



Jocassee Journal

Information and News about the Jocassee Gorges



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Students and teachers from Liberty Elementary's third-grade class gather on the observation platform atop Sassafras Mountain to learn about the state's highest point at 3,553 feet. (SCDNR photo by Greg Lucas)

Liberty Elementary third-graders scale Sassafras Mountain

Students count hawks, write journals while visiting highest point in S.C.

By Brenda Kingrea

September 25 dawned bright and clear, and the third graders at Liberty Elementary in Liberty could hardly contain their excitement as they loaded the busses for Sassafras Mountain!

Not only were lunches packed, but also writing journals and all the materials they needed for a reflective writing lesson.

Greg Lucas, an educator with the South Carolina Department of Natural Resources, gave the students pertinent information to their Third Grade State Standards, but the stories he wove along the way made it so much fun the students hardly realized they were gaining a lot of local history and geography. To top it off, Ed Moorer, site coordinator for the Sassafras Mountain Hawkwatch and

himself a retired school teacher, was there that day counting different species of hawks. Students were taught about flight patterns and migration from him, and they were allowed to help him "count" the birds! They also learned about "kettling," a term that birders use to describe a group of birds wheeling and circling in the air.

Finally, the students settled down for a writing session, armed with plenty of information and in this setting, they found it was easy to write a reflective selection, filled with words describing their emotions at the time.

Parents and teachers alike were heard saying that this might just be the best field trip they have ever taken! If you haven't headed up the mountain yet—why are you waiting? The view is exquisite, the atmosphere is so pure, and the view is indescribable! All this, right in our own county! 

(Brenda Kingrea is a third-grade teacher at Liberty Elementary School.)

Rare Cherokee artifact now housed in Pickens Museum

Fascinating story is behind how amulet arrived at local museum

By Dennis Chastain

At some point in the millennium that the Cherokees are thought to have occupied this region, a Cherokee craftsman was assigned the task of carving a stone amulet to be worn exclusively during certain ceremonies. The story of how that rare artifact, (known by experts as a spatulate ceremonial amulet), made its way to the Pickens County Museum is a story that played out over more than a hundred years.

In February of this year I received a phone call from Tom Bowen who lives near Seneca. He told me a story that still leaves me rubbing my chin and scratching my head. The story involves his wife's father, who lived on the Keowee River on the Oconee County side of the river, the site of the principle Cherokee Town, Keowee. For several years around the turn of the 20th century, the father had been visited by a small group of Cherokee Indians from western North Carolina. They asked if they could camp there, fish in the river and cut river cane to make their now famous split-cane baskets. According to Tom Bowen's wife, Tody, "It must have been around 1898, or '99; maybe as late as 1900." Her father told the small party that would be fine. And over the next several years, he and the Cherokees developed a friendship based on mutual respect.

On the occasion of the little band of Cherokees' final trip, they presented him with a hand-carved stone amulet, which they told him had been hidden away when their ancestors were rounded up and marched off to Oklahoma during the Trail of Tears in 1838. They wanted him to keep it in trust because none of their fellow Cherokees knew its significance and they feared that it faced an uncertain future. According to Tody Bowen, "He never told any of us children any of this, or even that the artifact existed." But he did tell Tom Bowen about it and presented it to him. He told Tom the essential elements of the story and asked him to keep it in trust. He said that later on he would tell him more about the significance of the medallion as it had been told to him

"The father had been visited by a small group of Cherokee Indians from western North Carolina. They asked if they could camp there, fish in the river and cut river cane to make their now famous split-cane baskets."



This rare Cherokee amulet, now on display at the Pickens County Museum, was donated to the museum by the Bowen family. (Photo by Dennis Chastain)

by the Cherokees, but unfortunately he died in a tragic woods fire before he could do that.

After I had listened to the Bowens' compelling story, I asked, "So how can I help you?" Tom explained they were getting on up in years and wanted to make sure that the rare artifact would be preserved after they were gone. I told them that I would be glad to help and that I thought, based on their description of the artifact, it should be in a museum. I told them that my wife, Jane, and I would come over and photograph the amulet and send the photos to several archaeologist friends of mine to authenticate it, and maybe get some suggestions on which museums to approach about displaying it.

I sent the photos to my old pal, now retired archaeologist Tommy Charles, along with Chris Judge, formerly the South Carolina Department of Natural Resources' (SCDNR) staff archaeologist and now at the Lancaster campus of University of South Carolina, along with Dr. Johannes Loubser in Atlanta, who is widely considered one of the region's foremost experts on rock art. To make a long story short, I authenticated the artifact based on Tommy's expert advice, and agreed with him that it should be displayed in the Pickens County Museum, which we both consider to be one of the state's best local museums. I passed all this along to the Bowens and they agreed,

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Water quality monitoring in Jocassee Gorges helps understand overall watershed health

Volunteers encouraged to get certified and help manage water resources

By Zach Nemec

If you have had the chance to explore Jocassee Gorges, you have probably witnessed some picturesque waterfalls and cold mountain streams. Although these waterways may look pristine, how can one really tell if the water is clean? How could one describe their health, and health over time, in ways that can be tracked and shared? Fortunately, there are some dedicated stewards that have been monitoring the Gorges' streams using the citizen science water quality program, South Carolina Adopt-A-Stream (SCAAS).

SCAAS was developed and is coordinated in a partnership between the South Carolina Department of Health and Environmental Control and Clemson University's Center for Watershed Excellence. Certified volunteers collect water quality data on chemical, bacterial, and biological parameters, as well as assess stream habitat condition. Data is put into a statewide database that helps establish a baseline record for watersheds throughout South Carolina. The data is shared and viewable for all audiences, anywhere in the world, simply excluding the names of the volunteers. You can access the database at <https://bit.ly/2Pw73BZ>; here is where you can find the closest monitoring site to you!

Watershed health is important to both Jocassee Gorges and beyond; these streams flow into Lake Jocassee, Lake Keowee, and Lake Hartwell; these reservoirs provide hundreds of thousands of residents with clean drinking water, energy in our homes, and safe recreational

opportunities. Since the start of the program in July 2017, there have been 183 monitoring events across 37 sites in the Seneca River watershed, which encompasses Jocassee Gorges. E. coli is a common fecal indicator bacteria, which means it is used as the standard for which we measure the potential threat of pathogens, viruses, and bacteria to create unsafe conditions for swimming, drinking, and

more. Volunteers monitor for E. coli as a way to alert local agencies of the need for follow-up in typically unmonitored headwater streams. Certified volunteers also measure pH (a measure of acidity), dissolved oxygen, water temperature, air temperature, and conductivity.

Even though the water quality of this watershed is considered good relative to state standards, there are plenty of places within Jocassee Gorges that have not yet been monitored or not monitored in a while. If you are a certified volunteer and want to monitor the waterways of the great and beloved Jocassee Gorges, please e-mail me, Zach Nemec, at znemec@clemson.edu. Also, if you want to become certified, please e-mail me. More information, including training events can be found at the SCAAS website, www.scadoptastream.org. I will look to report regularly on citizen science collected water quality and habitat data through this journal;

in turn, I hope that these articles inspire you to join this movement and get involved in the management of our shared water resources! Thanks for reading and being great stewards. ❁

(Zach Nemec is a watershed scientist with the Clemson University Center for Watershed Excellence. He is originally from the Greater Cleveland Metro area and enjoys hiking, fishing, and cooking.)



Dissolved oxygen and water temperature data were collected over time at an Eastatoee Creek monitoring site using South Carolina Adopt-A-Stream protocol. (Photo courtesy of Zach Nemec)

Winter loon research set on Lake Jocassee

Study to look at common loons wintering in Southeastern reservoirs

By Kay Wade

During February and March of 2020, a study of the winter behavior of the Common Loon will be led by Dr. Jay Mager and Jocassee Wild Outdoor Education. This study continues a three-year research project sponsored by Earthwatch International, which concluded in March 2019. This winter, citizen scientists from all over the country will spend one to two weeks studying loon behaviors.

Wintering on freshwater lakes in the Southeast is relatively new in the life history of loons, since the building of large freshwater reservoirs in the Southeast did not begin until the 1930s. Loons traditionally spend their summers on freshwater lakes in northern latitudes and winter on saltwater further south, along the Atlantic coast and all the way down to the Gulf of Mexico. It is not known exactly when loons began using these reservoirs as winter stay-over locations, but now more than 100 common loons winter each year on Lake Jocassee. The lake provides a perfect “laboratory” thanks to its relatively small size and large population of loons.

Studying common loons in freshwater environments will help scientists better understand



Studying common loons in freshwater environments such as Lake Jocassee will help scientists better understand the factors that influence the birds’ health and survival in winter.

the factors that influence their health and survival in winter. The loons’ general health, feeding and molting behaviors, and patterns of sociability are easy to observe on a relatively small reservoir such as Lake Jocassee. The results of the research will be used to raise awareness about the importance of reservoirs as habitat for loons and other water birds, and how to best monitor and manage them.

Anyone interested in joining this study can contact Brooks Wade at brooks@jocasseewild.org for more information. Jocassee Wild Outdoor Education is a non-profit 501(c)-3 branch of Jocassee Lake Tours. ❄️
(*Kay Wade is the co-founder of Jocassee Lake Tours, a Master Naturalist and is a former professional gardener and environmental gardening writer.*)

Legacy of rare Cherokee artifact lives on at Pickens Museum

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and accepted my advice that they should insist that it be displayed as a stand-alone artifact, and that the display ought to include interpretive material telling the story of how it came into their hands.

I contacted Daniel James, the director of the museum, and he readily agreed to those conditions. It is now prominently displayed at the Pickens County Museum and well worth the trip to go see it. A local newspaper, the Pickens County Courier, ran a front-page, above-the-fold story on the artifact, then Anne Sheriff, who is curator of the Faith Clayton Library at Southern Wesleyan University, sent me a clipping from an archival (1899) issue of the Keowee Courier newspaper. Amazingly, the

clipping was a short news item indicating that a small band of Cherokees was camped on Crow Creek and cutting river cane to make their baskets. Crow Creek meets the Keowee River at old Fort Prince George, and the Cherokee Town of Keowee was located directly across the river on the Oconee County side. In terms of verifying the Bowen’s account of the story behind the rare Cherokee artifact, it honestly doesn’t get any better than that. ❄️

(*Dennis Chastain is a Pickens County historian, hunter and naturalist, and he has been a writer for South Carolina Wildlife magazine for three decades.*)

2019 mountain bear harvest caps 'very active bear season'

First bear hunting season in Game Zone 2 results in harvest of five bears

After a year that saw an abundance of bear nuisance complaints throughout the Upstate of South Carolina, 107 bears were harvested during the two-week mountain bear season in October, the fourth-highest harvest on record.

And while hunting has in the past been allowed only in the northern portions (Game Zone 1) of Greenville, Pickens and Oconee counties, this year Game Zone 2 was open to bear hunting. This included private land in Spartanburg County and the southern portions of Greenville, Oconee and Pickens counties, south of Game Zone 1. A quota of 20 bears was set for this first-ever hunt, and still hunts (no dogs) were allowed Oct. 17-30. Five bears were harvested in Game Zone 2 during this period—four male and one female. Three of the bears were from Pickens County, and one each was harvested in Greenville and Oconee counties. No bears were harvested in Spartanburg County.

"There wasn't that much pressure on the bears in Game Zone 2," said Tammy Wactor, black bear biologist headquartered in the South Carolina Department of Natural Resources (SCDNR) Clemson office, "but it provided an opportunity for hunters. We didn't have any problems with the new area being open for bear hunting and don't see any reason to change this going into next year."

With more and more conflicts between people and bears in urban areas, the annual two-week black bear hunt is an important management tool to help deal with an expanding bear population, according to Wactor. This was especially important as it followed "a very active bear season" that saw hundreds of nuisance complaints registered during the summer of 2019.

Wactor attributed the success of this year's hunt to two factors: weather and acorns. Only two of the 14 days of hunting were interrupted by rain, and an abundant acorn production this year meant that most bears stayed put.

"Our nuisance calls went down dramatically when the acorns started to fall," Wactor said.

Of the 107 total bears harvested, Pickens County led with 52 bears, followed by Oconee County with 30 bears and Greenville County with 25 bears.

The two-week black bear season in the South Carolina mountains, typically the last two weeks in October, is divided into two parts. The first week is a still-hunt season, when dogs are not allowed, and the second week of bear season is the party dog hunts, where groups of up to 25 people hunt bears

with dogs. The limit during the dog hunts is five bears per party. This year, 108 parties registered to hunt during the dog season, representing 1,192 hunters.

In 2019, 46 bears were harvested during the still hunts, 61 during the dog hunts. Over the past 50 years, the bear harvest has averaged about 20 bears per year. However, during the past 13 years, since 2006, the average harvest has been around 77 bears per year. Wactor attributes the increase in the bear harvest since 2006 to an expansion in the black bear population in South Carolina's Upstate, both in numbers of bears and expanding to more counties.

The highest bear harvest on record was 2013, when 127 bears were taken.

The state also has a limited coastal hunting season in Horry, Georgetown, Marion and Williamsburg counties, where there is a 30-quota limit on bear harvest. The coastal bear harvest this year was six bears.

Black bears can be found throughout North America. In South Carolina, there are two resident populations of black bears, one in the mountains and upper piedmont and one in the coastal plain.

Home range for bears must include den sites, food, water and cover for adults and young. Typically, male bear home ranges can be 18 to 160 square miles, while home ranges for females are smaller, around 6-19 square miles. A shortage of natural food sources and lack of rainfall can cause home ranges to vary greatly. Black bears will travel great distances to find adequate food sources. In addition, juvenile bears, especially males, must disperse to find new home territories. Dispersing juvenile bears have been sighted in many South Carolina counties. These bears are usually transient and do not stay in the area for long. ❁



Wildlife biologists with SCDNR say the annual two-week black bear hunt in the South Carolina mountains is an important management tool to help deal with an expanding bear population. (SCDNR photo)

Three women, with various outdoors experiences, decide to backpack on Foothills, Chattooga trails

By Sarah Chabaane

The idea was simple. Three colleagues, who happen to be female minorities in the natural resources field, would backpack 18 miles, while closely documenting the trip (and my first experience with Spam).

I love camping and hiking. I love hiking so much that I have travelled to other continents in pursuit of fabled trails. I love camping to the point that one of my earlier childhood memories was playing in a tent my mom set up in the yard. Having a deep appreciation of both activities, I have never put them together until relatively recently. Backpacking always seemed like the logical next step, but it held its own set of challenges and barriers with an intimidation factor holding me back. I wanted to believe that I was capable, but needed a gentle introduction. When a colleague suggested that the three of us, Alix, Keya, and myself, undertake a trip to document the basics of backpacking for social media purposes, which would help increase our photo and video resources, I utilized the rules of stand-up comedy by responding “Yes and...” We included our video and social media staff member, Taylor, set a date a few months out and like most good intentions, didn’t start planning for it until the week before.

We were three women, with various aptitudes in outdoor experiences, ranging from having spent four days on the trail, to not having hiked more than five miles. We had quite a lot in common, coming from non-traditional user groups, a love of the outdoors, eagerness to learn, and desire to prove that a group of three women could hack it on the trail as beginners. After consulting with Diversity Outreach Volunteer and Appalachian Trail through-hiker, Brian, he helped us choose a trail that could serve as a loop. Brian taught us to select a trail with easy access to water that we could filter, which can help keep your backpack weight down and reduce stress of planning and finding viable water sources.



From left, Alix Pedraza, Keya Jackson and Sarah Chabaane stop briefly on the Foothills Trail at the Fish Hatchery Road Access in Oconee County.



Three women from SCDNR set out on an exploration of discovery in

He also pointed out tips and tricks on reading a topographic map, estimating mileage, and developing an emergency action plan. Brian passed along veteran knowledge on gear and packing lists, in addition to outfitting a member of our party with the basic combination of crucial supplies: backpack, tent/shelter, sleeping bag, sleeping pad and stove. We all met over coffee to review the map, make shopping lists, prepare a social media plan, and try to calm any last-minute jitters. We also determined a few basic skills that we needed to practice before hitting the trail.

Two days before the trip we met after work at my house to practice hanging food, using the two types of stoves we had, setting up our tents and making a menu. This is when it started to feel real! Imagine the five of us standing in my front yard practicing hanging food on a dogwood tree in downtown Columbia. We got some funny looks, especially when we had to fetch the ladder to retrieve an errant toss! After ensuring we were all capable of suspending the food bag, we moved on to getting familiar with the tents as each were different, then we polished off the evening with learning how to situate the gear into our packs.

Through our practice session I realized that I either needed a new, larger backpack or a smaller sleeping bag. This

Hike on Upstate trails



in the mountains of South Carolina. (SCDNR photos by Taylor Main)

is when things hit a low for me. My backpack was a gift from my family in 2010 when I took off “backpacking” in Europe. It was a smaller pack designed for clothing, not for toting gear. My sleeping bag was also of that nature, but even older, clocking in from 2002. It was bulky and heavy, taking up half of my pack. A sinking feeling set in that I was going to have to bite the bullet and spend money for upgrades. Choosing both items is very personal and can take a lot of time in research, which I didn’t have. Buying both a pack and sleeping bag began to feel like a commitment I wasn’t ready to make; what if I didn’t love backpacking and had just invested in new gear I wouldn’t use? Alix assured me, “You’ll love it, don’t worry”. After a last-minute trip to Mast General Store, with guidance from helpful staff, I was set and ready for the trail!

We spent the evening before our hike distributing food, reviewing maps, packing our bags and weighing them to ensure a balance of weight was distributed based on experience and overall comfort levels. I later learned after reading articles on backpacking that your pack should be approximately 10 percent of your body weight, which mine ultimately was. Oh yeah, and the cursory carb-loading dinner!

I spent a little extra time reviewing the map. Remember those barriers I mentioned holding me back? Well,

my sense of direction is less than adequate, but I can interpret a map! I had a lot of apprehension when it came to not getting lost. I heard a saying once, “You’re not lost, you’re just not where you’re supposed to be.” Which for its shaky logic can be oddly reassuring. Our loop route was relatively simple and Brian’s advice was to “always make a left.” The plan was to park at the top of Walhalla State Fish Hatchery and walk 3.3 miles on the Foothills Trail towards Sloan Bridge, where our coworker Taylor would leave us. It was a beautiful short hike with small creek crossings and three waterfalls to enjoy. We would take advantage of the picnic table for lunch and rustic bathrooms for the last time. From Sloan Bridge, we’d pick up the trail through Ellicott Rock Wilderness Area for approximately 7.5 miles. After passing through the wilderness area we would hike down the Chattooga River Trail about a mile, find a campsite for the night and then continue for three miles to Burrell’s Ford area where we would hike the Foothills trail back to the Walhalla Fish Hatchery for another 3.9 miles. Our goal was to do more than half of the miles on the first day, a common practice to knock out high mileage early on while everyone is still feeling good.

Our hope is to be a source of encouragement for women and minorities, that they can find accomplishment and inclusiveness in the outdoors. The trail is never going to judge you based on your gender, skin tone, body shape, or the language that you speak. We don’t all have a Brian to help us plan a trip and loan gear, but chances are, you know someone who would love to help introduce you to the outdoors. Start small, join our diversity outreach team on their nature hikes, choose well-marked trails, plan a long hike, rent camping gear from local stores or buy it used, try a weekend at a campground close to home and use the amazing web resources of those that have many helpful tips from which to learn. 🌿

This is an excerpt of an article that appeared in South Carolina WILD, part of the South Carolina Wildlife magazine website. To read the entire article, visit <https://www.southcarolinawild.org/2019/09/06/hiking-upstate-sc/> (Sarah Chabaane is the aquatic education coordinator for the South Carolina Department of Natural Resources.)



Sarah Chabaane (left) and Alix Pedraza take a moment to chat at Sloan Bridge Access on the Foothills Trail.

Foothills Trail Toxaway River suspension bridge renovated by Duke Energy

Hikers seldom delayed and project was completed three weeks ahead of schedule

By Heyward Douglass

As part of Duke Power's (now Duke Energy) construction of the middle portion of the Foothills Trail during the 1980s, many bridges were built to cross the myriad rivers and creeks of the Jocassee Gorges. These bridges came in all shapes and sizes, but the granddaddy of them all was the suspension bridge over the Toxaway River.

Designed by the engineering section of Duke Energy, the 225-foot bridge was built in the early 1980s. Two Duke engineers, Nick Seagle and Ed Luttrell, were the primary engineers for the design and construction of all the bridges, including the Toxaway bridge.

Construction on the bridge by Duke commenced in 1982 and took several months to complete. The heavy equipment necessary to carry out the project was brought down an old roadway from The Wilds camp, near Rosman, N.C., north of the bridge site, including multiple loads of concrete in standard concrete trucks!

All the Duke Energy bridges have been inspected on a regular basis, and a recent inspection revealed that some deterioration had begun to take place in parts of the wood supporting pillars of the bridge that would cause them to be replaced. Duke Energy decided this was a good time to refurbish the entire bridge. After studying all angles of this enormous task, Duke also decided that the best material for the longest life of the bridge was fiberglass. This would be much lighter to transport to the site, but also would be very long-lasting. Thus, the entire supporting structures at either end, as well as the tread of the bridge, are made of fiberglass. The handrails and cross supports are the only wooden portions. The supporting cables are the only original materials.

Now, after several decades of service, this iconic bridge, and symbol of the Foothills Trail, has been refurbished by Duke Energy. Originally built by the construction section of Duke Power, the complete overhaul of the bridge was carried out by Crowder Construction Company of Charlotte in just 60 days, during which men and materials had to be boated and barged up Lake Jocassee. Some heavy equipment

was even transported down the same roadway as it was 37 years ago.

When construction began, one of the first steps was to transport the huge main support poles to the site and strap them to the original wooden poles. This was necessary because the next step was to erect scaffolding at either end that would support the entire bridge during construction. This way the fiberglass poles would be on the inside of the scaffolding from the outset. In the meantime the cross-supports, fiberglass tread, and handrails were attached a section at a time until the "swinging" section of the bridge was completed.



Workers from Crawford Construction in Charlotte install new handrails on the Foothills Trail's Toxaway River Bridge. (Photo by Heyward Douglass)

Each day the Crowder Construction work crew would assemble at the Devils Fork State Park boat ramp, have a safety briefing, and then be transported up Lake Jocassee in their combination transport/tugboat that also pushed barge loads of materials to the site. Not your everyday way to get to work!

Depending on the weather, especially in the hot afternoons when thunderstorms tended to build up, this could make for an interesting commute. If there were a tricky part of the project, it was transferring the support cables for the bridge to the scaffolding in order to attach the fiberglass support poles to the base and then remove the old wooden poles.

Then the cables were placed on the new fiberglass support poles.

By the end of August, the actual bridge construction was finished, and what remained was to remove leftover materials, transport tons of scaffolding, clean the site, and drive the mechanized equipment back up the hillside-hugging road. On Sept. 9, Duke Energy had a final project inspection with Crowder Construction and formally accepted the finished bridge.

During the 60 days of actual construction, hikers were seldom delayed even a few minutes, and the project was finished almost three weeks ahead of schedule thanks to an innovative project design and work schedule.

Thank you Duke Energy and Crowder Construction Company! 🌿

(Heyward Douglass is executive director of the Foothills Trail Conservancy. Learn more about the Foothills Trail by visiting www.foothillstrail.org or the Foothills Trail Facebook page.)

Upgrades underway at Jocassee Hydro, Oconee Nuclear Station

Jocassee Hydro Station gets new transformers

By Kim Crawford, Duke Energy Corporate Communications

In early September, Duke Energy moved two 299,948-pound transformers to the Jocassee Hydroelectric Station by truck along a 30-mile route from a railyard in West Union, S.C., to Salem, S.C. The new generator step-up transformers, which will replace older transformers, are part of a larger station life-extension project that also includes refurbishing the spillway gates, tailrace gates, intake towers and powerhouse generator domes. The step-up transformers push energy from the generator to the transmission grid.

Built in 1973, the 780-megawatt station generates clean, renewable hydropower during times of peak demand, usually on hot summer afternoons and cold winter mornings. Because Jocassee is a pumped-storage generating station, the transformers also power a motor generator that reverses the turbines to pump previously-used water from Lake Keowee, the lower lake, back up to Lake Jocassee. ❄️



The two new transformers were installed at the Jocassee Hydro Station in late September as part of a life-extension project. (Photos courtesy of Duke Energy)



Workers at Duke Energy's Oconee Nuclear Station will install three new low-pressure turbines on Oconee Unit 2 during its planned refueling outage this fall.

Oconee Nuclear Station prepares for turbine upgrades

By Mikayla Kreuzberger, Duke Energy Corporate Communications

What weighs 150 metric tons, spins 1,800 rotations per minute and helps deliver clean, reliable power to nearly two million customers in Upstate, S.C.?

If you guessed Oconee Nuclear Station's new low-pressure turbines, you're right. Workers at Duke Energy's nuclear power plant will install three new low-pressure turbines on Oconee Unit 2 during its planned refueling outage this fall. These steam-driven turbines drive the electric generator. It's the first installation of three—low-pressure turbines on Oconee Unit 3 will be installed in the spring of 2020, followed by Oconee Unit 1 in the fall of 2020.

The Unit 2 turbines traveled from Schenectady, New York, to Charleston, S.C. on a barge, and from Charleston to Seneca by train.

While they were refurbished in the late 1990s and early 2000s, this will be the first time Oconee's low-pressure turbines have been replaced since the station began operating in 1973; but the station isn't new to equipment upgrades. For example, its steam generators, which convert water into steam, were replaced in the early 2000s, along with each unit's reactor vessel heads that are mounted atop the reactor vessel and help control power production.

Duke Energy has invested more than \$3 billion in equipment and maintenance upgrades at Oconee over the past 15 years. This strategy ensures the plant is well-equipped to continue to safely provide electricity 24/7 for Duke Energy customers. ❄️

Teachers learn about ecology, hydroelectric projects

Bad Creek Outdoor Classroom serves as headquarters for week-long course funded by Duke Energy Foundation

By John Hains

This summer brought leaders from Duke Energy, South Carolina Department of Natural Resources, Clemson Extension program and Clemson University for a field and classroom experience designed to enhance, enrich, and invigorate 13 in-service K-12 teachers. Funded by the Duke Energy Foundation, this course was offered at the Outdoor Classroom located within the boundary of the Bad Creek Hydroelectric Project.

The course title was “Natural History and Ecology of Bad Creek Hydroelectric Station and Jocassee Gorges.” The students came from both local and distant school systems to learn more about ecology and field biology as well as how ecological processes interact with human activities and hydroelectric projects. The Bad Creek Outdoor Classroom provided the ideal location for students to engage in experiences ranging



Teachers waded into Howard Creek to sample the stream for aquatic invertebrates and to assess the health of the water body.

from sampling stream organisms to in-depth learning about the vast underground Bad Creek Pumped Storage facility.

The students prepared for the experience with readings and online lectures during the weeks prior to the field work. At the Outdoor Classroom they were learning how to identify the organisms as small as zooplankton from Lake Jocassee to as large as a family of black bears.

On the first day they learned how to estimate wildlife populations and to identify the flora of the Blue Ridge ecosystems. The students set up sampling mechanisms to be checked at later times during the week for evidence of wildlife presence and numbers.

By the second day, the students and instructors knew each other well. The day was enhanced by a visit by a black bear with cubs. Despite this welcome disruption the group managed to complete a tour of Bad Creek Reservoir AND the massive underground powerhouse for which this project is famous. All were impressed by the magnitude and scale of these facilities. More importantly, they learned how engineering, the economy, and our society interact with ecosystems through facilities like the Keowee-Toxaway Project, and Bad Creek in particular.

The third day featured an adventure on Lake Jocassee where they learned about lakes the Jocassee Hydroelectric pumped-storage facility. We discussed complex interactions between power demand and power production by several means—Oconee Nuclear Station, and the interactions between Lakes Keowee, Jocassee, and Bad Creek—and how this system interacts with aquatic ecosystems. Of course we also literally “got into” our study subject at a few of the spectacular locations around Lake Jocassee, one of which allowed the students to view the rare Oconee bells that are unique to this area.



The Bad Creek Bears paid a couple of visits to teachers and instructors during the week-long course. (Photos by John Hains)

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Teachers completed a tour of the massive underground powerhouse that is an integral part of Bad Creek Hydro Station above Lake Jocassee. (Photo by John Hains)

Impact of Bad Creek class will touch many students

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The fourth day involved “getting into” streams to sample them for aquatic biota. We compared what we found at two streams of different sizes as well as a vernal pond at the outdoor classroom. A final check for evidence of wildlife (mainly bears) completed that part of the course. And, of course, the bears paid another visit just to say goodbye.

The final day took place at the World of Energy to emphasize that nuclear power is a central part of the entire Keowee-Toxaway Project. Students learned about the history and development of nuclear power and how it works at Oconee Nuclear Station. This was an objective lesson on how the operation of the nuclear plant makes it an integral part of the entire ecosystem and how it represents one more important way that society interacts with ecosystems.

After this intensive week of learning and activities the students were still not finished. They had writing assignments to complete before the end of the summer session and this gave them a chance to accomplish two major goals.

First, they were able to employ their daily notes

and diaries to complete a “reflection” document in which they could summarize what they had learned, how they may have changed some of their thoughts, how they may have expanded on their ideas, and importantly, how the experience had enhanced their teaching and even the quality of content for their students.

Second, they chose specific topic areas from the course to address as lesson plans or classroom presentations.

Combined, the overall experience, from online lectures to field sampling to written assignments, enabled the students not only to enhance their own professional capabilities but also to extend the course impact to literally thousands of students who will pass through their classrooms over the years, all of whom will benefit from a better understanding of our place in the ecosystem, and how we interact with all of it. ❄️

(John Hains is Emeritus Associate Professor at Clemson University. He gratefully acknowledges support from Duke Energy Foundation, which provided funding to make the Bad Creek course possible.)



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Mountain hiking keeps walker inspired

Hiker's passion is to see what's at end of the trail

By Odell Suttle

Mountain hiking has a different appeal for everyone. Some want to see the waterfalls, others the leaves. None of that gets me on the mountain. I began hiking in 1986 and what drew me to the mountain then is what keeps me going back. I simply want to know what is at the end of the trail, and do I have what it takes to get to the end.

Oh for sure, I could ask Greg Lucas, Dennis Chastain and Les Storm and they would tell me every detail; however, I want to see it myself. I want to see the petroglyphs, Governors' Rock and my favorite section of the Foothills Trail, the 44 miles maintained by Duke Energy in Pickens and Oconee counties in South Carolina and in

Transylvania County in North Carolina.

Don't forget Rock Creek, Bear Gap, Bear Camp, Cane Break and Horsepasture River. Places that describe a magic land that I love.

My wife, Sadie, got the hiking started by taking me on a picnic to Table Rock State Park. I saw what I thought was a path but she said it was a trail. I asked a trail to where and she pointed to the rock at the top of the mountain. I wanted to see the trail so off I went. Later I did all the trails in Table Rock State Park. Next came all the trails in Oconee State Park and finally the entire 77-mile Foothills Trail.

The only goal remaining is to once again get to the summit of Pinnacle Mountain.  (Odell Suttle is a lifelong resident of Fountain Inn in Greenville County and a Viet Nam veteran. His wife, Sadie, is the person who got him interested in hiking back in 1986. Suttle says they both love South Carolina State Parks, especially Oconee and Table Rock.)



The mountains are calling, and Odell Suttle must answer. (Photo by Mac Stone)