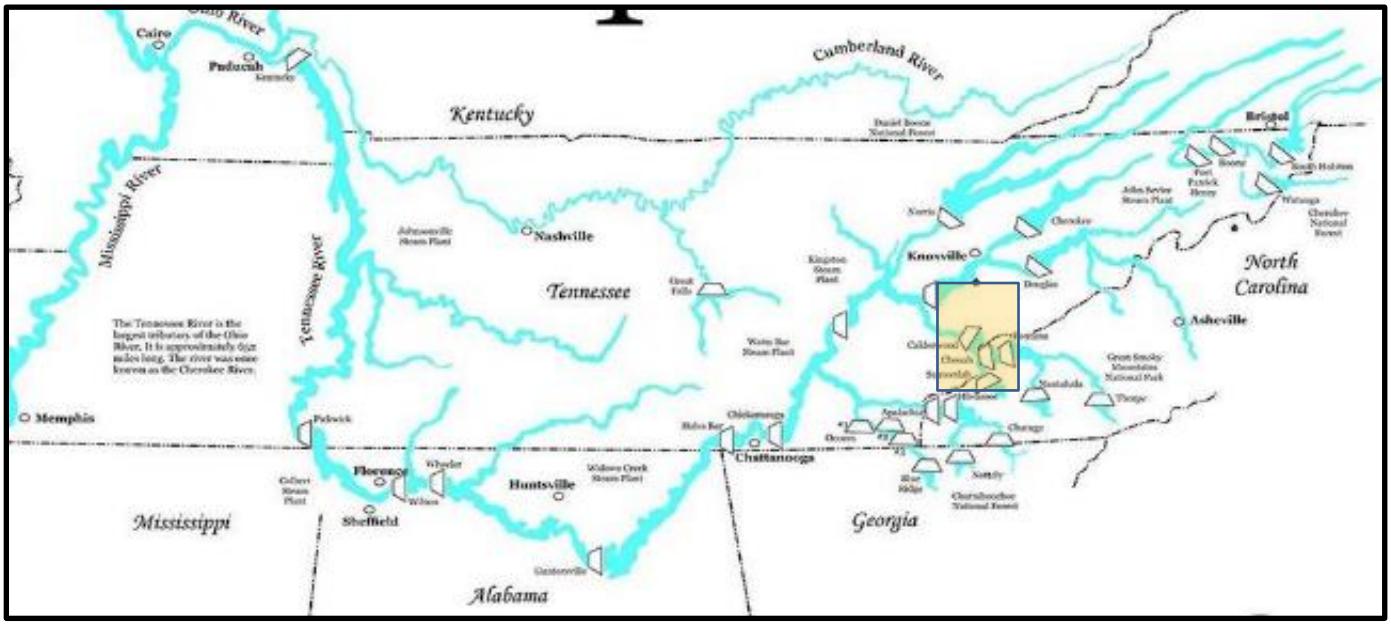

Figure 1 - General Location Map

The Little Tennessee River is a 135 mile long tributary of the Tennessee River with its uppermost headwaters in Georgia which drains 2,627 square miles (SQMI) including most of Graham, Macon, Swain and Jackson counties, as well as small portions of Cherokee and Clay counties. Approximately 90 percent of the land is forested, with less than five percent comprising urban/developed land. More than half of the basin is in the Great Smoky Mountains National Park (GSMNP) or the Nantahala National Forest.

The Project's four developments are located within the yellow-shaded portion of Figure 1. An enlarged view in Figure 2 shows the locations of the Santeetlah, Cheoah, Calderwood and Chilhowee developments.

Figure 2- Project Developments

3. ZONES OF EFFECT (ZOEs)

The Project has a total of ten ZOEs (Figures 3 – 7) defined from upstream to downstream on the Cheoah and Little Tennessee Rivers. ZOEs 1 through 10 are:

- ZOE 1 is the Santeetlah Impoundment, river mile (RM) 15.3 to 9.3;
- ZOE 2 is the Santeetlah Bypass Reach, RM 9.3 to 0.0 (RM 51.0 on Little Tennessee River);
- ZOE 3 is the Santeetlah Powerhouse discharge into Cheoah impoundment, RM 9.3 on the Cheoah impoundment to RM 56.5 on Little Tennessee River;
- ZOE 4 is the Cheoah Impoundment, RM 60.2 to 51.2;
- ZOE 5 is the Downstream of Cheoah Dam, RM 51.2 to 51.0;
- ZOE 6 is the Calderwood Impoundment, RM 51.0 to 43.6;
- ZOE 7 is the Calderwood Bypass Reach, RM 43.6 to 42.3;
- ZOE 8 is Calderwood Tailrace, RM 42.3 to 42.2;
- ZOE 9 is the Chilhowee Impoundment, RM 42.2 to 33.6;
- ZOE 10 is Chilhowee Downstream Reach, RM 33.6 to 33.0.

The alternative standards selected to satisfy the LIHI certification criteria in each of these ZOEs are identified in Table 1. As part of my review process, I checked and agreed with their selection.

Figure 3. Zones 1 and 2 (upper)

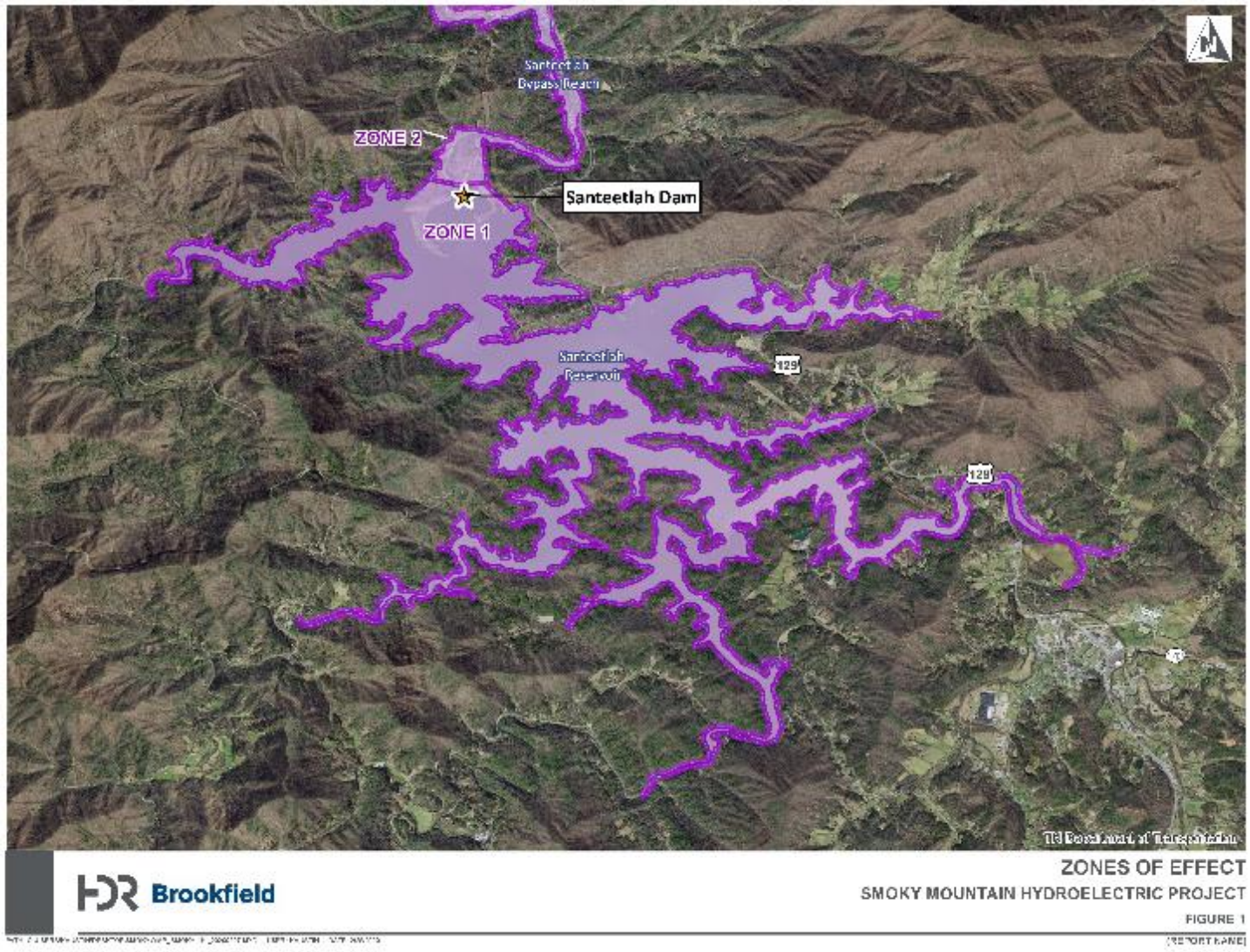

Figure 4. Zones 2 – 5

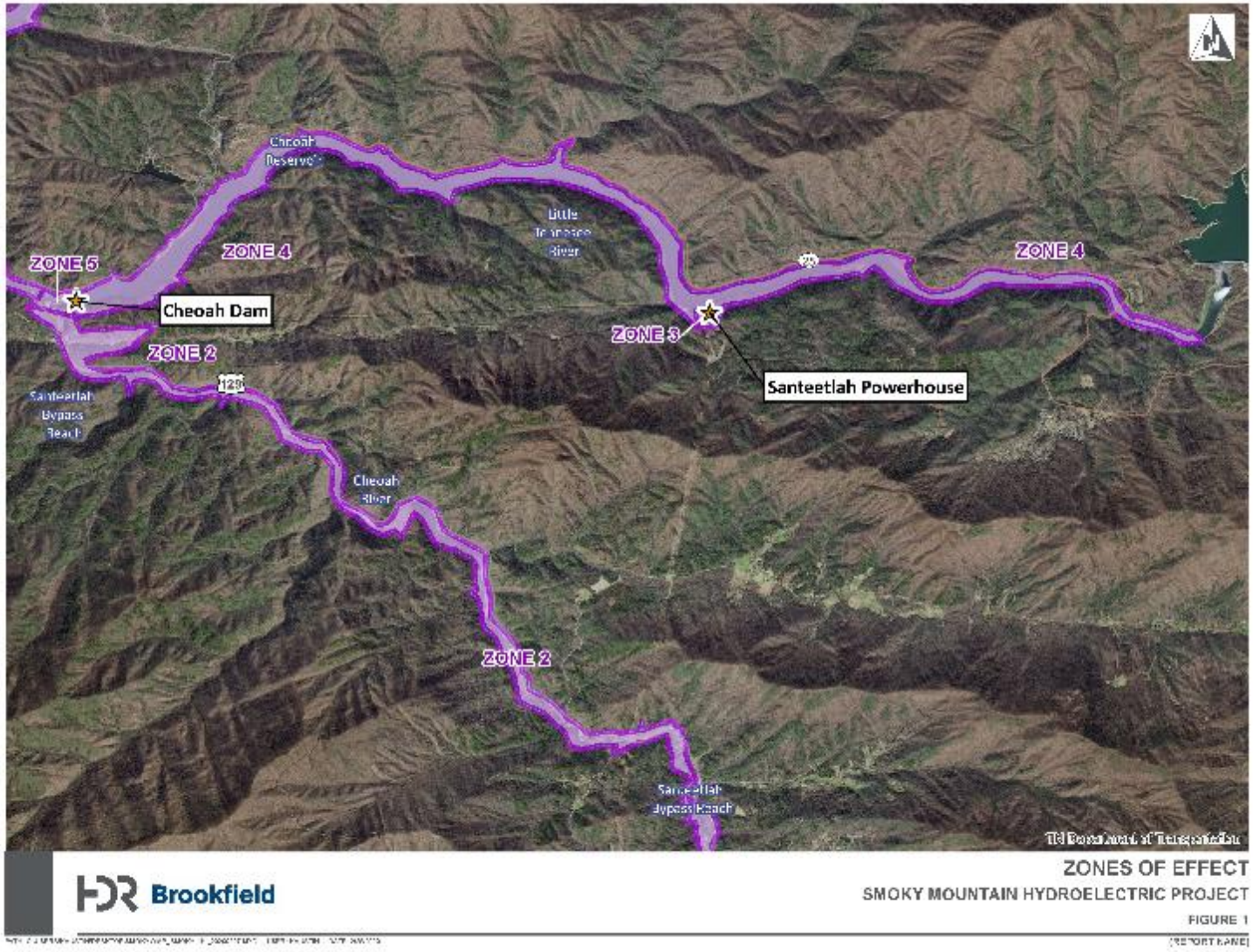

Figure 5. Zones 2, 5 and 6

Figure 6. Zones 6 - 9

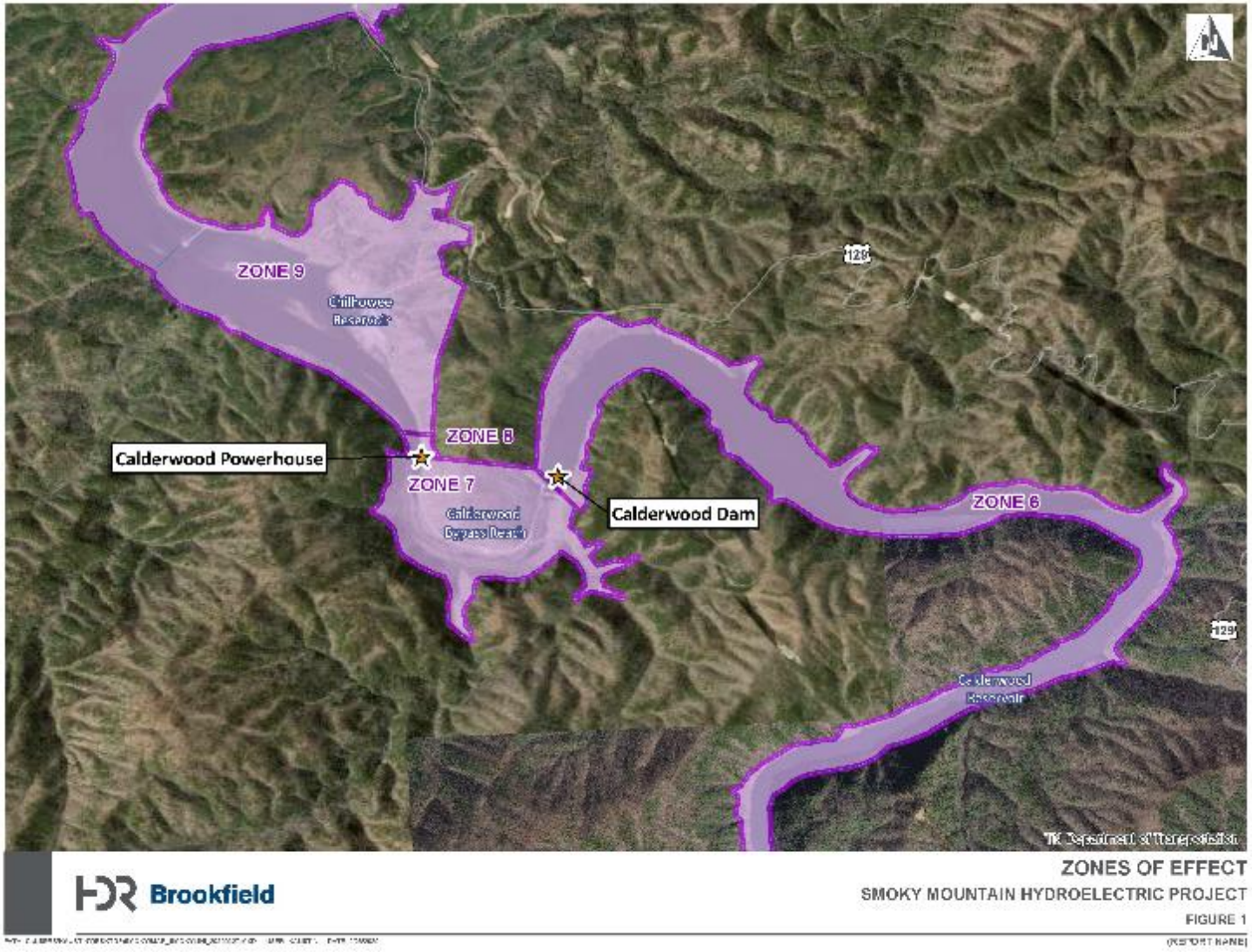

Figure 7. Zones 9 and 10

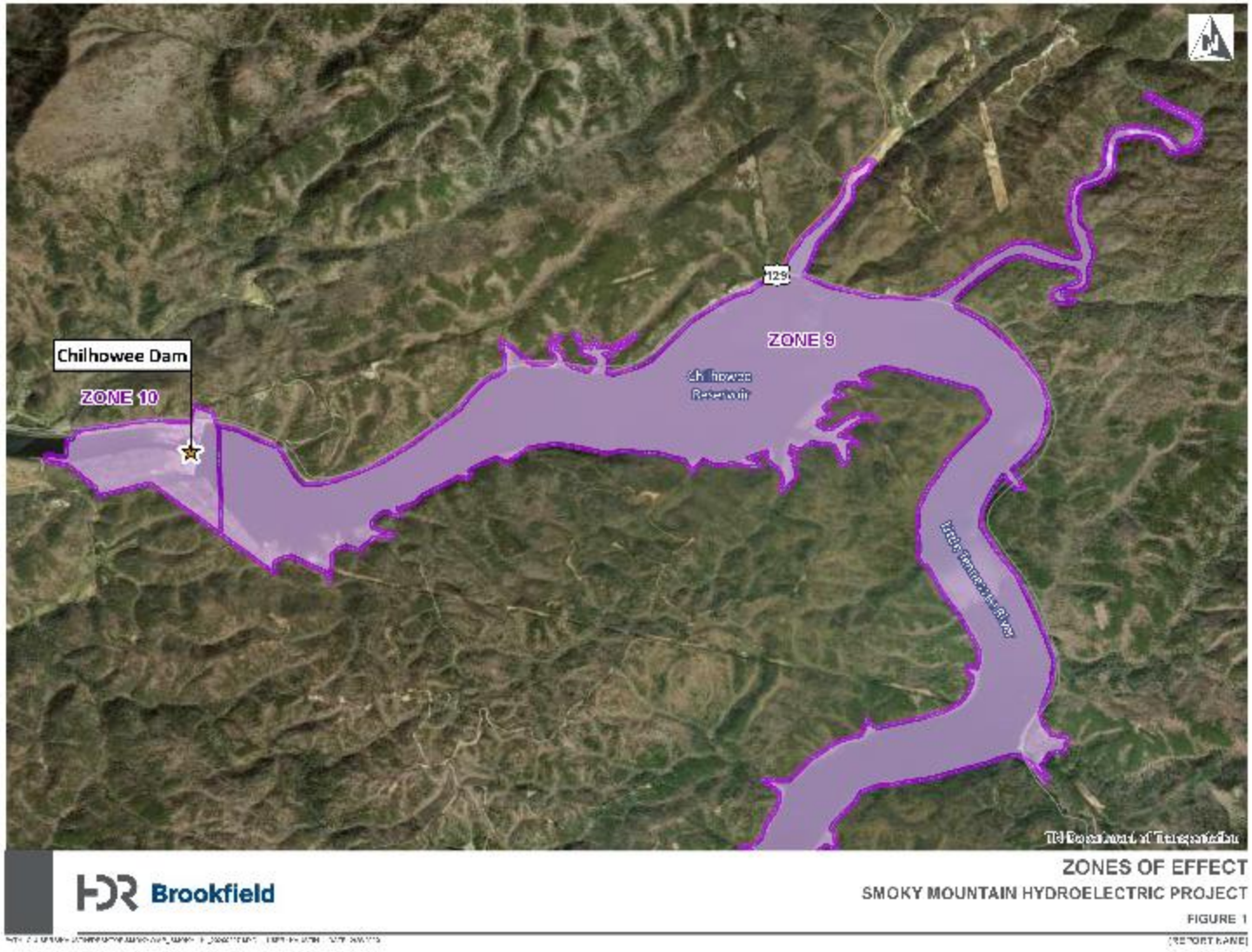

Table 1: Zones of Effect

CRITERION								
Zone No., Zone Name, and Standard Selected (including PLUS if selected)	***A***	***B***	***C***	***D***	***E***	***F***	***G***	***H***
	Ecological Flows	**Water Quality**	**Upstream Fish Passage**	**Downstream Fish Passage**	**Shoreline and Watershed Protection**	**Threatened and Endangered Species**	**Cultural and Historic Resources**	**Recreational Resources**
1. Santeetlah Impoundment	1	2	1	1	2, PLUS	3	2	2
2. Santeetlah Bypassed Reach	2	2	2	1	2, PLUS	3	2	2
3. Santeetlah Tailrace	1	2	1	1	2, PLUS	3	2	2
4. Cheoah Impoundment	1	2	1	1	2, PLUS	3	2	2
5. Cheoah Downstream Reach	1	2	1	1	2, PLUS	3	2	2
6. Calderwood Impoundment	1	2	1	1	2, PLUS	3	2	2
7. Calderwood Bypassed Reach	2	2	1	1	2, PLUS	3	2	2
8. Calderwood Tailrace	1	2	1	1	2, PLUS	3	2	2
9. Chilhowee Impoundment	1	2	1	1	2, PLUS	3	2	2
10. Chilhowee Downstream Reach	1	2	2	1	2, PLUS	3	2	2

4. PROJECT HYDROLOGY

There are two operating US Geological Survey (USGS) gages located in the vicinity of the Project's developments:

1. USGS gage 0351706800 (GAGE1), on the Cheoah River near Bearpen Gap and Tapoco, NC. This gage is located downstream of the Santeetlah development. While the Santeetlah development has a drainage area of 176 SQMI, the gage has a contributing drainage area of 206 SQMI and contains recorded daily flows from October 1, 1999 to present day. Given that the Santeetlah development diverts flow to its powerhouse through a tunnel at the dam, only bypass flows and downstream local drainage flow are measured by this gage;
2. USGS gage 03503000 (GAGE2), on the Little Tennessee River at Needmore, NC. This gage has a contributing drainage area of 436 SQMI with recorded daily flows from October 1, 1985 to present day and is upstream of the remaining three developments. The Cheoah, Calderwood and Chilhowee developments have contributing drainage areas of 1,608 SQMI, 1,856 SQMI and 1,977 SQMI, respectively. In addition the gage is upstream of the TVA's Fontana Dam which is used to regulate its inflows downstream.

Therefore, given that neither USGS gage is suitable for estimating development inflows, BSMH must back calculate inflows from turbine and spillage outflows and any changes in impoundment levels.

BSMH states the average annual flows at the Santeetlah, Cheoah, Calderwood and Chilhowee developments, based on flow data from 2014 through 2019, are 490 CFS (2.78 CFS per SQMI), 4,391 CFS (2.73 CFS per SQMI), 4,744 CFS (2.56 CFS per SQMI) and 5,054 CFS (2.56 CFS per SQMI), respectively.

5. PROJECT DESCRIPTION

The Project is comprised of the Santeetlah, Cheoah, Calderwood and Chilhowee developments. The Santeetlah Development, with a total installed capacity of 49.2 MW, was constructed between 1925 and 1928 and operates in a store and release mode. The Santeetlah Reservoir is operated to maintain high recreational elevations during the summer months. In an effort to provide some flood control, a fall drawdown is implemented to allow for collection of rainfall and runoff during the late fall, winter, and early spring. Release from the Santeetlah powerhouse empties into the Cheoah impoundment. Additionally, all bypass releases are conveyed by the Cheoah River and empty into the Cheoah impoundment.

The remaining developments are located on the Little Tennessee River and were constructed for the sole purpose of producing power. The Cheoah Development with a total installed capacity of 143.7 MW was constructed at RM 51.2 from 1916 through 1919. The Calderwood Development with a total installed capacity of 140.4 MW was constructed at RM 43.6 between 1925 and 1930. Lastly, the Chilhowee Development with a total installed capacity of 52.2 MW was constructed at RM 33.6 between 1955 and 1957.

In the 1940's, the TVA's Fontana Dam was built upstream of the Cheoah Development at RM 60. The combined releases from the Fontana Dam and Santeetlah Development frequently exceed the Cheoah powerhouse hydraulic capacity such that spillage occurs. BSMH states that all three developments operate

in a modified run-of-river (MROR) mode, where daily inflow and daily outflow volumes balance out. More commonly, this type of operation is defined as a pulsing mode of operation where hourly inflows and outflows can vary and where hourly outflows are typically increased during the on-peak portion of the day to maximize power revenue.

The Project's total installed capacity is 385.5 MW. Table 2 shows the Project produced an AAG of 1,560,636 MWh for calendar years 2017 through 2019, which corresponds to an annual plant factor of 46.2%.

Table 2 - Project Generation

Year	Santeetlah	Cheoah	Calderwood	Chilhowee	Sum
2017	106,813	383,631	456,673	83,299	1,030,416
2018	151,495	619,823	734,408	206,522	1,712,248
2019	182,878	719,273	808,365	228,727	1,939,243
Average	147,062	574,242	666,482	172,849	1,560,636

A. Santeetlah Dam

The Santeetlah Dam (latitude 35° 22' 39" N, longitude 83° 52' 36" W) consists of:

- A 1,054-foot long and 216-foot high concrete arch dam creating a 2,881-acre impoundment with a gross volume of 156,360 acre feet (ACFT) and a usable volume of 27,000 ACFT. The maximum full pond elevation is 1940.9 FTMSL. From December 1 to March 1, in accordance with the operating guide curve, the impoundment is lowered 9.9 feet to a pond elevation of 1931.0 FTMSL. (See Figure 8);

Figure 3 - Santeetlah Dam

- A spillway section containing six 25-foot wide and 12-foot high tainter gates with a sill elevations at elevation 1928.9 FTMSL. The maximum discharge capacity at the dam is 157,707 CFS when the water in the pond rises up to the walkway deck at elevation 1959.9 FTMSL. (See Figure 9). Tainter gates 1 and 2 include mini-gates within the radial gate frame for the release of minimum flows;

- A set of approximately 5-mile long conveyance structures pass water from the intake to a surge tank located just above the powerhouse. These include:
    - Six 11-foot diameter pipelines;
    - Two steel lined tunnels, varying in diameter from eight feet near the dam to seven feet near the powerhouse, and;
    - Three 11-foot diameter, horseshoe shaped tunnels that are excavated through rock and concrete lined.

Figure 4 – Santeetlah Tainter Gates

- A surge tank that has a two-penstock bifurcation immediately downstream of its base that is remotely controlled using Dow pivot valves (See Figure 10);
- Two identical trashracks with 2.375-inch clear spacing;
- Two identical vertical Francis turbines with a design capacity of 33,000 horsepower (HP)[8] at a design head of 640 feet and a speed of 450 rpm. Each turbine can pass flows from 249 CFS to 419 CFS;
- A 750-foot long, 161-kilovolt (kV) transmission line.

The single major infrastructure improvement occurring during the prior LIHI certification period (March 20, 2012 to March 19, 2020) was improvement to the tainter gates in 2014 and 2015 to facilitate and reduce binding during their operation. Structural modifications involved the strengthening of the strut arm structural members.

Figure 5 - Santeetlah Surge Tank and Powerhouse

[8] 24.608 MW.

B. Cheoah Dam

The Cheoah Dam (latitude 35° 26' 56" N, longitude 83° 56' 9" W) consists of:

- A 750-foot long and 229-foot high curved concrete gravity dam creating a 644-acre impoundment with a gross volume of 35,000 (ACFT) and a usable volume of 4,200 ACFT. There is no seasonal drawdown of the impoundment which operates with a maximum full pond elevation of 1276.8 FTMSL. The impoundment has a typical daily fluctuation of 1 to 2 feet, however that can increase up to 5 feet to meet system demands. The authorized minimum allowed elevation is 1268.8 FTMSL. (See Figure 11);
- A spillway section containing nineteen tainter gates 25 feet wide by 19 feet high with sill elevations at elevation 1257.8 FTMSL. (See Figure 12). The tops of the closed gates are at elevation 1276.8 feet. The gates can be opened vertically 15.75 feet. The maximum discharge capacity at the dam is 205,900 CFS when the water in the pond rises up to the top of the dam at elevation 1286.8 FTMSL;
- Five individual penstocks for each turbine. Penstocks for turbines 1 through 4 are each 13.5 feet in diameter and vary in length from 231 to 267 feet. The penstock for turbine 5 begins as a 17-foot diameter concrete conduit extending along the downstream face of the dam for 112 feet, then transitions to a 16-foot diameter steel penstock the remaining 375 feet. All turbines have trashracks with 4.75-inch clear spacing;
- Five vertical Francis turbines with a total installed capacity of 143.7 MW;
    - In 2013, turbines 1 through 4 were upgraded resulting in a design capacity of 33,000 HP (24.6 MW) at a design head of 185 feet and a speed of 171.5 rpm. Each turbine can pass flows from 1083 CFS to 1932 CFS.
    - One turbine with a design capacity of 45,000 HP (33.6 MW) at a design head of 185 feet and a speed of 171.4 rpm. The turbine can pass flows from 1197 CFS to 2198 CFS. This turbine is scheduled for upgrade in 2022.

Figure 6 - Cheoah Impoundment Looking Upstream

Figure 7 - Cheoah Dam & Powerhouse

C. Calderwood Dam

The Calderwood Dam (latitude 35° 29' 34" N, longitude 83° 58' 47" W) consists of:

- A 916-foot long and 230-foot high curved concrete arch dam creating a 570-acre impoundment with a gross volume of 41,000 (ACFT) and a usable volume of 3,500 ACFT. (See Figure 13). There is no seasonal drawdown of the impoundment which operates with a maximum full pond elevation of 1087.8 FTMSL. The impoundment has a typical daily fluctuation of 1 to 2 feet, however that can increase up to 5 feet to meet system demands. The authorized minimum allowed elevation is 1081.8 FTMSL;
- A spillway section containing twenty-four 24-foot wide and 20-foot high Stoney gates[9] with a sill elevation of 1067.8 FTMSL. (See Figure 14). The maximum discharge capacity at the dam is 375,000 CFS when the water in the pond rises up to the top of the dam at elevation 1102.8 FTMSL;
- A 2,050-foot long tunnel conveys water from the intake to the powerhouse:
    - The upstream section of the tunnel is 26.5 feet in diameter and approximately 220 feet long;
    - It transitions into a horseshoe shape section that is 26 feet wide at the invert and has a 13-foot radius on the upper half-round section, giving the tunnel a maximum height of 24 feet that drops at a 2% grade;
    - The tunnel connects to a surge tank that is excavated in the rock ledge. The surge shaft is concrete lined, while the surge chamber is unlined. Because of this, a rock trap is provided to catch any loose rock which may become dislodged from the walls of the chamber. The surge tank is vented to the atmosphere;
    - Downhill of the surge shaft, the powerhouse intake tunnel separates into three 16-foot diameter steel penstocks that are concreted within the rock ledge;
    - These penstocks end below the control valve house which is located on a steep rock cliff above the powerhouse.
- All turbines have trashracks with 6.0-inch clear spacing;
- Three identical vertical Francis turbines with a total installed capacity of 140.4 MW. Each turbine has a design capacity of 56,000 HP (41.75 MW) at a design head of 211 feet and a speed of 150 rpm. Each turbine can pass flows from 2214 CFS to 3400 CFS.

Figure 8 - Calderwood Dam and Impoundment

[9] Stoney gates are vertical gate moving on rollers.

Figure 9 - Calderwood Tainter Gates

D. Chilhowee Dam

The Chilhowee Dam (latitude 35° 32' 41" N, longitude 84° 03' 01" W) consists of:

- A 1,483-foot long and 88.5-foot high concrete gravity dam creating a 1,734-acre impoundment with a gross volume of 49,000 (ACFT) and a usable volume of 6,805 ACFT. (See Figure 15). There is no seasonal drawdown of the impoundment which operates with a maximum full pond elevation of 874.0 FTMSL. The impoundment has a typical daily fluctuation of 1 to 2 feet, however that can increase up to 4 feet to meet system demands. The authorized minimum allowed elevation is 869.0 FTMSL;
- A spillway section containing six tainter gates 24 feet wide by 38 feet high with sill elevations at 836.0 FTMSL. (See Figure 14). The maximum discharge capacity at the dam is 265,600 CFS when the water in the pond rises up to the top of the embankment at elevation 883.0 FTMSL;
- The Chilhowee intake and powerhouse are integral with the dam. The powerhouse is located immediately downstream of the intake structure between the tainter gate controlled spillway section and the left non-overflow. The total length of the powerhouse is 216.5 feet. The powerhouse consists of a concrete substructure containing three water passages and a conventional steel truss and frame superstructure. The deck over the intake is at El. 884.0 feet;
- All turbines have trashracks with 6.0-inch clear spacing;
- Three identical Kaplan turbines directly connected to generators with a total installed capacity of 52.2 MW. Each turbine has a design capacity of 23,333 HP (17.4 MW) at a design head of 56.5 feet and a speed of 128.6 rpm. Each turbine can pass flows from 1752 CFS to 4188 CFS.

The single major infrastructure activity occurring during the prior LIHI certification period was repair to the right embankment in 2017.

Figure 10 - Chilhowee Dam

6. REGULATORY SUMMARY

On September 10, 2004, the FERC filed a Final Environmental Assessment (FEA) for relicensing of the Project[10]. The FERC issued a 40-year major license for the Project to APG on January 25, 2005, effective March 1, 2005, expiring on February 28, 2045[11]. The license articles are based largely on a comprehensive relicensing settlement agreement (RSA) filed with FERC on May 7, 2004[12]. The participants in the RSA negotiations included APG, state and federal resource agencies, the Eastern Band of the Cherokee Indians (EBCI), local governments, homeowner associations, and local and national non-governmental organizations (NGOs).

The FERC license contains a WQC for the Santeetlah and Cheoah developments issued by the North Carolina Department of Environmental and Natural Resources (NCDENR) on June 27, 2014[13] that amended the original November 8, 2004 WQC to allow for flexibility in scheduling high flow events and creating additional recreational opportunities. Additionally, the license contains a WQC for the Calderwood and Chilhowee developments issued by the Tennessee Department of Environment and Conservation (TDEC) on April 29, 2004.[14]

On July 31, 2012, an application for the transfer of Project ownership from AEG to BSMH was filed with FERC.[15] On November 4, 2012, FERC filed order approving transfer of ownership to BSMH.[16]

[10] FEA- https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=10242127
[11] FERC License - https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=10382034
[12] RSA - https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=10149198, https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=10149195
[13] See page 75 of FERC license.
[14] See page 66 of FERC license.
[15] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=13038416
[16] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=13081337

A. Licensing Requirements

The FERC license includes a number of requirements intended to restore, protect, and enhance natural resources and improve public access and recreation. BSMH must comply with license requirements to:

- Operate the Santeetlah development to provide minimum flows into the bypass section of the Cheoah River below the development, maintain reservoir elevations to benefit aquatic resources, and provide high flow releases to benefit downstream aquatic resources and whitewater recreation;
- Consult with river stakeholders to assess water reallocation and flows for whitewater recreation in the Cheoah River;
- Release minimum flows from Calderwood dam to protect and restore aquatic resources in the bypass reach of the Little Tennessee River and minimize drawdowns from the Chilhowee Reservoir;
- Protect natural resources and recreation through conservation easements and land transfers;
- Upgrade existing and construct or fund additional recreational infrastructure and amenities while expanding recreation access;
- Fund up to $10,000 annually for seasonal trapping and relocation of threatened and endangered fish species at the Chilhowee development and implement a study to evaluate the presence and status of additional migrating riverine and diadromous fish species as the basis for possible future fishway requirements at the development.
- Fund or undertake activities to monitor and research natural resources affected by the Project, while promoting threatened and endangered species recovery and implementing outreach and environmental education.

The RSA goes beyond the FERC license requirements in reflecting agreement to carry out a number of additional actions relating to protection, restoration, and enhancement of natural resources or recreation. The RSA stipulates:

- The establishment of a fund in Tennessee and a fund in North Carolina for natural resource enhancement and stewardship activities. Over the 40-year license period, $4.0 million and $1.074 million will be deposited into the Tennessee and North Carolina funds, respectively. BSMH annually augments the funds under the terms of both the FERC license and Settlement Agreement.
- The establishment of a recreational enhancement fund for use at the four impoundments. Over the 40-year license term, $4.6 million will be provided.
- Convey roughly 10,000 acres of conservation easements and purchase options to land conservancies and public agencies and impose restrictive covenants to protect natural resources and public recreation access on Project lands. These land changes and use restrictions will permanently establish contiguous areas of land in conservation management.
- Over the 40-year license term, provide $400,000 for recreational fish stocking at Calderwood Reservoir.
- Implement a protocol for the feasibility and funding of additional high flow events to benefit whitewater recreation in the Cheoah River, beyond those required by the FERC license.

B. Compliance Issues

BSMH's Compliance Manager is responsible for overall compliance with the FERC license. Additionally, all personnel are responsible for understanding BSMH's commitments, and for conducting all activities in compliance with the FERC license.

The following tools are used to ensure compliance:

- Compliance database – maintained and updated regularly that includes electronic copies of all relevant agency correspondence, compliance filings, and FERC notices/approvals;
- Compliance tracking table – generated from the database and used to track compliance on an ongoing basis. This table identifies required action(s), person(s) accountable, and due dates;
- Monthly compliance calls – the Compliance Manager and support staff meet monthly on the first Thursday of the month via conference call to review the near and long term actions required to ensure ongoing compliance;
- Compliance manual – developed to help staff understand and comply with the Project license, agreements and plans. The manual is available electronically and in hard copy and is updated every five years;
- Annual compliance training – the Compliance Manager organizes an annual training, which typically includes a presentation, a question/answer period, and follow-up; and
- Information sharing on Project websites – the Project website[17] provides resource management plans in electronic format, monitoring data, flow data, annual reports etc.

Throughout the current certification period a total of four minimum flow or pond elevation deviations have occurred.

On August 1, 2013[18], FERC informed BSMH that a high flow deviation event that occurred on April 20 and 21, 2013 would not be considered a license violation. BSMH stated the required target flows for the two-day high flow event were met at the Santeetlah Dam, but the start of the 1,000 CFS release on day one (April 20) was delayed approximately 2.5 hours. Upon becoming aware that flows were lower than expected, BSMH made an adjustment to the gate height and discharged 1,000 CFS for the entire eight hours. Subsequently, BSMH identified the cause of the problem to be a faulty encoder at Gate #5, which provided an inaccurate reading of the actual gate height. BSMH scheduled a preventative maintenance check of the encoders to ensure tightness and positioning on a regular basis. The encoders are inspected before each high flow event. BSMH reviews gate operating procedures and settings with employees who are responsible for gate operations and incorporates flow verification procedures into the high flow event instructions provided to operators at the dam. These efforts are expected to minimize the chances of this occurring again in the future.

On November 20, 2015[19], FERC responded to a notice of an October 4, 2015 deviation of the Santeetlah reservoir elevation requirement and deemed the incident would not be considered a license violation. In an October 15, 2015 letter, BSMH stated that on October 1, 2015, FERC was notified of a multi-day drawdown of the Santeetlah reservoir due to a forecasted hurricane passing over the Project area and that the drawdown would make it possible to store the heavy runoff from the storm. As a result of this drawdown, and because

[17] Website - https://www.safewaters.com/river-system/3
[18] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=13320179
[19] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14050352

the hurricane ultimately did not pass near the reservoir, the reservoir surface dropped 0.15 feet below its minimum allowable elevation for 10 hours on October 4, 2015.

On January 21, 2016[20], FERC responded to a notice of a November 25, 2015 deviation of the Cheoah reservoir elevation requirement and deemed the incident would not be considered a license violation. The reservoir was lowered in anticipation of an inaccurately forecasted rain event 0.3 feet below the minimum for a period of 1.5 hours. BSMH stated it would review the alarm set points and operator training to prevent similar, future incidents.

On May 18, 2016, FERC informed BSMH that the aquatic base flow deviation below the Santeetlah development that occurred on January 18, 2016 was due to equipment failure and would not be considered a license violation[21]. That event resulted in only leakage flow rather than the January 50 CFS minimum flow over a period of 27 minutes.

7. LIHI RECERTIFICATION PROCESS

No material changes have occurred at the Project during the current certification term. However, since LIHI released a new, second Edition of the LIHI Certification Handbook based on a revised set of low-impact criteria, the need for a Stage II recertification review was required.

BSMH submitted a LIHI recertification application of the Project (LIHI#18) on March 19, 2020. The prior LIHI certification ended on March 20, 2020. LIHI extended certification until August 20, 2020 and again until October 31, 2020. On April 29, 2020, LIHI notified BSMH that the intake review for the Project was complete. The intake review found that no additional supplemental information was needed to conduct the full review. On May 27, 2020, I was selected to perform the full review and the public comment period was opened. The public comment period ended on July 26, 2020.

A. Comment Letters

On May 27, 2020, LIHI filed notice on their email list that the public comment period for the application has been opened. The notice states, *"LIHI is seeking comment on this application. Comments that are directly tied to specific LIHI criteria (flows, water quality, fish passage, etc.) will be most helpful, but all comments will be considered. Comments may be submitted to the Institute by e-mail at comments@lowimpacthydro.org with "Smoky Mountain Project Comments" in the subject line, or by mail addressed to the Low Impact Hydropower Institute, 329 Massachusetts Avenue, Suite 6, Lexington, MA 02420. Comments must be received at the Institute on or before 5 pm Eastern time on July 26, 2020 to be considered. All comments will be posted to the web site and the applicant will have an opportunity to respond. Any response will also be posted. The project description and complete application can be found HERE."* No comments were received.

[20] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14124008
[21] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=14266827

B. Agency Correspondence

On March 25, 2020 (See Appendix A, page A-2), the NCDENR responded to a February 20, 2020 request of BSMH (See Appendix A, page A-3) concerning the June 27, 2014 WQC for the Project. The NCDENR stated that the Project WQC is still valid and has the same expiration as the FERC License on February 28, 2045.

On March 17, 2020 (See Appendix A, page A-5), the TDEC responded to the February 20, 2020 request of BSMH (See Appendix A, page A-4) concerning the April 29, 2004 WQC for the Project. The TDEC stated that the Project WQC is still valid and appropriately protects the Project's water quality.

On May 27, 2020, LIHI[22] emailed contacts[23] listed in the Project application as knowledgeable about the Project stating, *"You may have already received this notice if you are on the Low Impact Hydropower Institute (www.lowimpacthydro.org) email list. However, you were also identified as an agency contact on the LIHI recertification application recently submitted by Brookfield Smoky Mountain Hydropower LLC for the Smoky Mountain Hydroelectric Project on the Little Tennessee and Cheoah Rivers. The application reviewer, Gary Franc (copied here), may be in contact with you if he has questions about these projects or wishes to clarify any aspects of the LIHI applications. You may also provide comments directly to LIHI as indicated below. More information about the projects and their application can be found in the link below. If you would like to receive additional notices about these projects or other hydroelectric projects in your region applying for LIHI certification, please sign up for our mailing list at https://lowimpacthydro.org/join-our-list/ ."*

No agencies or stakeholders responded. Given that the application provided all supporting documentation and no other apparent issues were uncovered in my review I did not have to reach out to any environmental agencies.

8. RECERTIFICATION REVIEW

This section contains my recertification review of the Project with regard to the LIHI Certification criteria. As part of my review, I conducted a FERC e-library search to verify claims in the recertification application. My review concentrated on the period since BSMH acquired the Project on November 4, 2012, through July of 2020, for FERC docket number P-2169.

22 Maryalice Fischer – LIHI Certification Program Director - mfischer@lowimpacthydro.org - 603-664-5097 office - 603-931-9119 cell

23 chonticha.mcdaniel@ncdenr.gov; Jimmy.R.Smith@tn.gov; bryan_tompkins@fws.gov; Renee.gledhill-earley@ncdcr.gov; Patrick.McIntyre@tn.gov

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A. LIHI Criterion-Flows

The goal of this criterion is to support habitat and other conditions that are suitable for healthy fish and wildlife resources in riverine reaches that are affected by the facility's operation.

The application states that the Project satisfies the LIHI flows criterion in ZOE 2 and ZOE 7 by meeting alternative standard A-2 and in all remaining ZOEs by meeting alternative standard A-1.

BSMH has proactively complied with the established flow conditions and impoundment levels and maintains records of these conditions at the Project. In the event of a deviation from maximum drawdown levels or flow requirements, BSMH files documentation with FERC detailing the reasons for the deviation. Throughout the current certification period a total of four minimum flow or pond elevation deviations have occurred.

A.1 Santeetlah

The Santeetlah impoundment (ZOE 1) can fluctuation up to 4 to 5 feet from April 1 to November 1, and up to 9.9 feet during the months of December 1 to March 1. Typically, the reservoir is filled in March and drawn down in November. Santeetlah is a storage and release facility. The Santeetlah impoundment fluctuations and releases were agreed upon in the RSA and FERC license, and were implemented to provide protection and enhancement for a variety of other resources and uses, including aquatic species and habitat, water quality, and reservoir wetlands. Santeetlah reservoir supports a warm-water fishery managed by the North Carolina Wildlife Resources Commission (NCWRC). Shortly after license issuance, on June 9, 2005, the U.S. Department of Interior (USDOI) filed a letter in support of the Project[24].

In accordance with license article 410, on April 1, 2016, BSMH filed a required ten-year update to the Shoreline Management Plan (SMP)[25]. The update included adjusting the maximum drawdown of the impoundment from 10.0 feet to 9.9 feet. FERC approved the updated SMP on July 6, 2017.[26]

Throughout the current eight year certification period, the Santeetlah development experienced two deviations with regard to compliance impoundment level conditions. Both of these deviations were deemed not to be FERC license violations.

The Santeetlah bypass (ZOE 2) is approximately 9.3 mile long from the Santeetlah Dam to the confluence with the Little Tennessee River. The RSA requires the release of aquatic base flows and high flow releases from the Santeetlah development in order to enhance, maintain, and protect fish and wildlife habitat and water quality in the Cheoah River downstream of the dam. BSMH determines the aquatic base flow each month by calculating the average daily inflow for the three preceding months, and ranges from 40 to 100 CFS depending on the historic average monthly flow

The aquatic base flow was determined from studies conducted and technical memorandums developed in 2002 during FERC relicensing. According to the FEA, Instream Flow Incremental Methodology (IFIM) analyses were conducted using flows of 2-3 CFS, 40 CFS and 103 CFS. The IFIM indicated that providing

[24] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=10605715
[25] Updated SMP - https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14187014
[26] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14630216

a seasonally variable flow would better restore the natural hydrologic condition to the Cheoah River. The Cheoah River downstream of Santeetlah dam supports a cool-water fishery that is managed by the NCWRC primarily for smallmouth bass and rock bass.

Additionally, the North Carolina WQC requires BSMH to provide 19 to 20 days of scheduled recreational releases on the Cheoah River of 1,000 CFS, as measured at Santeetlah Dam, based on a repeating five-year schedule to which also serve to provide more diverse assemblage of fish and aquatic biota.

License article 405 required the development of a plan to monitor the minimum flows from the Santeetlah development. The Licensee filed the Santeetlah Development Monitoring Plan (SDMP) on February 28, 2007[27]. On April 4, 2007, FERC approved a Modified Santeetlah Development Monitoring Plan (MSDMP).[28] The plan required summary reports for the first three years after approval. On June 30, 2009 the Final Summary Report was filed[29]. This report was approved by FERC on September 11, 2009.[30]

Throughout the current eight year certification period, the Santeetlah bypass reach experienced one deviation with regard to compliance flow which was deemed not to be a FERC license violation.

Zone 3 below the Santeetlah powerhouse discharges directly into the Cheoah impoundment. No minimum flow was recommended given that powerhouse outflows empty directly into the impoundment.

A.2 Cheoah

The Cheoah development's impoundment (ZOE 4) is operated as a daily cycle peaking facility with the upstream TVA Fontana Project serving as the primary flow control facility. During periods of high releases from Fontana, the Cheoah development operates 24 hours per day. As defined in the RSA, the maximum drawdown of the reservoir is 7 feet with no seasonal drawdown. Accordingly, high flows released from Fontana can possibly cause spillage at the Cheoah Dam due to its limited ability to store water.

The Cheoah powerhouse is immediately downstream from the dam (ZOE 5); therefore, there is no bypassed reach at this development. The RSA and FERC license do not require a minimum flow or base flow within the powerhouse tailrace since studies conducted during relicensing indicate the tailrace exhibits good water quality and a healthy aquatic environment.

Throughout the current eight year certification period, the Cheoah development experienced one deviation with regard to impoundment level which was deemed not to be a FERC license violation.

A.3 Calderwood

The Calderwood development's impoundment (ZOE 6) is operated as a daily cycle peaking facility with the upstream TVA Fontana Project serving as the primary flow control facility. During periods of high releases from Fontana, the Calderwood operates 24 hours per day. As defined in the RSA, the maximum drawdown of the reservoir is 6 feet with no seasonal drawdown. According to the FEA, the normal daily fluctuation is 1 to 2 feet and the development has a limited ability to store water.

[27] SDMP - https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=11280586
[28] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=11302684
[29] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12061321
[30] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12146422

The release of a minimum bypass flow (ZOE 7) is required according to a repeated 10-year schedule provided in the RSA (an average range of 32.5 CFS to 41.5 CFS) in order to reduce thermal impacts on stream biota. BSMH is required to record the flow data electronically and make the data available on the internet (https://safewaters.com/facility/4). The flow ranges are based on a set of monthly target flows provided in the WQC that range from 20 to 65 CFS. The flow releases are limited to no less than 5 CFS below or 50 CFS above the target flows.

The Calderwood tailrace immediately empties into the Chilhowee impoundment and does not require a minimum or base flow.

A.4 Chilhowee

The Chilhowee impoundment (ZOE 9) is operated with no seasonal drawdown and maximum drawdowns of 5 feet from normal full pool elevation of 874.0 FTMSL along with a daily allowed fluctuation of 1 to 2 feet.

The impoundment extends upstream to the Calderwood powerhouse and represents a thermal transition area in the Little Tennessee River Basin. Cold-water releases from TVA's Fontana Dam are transported through Cheoah and Calderwood impoundments and cool the upper portion of Chilhowee impoundment that supports a cold- to cool-water fishery. Since the impoundment is relatively shallow, waters warm as they move down river. Therefore, the lower portions support more of a cool-water fishery.

The Chilhowee downstream reach (ZOE 10) is supplied from May 1 to October 31 with a minimum daily average outflow of 1,000 CFS. This base flow was not a requirement in the license or the WQC and was implemented to support operation of TVA's downstream Tellico dam.

A.5 Summary

As previously discussed in Section 6B, only four minimum flow and/or impoundment level deviations have occurred throughout the current certification period. All were of short duration and none were found to be a license violation by FERC. BSMH's follow-up actions and implementation of measures will help to prevent similar occurrences in the future.

My review indicates that throughout the current certification period BSMH has proactively operated the Project impoundments and provided required minimum flows in accordance with the FERC license and WQCs. It is my recommendation the Project continues to satisfy the flow criterion.

B. LIHI Criterion-Water Quality

The goal of this criterion is to ensure water quality is protected in water bodies directly affected by facility operations, including downstream reaches, bypassed reaches, and impoundments above dams and diversions.

The application states that the Project satisfies the LIHI water quality criterion in all ZOEs by meeting alternative standard B-2.

B.1 Santeetlah and Cheoah

The original North Carolina WQC for the Project was issued November 8, 2004 by the NCDENR for the Santeetlah and Cheoah developments. On June 27, 2014, the NCDENR issued a revised WQC to allow for more flexibility in scheduling high flow events and creating additional recreational opportunities. The amended WQC does not affect any other environmental resources of the Project. FERC approved the revised WQC[31] on March 11, 2015.

On March 25, 2020 (See Appendix A, page A-2), the NCDENR responded to the February 20, 2020 request of BSMH (See Appendix A, page A-3) concerning the June 27, 2014 WQC for the Project. The NCDENR stated that the Project WQC is still valid and has the same expiration as the FERC License on February 28, 2045.

In the 2018 Section 303(d) list for North Carolina no impaired waters in the Project area are listed[32]. The waters of the Santeetlah impoundment are designated as Class B[33]. Downstream from the Santeetlah impoundment, the waters in the Cheoah impoundment are designated as Class C[34].

B.2 Calderwood and Chilhowee

The TDEC issued their WQC for the Project on April 29, 2004 for the Calderwood and Chilhowee developments. The draft 2020 Section 303(d) for Tennessee, lists the Little Tennessee River as an impaired waterway.[35] The Tellico impoundment, downstream of the Smoky Mountain Project is listed for PCBs while the rest of the river is listed only for flow regime modification due to the TVA and Smoky Mountain dams.

On March 17, 2020 (See Appendix A, page A-5), the TDEC responded to the February 20, 2020 request of BSMH (See Appendix A, page A-4) concerning the April 29, 2004 WQC for the Project. The TDEC stated that the Project WQC is still valid and appropriately protects the Project's water quality.

To alleviate impacts of the formerly dewatered bypass, on March 1, 2005 minimum instream flows in the Calderwood bypass reach began to be released according to the repeating 10-year schedule (an average annual range of 32.5 CFS to 41.5 CFS).

The Calderwood impoundment is designated as Class C. The Tennessee portion of the Calderwood impoundment is classified for domestic water supply, industrial water supply, fish and aquatic life, recreation, irrigation, livestock watering, wildlife, and trout stream.

The Chilhowee impoundment is classified for fish and aquatic life, recreation, irrigation, livestock watering and wildlife.

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[31] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=13799520

[32] NC 303(d) - https://files.nc.gov/ncdeq/Water%20Quality/Planning/TMDL/303d/2018/2018-NC-303-d--List-Final.pdf

[33] Class B - uses include swimming, skin diving, water skiing, and similar uses involving human body contact with water where such activities take place.

[34] Class C - uses include secondary recreation, fishing, wildlife, fish consumption, aquatic life including propagation, survival and maintenance of biological integrity, and agriculture. Secondary recreation includes wading, boating, and other uses involving human body contact with water where such activities take place in an infrequent, unorganized, or incidental manner.

[35] https://www.tn.gov/content/dam/tn/environment/water/water-public-notices/ppo_water_2019-11-15-dwr-2020-list-impaired-waters-draft.xlsx. Click on the Little Tennessee River sheet tab.

B.3 Summary

In my review, throughout the current LIHI certification period, no water quality issues were found, and it is my recommendation that the Project continues to satisfy the water quality criterion.

C. LIHI Criterion-Upstream Fish Passage

The goal of this criterion is to ensure safe, timely and effective upstream passage of migratory fish so that the migratory species can successfully complete their life cycles and maintain healthy populations in areas affected by the Project's facilities.

The application states that the Project satisfies the LIHI upstream fish passage criterion in ZOE 1 through ZOE 9 by meeting alternative standard C-1 and satisfies the LIHI upstream fish passage criterion in ZOE 10 by meeting alternative standard C-2.

The USDOI did not prescribe fish passage facilities for this Project, however, the agency requested reservation of its authority to prescribe upstream fish passage facilities in the future[36].

C.1 Santeetlah and Cheoah

As defined in the 2003 FERC License Application (FLA)[37], studies conducted in 1993, 1999, and 2001 as part of FERC relicensing indicated there were no known migrating fish in the Santeetlah development (impoundment, bypass or tailrace) or Cheoah development (impoundment and downstream) reaches.

The Santeetlah impoundment is currently managed by the NCWRC as a warm-water fishery. Fish species that are actively managed include walleye, smallmouth bass, largemouth bass, white crappie, black crappie, bluegill, and red breast sunfish. The FEA concluded the Santeetlah warm-water fish populations appear to be healthy and indicate a balanced, reproducing population.

The Cheoah River supports a cool-water fishery managed primarily for smallmouth bass and rock bass. The existing recreational fishery is dominated by smallmouth bass and rock bass, although occasional trout are found.

The NCWRC conducts a put, grow and take stocking of trout, with brook trout, rainbow trout, and brown trout stocked in the Cheoah impoundment on a regular basis. Catchable sized trout are stocked when they are nine to ten inches long.

Creel surveys indicate rainbow trout were the top species captured, followed by yellow perch, brook trout, and brown trout while 88 percent of all fish captured in the survey were trout and 4 percent were yellow perch. Other fish species present in the Cheoah impoundment include bluegill, walleye, smallmouth bass, rock bass, white sucker, and river chub. Fish populations appear to be healthy, especially the white suckers that showed a better growth rate than those normally found in this geographic region.

[36] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=9781039
[37] FLA - https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=10558837

C.2 Calderwood and Chilhowee

As part of the FERC license, the USFWS prescribed reintroducing native fish species to waters above the Chilhowee Dam. A Fish Passage Translocation Plan (FPTP) was filed on August 31, 2005[38]. FERC modified and approved the plan on August 22, 2006[39]. The plan provides the USFWS with annual funding for the trapping and relocation of certain numbers of target fish species (spotfin chub, yellowfin madtom, smoky madtom, and duskytail darter). The FPTP requires meeting annually each winter with the USFWS to discuss the specific numbers of each fish species to be passed, the timing and method of translocation, and the disbursement of funds and the filing of an annual report. The most recent report was filed on January 17, 2020 for the 2018 implementation year[40].

Fish sampling in 2000-2001 in the Calderwood impoundment produced many species of fish, including white sucker, rock bass, war paint shiner, mottled sculpin, river chub, northern hog sucker, red breast sunfish, largemouth bass, central stoneroller, whitetail shiner, spotfin shiner, northern striped shiner, warpaint shiner, yellow bullhead, Tennessee snub-nose darter, and rainbow trout. The FEA states the historic and current fish assemblage in the Calderwood bypassed reach consists primarily of species that inhabit medium-to-large warm-water or cool-water streams. There is no indication of migratory fish in vicinity of the Calderwood development.

The Calderwood impoundment is managed as a put, grow and take stocked trout fishery, with brook trout, rainbow trout, and brown trout stocked on a regular basis. Most of the trout stocked have been fingerlings (2 to 4 inches long). Recently, NCWRC has been stocking only rainbow trout fingerlings every other year, and ceased stocking brown and brook trout in the impoundment in 1994. The Tennessee Wildlife Resources Agency (TWRA) has also made regular stockings of catchable-sized (9 to 10 inches) rainbow trout over the past ten years. In 2003, BSMH supported the trout stocking effort by constructing a fish delivery chute upstream of the Calderwood Dam to facilitate trout stocking into the Calderwood impoundment.

The Chilhowee impoundment extends upstream to the Calderwood Powerhouse and represents a thermal transition area in the Little Tennessee River. Cold-water releases from Fontana Dam are transported through Cheoah and Calderwood impoundments and cool the upper portion of Chilhowee impoundment.

The upper portion of the Chilhowee impoundment supports a cold to cool-water fishery and the lower portion supports more of a cool-water fishery. The Chilhowee impoundment is actively managed by the TWRA. Although there is no formal management plan, TWRA manages the upper portion of the Chilhowee impoundment as a stocked trout fishery by annually stocking rainbow trout.

FERC license article 403 required that a Chilhowee Development Tailwater Fish Monitoring Plan (TFMP) be developed to evaluate the presence and status of important potamodromous and diadromous fish, specifically lake sturgeon, black buffalo, smallmouth buffalo, river redhorse, sauger, and American eel, in the vicinity of the lower end of the Chilhowee tailrace and the upper end of the downstream Tellico Reservoir. The TFMP was filed on August 31, 2005[41] and was accepted by FERC on July 20, 2006[42].

[38] FPTP - https://elibrary-backup.ferc.gov/idmws/common/opennat.asp?fileID=10888555
[39] https://elibrary-backup.ferc.gov/idmws/common/opennat.asp?fileID=11116997
[40] https://elibrary-backup.ferc.gov/idmws/common/opennat.asp?fileID=15445189
[41] TFMP - https://elibrary-backup.ferc.gov/idmws/common/opennat.asp?fileID=10888555
[42] https://elibrary-backup.ferc.gov/idmws/common/opennat.asp?fileID=11089415

The TFMP requires the filing of tailwater fish monitoring reports (TFMR) following fisheries sampling activities that were in conducted in 2009, 2014, and scheduled for 2024 at the Chilhowee tailrace to evaluate the presence and status of important migrating fish. The most recent report for the 2014 sampling year was filed on June 2, 2015[43] and acknowledged by FERC on September 8, 2015[44]. This report states that of the important potamodromous and diadromous fish, only black buffalo, river redhorse, sauger, and smallmouth buffalo were found in the tailrace. Resource agencies commented on the draft report and USFWS noted no need to initiate discussions about additional fish passage requirements at Chilhowee.

C.3 Summary

My review found that throughout the current LIHI certification, no issues pertaining to upstream fish passage were found. BSMH has proactively consulted with resource agencies pertaining to upstream fish passage. It is my recommendation that the Project continues to satisfy the upstream fish passage criterion.

D. LIHI Criterion-Downstream Fish Passage

The goal of this criterion is to ensure safe, timely and effective downstream passage of migratory fish and for riverine fish such that the facility minimizes loss of fish from reservoirs and upstream river reaches affected by facility operations. Migratory species can successfully complete their life cycles and maintain healthy populations in areas affected by the facility.

The application states that the Project satisfies the LIHI downstream fish passage criterion in ZOE 1 and ZOE3 through ZOE 10 by meeting alternative standard D-1 and satisfies the LIHI downstream fish passage criterion in ZOE 2 by meeting alternative standard D-2.

The USDOI did not prescribe fish passage facilities for this Project, however, the agency requested reservation of its authority to prescribe downstream fish passage facilities in the future[45].

D.1 Santeetlah and Cheoah

The Santeetlah impoundment is currently managed by the NCWRC as a warm-water fishery. Fish species that are actively managed include walleye, smallmouth bass, largemouth bass, white crappie, black crappie, bluegill, and red breast sunfish. The FEA concluded the Santeetlah warm-water fish populations appear to be healthy and indicate a balanced, reproducing population. The Cheoah River supports a cool-water fishery managed primarily for smallmouth bass and rock bass. The existing recreational fishery is dominated by smallmouth bass and rock bass, although occasional trout are found.

As defined in the 2003 FLA, studies conducted during the last relicensing indicated that there are no known migrating fish in the Santeetlah impoundment. Releases from the Santeetlah powerhouse empty into the Cheoah impoundment. The risk of turbine entrainment is low due to the size of the trashrack clear spacing (2.00 to 2.75 inches). Also, given that cold-water fisheries are downstream from the Santeetlah reservoir, downstream fish passage should not be encouraged. Additionally, all bypass releases are conveyed by the Cheoah River and empty into the Cheoah impoundment.

[43] TFMR - https://elibrary-backup.ferc.gov/idmws/common/opennat.asp?fileID=13894103
[44] https://elibrary-backup.ferc.gov/idmws/common/opennat.asp?fileID=13980751
[45] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=9781039

According to the FEA, Instream Flow Incremental Methodology (IFIM) analyses were conducted using flows of 2-3 CFS, 40 CFS and 103 CFS. The IFIM indicated that providing varying seasonal flows would better restore the natural hydrologic condition to the Cheoah River and support aquatic habitat. The pools within the Cheoah River bypassed reach typically have steep banks along with a u-shaped cross section, therefore exhibiting little change in wetted perimeter at varying flows and remain largely wetted at low flows. In the portions of the bypassed reach that contain braids, riffles, and bedrock ledges the wetted perimeter drastically declines in response to flows below 50 CFS.

Additionally, the North Carolina WQC requires BSMH to provide 19 to 20 days of scheduled releases on the Cheoah River of 1,000 CFS, as measured at Santeetlah Dam, based on a repeating five year schedule to provide more diverse assemblage of fish and aquatic biota.

The high flows proposed for the Cheoah River bypassed reach do not fully mimic inflows to the Santeetlah Reservoir. However, implementing ramping rates somewhat mimics a natural flow hydrograph. Ramping allows aquatic biota dependent on shallow, slow water habitats the opportunity to move laterally to avoid stranding or excessive velocities. Ramping rates of one to two inches per hour have demonstrated minimizing of stranding for some fishes in other studies. In general, analysis of unregulated, regional reference streams indicated that natural ramping rates following peak flow events rarely exceeded two inches per hour.

License article 405 required the development of a plan to monitor the minimum bypass flows from the Santeetlah Development. The Santeetlah Development Monitoring Plan (SDMP) was filed on February 28, 2007[46]. On April 4, 2007, FERC approved a Modified Santeetlah Development Monitoring Plan (MSDMP).[47] The plan required summary reports for the first three years after approval. On June 30, 2009 the Final Summary Report was filed[48]. This report was approved by FERC on September 11, 2009.[49]

The MSDMP specifies that BSMH determine the appropriate aquatic minimum flow each month based on average daily inflow for the three preceding months and releases are made via four mini-gates from two tainter gates. The aquatic flow has been provided since September 1, 2005. Prior to the installation and automation of the mini-gates, a continuous minimum aquatic discharge of 50 CFS was provided by one of the six Tainter gates. High flows have been released since September 2005. Prior to March 1, 2007, ramping of the high flows was not required. Since completion of the mini-gate installation effort, all high flows been ramped at a rate of 2 inches per hour for flows between the aquatic base flow and 100 CFS.

[46] MSDMP - https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=11280586
[47] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=11302684
[48] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12061321
[49] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=12146422

D.2 Calderwood and Chilhowee

The Calderwood impoundment is managed as a put, grow and take stocked trout fishery, with brook trout, rainbow trout, and brown trout stocked on a regular basis. Most of the trout stocked have been fingerlings (2 to 4 inches long). Recently, NCWRC has been stocking only rainbow trout fingerlings every other year, and ceased stocking brown and brook trout in the impoundment in 1994. The TWRA has also made regular stockings of catchable-sized (9 to 10 inches) rainbow trout over the past ten years. In 2003, BSMH supported the trout stocking effort by constructing a fish delivery chute upstream of the Calderwood Dam to facilitate trout stocking into the Calderwood impoundment.

The FEA states the historic and current fish assemblage in the Calderwood bypassed reach consists primarily of species that inhabit medium-to-large warm-water or cool-water streams. There is no indication of migratory fish in vicinity of the Calderwood development.

The minimum flow into the Calderwood bypass is required according to a repeated 10-year schedule provided in the RSA (an average range of 32.5 CFS to 41.5 CFS). The risk of trashrack impingement at the Calderwood powerhouse intake is very low due to the size of the trashrack clear spacing (6.00 inches). Although turbine entrainment is occurring, the USFWS stated that there is insufficient evidence currently in the record to recommend the installation of physical downstream fish passage facilities.

The Chilhowee impoundment extends upstream to the Calderwood Powerhouse and represents a thermal transition area in the Little Tennessee River. Cold-water releases from Fontana Dam are transported through Cheoah and Calderwood impoundments and cool the upper portion of Chilhowee impoundment.

The upper portion of the Chilhowee impoundment supports a cold to cool-water fishery and the lower portion supports more of a cool-water fishery. The Chilhowee impoundment is actively managed by the TWRA. Although there is no formal management plan, TWRA manages the upper portion of Chilhowee impoundment as a stocked trout fishery by annually stocking rainbow trout.

A Chilhowee base flow is supplied from May 1 through October 31 with a minimum daily average outflow of 1,000 CFS. This base flow is not a requirement in the FERC license and was implemented at the request of other hydropower facilities owner's downstream. The risk of trashrack impingement by the Chilhowee powerhouse intake is very low due to the size of the trashrack clear spacing (6.00 inches). Although turbine entrainment is occurring, the USFWS stated that there is insufficient evidence currently in the record to recommend the installation of physical downstream fish passage facilities. My review could not find any evidence of prior fish passage mortality studies being conducted. Instead, the USFWS has used owner funds to reintroduce native fish species to waters above the Chilhowee Dam by trapping and relocation of target fish species each season from sites below the Chilhowee Dam to sites above Chilhowee Dam.

BSMH files TFMR reports following fisheries sampling activities that were in conducted in 2009, 2014, and scheduled for 2024 at the Chilhowee tailrace to evaluate the presence and status of important migrating fish. The most recent report for the 2014 sampling year was filed on June 2, 2015[50] and states that of the important potamodromous and diadromous fish, only black buffalo, river redhorse, sauger, and smallmouth buffalo were found in the tailrace. The USFWS commented that based on the 2014 report there was no need to initiate discussions about additional fish passage requirements at Chilhowee. The future 2024

[50] TFMR - https://elibrary-backup.ferc.gov/idmws/common/opennat.asp?fileID=13894103

fisheries sampling activities will once again evaluate whether or not downstream physical passage facilities are required.

D.3 Summary

My review found that throughout the current LIHI certification, no issues pertaining to downstream fish passage were found. BSMH has proactively consulted with resource agencies pertaining to downstream fish passage issues. It is my recommendation that the Project continues to satisfy the downstream fish passage criterion. However, since the tailwater fish monitoring will occur during the next LIHI certification term, a condition is recommended to ensure that LIHI receives a copy of the report and any new agency recommendations related to downstream fish passage.

E. LIHI Criterion-Shoreline and Watershed Protection

The shoreline and watershed protection criterion is designed to ensure that sufficient action has been taken to protect, mitigate or enhance environmental conditions of soils, vegetation, and ecosystem functions on shoreline and watershed lands associated with the facility.

The Applicant states the LIHI shoreline and watershed protection criterion in all ZOEs is satisfied by meeting alternative standard E-2. An E-PLUS designation is also requested.

In the RSA, the North Carolina Resource Management and Enhancement Fund (NC Fund) was established for use by the NCWRC, NCDENR, U.S. Forest Service (USFS), EBCI, and USFWS. An initial payment of $100,000 was deposited into the fund. Deposits of $25,000 are made annually by BSMH.

The NC Fund is limited to use within the scope of the Fish and Wildlife Coordination Act, the Endangered Species Act, and Section 10 of the Federal Power Act, such as:

- monitoring of biotic and abiotic parameters;
- addition of large woody debris, and gravel and vegetation management within the Cheoah River below Santeetlah Dam, and;
- other activities such as:
    - threatened and endangered species recovery efforts;
    - control of exotic species and environmental outreach, and
    - education efforts related to resources affected by Project operations within North Carolina.

The Tallassee Fund was established for use by the USFS, USFWS, Great Smoky Mountains National Park, TDEC, TWRA, EBCI, The Nature Conservancy of Tennessee (TNC), the National Parks Conservation Association (NPCA), the Tennessee Clean Water Network (TCWN), and American Rivers (AR) for natural resource stewardship and mitigation activities. An initial payment of $100,000 was deposited into the fund. Deposits of $100,000 are made annually by BSMH.

The Tallassee Fund is used for activities such as:

- threatened and endangered species recovery efforts;
- ecosystem enhancements and restoration;
- management and control of exotic species, and

- environmental outreach and education directly related to the Project, as well as other non-Project lands in Tennessee currently owned by BSMH to mitigate the environmental impacts associated with the Project's operations.

BSMH submits an annual License Compliance Fund Board Implementation Report that documents the activities of each fund. The most recent annual fund report[51] for activities in 2018 was filed with FERC on June 11, 2019.

Additionally, THC has options to acquire title to significant portions of non-Project acreage for conveyance to a federal or state agency. The total number of acres available for conservation easements is approximately 11,000 acres.

The Shoreline Management Plan (SMP) for the Project was filed with FERC on October 1, 2004 and approved by FERC on March 31, 2006. The SMP was prepared in consultation with NCDENR, NCWRC, North Carolina State Historic Preservation Office (NCSHPO), USFS, USFWS, Bureau of Indian Affairs (BIA), Great Smoky Mountains National Park, EBCI, Cross Creek Property Owners Association, Friends of Lake Santeetlah, Town of Lake Santeetlah, Town of Robbinsville, Graham County, Sierra Club, American Rivers, TCWN, TNC, TDEC, TWRA, Tennessee Historic Commission and Tennessee State Historic Preservation Office (TSHPO).

In a USDOI letter[52] filed with FERC on June 9, 2005, the agency stated their agreement of the balance of shoreline uses afforded by the SMP and its shoreline classification. The USDOI is encouraged that the primarily undeveloped characteristics of the Project developments will be retained for the benefit of fish and wildlife and their habitats. Additionally, the SMP adequately protects and mitigates the ongoing and future impacts of the Project.

On April 1, 2016, BSMH filed a required ten-year update to the SMP[53]. The update included adjusting the maximum Santeetlah impoundment drawdown from 10 feet to 9.9 feet, updating recreation information and species considered rare, threatened, and endangered. FERC approved the updated SMP on July 6, 2017.[54]

My review found that throughout the current LIHI certification, no issues arose pertaining to shoreline and watershed protection. The NC Fund, Tallassee Fund and conveyance allowances allow for land management that achieves land protection value in excess of 50% or more around the undeveloped shoreline. It is my recommendation that the Project continues to satisfy the shoreline and watershed protection criterion and should receive an extra three years of certification for achieving the PLUS standard.

F. LIHI Criterion-Threatened and Endangered Species

The threatened and endangered species protection criterion is designed to ensure that the facility does not negatively impact state or federally-listed threatened or endangered species.

The Applicant states the LIHI threatened and endangered species criterion is satisfied in all ZOEs by meeting alternative standard F-3.

[51] https://elibrary-backup.ferc.gov/idmws/common/opennat.asp?fileID=15267908
[52] https://elibrary-backup.ferc.gov/idmws/common/opennat.asp?fileID=10605715
[53] https://elibrary-backup.ferc.gov/idmws/common/opennat.asp?fileID=14187014
[54] https://elibrary-backup.ferc.gov/idmws/common/opennat.asp?fileID=14630216

The USFWS filed a "Biological Assessment for the Tapoco Settlement Agreement"[55] with FERC, appended to the RSA. This Assessment concluded that none of the activities described in the RSA pertaining to Project operations and/or recreational enhancements were anticipated to have adverse effects on the rare, threatened or endangered (RTE) species listed at that time and included in the Biological Assessment. In some cases, the biological assessment stated that the activities described in the RSA would have a beneficial effect. The species evaluated included four fish species (spotfin chub, yellowfin madtom, smoky madtom, and duskytail darter), gray bat, Indiana bat, the then-listed bald eagle, Appalachian elktoe mussel and the Virginia spiraea plant.

FERC license article 407 required an Endangered Species Management Plan (ESMP) be developed to protect and enhance the federally listed threatened or endangered species and their critical habitat associated with the Project. On August 30, 2007, an ESMP was filed with FERC. On March 4, 2008, FERC issued an order modifying and approving the ESMP[56]. On September 4, 2008, the revised ESMP[57] was refiled, which was approved by FERC on April 14, 2009[58]. The modified ESMP requires filing of annual reports summarizing activities concerning endangered species conducted during the previous year.

On December 19, 2017, BSMH filed a revised ESMP[59] as required to update the ESMP every five years. The revised ESMP was developed in consultation with the resource agencies. On April 30, 2018, FERC approved the revised ESMP[60]. The ESMP requires the filing of annual reports summarizing activities concerning endangered species conducted during the previous year. The most recent report was filed on March 13, 2020 for the 2019 implementation year[61].

Article 411 of the license requires BSMH to consult with USFWS prior to beginning any land-disturbing activities that may affect a listed species or critical habitat.

The USFWS has published formal recovery plans for all federally listed species listed below except for the Northern long eared bat and bog turtle (within its southern range including the Project area). Generally, the goal of recovery plans is to restore viable populations of each species to a significant portion of its historic range and remove each species from the federal endangered species list. The goal of the ESMP is to incorporate the recovery plans to restore viable populations of the species and their habitats to such a degree that the species no longer qualifies for protection under the Endangered Species Act.

BSMH also consulted with North Carolina Department of Natural and Cultural Resources (NCDNCR) for an updated list of threatened and endangered species that may occur in the vicinity of the Project's developments. On February 27, 2020, the NCDNCR indicated that in addition to unlisted but rare species, the following listed species may occur:

- Junaluska Salamander, and Tellico Salamander
- Bald Eagle
- Three mussels: Appalachian Elktoe, Slippershell Mussel, and Rainbow
- Three bats: Rafinesque's Big-eared Bat, Northern Long-eared Bat, and Indiana Bat
- Three plants: Purple Fringeless Orchid, Virginia Spiraea, and Appalachian Filmy-fern

[55] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=10149195
[56] https://elibrary-backup.ferc.gov/idmws/common/opennat.asp?fileID=11601515
[57] https://elibrary-backup.ferc.gov/idmws/common/opennat.asp?fileID=11794571
[58] https://elibrary-backup.ferc.gov/idmws/common/opennat.asp?fileID=11989083
[59] https://elibrary-backup.ferc.gov/idmws/common/opennat.asp?fileID=14780431
[60] https://elibrary-backup.ferc.gov/idmws/common/opennat.asp?fileID=14902071
[61] https://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=15200639

F.1 Santeetlah

Based on information received from the USFWS's North Carolina Field Office on February 12, 2020, regarding a request for information on RTE species, it appears that there are nine federally listed species that have been known to be located at or near the Santeetlah development. These species are the Carolina Northern Flying Squirrel, Gray Bat, Indiana Bat, Northern Long-eared Bat, Bog Turtle, Spotfin Chub, Appalachian Elktoe, Virginia Spiraea, and Rock Gnome Lichen. There is critical habitat in the area for the Appalachian Elktoe mussel (See Appendix A, page A-6).

F.2 Cheoah

Based on information received from the USFWS's North Carolina Field Office on February 12, 2020, it appears that there are twelve listed species that have been known to be located at or near the Cheoah development. These species are the Carolina Northern Flying Squirrel, Gray Bat, Indiana Bat, Northern Long eared Bat, Bog Turtle, Spotfin Chub, Appalachian Elktoe, Littlewing Pearlymussel, Noonday Snail, Spruce-fir Moss Spider, Virginia Spiraea, and Rock Gnome Lichen. There are critical habitats in the area for Appalachian Elktoe and Indiana Bat (See Appendix A, page A-21).

F.3 Calderwood

Based on information received from the USFWS's North Carolina Field Office and the Tennessee Field Office on February 12, 2020, it appears that there are twelve listed species that have been known to be located at or near the Calderwood development. These species are the Carolina Northern Flying Squirrel, Gray Bat, Indiana Bat, Northern Long eared Bat, Bog Turtle, Spotfin Chub, Appalachian Elktoe, Littlewing Pearlymussel, Noonday Snail, Spruce-fir Moss Spider, Virginia Spiraea, and Rock Gnome Lichen. There are critical habitats in the area for Indiana Bat and Appalachian Elktoe (See Appendix A, page A-38).

F.4 Chilhowee

Based on information received from the USFWS's North Carolina Field Office and the Tennessee Field Office on February 12, 2020, it appears that there are eleven listed species that have been known to be located at or near the Chilhowee Development. These species are the Carolina Northern Flying Squirrel, Gray Bat, Indiana Bat, Northern Long-eared Bat, Duskytail Darter, Spotfin Chub, Cumberland Bean (a mussel), Anthony's Riversnail (native and an experimental population), and three plants: Spreading Avens, Virginia Spiraea, and White Fringeless Orchid. There is critical habitat in the area for Indiana Bat (See Appendix A, page A-61).

F.5 Summary

My review found that throughout the current LIHI certification, no license issues arose pertaining to the Project's threatened and endangered species management. BSMH has proactively consulted with resource agencies pertaining to threatened and endangered species compliance including coordination of periodic monitoring of some species, and BSMH has filed the required annual reports. Based on the information provided, it is my recommendation that the Project continues to satisfy the threatened and endangered species protection criterion.

G. LIHI Criterion-Cultural Resource Protection

The cultural and historic resource protection criterion is designed to ensure that the facility does not unnecessarily impact cultural and historic resources associated with the facility's lands and waters, including resources important to local indigenous populations.

The application states the LIHI cultural and historic resources criterion in all ZOEs is satisfied by meeting alternative standard G-2.

On August 25, 2004, FERC executed a Programmatic Agreement (PA) for the Project[62]. The PA was signed by FERC, the NCSHPO, the TSHPO, the USFS, and the Project owner. The PA specifically discusses management of historic properties, interim treatment of historic properties, and the development of a Historic Properties Management Plan (HPMP).

License article 409 and the PA required the filing of the HPMP[63] with FERC which occurred on February 28, 2006. The HPMP was developed in consultation with NCSHPO, TSHPO, USFS, the BIA, Eastern Band of Cherokee Indians Tribal Historic Preservation Office (EBCI THPO), and the GSMNP. On June 21, 2006, FERC issued an order approving the HPMP.[64]

In April of 2016, BSMH filed for FERC approval, a revised HPMP in accordance with the required ten-year reevaluation and update. On October 7, 2016, FERC issued an order modifying and approving the HPMP.[65] BSMH is required to file annual reports of all activities associated with implementation of the HPMP with FERC, NCSHPO, TSHPO, EBCI THPO, the BIA, USFS, the GSMNP, the United Keetowah Band of Cherokee Indians (UKB) and the Cherokee Nation of Oklahoma. The most recent annual report was filed on January 31, 2020 for the 2019 reporting year.[66]

G.1 Santeetlah

The historical resources for the Santeetlah development include the dam, pipeline and tunnels, powerhouse, and ancillary buildings and structures. These structures were added to the National Register of Historic Places (NRHP) on April 2, 2004. Numerous prehistoric and historic archaeological sites were also identified in cultural resource surveys conducted for the HPMP.

[62] PA - https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=10240982
[63] HPMP - https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=10965083
[64] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=11070060
[65] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=14372663
[66] https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=15456636

G.2 Cheoah

The historical resources for the Cheoah development include the dam, penstock building, powerhouse, and ancillary buildings and structures. These structures were added to the NRHP on April 2, 2004. No archaeological sites were identified.

G.3 Calderwood

The historical resources for the Calderwood development include the Calderwood Dam, penstock, tunnel, powerhouse, service building, school, theater, and ancillary buildings and structures. These structures were added to the NRHP on August 21, 1989 and July 3, 1990. Archaeological sites including an abandoned worker's camp, prehistoric lithic scatter, a former tunnel and railroad were also identified

G.4 Chilhowee

The historical resources for the Chilhowee development include the dam and powerhouse. These structures were added to the NRHP on May 7, 2004. Archaeological sites were identified including a former village and a cemetery.

G.5 Summary

BSMH has proactively consulted with resource agencies pertaining to cultural and historical issues. Throughout the current LIHI certification, the Project has been in compliance with all requirements regarding cultural resource protection, mitigation, enhancement and reporting included in the FERC license, PA, and HPMP. It is my recommendation that the Project continues to satisfy the cultural and historic resources protection criterion.

H. LIHI Criterion-Recreation

The goal of this criterion is to ensure that recreation activities on lands and waters controlled by the facility are accommodated and that the facility provides recreational access to its associated land and waters without fee or charge.

The Applicant states the LIHI recreation criterion in all ZOEs are satisfied by meeting alternative standard H-2.

The RSA required that new public recreation facilities be added and existing facilities be upgraded. License article 408 required that a Recreation Plan (RP) be developed. The RP was developed in consultation with NCWRC, NCDENR, TDEC, TWRA, USFWS, National Park Service (NPS), and USFS as appropriate. The RP was submitted to FERC on February 28, 2006[67]. FERC approved the RP on August 9, 2006.[68]

The RP requires BSMH to consult with the USFS, NCWRC, and TWRA annually to prioritize recreational enhancements to be implemented for the following year based on funding availability in accordance with

[67] https://elibrary-backup.ferc.gov/idmws/common/opennat.asp?fileID=10965081
[68] https://elibrary-backup.ferc.gov/idmws/common/opennat.asp?fileID=11107010

the RSA funding provisions and based on other relevant considerations. The most recent annual meeting occurred on July 24, 2019 and the most recent annual recreation report was filed February 3, 2020 for the 2019 year.[69]

H.1 Santeetlah

According to the 2019 Annual Report, all the scheduled recreational enhancements associated with Santeetlah have been implemented. The development is in compliance with recreational access, accommodation, and facilities' conditions in the FERC license. Recreational facilities include boat access and boat launches, campgrounds, and marinas. There are no formal FERC Project recreation facilities. However, BSMH provides 19 to 20 days of scheduled recreational releases on the Cheoah River of 1,000 CFS, as measured at Santeetlah Dam, based on a repeating five-year schedule.

H.2 Cheoah

According to the 2019 Annual Recreation Report, all the scheduled recreational enhancements associated with Cheoah have been implemented. At the Cheoah development, recreational facilities include canoe take outs with portage trails, an Americans with Disabilities Act (ADA) compliant fishing pier, boat ramp, and loading dock. The licensee provides undeveloped lake access on the north side of the impoundment. The formal FERC Project recreation facilities although BSMH provides informal lake access on the north side of the impoundment.

H.3 Calderwood

According to the 2019 Annual Recreation Report, all the scheduled recreational enhancements associated with Calderwood have been implemented. At the Calderwood development, recreational facilities include campsites and a canoe put-in and take out. There are no formal FERC Project recreation facilities.

H.4 Chilhowee

According to the 2019 Annual Recreation Report, all the scheduled recreational enhancements associated with Chilhowee have been implemented. At the Chilhowee Development, recreational facilities include canoe portage and fishing piers. There are no formal FERC Project recreation facilities.

H.5 Summary

BSMH is in compliance with the license recreational access, accommodation, and facility conditions. Throughout the current LIHI certification, BSMH has proactively consulted with resource agencies pertaining to recreational issues and annual planning of improvements and enhancements. My review found no issues pertaining to recreational resources compliance. Therefore, it is my recommendation that the Project continues to satisfy the recreational resources criterion.

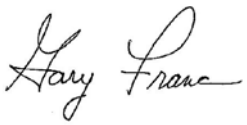
[69] https://elibrary-backup.ferc.gov/idmws/common/opennat.asp?fileID=15458959

9. RECOMMENDATION

A review of the certification application and supporting documentation, and a search of the FERC docket shows that the Project continues to satisfy the LIHI criteria as discussed in the sections above.

Given that the NC Fund, Tallassee Fund and conveyance allowances allow for land management that achieves land protection value in excess of 50% or more around undeveloped shoreline. I recommend that the Project be certified for an eight (8) year term. One condition is recommended as follows:

- **Condition 1**: The facility Owner shall file with LIHI a copy of the final 2024 Tailwater Fish Monitoring Report for the Chilhowee tailrace within 60 days of report finalization and agency and FERC approval. LIHI reserves the right to modify the Certificate and conditions based on the outcome of the monitoring.



Gary M. Franc

FRANC LOGIC

Licensing & Compliance
Hydropower Consulting & Modeling

APPENDIX A

DOCUMENTS

Brookfield

Brookfield Renewable
314 Growdon Blvd.
Tallassee, TN 37878

Phone: 865-206-3069

February 20, 2020

Mr. Paul Wojoski
North Carolina Division of Water Resources
617 Mail Service Center
Raleigh, NC 27699

Subject: **Smoky Mountain Hydroelectric Project (FERC No.2169)**
Low Impact Hydropower Institute Certification
Water Quality Certificate Verification

Dear Mr. Wojoski

Brookfield Smoky Mountain Hydropower, LLC (BSMH) is applying for Low Impact Hydropower Institute (LIHI) certification for the Smoky Mountain Hydroelectric Project (FERC No. 2169). The Smoky Mountain Hydroelectric Project includes the Chilhowee and Calderwood developments, located on the Little Tennessee River in Blount and Monroe Counties, Tennessee, and the Santeetlah and Cheoah developments, located on the Cheoah and Little Tennessee rivers in Graham and Swain Counties, North Carolina.

As part of this LIHI application process, BSMH is requesting confirmation from the North Carolina Division of Water Resources stating that the 401 Water Quality Certificate issued for the operation of Santeetlah and Cheoah developments on June 27, 2014 is still valid. Please provide this confirmation by reply to this letter via letter or email.

BSMH would appreciate a response within 30 days of the date of this letter. Thank you in advance for your assistance, and if you have any questions, please do not hesitate to contact me at (865) 306-3069 or by email at Ashley.Thomas@brookfieldrenewable.com.

Sincerely,

Ashley Thomas
Compliance Manager
Brookfield Renewable

From: Mcdaniel, Chonticha
To: Thomas, Ashley
Subject: Smoky Mountain Hydro Project (DWR# 2003-0191v3)
Date: Thursday, February 27, 2020 11:23:08 AM
Attachments: image002.png

Hi Ashley,

The 401 Individual Certification #3447 for the subject project is still valid and has the same expiration as the FERC License (#2169) which is good until 2045. Please feel free to let me know if you have additional questions regarding this matter. Thank you!

Chonticha McDaniel
401 Stormwater Engineer
401 & Buffer Permitting Branch
Division of Water Resources
Department of Environmental Quality

919-707-3634 office
chonticha.mcdaniel@ncdenr.gov

Mailing Address - 1617 Mail Service Center, Raleigh, North Carolina, 27699-1617
Street Address - 512 N. Salisbury St. (Floor 9th), Raleigh, North Carolina, 27604

Brookfield

Brookfield Renewable
314 Growdon Blvd.
Tallassee, TN 37878

Phone: 865-306-3069

February 20, 2020

Mr. Jimmy Smith
Tennessee Division of Water Resources
William R. Snodgrass Tennessee Tower
312 Rosa Park Avenue
Nashville, TN 37243

Subject: **Smoky Mountain Hydroelectric Project (FERC No.2169)**
Low Impact Hydropower Institute Certification
Water Quality Certificate Verification

Dear Mr. Jimmy Smith:

Brookfield Smoky Mountain Hydropower, LLC (BSMH) is applying for the Low Impact Hydropower Institute (LIHI) certification for the Smoky Mountain Hydroelectric Project (FERC No. 2169). The Smoky Mountain Hydroelectric Project includes the Chilhowee and Calderwood developments, located on the Little Tennessee River in Blount and Monroe Counties, Tennessee, and the Santeetlah and Cheoah developments, located on the Cheoah and Little Tennessee rivers in Graham and Swain Counties, North Carolina.

As part of the LIHI application process, BSMH is requesting confirmation from the Tennessee Department of Environment and Conservation stating that the 401 Water Quality Certificate issued for the operation of Santeetlah and Cheoah developments on February 11, 2004 (revised April 29, 2004) is still valid. Please provide this confirmation by reply to this letter via letter or email.

BSMH would appreciate a response within 30 days of the date of this letter. Thank you in advance for your assistance, and if you have any questions, please do not hesitate to contact me at (865) 306-3069 or by email at Ashley.Thomas@brookfieldrenewable.com

Sincerely,

Ashley Thomas
Compliance Manager
Brookfield Renewable

STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
Division of Water Resources
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 11th Floor
Nashville, Tennessee 37243

March 17, 2020

Ashley Thomas
Compliance Manager
Brookfield Renewable
314 Growden Blvd.
Tallassee, TN 37878

Subject: Smoky Mountain Hydroelectric Project (FERC No.2169)
Low Impact Hydropower Institute Certification
Water Quality Certificate Verification

Dear Mr. Thomas:

Brookfield Smoky Mountain Hydropower, LLC (BSMH) is applying for the Low Impact Hydropower Institute (LIHI) certification for the Smoky Mountain Hydroelectric Project (FERC No. 2169). The Smoky Mountain Hydroelectric Project includes the Chilhowee and Calderwood developments, located on the Little Tennessee River in Blount and Monroe Counties, Tennessee, and the Santeetlah and Cheoah developments, located on the Cheoah and Little Tennessee rivers in Graham and Swain Counties, North Carolina.

In a Section 401 Water Quality Certification issued April 29, 2004, the Tennessee Department of Environment and Conservation (TDEC), Division of Water Resources, certified that the operation of the Smoky Mountain Hydroelectric Project, in conformance with approved plans and specifications, will not violate applicable water quality standards. We believe that the Smoky Mountain Hydroelectric Project is appropriately protective of water quality in the bypass reach below Calderwood Dam.

Sincerely,

Robert Baker

Robert Baker
Natural Resources Unit
615-532-0710
robert.d.baker@tn.gov

United States Department of the Interior
FISH AND WILDLIFE SERVICE
Asheville Ecological Services Field Office
160 Zillicoa Street
Asheville, NC 28801-1082
Phone: (828) 258-3939 Fax: (828) 258-5330
http://www.fws.gov/nc-es/es/countyfr.html

In Reply Refer To:
Consultation Code: 04EN1000-2020-SLI-0327
Event Code: 04EN1000-2020-E-00780
Project Name: Santeetlah Reservoir

February 12, 2020

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The attached species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. Although not required by section 7, many agencies request species lists to start the informal consultation process and begin their fulfillment of the requirements under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

This list, along with other helpful resources, is also available on the U.S. Fish and Wildlife Service (Service) Asheville Field Office's (AFO) website: https://www.fws.gov/raleigh/species/cntylist/nc_counties.html. The AFO website list includes "species of concern" species that could potentially be placed on the federal list of threatened and endangered species in the future. Also available are:

Design and Construction Recommendations
https://www.fws.gov/asheville/htmls/project_review/Recommendations.html

Optimal Survey Times for Federally Listed Plants
https://www.fws.gov/nc-es/plant/plant_survey.html

Northern long-eared bat Guidance
https://www.fws.gov/asheville/htmls/project_review/NLEB_in_WNC.html

Predictive Habitat Model for Aquatic Species
https://www.fws.gov/asheville/htmls/Maxent/Maxent.html

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could require modifications of these lists. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of the species lists should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website or the AFO website (the AFO website dates each county list with the day of the most recent update/change) at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list or by going to the AFO website.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a Biological Evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12 and on our office's website at https://www.fws.gov/asheville/htmls/project_review/assessment_guidance.html.

If a Federal agency (or their non-federal representative) determines, based on the Biological Assessment or Biological Evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species, and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at: http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF.

Though the bald eagle is no longer protected under the Endangered Species Act, please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require additional consultation (see https://www.fws.gov/southeast/our-services/permits/eagles/). Wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds (including bald and golden eagles) and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm;

http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- Migratory Birds
- Wetlands

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Asheville Ecological Services Field Office
160 Zillicoa Street
Asheville, NC 28801-1082
(828) 258-3939

Project Summary

Consultation Code: 04EN1000-2020-SLI-0327

Event Code: 04EN1000-2020-E-00780

Project Name: Santeetlah Reservoir

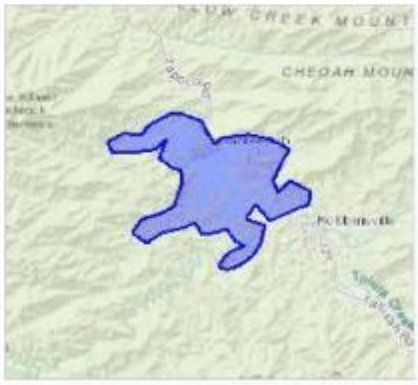
Project Type: DAM

Project Description: Brookfield Smoky Mountain Hydropower is presently working with the Low Impact Hydropower Institute (LIHI) to certify the Smoky Mountain (FERC No. 2169) as a low impact project. In preparing the application for LIHI certification, Brookfield must update or confirm consultation with resource agencies with respect to the presence of threatened or endangered species within the vicinity of the hydroelectric development. Per the request from LIHI, Brookfield respectfully requests information on the presence of threatened or endangered species within the vicinity of the above-listed projects.

As a matter of background, the license from the Federal Energy Regulatory Commission (FERC) was issued for this Project on January 25, 2005. Project operations and environmental protection measures at this Project have been largely determined by a comprehensive Offer of Settlement. The licensing processes for this Project included consultation with resource agencies regarding threatened and endangered species.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/35.344526478660185N83.8530087987439W



Counties: Graham, NC

Endangered Species Act Species

There is a total of 9 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Carolina Northern Flying Squirrel *Glaucomys sabrinus coloratus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/2657	Endangered
Gray Bat *Myotis grisescens* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6329	Endangered
Indiana Bat *Myotis sodalis* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/5949	Endangered
Northern Long-eared Bat *Myotis septentrionalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Threatened

Reptiles

NAME	STATUS
Bog Turtle *Clemmys muhlenbergii* Population: U.S.A. (GA, NC, SC, TN, VA) No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6962	Similarity of Appearance (Threatened)

Fishes

NAME	STATUS
Spotfin Chub *Erimonax monachus* Population: Wherever found, except where listed as an experimental population There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/1521	Threatened

Clams

NAME	STATUS
Appalachian Elktoe *Alasmidonta raveneliana* There is **final** critical habitat for this species. Your location overlaps the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/5039	Endangered

Flowering Plants

NAME	STATUS
Virginia Spiraea *Spiraea virginiana* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1728	Threatened

Lichens

NAME	STATUS
Rock Gnome Lichen *Gymnoderma lineare* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/3933	Endangered

Critical habitats

There is 1 critical habitat wholly or partially within your project area under this office's jurisdiction.

NAME	STATUS
Appalachian Elktoe *Alasmidonta raveneliana* https://ecos.fws.gov/ecp/species/5039#critHab	Final

Migratory Birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

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1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Sep 1 to Aug 31
Canada Warbler *Cardellina canadensis* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Aug 10

NAME	BREEDING SEASON
Eastern Whip-poor-will *Antrostomus vociferus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Aug 20
Golden-winged Warbler *Vermivora chrysoptera* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8745	Breeds May 1 to Jul 20
Kentucky Warbler *Oporornis formosus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 20 to Aug 20
Red-headed Woodpecker *Melanerpes erythrocephalus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Sep 10
Wood Thrush *Hylocichla mustelina* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Aug 31
Yellow-bellied Sapsucker *sphyrapicus varius* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/8792	Breeds May 10 to Jul 15

Probability Of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (▦)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for

that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.

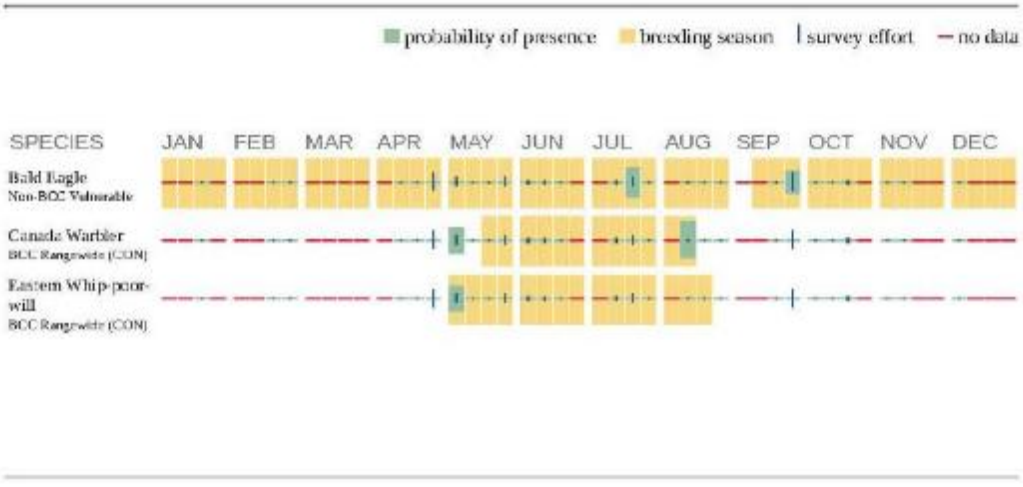
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

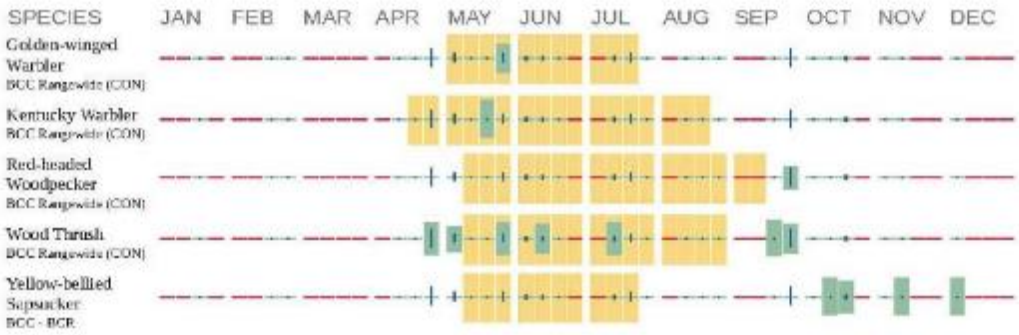
Breeding Season (■)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.





Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

Migratory Birds FAQ

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures and/or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as

warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?
The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?
To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?
Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can

implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects
For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?
If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report
The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Wetlands

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

FRESHWATER EMERGENT WETLAND
- PEM1A
- PEM1Ah

FRESHWATER FORESTED/SHRUB WETLAND
- PSS1A
- PSS1Fh

FRESHWATER POND
- PUBHh

LAKE
- L1UBHh

RIVERINE
- R3UB1H
- R3UBH
- R4SBC
- R5UBH

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Asheville Ecological Services Field Office
160 Zillicoa Street
Asheville, NC 28801-1082
Phone: (828) 258-3939 Fax: (828) 258-5330
http://www.fws.gov/nc-es/es/countyfr.html

In Reply Refer To:
Consultation Code: 04EN1000-2020-SLI-0328
Event Code: 04EN1000-2020-E-00782
Project Name: Cheoah Development 2

February 12, 2020

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The attached species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. Although not required by section 7, many agencies request species lists to start the informal consultation process and begin their fulfillment of the requirements under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

This list, along with other helpful resources, is also available on the U.S. Fish and Wildlife Service (Service) Asheville Field Office's (AFO) website: https://www.fws.gov/raleigh/species/cntylist/nc_counties.html. The AFO website list includes "species of concern" species that could potentially be placed on the federal list of threatened and endangered species in the future. Also available are:

Design and Construction Recommendations
https://www.fws.gov/asheville/htmls/project_review/Recommendations.html

Optimal Survey Times for Federally Listed Plants
https://www.fws.gov/nc-es/plant/plant_survey.html

Northern long-eared bat Guidance
https://www.fws.gov/asheville/htmls/project_review/NLEB_in_WNC.html

Predictive Habitat Model for Aquatic Species
https://www.fws.gov/asheville/htmls/Maxent/Maxent.html

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could require modifications of these lists. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of the species lists should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website or the AFO website (the AFO website dates each county list with the day of the most recent update/change) at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list or by going to the AFO website.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a Biological Evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12 and on our office's website at https://www.fws.gov/asheville/htmls/project_review/assessment_guidance.html.

If a Federal agency (or their non-federal representative) determines, based on the Biological Assessment or Biological Evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species, and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at: http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF.

Though the bald eagle is no longer protected under the Endangered Species Act, please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require additional consultation (see https://www.fws.gov/southeast/our-services/permits/eagles/). Wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds (including bald and golden eagles) and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm;

http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- Migratory Birds
- Wetlands

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Asheville Ecological Services Field Office
160 Zillicoa Street
Asheville, NC 28801-1082
(828) 258-3939

Project Summary

Consultation Code: 04EN1000-2020-SLI-0328

Event Code: 04EN1000-2020-E-00782

Project Name: Cheoah Development 2

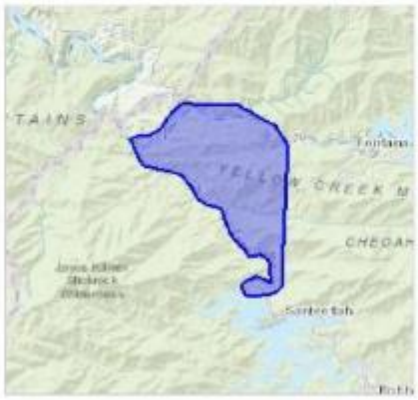
Project Type: DAM

Project Description: Brookfield Smoky Mountain Hydropower is presently working with the Low Impact Hydropower Institute (LIHI) to certify the Smoky Mountain (FERC No. 2169) as a low impact project. In preparing the application for LIHI certification, Brookfield must update or confirm consultation with resource agencies with respect to the presence of threatened or endangered species within the vicinity of the hydroelectric development. Per the request from LIHI, Brookfield respectfully requests information on the presence of threatened or endangered species within the vicinity of the above-listed projects.

As a matter of background, the license from the Federal Energy Regulatory Commission (FERC) was issued for this Project on January 25, 2005. Project operations and environmental protection measures at this Project have been largely determined by a comprehensive Offer of Settlement. The licensing processes for this Project included consultation with resource agencies regarding threatened and endangered species.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/35.42268627895221N83.88172194359322W



02/12/2020 Event Code: 04EN1000-2020-E-00782 3

Counties: Graham, NC | Swain, NC

Endangered Species Act Species

There is a total of 12 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Carolina Northern Flying Squirrel *Glaucomys sabrinus coloratus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/2657	Endangered
Gray Bat *Myotis grisescens* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6329	Endangered
Indiana Bat *Myotis sodalis* There is **final** critical habitat for this species. Your location overlaps the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/5949	Endangered
Northern Long-eared Bat *Myotis septentrionalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Threatened

Reptiles

NAME	STATUS
Bog Turtle *Clemmys muhlenbergii* Population: U.S.A. (GA, NC, SC, TN, VA) No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6962	Similarity of Appearance (Threatened)

Fishes

NAME	STATUS
Spotfin Chub *Erimonax monachus* Population: Wherever found, except where listed as an experimental population There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/1321	Threatened

Clams

NAME	STATUS
Appalachian Elktoe *Alasmidonta raveneliana* There is **final** critical habitat for this species. Your location overlaps the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/5039	Endangered
Littlewing Pearlymussel *Pegias fabula* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/2572	Endangered

Snails

NAME	STATUS
Noonday Snail *Mesodon clarki nantahala* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/322	Threatened

Arachnids

NAME	STATUS
Spruce-fir Moss Spider *Microhexura montivaga* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/4801	Endangered

Flowering Plants

NAME	STATUS
Virginia Spiraea *Spiraea virginiana* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1728	Threatened

Lichens

NAME	STATUS
Rock Gnome Lichen *Gymnoderma lineare* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/3933	Endangered

Critical habitats

There are 2 critical habitats wholly or partially within your project area under this office's jurisdiction.

NAME	STATUS
Appalachian Elktoe *Alasmidonta raveneliana* https://ecos.fws.gov/ecp/species/5039#crithab	Final
Indiana Bat *Myotis sodalis* https://ecos.fws.gov/ecp/species/5949#crithab	Final

Migratory Birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

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1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Sep 1 to Aug 31
Canada Warbler *Cardellina canadensis* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Aug 10

NAME	BREEDING SEASON
Cerulean Warbler *Dendroica cerulea* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/2974	Breeds Apr 27 to Jul 20
Eastern Whip-poor-will *Antrostomus vociferus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Aug 20
Golden-winged Warbler *Vermivora chrysoptera* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8745	Breeds May 1 to Jul 20
Kentucky Warbler *Oporornis formosus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 20 to Aug 20
Prairie Warbler *Dendroica discolor* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Jul 31
Red-headed Woodpecker *Melanerpes erythrocephalus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Sep 10
Wood Thrush *Hylocichla mustelina* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Aug 31
Yellow-bellied Sapsucker *sphyrapicus varius* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/8792	Breeds May 10 to Jul 15

Probability Of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

Breeding Season (■)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

■ probability of presence ■ breeding season | survey effort — no data

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

Migratory Birds FAQ

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures and/or

permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?
The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?
The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?
To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In

contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Wetlands

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

FRESHWATER EMERGENT WETLAND
- PEM1A

FRESHWATER FORESTED/SHRUB WETLAND
- PFO1A
- PSS1A

FRESHWATER POND
- PUBHh
- PUBHx

LAKE
- L1UBHh

RIVERINE
- R3RBH
- R3UB1H
- R4SB3C
- R4SBC
- R5UBH
- R3UB1F
- R3UBH

United States Department of the Interior
FISH AND WILDLIFE SERVICE
Asheville Ecological Services Field Office
160 Zillicoa Street
Asheville, NC 28801-1082
Phone: (828) 258-3939 Fax: (828) 258-5330
http://www.fws.gov/nc-es/es/countyfr.html

In Reply Refer To:
Consultation Code: 04EN1000-2020-SLI-0324
Event Code: 04EN1000-2020-E-00774
Project Name: Calderwood Reservoir

February 11, 2020

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The attached species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. Although not required by section 7, many agencies request species lists to start the informal consultation process and begin their fulfillment of the requirements under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

This list, along with other helpful resources, is also available on the U.S. Fish and Wildlife Service (Service) Asheville Field Office's (AFO) website: https://www.fws.gov/raleigh/species/cntylist/nc_counties.html. The AFO website list includes "species of concern" species that could potentially be placed on the federal list of threatened and endangered species in the future. Also available are:

Design and Construction Recommendations
https://www.fws.gov/asheville/htmls/project_review/Recommendations.html

Optimal Survey Times for Federally Listed Plants
https://www.fws.gov/nc-es/plant/plant_survey.html

Northern long-eared bat Guidance
https://www.fws.gov/asheville/htmls/project_review/NLEB_in_WNC.html

Predictive Habitat Model for Aquatic Species
https://www.fws.gov/asheville/htmls/Maxent/Maxent.html

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could require modifications of these lists. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of the species lists should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website or the AFO website (the AFO website dates each county list with the day of the most recent update/change) at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list or by going to the AFO website.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2) (c)). For projects other than major construction activities, the Service suggests that a Biological Evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12 and on our office's website at https://www.fws.gov/asheville/htmls/project_review/assessment_guidance.html.

If a Federal agency (or their non-federal representative) determines, based on the Biological Assessment or Biological Evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species, and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at: http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF.

Though the bald eagle is no longer protected under the Endangered Species Act, please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require additional consultation (see https://www.fws.gov/southeast/our-services/permits/eagles/). Wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds (including bald and golden eagles) and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm;

http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- Migratory Birds
- Wetlands

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Asheville Ecological Services Field Office
160 Zillicoa Street
Asheville, NC 28801-1082
(828) 258-3939

This project's location is within the jurisdiction of multiple offices. Expect additional species list documents from the following office, and expect that the species and critical habitats in each document reflect only those that fall in the office's jurisdiction:

Tennessee Ecological Services Field Office
446 Neal Street
Cookeville, TN 38501-4027
(931) 528-6481

Project Summary

Consultation Code: 04EN1000-2020-SLI-0324

Event Code: 04EN1000-2020-E-00774

Project Name: Calderwood Reservoir

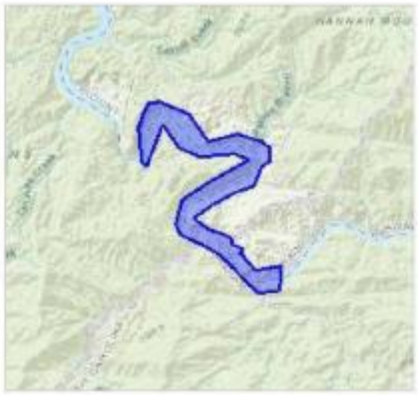
Project Type: DAM

Project Description: Brookfield Smoky Mountain Hydropower is presently working with the Low Impact Hydropower Institute (LIHI) to certify the Smoky Mountain (FERC No. 2169) as a low impact project. In preparing the application for LIHI certification, Brookfield must update or confirm consultation with resource agencies with respect to the presence of threatened or endangered species within the vicinity of the hydroelectric development. Per the request from LIHI, Brookfield respectfully requests information on the presence of threatened or endangered species within the vicinity of the above-listed projects.

As a matter of background, the license from the Federal Energy Regulatory Commission (FERC) was issued for this Project on January 25, 2005. Project operations and environmental protection measures at this Project have been largely determined by a comprehensive Offer of Settlement. The licensing processes for this Project included consultation with resource agencies regarding threatened and endangered species.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/35.474505380464834N83.95806371228866W



02/11/2020 Event Code: 04EN1000-2020-E-00774 3

Counties: Graham, NC | Swain, NC | Blount, TN | Monroe, TN

Endangered Species Act Species

There is a total of 12 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Carolina Northern Flying Squirrel *Glaucomys sabrinus coloratus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/2657	Endangered
Gray Bat *Myotis grisescens* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6329	Endangered
Indiana Bat *Myotis sodalis* There is **final** critical habitat for this species. Your location overlaps the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/5949	Endangered
Northern Long-eared Bat *Myotis septentrionalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Threatened

Reptiles

NAME	STATUS
Bog Turtle *Clemmys muhlenbergii* Population: U.S.A. (GA, NC, SC, TN, VA) No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6962	Similarity of Appearance (Threatened)

Fishes

NAME	STATUS
Spotfin Chub *Erimonax monachus* Population: Wherever found, except where listed as an experimental population There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/1521	Threatened

Clams

NAME	STATUS
Appalachian Elktoe *Alasmidonta raveneliana* There is **final** critical habitat for this species. Your location overlaps the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/5039	Endangered
Littlewing Pearlymussel *Pegias fabula* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/2572	Endangered

Snails

NAME	STATUS
Noonday Snail *Mesodon clarki nantahala* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/322	Threatened

Arachnids

NAME	STATUS
Spruce-fir Moss Spider *Microhexura montivaga* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/4801	Endangered

Flowering Plants

NAME	STATUS
Virginia Spiraea *Spiraea virginiana* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1728	Threatened

Lichens

NAME	STATUS
Rock Gnome Lichen *Gymnoderma lineare* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/3933	Endangered

Critical habitats

There are 2 critical habitats wholly or partially within your project area under this office's jurisdiction.

NAME	STATUS
Appalachian Elktoe *Alasmidonta raveneliana* https://ecos.fws.gov/ecp/species/5039#crithab	Final
Indiana Bat *Myotis sodalis* https://ecos.fws.gov/ecp/species/5949#crithab	Final

Migratory Birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

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1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Sep 1 to Aug 31
Prairie Warbler *Dendroica discolor* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Jul 31

Probability Of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

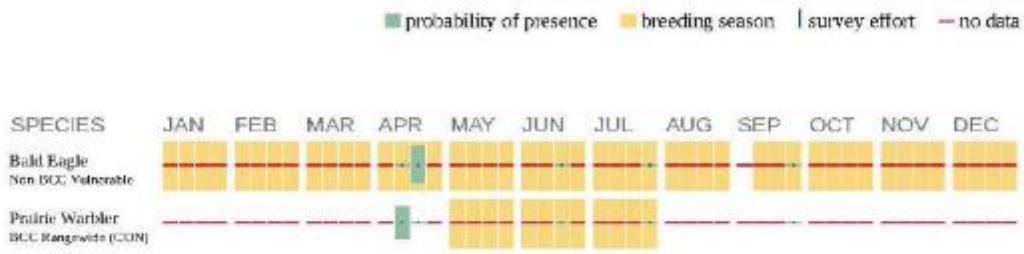
Breeding Season (■)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

Migratory Birds FAQ

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.
Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures and/or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?
The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?
The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?
To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?
Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects
For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?
If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report
The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

United States Department of the Interior
FISH AND WILDLIFE SERVICE
Tennessee Ecological Services Field Office
446 Neal Street
Cookeville, TN 38501-4027
Phone: (931) 528-6481 Fax: (931) 528-7075

In Reply Refer To:
Consultation Code: 04ET1000-2020-SLI-0660
Event Code: 04ET1000-2020-E-00926
Project Name: Calderwood Reservoir

February 11, 2020

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Tennessee Ecological Services Field Office
446 Neal Street
Cookeville, TN 38501-4027
(931) 528-6481

This project's location is within the jurisdiction of multiple offices. Expect additional species list documents from the following office, and expect that the species and critical habitats in each document reflect only those that fall in the office's jurisdiction:

Asheville Ecological Services Field Office
160 Zillicoa Street
Asheville, NC 28801-1082
(828) 258-3939

Project Summary

Consultation Code: 04ET1000-2020-SLI-0660

Event Code: 04ET1000-2020-E-00926

Project Name: Calderwood Reservoir

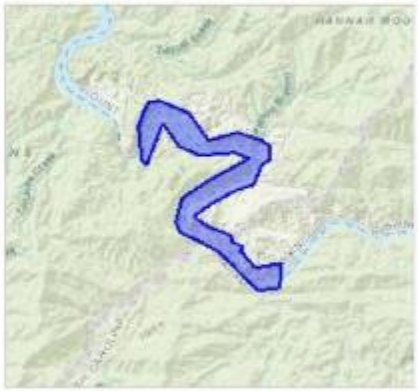
Project Type: DAM

Project Description: Brookfield Smoky Mountain Hydropower is presently working with the Low Impact Hydropower Institute (LIHI) to certify the Smoky Mountain (FERC No. 2169) as a low impact project. In preparing the application for LIHI certification, Brookfield must update or confirm consultation with resource agencies with respect to the presence of threatened or endangered species within the vicinity of the hydroelectric development. Per the request from LIHI, Brookfield respectfully requests information on the presence of threatened or endangered species within the vicinity of the above-listed projects.

As a matter of background, the license from the Federal Energy Regulatory Commission (FERC) was issued for this Project on January 25, 2005. Project operations and environmental protection measures at this Project have been largely determined by a comprehensive Offer of Settlement. The licensing processes for this Project included consultation with resource agencies regarding threatened and endangered species.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/35.474505380464834N83.95806371228866W



02/11/2020 Event Code: 04ET1000-2020-E-00926 3

Counties: Graham, NC | Swain, NC | Blount, TN | Monroe, TN

Endangered Species Act Species

There is a total of 12 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Carolina Northern Flying Squirrel *Glaucomys sabrinus coloratus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/2657	Endangered
Gray Bat *Myotis grisescens* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6329	Endangered
Indiana Bat *Myotis sodalis* There is **final** critical habitat for this species. Your location overlaps the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/5949	Endangered
Northern Long-eared Bat *Myotis septentrionalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Threatened

Fishes

NAME	STATUS
Duskytail Darter *Etheostoma percnurum* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/891	Endangered
Spotfin Chub *Erimonax monachus* Population: Wherever found, except where listed as an experimental population There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/1521	Threatened

Clams

NAME	STATUS
Cumberland Bean (pearlymussel) *Villosa trabalis* Population: Wherever found; Except where listed as Experimental Populations No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6061	Endangered

Snails

NAME	STATUS
Anthony's Riversnail *Athearnia anthonyi* Population: Wherever found; Except where listed as Experimental Populations No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4827	Endangered
Anthony's Riversnail *Athearnia anthonyi* Population: U.S.A. (TN - specified portions of the French Broad and Holston Rivers; see 17.85(b)(1)) No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4827	Experimental Population, Non-Essential

Flowering Plants

NAME	STATUS
Spreading Avens *Geum radiatum* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6854	Endangered
Virginia Spiraea *Spiraea virginiana* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1728	Threatened
White Fringeless Orchid *Platanthera integrilabia* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1889	Threatened

Critical habitats

There is 1 critical habitat wholly or partially within your project area under this office's jurisdiction.

NAME	STATUS
Indiana Bat *Myotis sodalis* https://ecos.fws.gov/ecp/species/5949#crithab	Final

Wetlands

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

LAKE
- L1UBHh

RIVERINE
- R4SBC
- R5UBH
- R3UB1H

United States Department of the Interior
FISH AND WILDLIFE SERVICE
Tennessee Ecological Services Field Office
446 Neal Street
Cookeville, TN 38501-4027
Phone: (931) 528-6481 Fax: (931) 528-7075

In Reply Refer To:
Consultation Code: 04ET1000-2020-SLI-0657
Event Code: 04ET1000-2020-E-00920
Project Name: Chilhowee Development

February 11, 2020

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

Official Species List

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This species list is provided by:

Tennessee Ecological Services Field Office
446 Neal Street
Cookeville, TN 38501-4027
(931) 528-6481

Project Summary

Consultation Code: 04ET1000-2020-SLI-0657

Event Code: 04ET1000-2020-E-00920

Project Name: Chilhowee Development

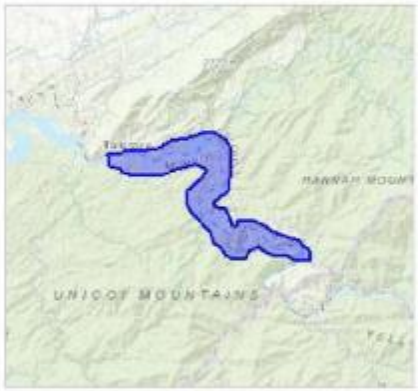
Project Type: DAM

Project Description: Brookfield Smoky Mountain Hydropower is presently working with the Low Impact Hydropower Institute (LIHI) to certify the Smoky Mountain (FERC No. 2169) as a low impact project. In preparing the application for LIHI certification, Brookfield must update or confirm consultation with resource agencies with respect to the presence of threatened or endangered species within the vicinity of the hydroelectric development. Per the request from LIHI, Brookfield respectfully requests information on the presence of threatened or endangered species within the vicinity of the above-listed projects.

As a matter of background, the license from the Federal Energy Regulatory Commission (FERC) was issued for this Project on January 25, 2005. Project operations and environmental protection measures at this Project have been largely determined by a comprehensive Offer of Settlement. The licensing processes for this Project included consultation with resource agencies regarding threatened and endangered species.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/35.520900849449 84N84.0067610414183 2W



Counties: Blount, TN | Monroe, TN

Endangered Species Act Species

There is a total of 12 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Carolina Northern Flying Squirrel *Glaucomys sabrinus coloratus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/2657	Endangered
Gray Bat *Myotis grisescens* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6329	Endangered
Indiana Bat *Myotis sodalis* There is **final** critical habitat for this species. Your location overlaps the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/5949	Endangered
Northern Long-eared Bat *Myotis septentrionalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Threatened

Fishes

NAME	STATUS
Duskytail Darter *Etheostoma percnurum* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/891	Endangered
Spotfin Chub *Erimonax monachus* Population: Wherever found, except where listed as an experimental population There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/1321	Threatened

Clams

NAME	STATUS
Cumberland Bean (pearlymussel) *Villosa trabalis* Population: Wherever found; Except where listed as Experimental Populations No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6061	Endangered

Snails

NAME	STATUS
Anthony's Riversnail *Athearnia anthonyi* Population: U.S.A. (TN - specified portions of the French Broad and Holston Rivers; see 17.85(b)(1)) No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4827	Experimental Population, Non-Essential
Anthony's Riversnail *Athearnia anthonyi* Population: Wherever found; Except where listed as Experimental Populations No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4827	Endangered

Flowering Plants

NAME	STATUS
Spreading Avens *Geum radiatum* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6854	Endangered
Virginia Spiraea *Spiraea virginiana* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1728	Threatened
White Fringeless Orchid *Platanthera integrilabia* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1889	Threatened

Critical habitats

There is 1 critical habitat wholly or partially within your project area under this office's jurisdiction.

NAME	STATUS
Indiana Bat *Myotis sodalis* https://ecos.fws.gov/ecp/species/5949#crithab	Final

NC DEPARTMENT OF NATURAL AND CULTURAL RESOURCES

Roy Cooper, **Governor**
Susi Hamilton, **Secretary**
Walter Clark, **Director, Land and Water Stewardship**

NCNHDE-11492

February 27, 2020

Johanna Velasquez
HDR Inc
440 S. Church Street
Charlotte, NC 28202
RE: Smoky_LIHI_Recertification; 10217273

Dear Johanna Velasquez:

The North Carolina Natural Heritage Program (NCNHP) appreciates the opportunity to provide information about natural heritage resources for the project referenced above.

A query of the NCNHP database indicates that there are records for rare species, important natural communities, natural areas, and/or conservation/managed areas within the proposed project boundary. These results are presented in the attached 'Documented Occurrences' tables and map.

The attached 'Potential Occurrences' table summarizes rare species and natural communities that have been documented within a one-mile radius of the property boundary. The proximity of these records suggests that these natural heritage elements may potentially be present in the project area if suitable habitat exists. Tables of natural areas and conservation/managed areas within a one-mile radius of the project area, if any, are also included in this report.

If a Federally-listed species is documented within the project area or indicated within a one-mile radius of the project area, the NCNHP recommends contacting the US Fish and Wildlife Service (USFWS) for guidance. Contact information for USFWS offices in North Carolina is found here: https://www.fws.gov/offices/Directory/ListOffices.cfm?statecode=37.

Please note that natural heritage element data are maintained for the purposes of conservation planning, project review, and scientific research, and are not intended for use as the primary criteria for regulatory decisions. Information provided by the NCNHP database may not be published without prior written notification to the NCNHP, and the NCNHP must be credited as an information source in these publications. Maps of NCNHP data may not be redistributed without permission.

Also please note that the NC Natural Heritage Program may follow this letter with additional correspondence if a Dedicated Nature Preserve, Registered Heritage Area, Clean Water Management Trust Fund easement, or an occurrence of a Federally-listed species is documented near the project area.

If you have questions regarding the information provided in this letter or need additional assistance, please contact Rodney A. Butler at rodney.butler@ncdcr.gov or 919-707-8603.

Sincerely,
NC Natural Heritage Program

DEPARTMENT OF NATURAL AND CULTURAL RESOURCES
121 W. JONES STREET, RALEIGH, NC 27603 • 1651 MAIL SERVICE CENTER, RALEIGH, NC 27699
OFC 919.707.9120 • FAX 919.707.9121

Natural Heritage Element Occurrences, Natural Areas, and Managed Areas Intersecting the Project Area
Smoky_LP_Recertification
Project No. 10217273
January 27, 2020
NCN_ID1-11492

Element Occurrences Documented Within Project Area

Taxonomic Group	EO ID	Scientific Name	Common Name	Last Observation Date	Element Occurrence Rank	Accuracy	Federal Status	State Status	Global Rank	State Rank
Amphibian	21828	Cryptobranchus alleganiensis alleganiensis	Eastern Hellbender	2018-10-29	AB	3-Medium	---	Special Concern	G3T2	S3
Amphibian	16733	Cryptobranchus alleganiensis alleganiensis	Eastern Hellbender	2018-10-13	AB	3-Medium	---	Special Concern	G3T2	S3
Amphibian	27561	Cryptobranchus alleganiensis alleganiensis	Eastern Hellbender	2004-08-17	E	3-Medium	---	Special Concern	G3T2	S3
Amphibian	7903	Eurycea junaluska	Junaluska Salamander	2018-05-17	BC	3-Medium	---	Threatened	G2G3	S
Amphibian	13753	Eurycea junaluska	Junaluska Salamander	2014-07-11	A?	3-Medium	---	Threatened	G2G3	S
Amphibian	35480	Plethodon aureolus	Tellico Salamander	2012-05-26	E	3-Medium	---	Significantly Rare	G2G3	S2
Bird	25178	Haliaeetus leucocephalus	Bald Eagle	2015-02	E	3-Medium	Bald/Golden Eagle Protection Act	Threatened	G5	S3B,S3N
Bird	31328	Haliaeetus leucocephalus	Bald Eagle	2015-03	E	2-High	Bald/Golden Eagle Protection Act	Threatened	G5	S3B,S3N
Butterfly	24856	Autochton cellus	Golden Banded-Skipper	2007-06-15	E	3-Medium	---	Significantly Rare	G4	S2
Butterfly	20005	Autochton cellus	Golden Banded-Skipper	1999-04-29	H?	3-Medium	---	Significantly Rare	G4	S2
Butterfly	28792	Erynnis martialis	Mottled Duskywing	2010-05-06	E	3-Medium	---	Significantly Rare	G3	S2
Butterfly	20261	Euphydryas phaeton	Baltimore Checkerspot	2004-05-20	H?	3-Medium	---	Significantly Rare	G5	S2
Dragonfly or Damselfly	33679	Ophiogomphus colubrinus	Flag-tailed Spinyleg	2014-06-26	E	3-Medium	---	Significantly Rare	G4G5	S

Element Occurrences Documented Within Project Area

Taxonomic Group	EO ID	Scientific Name	Common Name	Last Observation Date	Element Occurrence Rank	Accuracy	Federal Status	State Status	Global Rank	State Rank
Freshwater Bivalve	21097	Alasmidonta raveneliana	Appalachian Elktoe	2018-11-26	C??	5-Medium	Endangered	Endangered	G1	S1
Freshwater Bivalve	39254	Alasmidonta viridis	Slippershell Mussel	2018-11-26	E	3-Medium	---	Endangered	G4G5	S1
Freshwater Bivalve	28599	Lamosilis fasciola	Wavyrayed Lampmussel	2018-11-26	Er	3-Medium	---	Special Concern	G5	S2
Freshwater Bivalve	39262	Villosa iris	Rainbow	2018-11-26		5-Medium	---	Threatened	G5	S2
Freshwater Fish	27470	Chrosomus sp. 1	Smoky Dace	2016-06-07		5-Medium	---	Special Concern	G5T5Q	S2
Freshwater Fish	27471	Chrosomus sp. 1	Smoky Dace	1997-07-23	-?	3-Medium	---	Special Concern	G5T3Q	S2
Freshwater Fish	27472	Chrosomus sp. 1	Smoky Dace	1997-07-15	-?	3-Medium	---	Special Concern	G5T3Q	S2
Freshwater Fish	31089	Etheostoma vulneratum	Wounded Darter	2018-06-07	Cr	5-Medium	---	Special Concern	G3	S2
Freshwater or Terrestrial Gastropod	1727	Paravitrea umbilicaris	Open Supercoil	1946-Pre		5-Medium	---	Special Concern	G3?	S2
Liverwort	21805	Plagiochila echinata	A Liverwort	1998		5-Medium	---	Significantly Rare Limited	G2	S1
Liverwort	22021	Plagiochila sullivantii var. sullivantii	A Liverwort	1991-09-09	E	3-Medium	---	Significantly Rare Throughout	G2T2	S2
Liverwort	21844	Plagiochila sullivantii var. sullivantii	A Liverwort	1998		5-Medium	---	Significantly Rare Throughout	G2T2	S2
Mammal	11389	Corynorhinus rafinesquii rafinesquii	Rafinesque's Big-eared Bat	2000-10-1	?	5-Medium	---	Threatened	G5G4T5	S2
Mammal	1602	Myotis leibii	Eastern Small-footed Bat	2000-10-1	-?	3-Medium	---	Special Concern	G4	S2
Mammal	34760	Myotis lucifugus	Little Brown Bat	2012-08-12	E	2-High	---	Significantly Rare	G3	S2
Mammal	35191	Myotis lucifugus	Little Brown Bat	2000-07-14	?	2-High	---	Significantly Rare	G3	S2

Element Occurrences Documented Within Project Area

Taxonomic Group	EO ID	Scientific Name	Common Name	Last Observation Date	Element Occurrence Rank	Accuracy	Federal Status	State Status	Global Rank	State Rank
Mammal	36044	Myotis lucifugus	Little Brown Bat	2006-07-25	C	5-Medium	---	Significantly Rare	G5	S2
Mammal	34790	Myotis septentrionalis	Northern Long-eared Bat	2012-08-15	E	2-High	Threatened	Threatened	G1G2	S2
Mammal	32835	Myotis septentrionalis	Northern Long-eared Bat	2010-07-11	E	2-High	Threatened	Threatened	G1G2	S2
Mammal	35265	Myotis septentrionalis	Northern Long-eared Bat	2000	?	2-High	Threatened	Threatened	G1G2	S2
Mammal	26682	Myotis sodalis	Indiana Bat	2005-06-07	C	5-Medium	Endangered	Endangered	G2	S1S2
Mammal	34795	Perimyotis subflavus	Tricolored Bat	2012-08-15	E	2-High	---	Significantly Rare	G2G3	S3
Mammal	37956	Spilogale putorius	Eastern Spotted Skunk	2018-05-30	C	5-Medium	---	Game Animal	G4	S5
Moss	22013	Scopelophila ligulata	Copper Moss	1991-03-05	E	3-Medium	---	Significantly Rare; Other	G5?	S?
Natural Community	38504	Acidic Cove Forest (Silverbell Subtype)	---	1997	A	2-High	---	---	G2	S
Natural Community	31440	Acidic Cove Forest (Typic Subtype)	---	2011-06-18	BC	5-Medium	---	---	G5	S4
Natural Community	31554	Acidic Cove Forest (Typic Subtype)	---	2011-06-08	C	2-High	---	---	G5	S4
Natural Community	31552	Acidic Cove Forest (Typic Subtype)	---	2011-10-05	C	3-Medium	---	---	G5	S4
Natural Community	31871	Chestnut Oak Forest (Dry Heath Subtype)	---	2012-09-04	C	5-Medium	---	---	G5	S5
Natural Community	31869	Chestnut Oak Forest (Dry Heath Subtype)	---	2011-05-25	AB	5-Medium	---	---	G5	S5
Natural Community	31873	Chestnut Oak Forest (Herb Subtype)	---	2011-10-05	B	3-Medium	---	---	G4G5	S4
Natural Community	31453	Low Elevation Rocky Summit (Acidic Subtype)	---	2011-10-14	B	2-High	---	---	G3?	S2
Natural Community	31454	Low Mountain Pine Forest (Shortleaf Pine Subtype)	---	2011-10-14	B	2-High	---	---	G2G3	S2

Element Occurrences Documented Within Project Area

Taxonomic Group	EO ID	Scientific Name	Common Name	Last Observation Date	Element Occurrence Rank	Accuracy	Federal Status	State Status	Global Rank	State Rank
Natural Community	31465	Montane Alluvial Forest (Large River Subtype)	---	2011-05-29	C	2-High	---	---	G2?	S?
Natural Community	31952	Montane Cliff (Acidic Herb Subtype)	---	2011-10-05	B	2-High	---	---	G3G4	S3
Natural Community	31946	Montane Oak-Hickory Forest (Mesic Subtype)	---	2011-06-11	A	2-High	---	---	G5	S3
Natural Community	31069	Pine-Oak/Heath (Typic Subtype)	---	2011-05-25	C	3-Medium	---	---	G3	S3
Natural Community	32049	Rich Cove Forest (Boulderfield Subtype)	---	2012-03-29	A	3-Medium	---	---	G3	S2
Natural Community	31471	Rich Cove Forest (Boulderfield Subtype)	---	2011-05-29	B	2-High	---	---	G3	S2
Natural Community	31992	Rich Cove Forest (Montane Rich Subtype)	---	2012-09-04	B	3-Medium	---	---	G3G4	S3
Natural Community	31103	Rich Cove Forest (Montane Rich Subtype)	---	2011-06-25	BC	3-Medium	---	---	G3G4	S3
Natural Community	32019	Rich Cove Forest (Montane Rich Subtype)	---	2011-10-05	B	3-Medium	---	---	G3G4	S3
Natural Community	31485	Rocky Bar and Shore (Alder-Yellowroot Subtype)	---	2011-06-18	B	2-High	---	---	G3G4	S3
Natural Community	32025	Spray Cliff	---	2011-10-05	B	2-High	---	---	G2	S2
Natural Community	31479	White Pine Forest	---	2011-05-29	B	3-Medium	---	---	G2G3	S2
Vascular Plant	30144	Adlumia fungosa	Climbing Fumitory	2011-10-11	C	2-High	---	Special Concern Vulnerable	G4	S2
Vascular Plant	29135	Adlumia fungosa	Climbing Fumitory	2012-08	E	2-High	---	Special Concern Vulnerable	G4	S2

Element Occurrences Documented Within Project Area

Taxonomic Group	EO ID	Scientific Name	Common Name	Last Observation Date	Element Occurrence Rank	Accuracy	Federal Status	State Status	Global Rank	State Rank
Vascular Plant	1978	Carex purpurifera	Purple Sedge	1994-08	B	3-Medium	---	Special Concern Vulnerable	G4?	S3
Vascular Plant	29193	Carex purpurifera	Purple Sedge	2012-08	A	2-High	---	Special Concern Vulnerable	G4?	S3
Vascular Plant	21804	Dicentra exima	Bleeding Heart	1998		3-Medium	---	Significantly Rare Peripheral	G4	S3
Vascular Plant	29199	Dicentra exima	Bleeding Heart	2012-08	E	2-High	---	Significantly Rare Peripheral	G4	S3
Vascular Plant	5101	Didymoglossum petersii	Dwarf Filmy-fern	1998-06-17	C	3-Medium	---	Significantly Rare Throughout	G4G5	S2
Vascular Plant	12579	Didymoglossum petersii	Dwarf Filmy-fern	1979-03-19	H	3-Medium	---	Significantly Rare Throughout	G4G5	S2
Vascular Plant	21845	Didymoglossum petersii	Dwarf Filmy-fern	1998-11-19	B	2-High	---	Significantly Rare Throughout	G4G5	S2
Vascular Plant	2723	Didymoglossum petersii	Dwarf Filmy-fern	1999-10-20	AB	2-High	---	Significantly Rare Throughout	G4G5	S2
Vascular Plant	21827	Didymoglossum petersii	Dwarf Filmy-fern	1998-06-17		2-High	---	Significantly Rare Throughout	G4G5	S2
Vascular Plant	21826	Didymoglossum petersii	Dwarf Filmy-fern	1998-06-17		2-High	---	Significantly Rare Throughout	G4G5	S2
Vascular Plant	30165	Echinacea purpurea	Purple Coneflower	2011-06-24	H	2-High	---	Special Concern Vulnerable	G4	S
Vascular Plant	30163	Erigenia bulbosa	Harbinger-of-spring	2011-04		2-High	---	Significantly Rare Peripheral	G5	S

Element Occurrences Documented Within Project Area

Taxonomic Group	EO ID	Scientific Name	Common Name	Last Observation Date	Element Occurrence Rank	Accuracy	Federal Status	State Status	Global Rank	State Rank
Vascular Plant	31708	Platanthera peramoena	Purple Fringeless Orchid	2012-08-04	D	2-High	---	Threatened	G5	S2
Vascular Plant	30179	Platanthera peramoena	Purple Fringeless Orchid	2011-08-18	D	2-High	---	Threatened	G5	S2
Vascular Plant	31715	Smilax hugeri	Huger's Carrion-flower	2012-09-04	C	2-High	---	Significantly Rare Peripheral	G4	S3
Vascular Plant	14324	Spiraea virginiana	Virginia Spiraea	2018-06-13	BC	2-High	Threatened	Threatened	G2	S2
Vascular Plant	30471	Spiraea virginiana	Virginia Spiraea	2011-06-09	D	2-High	Threatened	Threatened	G2	S2
Vascular Plant	25737	Spiraea virginiana	Virginia Spiraea	2007-06-01	F	2-High	Threatened	Threatened	G2	S2
Vascular Plant	3765	Spiraea virginiana	Virginia Spiraea	2018-06-13	C	2-High	Threatened	Threatened	G2	S2
Vascular Plant	16185	Spiraea virginiana	Virginia Spiraea	2003	C	2-High	Threatened	Threatened	G2	S2
Vascular Plant	30336	Stewartia ovata	Mountain Camellia	2013-06-18	BC	2-High	---	Significantly Rare Peripheral	G4	S3
Vascular Plant	30337	Stewartia ovata	Mountain Camellia	2011-05-25	B	2-High	---	Significantly Rare Peripheral	G4	S3
Vascular Plant	30339	Stewartia ovata	Mountain Camellia	2011-10-05	C	2-High	---	Significantly Rare Peripheral	G4	S3
Vascular Plant	35801	Stewartia ovata	Mountain Camellia	2013-07-23	C	2-High	---	Significantly Rare Peripheral	G4	S3
Vascular Plant	34845	Stewartia ovata	Mountain Camellia	2013-05-24	CD	2-High	---	Significantly Rare Peripheral	G4	S3
Vascular Plant	27233	Vandenboschia boschiana	Appalachian Filmy-fern	1995	[illegible]	3-Medium	---	Endangered	G4	S1
Vascular Plant	30345	Vandenboschia boschiana	Appalachian Filmy-fern	2011-10-11	B	2-High	---	Endangered	G4	S1

Natural Areas Documented Within Project Area

Site Name	Representational Rating	Collective Rating
LTN/Cheoah River Aquatic Habitat	R1 (Exceptional)	C3 (High)
Great Smoky Mountains National Park	R1 (Exceptional)	C1 (Exceptional)

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Natural Areas Documented Within Project Area

Site Name	Representational Rating	Collective Rating
Yellow Creek Wetlands and Slopes	R1 (Exceptional)	C3 (High)
LTN/Santeetlah Creek Aquatic Habitat	R1 (Exceptional)	C4 (Moderate)
LTN/Snowbird Creek Aquatic Habitat	R3 (High)	C4 (Moderate)
Cheoah Mountains	R1 (Exceptional)	C1 (Exceptional)
Farley Branch	R3 (High)	C4 (Moderate)
Tapoco/Calderwood Lake Slopes	R2 (Very High)	C3 (High)
Round Mountain Cove	R2 (Very High)	C3 (High)
Rocky Point - Farley Branch/Little Tennessee Slopes	R3 (High)	C4 (Moderate)
Cheoah River - Floodplain	R2 (Very High)	C1 (Exceptional)
Joyce Kilmer Wilderness Area	R1 (Exceptional)	C1 (Exceptional)

Managed Areas Documented Within Project Area*

Managed Area Name	Owner	Owner Type
Great Smoky Mountains National Park	US National Park Service	Federal
Great Smoky Mountains Registered Heritage Area	US National Park Service	Federal
Nantahala National Forest - Cheoah Ranger District	US Forest Service	Federal
Nantahala National Forest - Joyce Kilmer Wilderness	US Forest Service	Federal
Joyce Kilmer Wilderness Registered Heritage Area	US Forest Service	Federal
Mainsprig Conservation Trust Easement	Land Trust for the Little Tennessee	Private

*NOTE: If the proposed project intersects with a conservation/managed area, please contact the landowner directly for additional information. If the project intersects with a Dedicated Nature Preserve (DNP), Registered Natural Heritage Area (RHA), or Federally listed species, NCNHP staff may provide additional correspondence regarding the project.

Definitions and an explanation of status designations and codes can be found at https://ncnhde.natureserve.org/content/help. Data query generated on February 27, 2020; source: NCNHP, 07 Jan 2020. Please resubmit your information request 4 months then one year calendar before project initiation as new information is continually added to the NCNHP database.

Natural Heritage Element Occurrences, Natural Areas, and Managed Areas Within a One-mile Radius of the Project Area
Smoky_LP_Recertification
Project No. 10217273
January 27, 2020
NCN_ID1-1492

Element Occurrences Documented Within a One-mile Radius of the Project Area

Taxonomic Group	EO ID	Scientific Name	Common Name	Last Observed Date	Element Occurrence Rank	Accuracy	Federal Status	State Status	Global Rank	State Rank
Amphibian	21828	Cryptobranchus alleganensis alleganensis	Eastern Hellbender	2019-10-29	AB	5-Medium	---	Special Concern	G3T2	S3
Amphibian	16733	Cryptobranchus alleganensis alleganensis	Eastern Hellbender	2018-10-13	AB	5-Medium	---	Special Concern	G3T2	S3
Amphibian	27561	Cryptobranchus alleganensis alleganensis	Eastern Hellbender	2004-08-17	C	5-Medium	---	Special Concern	G3T2	S3
Amphibian	7903	Eurycea junaluska	Junaluska Salamander	2018-05-17	BC	5-Medium	---	Threatened	G2G3	S2
Amphibian	13753	Eurycea junaluska	Junaluska Salamander	2014-07-11	A?	3-Medium	---	Threatened	G2G3	S2
Amphibian	14289	Eurycea junaluska	Junaluska Salamander	1992-06-29	?	5-Medium	---	Threatened	G2G3	S2
Amphibian	35480	Plethodon aureolus	Tellico Salamander	2012-05-25	E	3-Medium	---	Significantly Rare	G2G3	S2
Bird	25178	Haliaeetus leucocephalus	Bald Eagle	2015-07	C	5-Medium	Bald/Golden Eagle Protection Act	Threatened	G5	S3B,S3N
Bird	31328	Haliaeetus leucocephalus	Bald Eagle	2015-03	E	2-High	Bald/Golden Eagle Protection Act	Threatened	G5	S3B,S3N
Bird	37807	Loxia curvirostra	Red Crossbill	2014-09-27	C	2-High	---	Special Concern	G5	S2
Bird	15334	Setophaga cerulea	Cerulean Warbler	1982-06	H	3-Medium	---	Special Concern	G4	S2B
Bird	3244	Setophaga cerulea	Cerulean Warbler	2000-05	A	3-Medium	---	Special Concern	G4	S2B
Bird	54180	Vermivora chrysoptera	Golden-winged Warbler	2017-05-17	C	2-High	---	Special Concern	G4	S2S3B

Element Occurrences Documented Within a One-mile Radius of the Project Area

Taxonomic Group	EO ID	Scientific Name	Common Name	Last Observation Date	Element Occurrence Rank	Accuracy	Federal Status	State Status	Global Rank	State Rank
Bird	117	Vermivora cyanoptera	Blue-winged Warbler	1984-07-11		4-Low	---	Significantly Rare	G5	S2B
Butterfly	9836	Autochton cellus	Golden Banded-Skipper	2003-06	E	4-Low	---	Significantly Rare	G4	S2
Butterfly	15130	Autochton cellus	Golden Banded-Skipper	2000-Pre	-?	4-Low	---	Significantly Rare	G4	S2
Butterfly	28791	Autochton cellus	Golden Banded-Skipper	2010-05-05		3-Medium	---	Significantly Rare	G4	S2
Butterfly	24966	Autochton cellus	Golden Banded-Skipper	2007-05-15		3-Medium	---	Significantly Rare	G4	S2
Butterfly	21057	Autochton cellus	Golden Banded-Skipper	2004-07-06	3C	3-Medium	---	Significantly Rare	G4	S2
Butterfly	10966	Autochton cellus	Golden Banded-Skipper	1996-04-27	-?	3-Medium	---	Significantly Rare	G4	S2
Butterfly	20100	Autochton cellus	Golden Banded-Skipper	1999-04-28	?	3-Medium	---	Significantly Rare	G4	S2
Butterfly	13975	Celastrina nigra	Dusky Azure	1996-04-28	?	3-Medium	---	Significantly Rare	G4	S2
Butterfly	25792	Erynnis martialis	Mottled Duskywing	2010-05-05	E	3-Medium	---	Significantly Rare	G3	S2
Butterfly	20261	Euphydryas phaeton	Baltimore Checkerspot	2004-05-20	B?	3-Medium	---	Significantly Rare	G5	S2
Butterfly	11944	Polygonia faunus	Green Comma	1996-04-25	?	3-Medium	---	Significantly Rare	G5	S1S2
Butterfly	1106	Polygonia faunus	Green Comma	1996-04-27	?	3-Medium	---	Significantly Rare	G5	S1S2
Dragonfly or Damselfly	33679	Dromogomphus spoliatus	Flag-tailed Spinyleg	2014-06-23	E	3-Medium	---	Significantly Rare	G4G5	S1
Dragonfly or Damselfly	33785	Stylurus scudderi	Zebra Clubtail	2004-Pre	?	5-Very Low	---	Significantly Rare	G5	S2?
Freshwater Bivalve	21092	Alasmidonta raveneliana	Appalachian Elktoe	2018-11-26	CD?	3-Medium	Endangered	Endangered	G1	S1
Freshwater Bivalve	13440	Alasmidonta raveneliana	Appalachian Elktoe	1981-Pre	X?	2-High	Endangered	Endangered	G1	S1
Freshwater Bivalve	39254	Alasmidonta viridis	Slippershell Mussel	2018-11-26	E	3-Medium	---	Endangered	G4G5	S1

Element Occurrences Documented Within a One-mile Radius of the Project Area

Taxonomic Group	EO ID	Scientific Name	Common Name	Last Observation Date	Element Occurrence Rank	Accuracy	Federal Status	State Status	Global Rank	State Rank
Freshwater Bivalve	26599	Lampsilis fasciola	Wavyrayed Lampmussel	2018-11-28	H	5-Medium	---	Special Concern	G5	S2
Freshwater Bivalve	39262	Villosa iris	Rainbow	2018-11-26	E	3-Medium	---	Threatened	G5	S2
Freshwater Fish	27470	Catostomus sp. 1	Smoky Dace	2016-06-07	E	3-Medium	---	Special Concern	G5T3Q	S2
Freshwater Fish	27471	Catostomus sp. 1	Smoky Dace	1997-07-23	?	5-Medium	---	Special Concern	G5T3Q	S2
Freshwater Fish	27472	Catostomus sp. 1	Smoky Dace	1997-07-15	?	5-Medium	---	Special Concern	G5T3Q	S2
Freshwater Fish	31089	Etheostoma vulneratum	Wounded Darter	2016-06-07	Ex	3-Medium	---	Special Concern	G3	S2
Freshwater Fish	34520	Moxostoma sp. 2	Sicklefin Redhorse	2008-10-08	E	3-Medium	---	Threatened	G1G2	S2
Freshwater or Terrestrial Gastropod	37648	Discus nigromontanus	Black Mountain Disc	2005-10-26		2-High	---	Significantly Rare	G4	S2S3
Freshwater or Terrestrial Gastropod	35976	Glyphyalinia junaluskana	Dark Glyph	2006-06-15		2-High	---	Special Concern	G2G3	S2
Freshwater or Terrestrial Gastropod	1027	Paravitrea umbilicaris	Open Supercoil	1946-Pre		5-Medium	---	Special Concern	G3?	S2
Freshwater or Terrestrial Gastropod	35955	Paravitrea umbilicaris	Open Supercoil	2006-06-15		2-High	---	Special Concern	G3?	S2
Liverwort	21805	Plagiochila echinata	A Liverwort	1998		5-Medium	---	Significantly Rare Limited	G2	S1
Liverwort	22021	Plagiochila sullivantii var. sullivantii	A Liverwort	1991-09-06		5-Medium	---	Significantly Rare Throughout	G2T2	S2
Liverwort	21844	Plagiochila sullivantii var. sullivantii	A Liverwort	1998		5-Medium	---	Significantly Rare Throughout	G2T2	S2
Liverwort	29261	Plagiochila virginica var. carolinana	A Liverwort	2012-08		2-High	---	Significantly Rare Throughout	G3T2	S1

Element Occurrences Documented Within a One-mile Radius of the Project Area

Taxonomic Group	EO ID	Scientific Name	Common Name	Last Observation Date	Element Occurrence Rank	Accuracy	Federal Status	State Status	Global Rank	State Rank
Liverwort	8574	Aneura walaugensis	A Liverwort	1990-Jne	I	4-Low	---	Significantly Rare Limited	G?Q?G	S
Mammal	250	Corynorhinus rafinesquii rafinesquii	Rafinesque's Big-eared Bat	2000-07-14	--?	3-Medium	---	Threatened	G3G4T3	S2
Mammal	11399	Corynorhinus rafinesquii rafinesquii	Rafinesque's Big-eared Bat	2000-10-11	--?	3-Medium	---	Threatened	G3G4T3	S2
Mammal	1602	Myotis leib	Eastern Small-footed Bat	2000-10-11	?	3-Medium	---	Special Concern	G4	S2
Mammal	27987	Myotis leib	Eastern Small-footed Bat	2009-06-02	E	2-High	---	Special Concern	G4	S2
Mammal	34024	Myotis leib	Eastern Small-footed Bat	2006-07-25	E	2-High	---	Special Concern	G4	S2
Mammal	36464	Myotis lucifugus	Little Brown Bat	2000-07-16	--?	3-Medium	---	Significantly Rare	G3	S2
Mammal	36012	Myotis lucifugus	Little Brown Bat	2007-07-27	E	2-High	---	Significantly Rare	G3	S2
Mammal	36040	Myotis lucifugus	Little Brown Bat	2007-06-22	E	2-High	---	Significantly Rare	G3	S2
Mammal	36035	Myotis lucifugus	Little Brown Bat	2007-06-22	E	2-High	---	Significantly Rare	G3	S2
Mammal	34760	Myotis lucifugus	Little Brown Bat	2012-08-12	E	2-High	---	Significantly Rare	G3	S2
Mammal	34756	Myotis lucifugus	Little Brown Bat	2012-08-15	E	2-High	---	Significantly Rare	G3	S2
Mammal	35191	Myotis lucifugus	Little Brown Bat	2000-07-14	?	2-High	---	Significantly Rare	G3	S2
Mammal	34769	Myotis lucifugus	Little Brown Bat	2012-08-13	E	2-High	---	Significantly Rare	G3	S2
Mammal	35179	Myotis lucifugus	Little Brown Bat	2006-08-07	E	2-High	---	Significantly Rare	G3	S2
Mammal	36044	Myotis lucifugus	Little Brown Bat	2006-07-25	E	3-Medium	---	Significantly Rare	G3	S2
Mammal	36675	Myotis lucifugus	Little Brown Bat	2006-07-25	E	2-High	---	Significantly Rare	G3	S2
Mammal	34758	Myotis lucifugus	Little Brown Bat	2012-08-11	E	2-High	---	Significantly Rare	G3	S2

Element Occurrences Documented Within a One-mile Radius of the Project Area

Taxonomic Group	EO ID	Scientific Name	Common Name	Last Observation Date	Element Occurrence Rank	Accuracy	Federal Status	State Status	Global Rank	State Rank
Mammal	34170	Myotis septentrionalis	Northern Long-eared Bat	2000-07-17	-?	5-Medium	Threatened	Threatened	G1G2	S2
Mammal	32148	Myotis septentrionalis	Northern Long-eared Bat	2000-07-14	-?	2-High	Threatened	Threatened	G1G2	S2
Mammal	34169	Myotis septentrionalis	Northern Long-eared Bat	2000-06-09	-?	3-Medium	Threatened	Threatened	G1G2	S2
Mammal	34790	Myotis septentrionalis	Northern Long-eared Bat	2012-08-15		2-High	Threatened	Threatened	G1G2	S2
Mammal	34208	Myotis septentrionalis	Northern Long-eared Bat	2009-06-06		2-High	Threatened	Threatened	G1G2	S2
Mammal	34211	Myotis septentrionalis	Northern Long-eared Bat	2011-07-27	E	2-High	Threatened	Threatened	G1G2	S2
Mammal	32790	Myotis septentrionalis	Northern Long-eared Bat	2006-07-25	E	2-High	Threatened	Threatened	G1G2	S2
Mammal	34216	Myotis septentrionalis	Northern Long-eared Bat	2007-06-22		2-High	Threatened	Threatened	G1G2	S2
Mammal	37855	Myotis septentrionalis	Northern Long-eared Bat	2010-07-11		2-High	Threatened	Threatened	G1G2	S2
Mammal	35255	Myotis septentrionalis	Northern Long-eared Bat	2000	-?	2-High	Threatened	Threatened	G1G2	S2
Mammal	29682	Myotis sodalis	Indiana Bat	2005-06-07	E	3-Medium	Endangered	Endangered	G2	S1S2
Mammal	32457	Myotis sodalis	Indiana Bat	2017-10-06	E	2-High	Endangered	Endangered	G2	S1S2
Mammal	36157	Perimyotis subflavus	Tricolored Bat	2008-06-07		4-Low	---	Significantly Rare	G2G3	S3
Mammal	34795	Perimyotis subflavus	Tricolored Bat	2012-08-15		2-High	---	Significantly Rare	G2G3	S3
Mammal	36156	Perimyotis subflavus	Tricolored Bat	2006-07-25	E	2-High	---	Significantly Rare	G2G3	S3
Mammal	35260	Perimyotis subflavus	Tricolored Bat	2006-08-07		2-High	---	Significantly Rare	G2G3	S3
Mammal	36805	Perimyotis subflavus	Tricolored Bat	2006-07-25		2-High	---	Significantly Rare	G2G3	S3
Mammal	32956	Spilogale putorius	Eastern Spotted Skunk	2019-03-30	E	3-Medium	---	Game Animal	G4	S3
Moss	21851	Pylaisiadelpha carolinianum	Carolina Star-moss	1998-05-20		2-High	---	Significantly Rare Limited	G5	S2

Element Occurrences Documented Within a One-Mile Radius of the Project Area

Taxonomic Group	EO ID	Scientific Name	Common Name	Last Observation Date	Element Occurrence Rank	Accuracy	Federal Status	State Status	Global Rank	State Rank
Moss	25462	Pylaisiadelpha elliptica	Marsh Magnificent Moss	1997-10-05	E	5-Medium	---	Significantly Rare Peripheral	G5	S?
Moss	22015	Scopelophila ligulata	Copper Moss	1991-05-08	E	5-Medium	---	Significantly Rare Other	G5?	S
Natural Community	39504	Acidic Cove Forest (Silverbell Subtype)	---	1997	A	2-High	---	---	G2	S
Natural Community	31442	Acidic Cove Forest (Typic Subtype)	---	2010-08-16	AB	4-Low	---	---	G5	S4
Natural Community	31440	Acidic Cove Forest (Typic Subtype)	---	2011-08-18	BC	3-Medium	---	---	G5	S4
Natural Community	31654	Acidic Cove Forest (Typic Subtype)	---	2011-06-08	C	2-High	---	---	G5	S4
Natural Community	31649	Acidic Cove Forest (Typic Subtype)	---	2011-06-06	C	5-Medium	---	---	G5	S4
Natural Community	13246	Canada Hemlock Forest (Typic Subtype)	---	2010	A	4-Low	---	---	G3G4	S1S2
Natural Community	7529	Chestnut Oak Forest (Dry Heath Subtype)	---	2018-08-04	A	4-Low	---	---	G5	S5
Natural Community	31871	Chestnut Oak Forest (Dry Heath Subtype)	---	2019-09-04	C	5-Medium	---	---	G5	S5
Natural Community	31102	Chestnut Oak Forest (Dry Heath Subtype)	---	2017-05-25	AB	3-Medium	---	---	G5	S5
Natural Community	31443	Chestnut Oak Forest (Herb Subtype)	---	2010-05-25	B	4-Low	---	---	G4G5	S4
Natural Community	31874	Chestnut Oak Forest (Herb Subtype)	---	2011-08-15	B	4-Low	---	---	G4G5	S4
Natural Community	30896	Chestnut Oak Forest (Herb Subtype)	---	2010-04-29	BC	5-Medium	---	---	G4G5	S4
Natural Community	31873	Chestnut Oak Forest (Herb Subtype)	---	2017-10-05	B	3-Medium	---	---	G4G5	S4
Natural Community	30910	Low Elevation Basic Glade (Montane Subtype)	---	2012-05-23	A	4-Low	---	---	G2	S2

Element Occurrences Documented Within a One-Mile Radius of the Project Area

Taxonomic Group	EO ID	Scientific Name	Common Name	Last Observation Date	Element Occurrence Rank	Accuracy	Federal Status	State Status	Global Rank	State Rank
Natural Community	31897	Low Elevation Basic Glade (Montane Subtype)	---	2012-06-19	C	2-High	---	---	G2	S2
Natural Community	31453	Low Elevation Rocky Summit (Acidic Subtype)	---	2011-10-14	B	2-High	---	---	G3?	S2
Natural Community	31915	Low Elevation Seep (Montane Subtype)	---	2011-06-11	B	2-High	---	---	G2G3	S2S3
Natural Community	31480	Low Elevation Seep (Montane Subtype)	---	2011-09-18	B	2-High	---	---	G2G3	S2S3
Natural Community	31914	Low Elevation Seep (Montane Subtype)	---	2012-06-19	C	2-High	---	---	G2G3	S2S3
Natural Community	31454	Low Mountain Pine Forest (Shortleaf Pine Subtype)	---	2011-10-14	B	2-High	---	---	G2G3	S2
Natural Community	31917	Low Mountain Pine Forest (Shortleaf Pine Subtype)	---	2011-04-11	C	2-High	---	---	G2G3	S2
Natural Community	31455	Montane Alluvial Forest (Large River Subtype)	---	2011-03-29	C	2-High	---	---	G2?	S1
Natural Community	31926	Montane Alluvial Forest (Small River Subtype)	---	2010-09-16	C	3-Medium	---	---	G3	S1
Natural Community	31941	Montane Cliff (Acidic Herb Subtype)	---	2011-08-15	B	3-Medium	---	---	G4G4	S3
Natural Community	31932	Montane Cliff (Acidic Herb Subtype)	---	2011-10-05	B	2-High	---	---	G3G4	S3
Natural Community	31927	Montane Cliff (Mafic Subtype)	---	2012-06-19	AB	2-High	---	---	G3	S3
Natural Community	32044	Montane Oak-Hickory Forest (Acidic Subtype)	---	2012-08	A	4-Low	---	---	G4G5	S4S5
Natural Community	38638	Montane Oak-Hickory Forest (Acidic Subtype)	---	2018-08-24	B	3-Medium	---	---	G4G5	S4S5

Element Occurrences Documented Within a One-mile Radius of the Project Area

Taxonomic Group	EO ID	Scientific Name	Common Name	Last Observation Date	Element Occurrence Rank	Accuracy	Federal Status	State Status	Global Rank	State Rank
Natural Community	38688	Montane Oak-Hickory Forest (Acidic Subtype)	---	2018-09-25	A	2-High	---	---	G4G5	S4S5
Natural Community	30929	Montane Oak-Hickory Forest (Acidic Subtype)	---	2011-05-10	C	2-High	---	---	G4G5	S4S5
Natural Community	5146	Montane Oak-Hickory Forest (Acidic Subtype)	---	2011-08-18	B	4-Low	---	---	G4G5	S4S5
Natural Community	30935	Montane Oak-Hickory Forest (Basic Subtype)	---	2011-05-10	B	3-Medium	---	---	G3	S3
Natural Community	31949	Montane Oak-Hickory Forest (Basic Subtype)	---	2012-06-19	A/B	4-Low	---	---	G3	S3
Natural Community	31964	Montane Oak-Hickory Forest (Basic Subtype)	---	2011-05-25	A/B	4-Low	---	---	G3	S3
Natural Community	31946	Montane Oak-Hickory Forest (Basic Subtype)	---	2011-06-11	A	2-High	---	---	G3	S3
Natural Community	31965	Piedmont/Mountain Canebrake	---	2012-08-04	C?	2-High	---	---	G2?	S?
Natural Community	31969	Pine-Oak/Heath (Typic Subtype)	---	2011-05-25	C	3-Medium	---	---	G3	S3
Natural Community	31970	Rich Cove Forest (Boulderfield Subtype)	---	2011-06-11	A	4-Low	---	---	G3	S2
Natural Community	32049	Rich Cove Forest (Boulderfield Subtype)	---	2012-03-29	A	3-Medium	---	---	G3	S2
Natural Community	31972	Rich Cove Forest (Boulderfield Subtype)	---	2018-09-24	A	2-High	---	---	G3	S2
Natural Community	31971	Rich Cove Forest (Boulderfield Subtype)	---	2011-03-29	B	2-High	---	---	G3	S2
Natural Community	31971	Rich Cove Forest (Boulderfield Subtype)	---	2012-06-19	A	2-High	---	---	G3	S2
Natural Community	31969	Rich Cove Forest (Boulderfield Subtype)	---	2011-03-15	C	2-High	---	---	G3	S2
Natural Community	8707	Rich Cove Forest (Montane Intermediate Subtype)	---	2010	A	4-Low	---	---	G4	S4

Element Occurrences Documented Within a One-mile Radius of the Project Area

Taxonomic Group	EO ID	Scientific Name	Common Name	Last Observation Date	Element Occurrence Rank	Accuracy	Federal Status	State Status	Global Rank	State Rank
Natural Community	31974	Rich Cove Forest (Montane Intermediate Subtype)	---	2011-06-15	BC	5-Medium	---	---	G4	S4
Natural Community	5510	Rich Cove Forest (Montane Intermediate Subtype)	---	2018-09-24	B	5-Medium	---	---	G4	S4
Natural Community	32020	Rich Cove Forest (Montane Rich Subtype)	---	2012-09-20	AB	5-Medium	---	---	G4G4	S4
Natural Community	31992	Rich Cove Forest (Montane Rich Subtype)	---	2012-09-04	B	3-Medium	---	---	G3G4	S3
Natural Community	38636	Rich Cove Forest (Montane Rich Subtype)	---	2018-06-24	B	3-Medium	---	---	G3G4	S3
Natural Community	31103	Rich Cove Forest (Montane Rich Subtype)	---	2011-05-25	BC	3-Medium	---	---	G3G4	S3
Natural Community	32019	Rich Cove Forest (Montane Rich Subtype)	---	2011-10-05	B	3-Medium	---	---	G3G4	S3
Natural Community	31475	Rich Cove Forest (Red Oak Subtype)	---	2018-06-24	A	2-High	---	---	G3	S2?
Natural Community	32005	Rich Montane Seep	---	2011-05-15	AB	2-High	---	---	G3	S3
Natural Community	31485	Rocky Bar and Shore (Alder-Yellowroot Subtype)	---	2011-06-18	B	2-High	---	---	G3G4	S3
Natural Community	32025	Spray Cliff	---	2011-10-05	B	2-High	---	---	G2	S2
Natural Community	32032	Swamp Forest-Bog Complex (Typic Subtype)	---	2012-09-04	C	5-Medium	---	---	G2	S2
Natural Community	11874	White Pine Forest	---	1991-06-13	A	4-Low	---	---	G2G3	S2

Element Occurrences Documented Within a One-mile Radius of the Project Area

Taxonomic Group	EO ID	Scientific Name	Common Name	Last Observation Date	Element Occurrence Rank	Accuracy	Federal Status	State Status	Global Rank	State Rank
Natural Community	6479	White Pine Forest	---	2011-05-29	B	5-Medium	---	---	G2G3	S2
Reptile	18186	Pituophis melanoleucus melanoleucus	Northern Pinesnake	1959-08-19	H	4-Low	---	Threatened	G4T4	S2
Reptile	23777	Pantherophis alleghaniensis	Coal Snake	1967-07-30	I	5-Medium	---	Significantly Rare	G5	S2
Sawfly, Wasp, Bee, or Ant	37118	Bombus affinis	Rusty-patched Bumble Bee	1975-06-09	H	4-Low	Endangered	Significantly Rare	G2	S1
Vascular Plant	30144	Adlumia fungosa	Climbing Fumitory	2011-10-11	C	2-High	---	Special Concern Vulnerable	G4	S2
Vascular Plant	29135	Adlumia fungosa	Climbing Fumitory	2012-08	E	2-High	---	Special Concern Vulnerable	G4	S2
Vascular Plant	31646	Calamagrostis porteri ssp. porteri	Porter's Reed Grass	2012-09-20	E	2-High	---	Significantly Rare Peripheral	G4T4	S2
Vascular Plant	1978	Carex purpurifera	Purple Sedge	1994-09	B	3-Medium	---	Special Concern Vulnerable	G4?	S3
Vascular Plant	29193	Carex purpurifera	Purple Sedge	2012-08	A	2-High	---	Special Concern Vulnerable	G4?	S3
Vascular Plant	66495	Celastrus scandens	American Bittersweet	2012-05-24 or before	D	5-Medium	---	Endangered	G5	S2?
Vascular Plant	31696	Celastrus scandens	American Bittersweet	2012-09-20	B	2-High	---	Endangered	G5	S2?
Vascular Plant	7667	Cystopteris tennesseensis	Tennessee Bladder-fern	1956-08-19	I	4-Low	---	Endangered	G5	S1
Vascular Plant	21804	Dicentra eximia	Bleeding Heart	1998	E	3-Medium	---	Significantly Rare Peripheral	G4	S3
Vascular Plant	29199	Dicentra eximia	Bleeding Heart	2012-08	E	2-High	---	Significantly Rare Peripheral	G4	S3

Element Occurrences Documented Within a One-mile Radius of the Project Area

Taxonomic Group	EO ID	Scientific Name	Common Name	Last Observation Date	Element Occurrence Rank	Accuracy	Federal Status	State Status	Global Rank	State Rank
Vascular Plant	30164	Dicentra eximia	Bleeding Heart	2011-05-29	CD	2-High	---	Significantly Rare Peripheral	G4	S5
Vascular Plant	510	Didymoglossum petersii	Dwarf Filmy-fern	1999-06-17	C	3-Medium	---	Significantly Rare Throughout	G4G5	S2
Vascular Plant	12578	Didymoglossum petersii	Dwarf Filmy-fern	1978-04-19	F	3-Medium	---	Significantly Rare Throughout	G4G5	S2
Vascular Plant	21845	Didymoglossum petersii	Dwarf Filmy-fern	1998-11-19	B	2-High	---	Significantly Rare Throughout	G4G5	S2
Vascular Plant	2723	Didymoglossum petersii	Dwarf Filmy-fern	1999-10-20	AB	2-High	---	Significantly Rare Throughout	G4G5	S2
Vascular Plant	21827	Didymoglossum petersii	Dwarf Filmy-fern	1999-06-17	E	2-High	---	Significantly Rare Throughout	G4G5	S2
Vascular Plant	30346	Didymoglossum petersii	Dwarf Filmy-fern	2011-08-11	C	2-High	---	Significantly Rare Throughout	G4G5	S2
Vascular Plant	21830	Didymoglossum petersii	Dwarf Filmy-fern	1999-06-17	E	2-High	---	Significantly Rare Throughout	G4G5	S2
Vascular Plant	21826	Didymoglossum petersii	Dwarf Filmy-fern	1999-06-17		2-High	---	Significantly Rare Throughout	G4G5	S2
Vascular Plant	30165	Echinacea purpurea	Purple Coneflower	2011-06-24	B	2-High	---	Special Concern Vulnerable	G4	S
Vascular Plant	30164	Erigenia bulbosa	Harbinger-of-spring	2011-04		2-High	---	Significantly Rare Peripheral	G5	S
Vascular Plant	5400	Erigenia bulbosa	Harbinger-of-spring	2015-04-24	B	2-High	---	Significantly Rare Peripheral	G5	S

Element Occurrences Documented Within a One-mile Radius of the Project Area

Taxonomic Group	EO ID	Scientific Name	Common Name	Last Observation Date	Element Occurrence Rank	Accuracy	Federal Status	State Status	Global Rank	State Rank
Vascular Plant	30172	Frasera caroliniensis	Columbo	2011-08-24	B	2-High	---	Significantly Rare Peripheral	G5	S2S3
Vascular Plant	31701	Hydrastis canadensis	Goldenseal	2012-09-20	BC	2-High	---	Significantly Rare Other	G3G4	S3
Vascular Plant	31706	Platanthera peramoena	Purple Fringeless Orchid	2012-09-04	D	2-High	---	Threatened	G5	S2
Vascular Plant	30176	Platanthera peramoena	Purple Fringeless Orchid	2011-08-18	D	2-High	---	Threatened	G5	S2
Vascular Plant	8027	Rhododendron cumberlandense	Cumberland Azalea	1951-06	H	4-Low	---	Significantly Rare Peripheral	G4?	S1
Vascular Plant	29267	Rudbeckia triloba var. beadlei	Chauncey's Coneflower	2011-09-08	A	2-High	---	Significantly Rare Throughout	G5TNR	S1
Vascular Plant	30275	Scutellaria saxatilis	Rock Skullcap	2011-06-09	CD	2-High	---	Significantly Rare Throughout	G3G4	S2
Vascular Plant	31713	Silene ovata	Mountain Catchfly	2012-09-20	AB	2-High	---	Special Concern Vulnerable	G3	S3
Vascular Plant	29303	Smilax hugeri	Huger's Carrion-flower	1995	E	2-High	---	Significantly Rare Peripheral	G4	S3
Vascular Plant	31715	Smilax hugeri	Huger's Carrion-flower	2012-09-04	C	2-High	---	Significantly Rare Peripheral	G4	S3
Vascular Plant	29311	Solidago simulans	Granite Dome Goldenrod	2011-09-08	A	3-Medium	---	Significantly Rare Limited	G2	S2
Vascular Plant	30304	Solidago simulans	Granite Dome Goldenrod	2012-05-23	BC	2-High	---	Significantly Rare Limited	G2	S2
Vascular Plant	31716	Solidago simulans	Granite Dome Goldenrod	2012-06-19	BC	2-High	---	Significantly Rare Limited	G2	S2
Vascular Plant	14374	Spiraea virginiana	Virginia Spiraea	2018-06-13	BC	2-High	Threatened	Threatened	G2	S2
Vascular Plant	30371	Spiraea virginiana	Virginia Spiraea	2011-05-09	D	2-High	Threatened	Threatened	G2	S2
Vascular Plant	25737	Spiraea virginiana	Virginia Spiraea	2007-06-01	[illegible]	2-High	Threatened	Threatened	G2	S2

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Element Occurrences Documented Within a One-mile Radius of the Project Area

Taxonomic Group	EO ID	Scientific Name	Common Name	Last Observation Date	Element Occurrence Rank	Accuracy	Federal Status	State Status	Global Rank	State Rank
Vascular Plant	6765	Sorbaria virginiana	Virginia Sorbaria	2018-06-15	C	2-High	Threatened	Threatened	G2	S2
Vascular Plant	16185	Sorbaria virginiana	Virginia Sorbaria	2003	C	2-High	Threatened	Threatened	G2	S2
Vascular Plant	29317	Stewartia ovata	Mountain Camellia	2010-08-25	A	3-Medium	---	Significantly Rare Peripheral	G4	S3
Vascular Plant	30636	Stewartia ovata	Mountain Camellia	2013-06-18	BC	2-High	---	Significantly Rare Peripheral	G4	S3
Vascular Plant	29316	Stewartia ovata	Mountain Camellia	2010-06-26	C	2-High	---	Significantly Rare Peripheral	G4	S3
Vascular Plant	30637	Stewartia ovata	Mountain Camellia	2011-06-25	B	2-High	---	Significantly Rare Peripheral	G4	S3
Vascular Plant	30639	Stewartia ovata	Mountain Camellia	2011-06-05	C	2-High	---	Significantly Rare Peripheral	G4	S3
Vascular Plant	45801	Stewartia ovata	Mountain Camellia	2014-07-24	C	2-High	---	Significantly Rare Peripheral	G4	S3
Vascular Plant	34945	Stewartia ovata	Mountain Camellia	2013-05-24	CD	2-High	---	Significantly Rare Peripheral	G4	S3
Vascular Plant	27233	Vandenboschia boschiana	Appalachian Filmy-fern	1995	E	3-Medium	---	Endangered	G4	S1
Vascular Plant	30345	Vandenboschia boschiana	Appalachian Filmy-fern	2011-10-11	B	2-High	---	Endangered	G4	S1

Natural Areas Documented Within a One-mile Radius of the Project Area

Site Name	Representational Rating	Collective Rating
LTN/Cheoah River Aquatic Habitat	R1 (Exceptional)	C3 (High)
Great Smoky Mountains National Park	R1 (Exceptional)	C1 (Exceptional)
Yellow Creek Wetlands and Slopes	R1 (Exceptional)	C3 (High)
LTN/Santeetlah Creek Aquatic Habitat	R1 (Exceptional)	C4 (Moderate)
LTN/Snowbird Creek Aquatic Habitat	R3 (High)	C4 (Moderate)
Cheoah Mountains	R1 (Exceptional)	C1 (Exceptional)

Natural Areas Documented Within a One-mile Radius of the Project Area

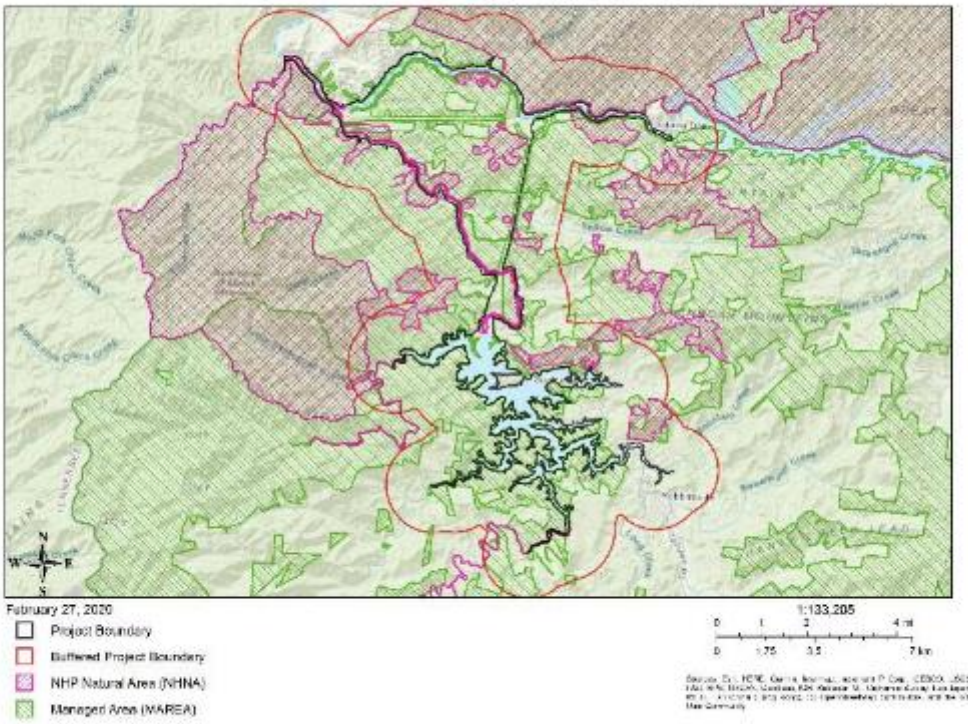
Site Name	Representational Rating	Collective Rating
Farley Branch	R3 (High)	C4 (Moderate)
Tapoco/Calderwood Lake Slopes	R2 (Very High)	C3 (High)
Sammy Basin	R2 (Very High)	C2 (Very High)
Round Mountain Cove	R2 (Very High)	C3 (High)
Rocky Point Ferry Branch/Little Tennessee Slopes	R3 (High)	C4 (Moderate)
Rock Creek Knob	R5 (General)	C4 (Moderate)
High Top/Bee Cove Slopes	R2 (Very High)	C3 (High)
Cheoah River Floodplain	R2 (Very High)	C1 (Exceptional)
Joyce Kilmer Wilderness Area	R1 (Exceptional)	C1 (Exceptional)

Managed Areas Documented Within a One-mile Radius of the Project Area

Managed Area Name	Owner	Owner Type
Great Smoky Mountains National Park	US National Park Service	Federal
Great Smoky Mountains Registered Heritage Area	US National Park Service	Federal
Nantahala National Forest - Cheoah Ranger District	US Forest Service	Federal
Nantahala National Forest - Joyce Kilmer Wilderness	US Forest Service	Federal
Joyce Kilmer Wilderness Registered Heritage Area	US Forest Service	Federal
Mainspring Conservation Trust Easement	Land Trust for the Little Tennessee	Private
Nantahala National Forest - Joyce Kilmer Memorial Forest	US Forest Service	Federal
NC Division of Mitigation Services Easement	NC DEQ, Division of Mitigation Services	State
NC Clean Water Management Trust Fund Funded Project	NC DNCR, Clean Water Management Trust Fund	State

Definitions and an explanation of status designations and codes can be found at https://ncnhde.natureserve.org/content/help. Data query generated on February 27, 2020; source: NCNHP, Q1 Jan 2020.
Please resubmit your information request if more than one year elapses before project initiation as new information is continually added to the NCNHP database.

NCNHDE-11492: Smoky_LIHI_Recertification



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