



The Chattooga Quarterly

Spring ❖ 2002

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Community Fare

Common Causes



The 1st annual Conservation Fair featured storytelling, live music, and exhibits from regional and local groups.

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Director's Page

Buzz Williams

Let's face it. Times are not good for conservation. Yet this should not stop us from celebrating in those moments when we feel good about the value of our work. This spring, the Chattooga Conservancy sponsored our first annual Conservation Fair. The event was a great success, demonstrating the overwhelming support of the community and the untiring dedication of our staff.

Earlier this year, I received a call from Marie Mellinger requesting that we sponsor the Conservation Fair. For those who do not know Marie, she is one of the most outstanding naturalists in the state of Georgia. Her long commitment (Marie is now in her eighties) to preserving habitats is also a great inspiration. So, without hesitation we agreed to take on the Conservation Fair.

Frankly, the prospect of another large project at this time was not favorable, for we were already fully committed. The fight to stop the power line in Rabun County is at its peak, accompanied by the never ending struggle to stop poor land use practices on private land, along with Forest Service issues both pro and con. In short, our program of work can best be described as a fight with Medusa; as soon as one battle is over, two more crop up. We have been able to keep up only because of a brief hiatus on bad timber sales on national forest lands during the Clinton Administration. But now the "timber beast" is back at the helm, and we are bracing for renewed struggles on that front. Add to the mix that the Forest Service has strong, new incentives to over develop recreation programs on public lands, "Disney style." Other issues that loom large on the horizon are the continued threats to our forest ecosystem from the introduction of the Hemlock Woolly Adelgid, and Sudden Oak Death. More problems relate to funding. Despite what you hear about the economy getting better post September 11th, contributions for environmental work are down. One would think with all of this work and dwindling resources, the last thing we would do is add the challenge of organizing a springtime Conservation Fair. We did, though, and I'm glad.

The morning of the fair brought hard and steady rain. Driving to our office in Clayton I was feeling a bit depressed—that is until I reached the Chattooga River. Suddenly everything changed. The river was singing with joy at the much needed rain; the forest was bright, vernal green and the birds were in full throat. Once at the office I began putting up tents and tables, and realized that nearly everything was done. Carol Greenberger, our administrative assistant, had almost single handedly organized the entire event including food, door prizes (generously donated by

individuals in the community), kids crafts, live music and games. But what about people? The hard rain surely deterred some but looking around I could hardly believe my eyes. The place was packed by noon. The folks representing all of the participating conservation organizations had great displays, and musicians created a lively and cheerful atmosphere throughout the day (please see p. 11). We also heard stories from Cherokee Indian storyteller Lloyd Arneach, who took us on an emotional roller coaster from joy to thoughtful sadness and then back to hilarity with an unforgettable array of stories. During the afternoon we honored two great conservationists by presenting the first Marie Mellinger Conservation Award posthumously to John Harmon for his outstanding contribution in the field of conservation journalism in the *Atlanta Journal-Constitution*. We also had great food and conversation, so it was truly a memorable day.



Buzz Williams presents the first Marie Mellinger Conservation Award to John Harmon's family.

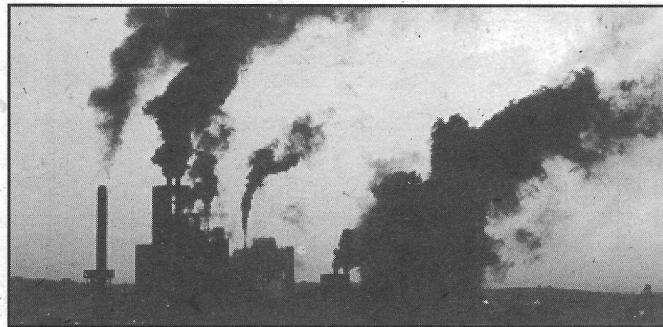
We have what often seems to be an insurmountable challenge facing us in protecting and restoring the Chattooga River ecosystem. Development is steamrolling through the watershed, exotic pests threaten to destroy our most valuable forest trees, our government seems intent on unleashing big corporations to exploit both public and private lands unchecked, and donations are down. But we aren't! Thanks to you, our membership, volunteers and a skilled and dedicated staff, we are ready for these challenges. Please enjoy this *Chattooga Quarterly* and again, thanks for your support.

Tragedy of the Commons

Carol Greenberger

Imagine for a moment that you own two big dogs (let's call them Jake and Lucky) and you have a nice fenced back yard where they can play. Your town also has a park nearby with a large area where dogs are allowed to be off their leashes. You notice that your own back yard is being ruined by the dogs digging and playing, and you constantly have to get out the pooper scooper. But, if you spend as much time as you can with your dogs at the park, your yard stays nicer, and besides, there's no scooper law in your town. So, that's where you hang out with Jake and Lucky. After a while you notice that more people are doing the same thing as you – using the park to exercise their dogs and keep their own yards neater. It's working for you, so you spend more and more afternoons there. In time, the park begins to deteriorate. There are holes dug everywhere, bare trails where the dogs' running and playing has killed the grass. And you better watch where you step. This, my friends, is the "tragedy of the commons."

In the mid 1800s, William Forster Lloyd, an Oxford mathematician, wrote an essay on resources and the effects of individual decision making on society as a whole. Lloyd examined the fate of a pasture held in common by a group of herdsmen. These herdsmen owned individual parcels of land on which they grazed their cattle. They also could utilize a public pasture, the commons, owned by the village for the benefit of the entire community. Some grazed their cattle each day in the commons, preferring to save their own land and use the common pasture that seemed to be of no cost to them as individuals. Herdsmen, acting in self-interest, added more animals to their flock in the commons. As others began to do the same, the commons were overgrazed and became useless to everyone. The ability of the commons, with its fixed supply, to support animals was finite. The limit, its carrying capacity, was exceeded. Lloyd said that it was inevitable that the commons would be exploited to exhaustion and the result would be tragedy. His theory states that a resource owned collectively will be destroyed by each individual overusing that resource, ignoring the group's collective interests in favor of their own. This contrasted a school of thought prevalent at the time, championed by 18th century economist Adam Smith, which held that decisions reached individually would be the best decisions for an entire society. Smith's "invisible hand" theory stated that each individual pursuing his or her own good is led, as if by an invisible hand, to achieve the best good for all.



Unchecked pollution diminishes the quality of "common" resources such as the air we breathe.

Commons can best be described as any resource held collectively by a group of people, all of whom have access and who gain benefit with increasing access. Each resource has a carrying capacity that is the maximum amount of use it can support. Once a resource is being used near its limit, additional use will degrade its value to its current users. Users typically enter a cycle of additional use to gain personally as others use the resource. Since all users behave in this manner, the resource is ultimately doomed. "Ruin is the destination toward which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons" was the view held by Garret Hardin, an ecologist from California who studied Lloyd's work.

In 1968 Hardin applied the Tragedy of the Commons theory to population growth and its effects on the earth's finite resources. His essay appeared in *Science* and has been included since then in works on almost every subject, including ecology, environmentalism, health care,

philosophy, political science, ethics, sociology, law, psychology and economics. His thesis illustrated the need to combine political and social theory with biological data. Hardin stated, "A finite world can support only a finite population: therefore, population growth must eventually equal zero." He painted a bleak picture of the future, calling for social rather than technical solutions and rigorous

regulation of human population. Hardin said, "Freedom to breed will bring ruin to all." It is probably no surprise that Hardin's work was perceived as revolutionary and caused quite a stir. Paul Hawken in his 1993 work, *The Ecology of Commerce*, commented along those same lines when he said, "5.5 billion people are breeding exponentially. The process of fulfilling their wants and needs is stripping the earth of its biotic capacity to produce life; a climactic bust of consumption by a single species is overwhelming the skies, earth, water and fauna."

Hardin went on to relate the Tragedy of the Commons theory to other environmental concerns, such as national parks and pollution. National parks are currently open to all, without limit. Anyone who has visited Yellowstone or Yosemite or the Smoky Mountains in the summer knows how this theory applies. The collective resource is overused by individuals concerned with their own interests over the interests of the entire group. The experience you hope for when visiting a national park is diminished by the vast numbers of other visitors, hoping for their own unique experience. Traffic, standing in line to view a geyser,

Tragedy of the Commons

camping close to hundreds of other campers all detract from your personal visit. But, what is the answer? Should the parks limit their maximum number of daily visitors and turn away taxpayers whose dollars have contributed to the parks? Should they be sold off as private property? Most of the recently proposed solutions seem objectionable, yet the current overuse of these resources is damaging the very property we aim to protect. Closer to home is the proposed Amendment 14, Recreational Boating Use on the Chattooga Wild and Scenic River, to the existing river management plan that would allow increased usage of the river. At contention is determination of the river's carrying capacity, the point at which additional use will degrade the value as a wilderness experience to its current users and to the ecosystem itself.

Pollution, Hardin said, presents the tragedy of the commons in a reverse manner. This is not a question of taking something out of the commons, but putting something in – toxins and waste into the air and water, trash into dumps, chemical and oil spills into the ground and groundwater. Hardin theorized “The rational man finds that his share of the costs of the wastes he discharges into the common is less than the cost of purifying his wastes before releasing them.” Laws or taxes, he reasoned, would be the solution in making it cheaper for the polluter to treat his pollutants than to discharge them untreated. We can see today that his solution has limited application, and the pollution problem continues to spiral out of control. The tragedy is being played out in the air we breathe and the water we drink.

Commercial fishing offers classic examples of commons issues that can be local, regional or global. Over-fishing on each of these levels has led to the total or near extinction of many species of sea life. In 1625, a Dutch scholar said, “The extent of the ocean is in fact so great that it suffices for any possible use on the part of all peoples for drawing water, for fishing, for sailing.” Today we know that the ocean's resources are limited. The decline of once booming fisheries and whale populations is a direct result of overexploitation brought on by the world's maritime nations treating the oceans as a commons. Individual nations have imposed restrictions on their own fishing practices that are negated by other countries continuing to pursue their own self interests and exceeding the oceans' carrying capacities.

Overgrazing on public lands, destruction of the rain forests, ozone depletion, global warming and over-fishing are all instances where individual rational behavior can cause long-range harm to our collective environment, and ultimately oneself. Many people rely on others to make sacrifices and

are generally inclined to act for themselves, rather than for the good of society as a whole. Unfortunately, knowing the conditions that lead to a tragedy does not mean it can be easily avoided. Averting tragedy requires limiting both consumption and access. Hardin and others have argued that restraint will best be achieved through coercion, administered by outside agents. Hardin said, “To many, the word coercion implies arbitrary decisions of distant and irresponsible bureaucrats; but this is not a necessary part of its meaning. The only kind of coercion I recommend is mutual coercion, mutually agreed upon by the majority of the people affected.”

Twenty-five years after writing his revolutionary essay, Garret Hardin believes its message is still true. He wrote, “The more the population exceeds the carrying capacity of the environment, the more freedoms must be given up.” What freedoms can we give up as individuals to help protect the environment without impacting our quality of life?

There are many small things we can each do every day that can have an impact, and help preserve our big, rotating common: Earth.



A landfill next to a water source threatens the quality of everyone's water.

Conserve water – For one day use water in your normal manner, but try to notice ways you can use less. Do you leave the tap on in the sink when you're not using the water? Do you water your lawn in the middle of the day? Have you seen sprinklers that are on timers, running while it's raining?

Minimize your trash – One community in the northeast came up with a system that greatly reduced the amount of trash thrown out by their community. Trash was only picked up if it was in a special bag that had to be purchased from the county. Therefore, everyone paid based on how much trash they threw out. Do you recycle? Do you recycle everything that can be recycled? Do you reuse items as much as possible?

Pollute less – Drive less, drive smarter. Is your vehicle fuel efficient? Do you plan your errands to minimize trips to the store? Do you throw candy wrappers out your window? Do you throw cigarette butts in parking lots? Do you ever pick up trash that you see that wasn't yours?

The concept of our ultimate tragic fate has roots that go back to Aristotle who said, “What is common to the greatest number has the least care bestowed upon it.” The tragedy of the commons can be averted if we all work together. Do we need coercion? Maybe. But maybe if we think about the possible future tragedy, talk about it and act on it, we can help save our environment voluntarily.

Save Our Hemlocks!

Eric Orr

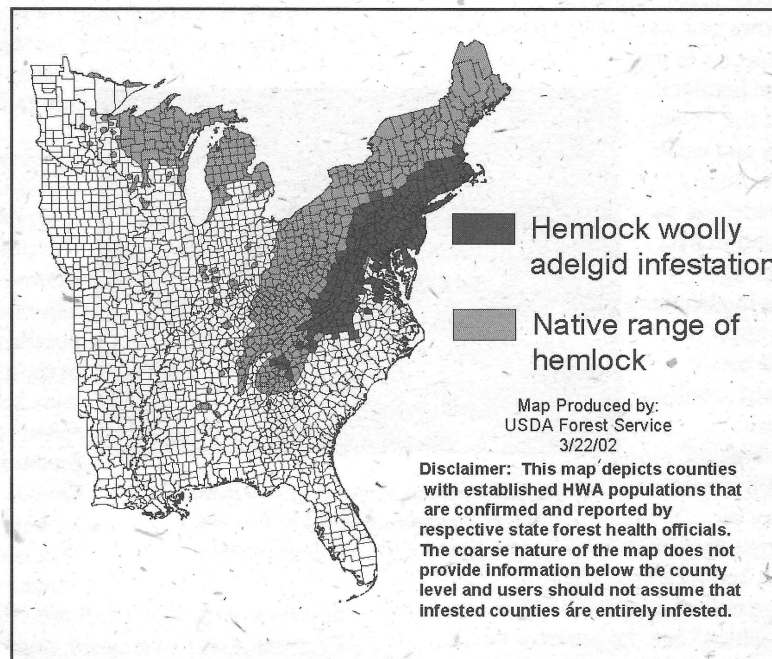
Picture yourself walking through a lush forest densely carpeted with trillium, moss, fern, and dozens of other ground loving plants. When you stop to take a drink from a cold, cascading mountain stream, you notice the majestic reflections of the old towering hemlocks that line the water's edge. In fact, hemlocks are the only trees you see as you peer downstream into a deep gorge. Looking back into the water you catch a glimpse of a small brook trout darting in and out of the swift current, and just upstream a water shrew runs across an eddy and dives under the current searching for a meal. This picturesque scene is descriptive of the pristine hemlock forests found in the Ellicott Rock Wilderness Area in South Carolina. A short hike into an area such as this imparts a tremendous feeling of sorrow at the realization of what may be at stake.

Throughout the eastern United States and Canada, hemlock forests are being threatened by the tiny non-native hemlock woolly adelgid, which has already devastated thousands of acres. The adelgid was introduced to the East Coast in the 1950's and has infested half of the Eastern Hemlock's range. Hemlocks typically grow in riparian areas throughout the Appalachians where they are frequently the dominant trees, providing habitat for hundreds of species of plants and animals, many of which exist exclusively in hemlock ecosystems. Though the Western

Hemlock is not significantly affected by the adelgid, Eastern and Carolina Hemlocks have shown no natural resistance, making the insect possibly the most destructive pest to hit the Appalachians. The chestnut blight swept through the US almost a century ago leaving stumps in place of old trees and virtually eradicated the American Chestnut. Today, some of these stumps continue to send up sprouts, and a few even bear seeds, until they are beaten back by the blight. Since much of the American Chestnut's genetic material has been preserved by healthy root systems, we have a good chance of restoring these trees to our forests. The hemlock woolly adelgid leaves nothing. After initial infestation, tree mortality occurs within five to seven years.

In some areas like Shenandoah Valley in Virginia the hemlocks have suffered severe mortality, leaving only

decaying brown skeletons over vast areas of once deep, flourishing forests. The hemlock woolly adelgid was recently discovered in Ellicott Rock Wilderness Area, where it was not expected for another 15 years. According to Rusty Rhea, US Forest Service entomologist, mortality in this area will occur in about two years. As the trees begin to die a long list of species will be affected, including the Blackburnian Warbler, Black-throated Green Warbler, and Blue-headed Vireo, which depend on hemlock forests for survival. The Pygmy Shrew and Northern Water Shrew, both rare, also need healthy hemlock ecosystems. The death of shade trees along streams and rivers will raise water temperatures as much as 9 degrees Fahrenheit making once pristine waterways uninhabitable by struggling brook trout and several species of aquatic insects. If nothing is done to halt the death march, a vital resource will be lost forever.



Hemlock woolly adelgid was discovered this year in the Chattooga watershed.

While hungry adelgids continue to ravage shrinking hemlock forests, scientists are wringing their hands in search of viable solutions. Forest Service entomologists are studying several treatment options including insecticidal oils and soaps, systemic injections, and biological controls. Soaps work well in areas that are accessible to trucks and equipment necessary for treatment. These chemicals can be harmful to aquatic organisms, however, so this method is

unsuitable in riparian areas. It is an effective alternative only in places like parks that contain relatively isolated, easy to reach stands of hemlock trees. Since each tree must be thoroughly saturated, aerial spraying is useless, as it cannot provide complete coverage. Systemic insecticides show limited promise on individual trees, but long-term treatment significantly damages the trees. It works by applying insecticide to the soil at the base of the tree or injecting it directly into the hemlock, at which time the tree's vascular system absorbs the chemical. As adelgids feed on a treated hemlock, they consume the highly toxic insecticide and die. Unfortunately, many other species are susceptible to the poison as the soil and water around the trees are contaminated by large-scale treatment. It is also not cost effective since individual hemlocks must be re-treated every 2 or 3 years. So far the most promising

Save Our Hemlocks!

treatment option is biological control.

The objective of biological control is to establish a suitable predator species to keep the adelgid in check. Since there is little chance of eliminating the hemlock woolly adelgid, creating a balanced predator-prey relationship is the goal. A biological control agent must meet several criteria to be considered effective. It should be hardy enough to survive a wide climatic range; it must be prolific enough to keep up with the woolly adelgid's high reproduction rate; its life cycle should be similar to the adelgid's; it should feed exclusively on the adelgid; and above all it should have minimal impact on non-target species. Several candidates are being considered, including a beetle native to Western U.S. However, most of the species being studied show limited effectiveness due to slow reproduction rates.

One species, a tiny non-native beetle known as *Pseudoscymnus tsugae*, shows promise. What sets this predator apart from other species is its close synchronicity with the hemlock woolly adelgid and the fact that it can be reared relatively quickly and easily in a laboratory. *P. tsugae* is highly adapted to seeking out the adelgid, as well as dispersing its population over large infested areas, and through laboratory and field studies the beetle has shown no significant impact on other species. In Japan this beetle feeds exclusively on hemlock woolly adelgids. Laboratory research indicates that other non-native adelgids (i.e., pine bark adelgid and balsam woolly adelgid) may be potential prey, as well. Depending on the geographic location, the hemlock woolly adelgid goes through a dormant period of four to eight months each year, at which time the predator beetle seeks alternative food sources of nectar. Research shows that when the beetles run out of food they begin to cannibalize themselves or they simply starve to death. Another concern is whether or not it will become a nuisance to humans like its cousin, the multi-colored Asiatic lady beetle. According to field studies the predatory beetle does not seek warm shelter in the fall, nor does it congregate in large groups, but it remains in the forest near its prey. During the winter, the beetle lives in leaf litter on the ground.

Currently only two labs in the U.S. are rearing the Japanese predator beetle for distribution, but they cannot produce enough insects to meet the needs of our hemlocks. One of these companies plans to abandon the project, leaving only one facility. The Chattooga Conservancy is trying to raise enough money to build a rearing lab in the watershed. *P. tsugae* are expensive to produce, but we may have a unique advantage. Since the eggs of this predatory beetle are susceptible to extreme cold, the rearing method in use by the

existing labs consists of starting beetles from eggs and releasing the adults onto infested hemlock trees after the adelgids break their dormancy in November. However, for reasons yet unknown, the hemlock woolly adelgids in our region break dormancy in February. The warmer temperatures of February may allow us to release eggs directly onto infested trees eliminating a good bit of production overhead. This would also free up more laboratory resources for increased egg production.

To determine the predator beetle's effectiveness a series of tests was conducted in Connecticut by releasing 2000 to 3000 beetles in 15 acre forests. At least 10,000 beetles were released in larger forests in Connecticut and Virginia. Results indicated that the beetles were successful in significantly increasing their own populations and reducing adelgid populations by 47-87 % in five months. If the lab can generate enough eggs there may be a chance of establishing a "fire break" in the Chattooga River watershed to stop the adelgid from advancing any farther.



Pseudoscymnus tsugae preys on hemlock woolly adelgids, and is our best hope for fighting this devastating pest.

Releasing a non-native species seems like a risky proposition, and it is risky to an extent. Although this predatory beetle has been tested extensively in the field and laboratory, lab research cannot possibly replicate a natural situation or definitively foretell every consequence. But our hemlock forests are succumbing to a serious predator, and there is no question of the outcome if we choose to do nothing. There is no natural resistance, no natural control, no chance of survival. Our hemlocks

and their inhabitants will die. End of story. The American Chestnut almost vanished, dogwoods are disappearing, and in California and Oregon the great oaks are being wiped out by sudden oak death. We simply cannot afford to lose any more trees. Right now we have a chance to prevent further devastation, but the key is getting enough beetles into the woods to break the adelgid's well-established foothold. If we do not act quickly, it will be too late.

For more information, check out the Forest Service's Hemlock Woolly Adelgid website:
<http://www.fs.fed.us/na/morgantown/fhp/hwa/hwasite.html>

In a cooperative effort to combat the hemlock woolly adelgid, the Chattooga Conservancy is working to raise money for opening a predator beetle rearing facility in the Chattooga River watershed. We hope to have our own beetles in the forest by early next spring. If you would like to make a contribution, please mail your check to:
Chattooga Conservancy
 2368 Pinnacle Drive
 Clayton, GA 30525
 We greatly appreciate your help.

Bull Pen Mill Restoration

**Betsy Rivard
Bruce Kitchell**

The Chattooga Conservancy applauds this project to preserve sensitive property in the Chattooga River watershed, while also promoting local cultural heritage.

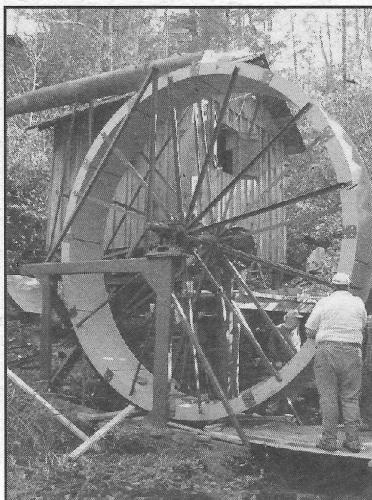
I never intended to own a mill, or even to buy property. But on the way back from a trip to the Iron Bridge that crosses the Chattooga River, we stopped at a spot on Bull Pen Road and hiked through a tunnel of huge rhododendrons to a rustic cabin overlooking a 35 foot waterfall on Fowler Creek, a tributary to the Chattooga. The creek was crystal clear and at the bottom of the waterfall was a picturesque gristmill. I learned that the property was for sale, and it was bordered on two sides by the Nantahala National Forest. Over the next year I visited the mill and cabin, and wanted to preserve that gorgeous, pristine spot. I was concerned that development in the area would have terrible repercussions on the health of the Chattooga River and believed that as a landowner, I could help prevent the degradation of this precious area. One day my neighbor called saying that the owner was eager to sell, and would take half the price! The cabin was infested with powder-post beetles and the gristmill roof was bad; the waterwheel's buckets were rusting out and the underpinnings of the mill were starting to rot. In spite of the drawbacks, I decided to buy. I found out a little about the cabin and mill's history from Mary Cole, who lived across the creek from the cabin.

The exact history of the mill is not known, but it is thought to date from the early 1800's. The earliest known miller there was Wack McCall who ground corn for the neighboring Pleasant Grove Community in the 1880's. The falls are officially named Morgan's Shoals, and there is evidence the mill was once owned by a man named Morgan. The original waterwheel was a horizontal wooden tub wheel, which was replaced with a wooden overshot wheel (vertical). In the 1940's, the property was bought by Dr. James Fancher. After building the cabin in 1946, he renovated the mill, installing a 17-foot metal overshot wheel and flume line. A portion of the enormous amount of water in Fowler Creek is channeled toward the flume by a submerged log dam. A penstock (floodgate) was installed at the mouth of the flume that can be opened or closed at will.

Mary and her late husband, Forrest Cole, discovered the gristmill and cabin in the early 1970's and with permission from the owners, renovated the mill. With the help of interested neighbors, Forrest rebuilt the millhouse surrounding the millstones. He was careful to leave the

millstones in place, feeling this would give historical accuracy to the renovation. Some of the timbers underpinning the millhouse were replaced, and others were added for stability. Like the first builders of the mill, Forrest used locust wood. After reworking the gears and sharpening the stones, Forrest and his friends ground corn for the Pleasant Grove neighbors once again.

Mary was happy I bought the mill and hoped I could improve its stability. She feared the mill might just collapse during a storm. Later a tree fell that grazed the side of the millhouse and wheel, and I felt compelled to get the renovation underway. I found an engineer and professional millwright named John Lovett, who runs Falls Mill in Belvedere, Tennessee. My recently retired friend, Bruce Kitchell, was also eager to oversee the renovation of Bull Pen Mill. I hoped to preserve the mill, enabling it to grind corn again and hopefully produce some hydro-power. The waterwheel restoration began in July 2001, and Bruce's description of the project follows.



Recently restored, Bull Pen Mill is ready to once again grind corn for the Pleasant Grove Community.

The initial phase of restoring the Bull Pen Mill involved determining what work was needed, and how it could be done to have minimal impact on the environment around the waterwheel and mill house. We were fortunate to find Robert Hubbs, founder of the Water Wheel Factory in Franklin, NC, and John Lovett of Falls Mill in Belvedere, TN to assist and guide us in this endeavor.

The first challenge was to develop a system for delivering material to the wheel site which is more than 50 feet below the driveway to the cabin. To solve this problem, Hubbs installed a 100 foot long steel aerial cable suspended between trees at the top and bottom of the run. A trolley

mechanism was hung from the steel cable, carrying a wooden box into which material could be loaded. A platform and ramp was constructed to allow easy access to all sides of the wheel. The buckets and periphery of the wheel were cut into manageable sections and burned off the radial angle-iron spokes, and two damaged spokes were also cut off. The remainder of the waterwheel frame, axle and spokes were sandblasted and wire-brushed. The area directly beneath and around the frame was covered with plastic sheeting to catch scale, paint chips and sand, thus minimizing the impact on the area surrounding the wheel.

After much discussion, the decision was made to replace all the existing mill house post and beam supports with new locust posts and beams. Fred Strong, a local building contractor with more than 25 years experience, undertook this phase of the restoration, and he also built the "balcony," a walkway outside the mill house that supports the pinion

Bull Pen Mill Restoration

shaft and drum that is connected to the wheel. The old differential used for power generation was retired permanently.

The fabrication of the 12 bucket segments at the factory was now complete and ready for delivery and installation. A CAD (computer aided drafting) system was used to design the bucket segments, and the segments were assembled and welded by hand. The segments were lowered by the aerial cable to the wheel site. Each segment was bolted to the radial spokes and the wheel was then rotated using a come-along so that the next segment could be inserted and bolted to the radials and the previous segment. Rubber gaskets were inserted between each segment to contain the water spill.

It was now time for millwright, John Lovett, to perform his centuries old craft. The first step was to sharpen the stones. This involved lifting the 1,000 pound-plus top "running" stone and turning it over to expose the cutting surface. Once settled on the floor of the millhouse, the top stone was sharpened using a hand held pick. The process involved chipping away small amounts of stone in such a way as to recreate the radial furrows that perform the grinding function, while at the same time maintaining an absolutely flat surface. This process took about one day for each stone. After both surfaces had been sharpened, the top stone was carefully lifted back into its original position.

Then we began work on the drive train connection, which was broken into three sections. First, the 3' horizontal shaft with a 3" pinion gear on one end and a 19" belt drum on the other end. This was mounted on the balcony and engaged a 24" ring gear attached to the waterwheel. Second, the vertical shaft with a 19" belt drum on the lower end and a square, pointed upper end that engaged the yoke bar, which supported the upper stone. The lower end of the shaft rested in a bronze bearing that was mounted on the "bridge-tree."

The "bridge-tree" is a horizontal beam that is attached to a pivot point on one end and has a vertical chain connected at the other end. This allows the mill operator to raise and lower the top stone by means of a screw mechanism in the mill house. Lastly, there is a 6" wide leather belt with a quarter twist, to connect the horizontal and vertical drums.

The upper-end of the vertical shaft was held in place by a wooden bearing. A new 8" diameter bearing, constructed from laminated pieces of hard maple, was inserted in a tapered opening in the stationary bottom stone. Once the vertical shaft was ready, the horizontal shaft was installed on the balcony. The alignment of the drums was crucial for proper belt tracking. At this point we were ready to turn the stones by means of water flowing over the wheel, and John Lovett returned to his shop in Tennessee to build the accessories needed for the milling operation. These included a new "hoop" that surrounded the rotating upper stone, a "hopper" that sat on top of the "hoop" and held the grain before grinding, and a sifting "bin" that separated the

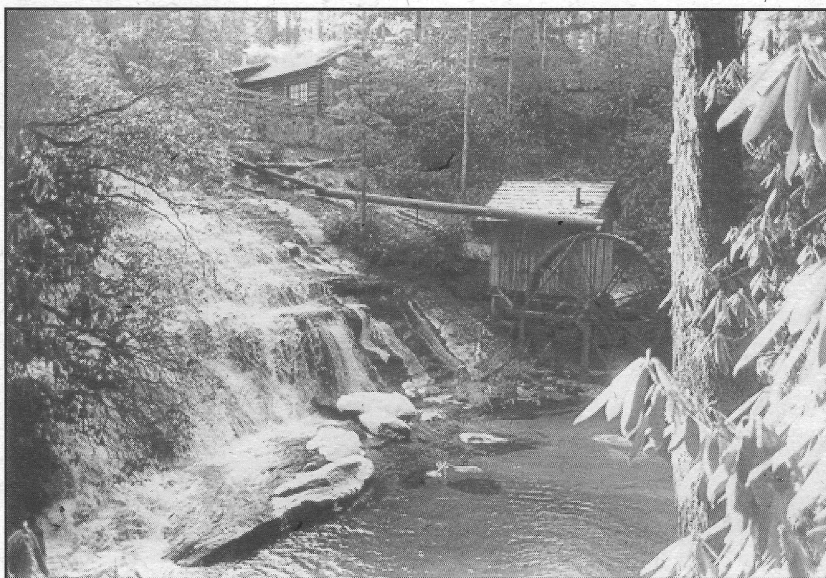
ground material as it exited the grinding stone according to size. The hopper was "bumped" by a cam-like rod called the "damsel" that was driven off the top of the vertical shaft. The bumping action caused the hopper to feed the grain smoothly into the center hole of the top stone for grinding. The sifting "bin" was driven by a small belt that came up through the millhouse floor. The

belt was guided by a complex arrangement of small pulleys and received its power from a wooden drive

wheel attached to the vertical shaft.

The final task was to bring all the individual pieces into harmonious operation. The first and most important of these operations was to balance the running stone. This had been done by adding flattened pieces of lead to the top of the stone until it rotated smoothly without dipping. Numerous adjustments were made on the guide roller to ensure that the belt would track properly and not slip off. Finally, the remaining and most important ingredient was to pour 50 pounds of dried corn into the hopper and start the stone a-turnin'.

Thousands of water wheels were constructed on streams of every size throughout America by farmers, millers, sawyers and mine operators. The ability to grind corn into meal allowed pioneers to settle and build lives in new frontiers. Preserving these mills not only forges a valuable link to our nation's past, it also provides a valuable tool for use today.



There is enough head on Morgan's Shoals to generate 8,000 watts of electricity. Pictured here prior to restoration, the mill included a 1950 Ford differential for running a generator.

Eastern Cougars: Science, Skepticism, and Scat

Chris Bolgiano

Sometimes it seems that I am the only person I know who *hasn't* seen a cougar in the mountains of western Virginia, where I live. Reports come in from all sides. Lori saw a black one playing at the foot of Little North Mountain not far from here, but she is a poet and a writer of fantasy novels, and sees things in the shadows that other people don't. My neighbor Willy was startled the other night by a big, long-tailed cat that ran in front of his car; he is a hunter and said he never saw anything like it in the woods, but it was night and he barely got a glimpse as the animal streaked by. David saw one on the outskirts of the small city down in the valley where he lives, but he is, sadly, too often in his cups. Gil was riding his mountain bike just across the state line in West Virginia and swears he saw one gliding through the green gloom, but he runs a bike touring company, and if tales of eastern panthers spark up his clients' experience, so much the better.

The cat known as cougar, panther, painter, mountain lion, puma, catamount and three dozen other names was officially extirpated in the East by 1938, when the last wild cougar was shot in Maine, but reports of them have never ceased. Sparse and scattered in the early twentieth century, by the last quarter of it cougar sightings swelled to such a volume that they have become a phenomenon in themselves. The eastern cougar is a mythic presence. I cast my mind in search of it, as I walk through my hundred acres of woods along the flank of Cross Mountain.

Cougars were the top predators in the eastern forests. The cats' soundless, solitary stalking is better adapted to deep woods than the chasing habits of wolves. Many mountain stories tell of cougars dropping from trees onto unsuspecting people, or covering a sleeping person with leaves as they do to cache their prey, or screaming like a woman being murdered. A tombstone in Chester County, Pennsylvania, dated 1751, records the earliest documented death by cougar, although undoubtedly not the first, and definitely not the last. I feel no fear, though, as I pad along the moss-carpeted old logging roads that now serve as forest paths. I almost wish I did.

Settlers feared cougars enough to try to eliminate them altogether. That goal seemed already achieved by the end of the nineteenth century, when massive deforestation facilitated by railroads devastated much of the last remaining cougar habitat in the Appalachian Mountains. The destruction of the region's fabulous hardwood forests by private loggers prompted the government to buy up seven million acres of national forest and parklands, for purposes of environmental restoration. Stretching down the southern Appalachian Mountains from Virginia to Alabama, these now compose the largest complex of federal lands east of the Mississippi. Although too much topsoil has burned or washed away for the forests to recover their former productivity, trees have grown back. Here lies the eastern cougar's best hope for the future. My property borders a national forest, on the threshold of that

geography of hope. If cougars are making it anywhere in the east, sooner or later they ought to be in my backyard.

Or maybe they always have been, if sightings mean anything. But they don't. Even out West, where cougars are known to be present, so many sightings turn out to be coyotes or dogs or feral cats that biologists simply label them as UFOs — Unidentified Furry Objects. In the East, wildlife officials have routinely dismissed as a crank or a drunk anyone who reported seeing a cougar.

The psychology of eastern cougar sightings is convoluted. People who think they've seen a cougar resist the obvious and logical explanations. "It was a dog," I told Lori, Willy, David, and Gil, only to be met with angry stares. They *want* to believe they've seen the rarest and most dangerous animal possible where they live. Surely these cougars are cultural projections, drawn perhaps from guilt for our collective ravaging of the continent, or from yearning for the exoneration that the survival of cougars would confer. Surely, too, there is an element of thrill-seeking in the sightings, in a culture addicted to the fastest, highest, and fiercest, whether in machines, mountains, or animals. Maybe the image of cat goes deeper than culture. Maybe it has been permanently etched on human consciousness by eons of that peculiar tension between fear and admiration, the anxiety of ambivalence. Cat sightings may be a primal expression of the human understanding of nature.

But there is now much more to the story than sightings. In 1983, a third generation coal miner named Todd Lester saw a cougar in southern West Virginia not far from his home.

"When we made eye contact," Todd said, "the cat captured a piece of my heart." But when he reported the sighting to local wildlife officials, they ridiculed him, which made Todd determined to learn everything he could about cougars. In 1996 he made plaster casts of tracks near the same place as his sighting. Two independent experts confirmed those tracks as cougar. Buoyed by the affirmation, Todd founded the Eastern Cougar Foundation (ECF) to advocate for restoration of cougars in the East. He asked me to be vice president. Together, we have compiled written validation from reputable authorities to document well over a dozen cases of confirmed field evidence of cougar presence from Maine to Missouri, evidence that includes bodies, scats, and videos.

So much persuasive evidence has accumulated that the wildlife establishment is beginning to acknowledge it, sort of. Instead of denying all possibilities of cougar existence, officials now routinely say that yes, there may be a few cougars out there, but they're all escaped or released captives from elsewhere, not remnant natives. Therefore, these cats aren't the eastern cougar subspecies that is listed on the Endangered Species Act, and by implication aren't entitled to the protections of the Act. It's a handy way to sidestep any responsibility for a wide-ranging, threatening predator.

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And it's probably true that at least some cougars in the East are former pets. There's an astounding market, legal and illegal, in exotic felines. Endearingly cute as kittens, cougars grow into unpredictable, voracious adults. Surely, some number of fearful or exasperated owners have driven to the nearest forested area and opened the cage door. Can former pets, most of them declawed, survive in the wild? Yes, according to the experiences of several biologists who have tracked escaped captives.

Another source of cougars in the East may be migrants from established populations in Florida and the West. For the first time in the twenty-plus years of the Florida panther recovery project, cougars have been radio-tracked crossing north of the Caloosahatchee River in search of new territories. If the transmitter signals didn't prove it, biologists wouldn't have believed the cats could negotiate the intense agricultural development of the area. Cougar movements eastward are being documented by confirmed evidence in mid-Western states where cougars haven't been seen in a century. They may even be swimming across the Mississippi River. Nothing can be ruled out for this highly adaptive animal.

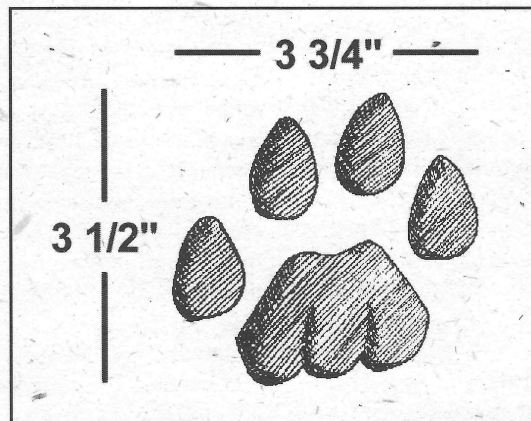
So to the possibility of a few remnant natives surviving in the most remote areas must be added escapees and migrants. My own theory is that we have a proto-population of eastern cougars, composed of mongrels. I say "proto" because studies done as part of the Florida panther recovery program showed that a very small cougar population can be extremely fluid, its social network too weak to hold individual members from wandering widely in search of a mate or their fate, whichever comes first. Field sign of such transient and highly secretive animals will naturally be, to put it mildly, scarce.

I call them "mongrels" for a purpose as well. By its own tools, science has now proved that subspecies purity is nothing more than a human concept, with little application in the wild. A 1999 analysis of DNA from all 32 subspecies of cougar found too little genetic variation to support this taxonomy, and recommended collapsing it to six subspecies, including one for all of North America. In addition, extant DNA from only six museum specimens of what were considered the "eastern cougar" subspecies could be found, too small a sample from which to construct a valid genetic profile. There is, in essence, no such thing as the eastern cougar subspecies.

A cougar kitten killed by a vehicle in eastern Kentucky in 1997 illustrates what is happening in the eastern woods: DNA tests showed that the kitten's maternal ancestry

included South American genes, popular in the pet trade, but that the father was a North American native. It doesn't make a whit of difference where the cougars in the eastern woods come from. They are all capable of filling the eastern cougar niche. We should be grateful to them for their courage in trying.

Agencies clutch at absurd genetic excuses because they don't want to become involved in what they think will be a hotbed of cougar controversy. This is not necessarily the case. Establishment of viable populations of cougars won't require drastic changes from current land use, although they will depend on slowing the loss of habitat to sprawl and establishing protected travel corridors between the blocks of public land that provide the best cougar habitat. But it has become clear from ecological research that the future of many other wildlife species will also depend on these strategies, so this is hardly a new issue.



Tracks are often the only indication of the elusive cougar's presence.

Maybe the agencies dread the prospect of engaging the public in discussions about a predator that can kill people. Yet all western states with cougars have developed successful educational programs on cougar biology and behavior, providing models for eastern states. The general public can be reassured that cougars attack people so rarely that getting hit by lightning poses a much greater risk. Farmers can be reassured that livestock losses are extremely low and can be avoided

through use of guard dogs. Hunters can be reassured that cougars tend to take young and old deer, which helps to stabilize herd sizes without unduly impinging on trophy bucks. There may be a role for hunters with dogs to chase cougars without killing them, as a way of training the cats to avoid humans.

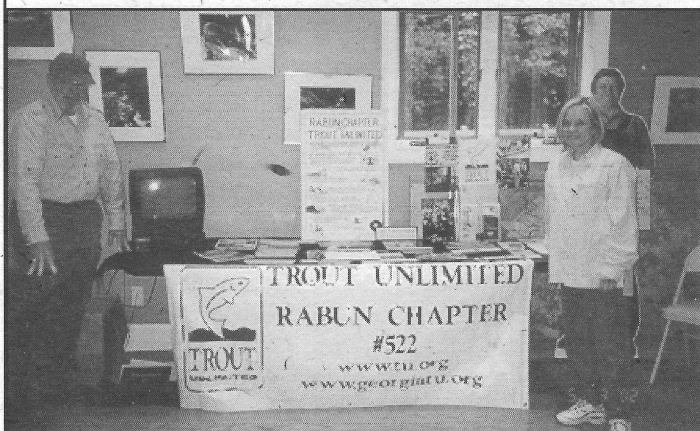
The Eastern Cougar Foundation is exploring ways to integrate local customs and love of place into strategies for recovering cougars in the East. And as I walk on Cross Mountain I peer at whiskery arrangements of twigs and leaves in the shadowy undergrowth, while my back awaits the sensation of cat eyes upon it.

Chris Bolgiano is the author of *Mountain Lion* (1995), *The Appalachian Forest* (1998), and the forthcoming *Living In The Appalachian Forest: True Tales of Sustainable Forestry*, which includes a profile of Todd Lester in a chapter on cougars, coal, and the commons. The picture on the previous page is by Heiner Hertling, from the cover of *Mountain Lion*. For more information on Eastern cougars, contact the Eastern Cougar Foundation's website under construction at www.easterncougar.org. To receive a free brochure, send a self-addressed business envelope to the Eastern Cougar Foundation, P.O. Box 91, North Spring, WV 24869.

Conservation Fair

On Saturday, May 4th the Chattooga Conservancy hosted our first Conservation Fair. The event was spearheaded for years by Marie Mellinger, renowned Georgia botanist who has contributed to the community through her extraordinary knowledge of native plants and tireless work to save their habitats. The Conservancy was honored to take over the fair at Marie's request.

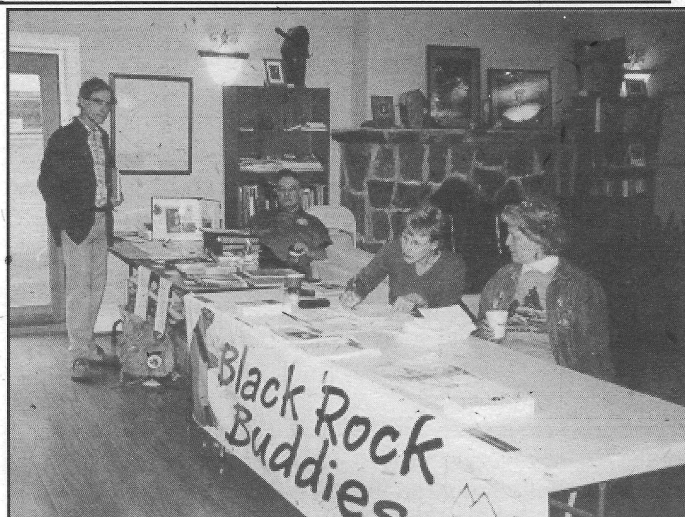
The much needed downpour on fair day brought us into the Conservancy's office for a more intimate indoor event. Action for a Clean Environment, the American Chestnut Foundation, Black Rock Buddies, Georgia Land Trust Service Center, Nantahala Hiking Club, the Rabun County Library, Rabun County Elementary School, Trout Unlimited and the USDA Forest Service all had exhibits and information. Literature was also provided by Foxfire, the Georgia Conservancy, Land Stewards of the Highlands Plateau, Georgia Forest Watch, Southern Appalachian Forest Coalition and Georgia Organics.



The Rabun County Chapter of Trout Unlimited hosted a booth at the Conservation Fair.

Day-long entertainment made the event a lot of fun. The morning began with storytelling by Cherokee Indian Lloyd Arneach. Lloyd had us all glued to our seats while he wove magic with words, relating traditional tales as well as contemporary and personal stories. Toe-tapping commenced next with the music of local talent, namely Hank Belew, Curtis Blackwell, Oliver Rice and Tom Roach. Then acoustical guitarist, singer and songwriter Rich Wells entertained everyone with his original tunes. Outside under our pavilion, kids (and some adults) made wind socks out of construction paper, crepe paper and yarn. A dart game provided great entertainment with kids throwing darts at balloons for prizes.

The Chattooga Conservancy initiated the first annual Marie Mellinger Conservation Award, to be given each year to a person who has made noteworthy contributions to the conservation field. This first award was given posthumously to John Harmon, who covered environmental issues for the *Atlanta Journal-Constitution*. John's wife, Lisa, accepted the award and was joined at the fair by her two sons and several family members. In the afternoon Joanne Steele entertained with folk songs, and Lloyd had us spellbound again with more



The Black Rock Buddies promote programs to enhance the environment and visitor experience at Black Rock State Park.

stories. Will and Betsy Deanne finished the day with beautiful harmonizing on songs written by Will, who accompanied on the guitar and harmonica.

Thank you to everyone in the community who helped make the Conservation Fair a success. Door prizes were donated by Cheryl Bird, Marie Mellinger, Claudia Taylor and Eric Orr. Prizes for the games and supplies for kids' crafts were donated by Clayton Photo, Sole Place, Walmart, Dairy Queen, Hatcher Office Supply, Prater's Main Street Books and Reeves Hardware. Fat Boys Café provided concessions all day. Don Bundrick crafted a beautiful piece of wood for the Conservation Award plaque. We greatly appreciate all the support from the community, and look forward to next year's fair!



Visitors take a break from other fair activities to enjoy live acoustic music.

Cover photos clockwise from top left: Volunteer, Beverly Logan; Buzz Williams with Lisa Harmon and family; Storyteller, Lloyd Arneach; Musicians, Oliver Rice, Tom Roach, Curtis Blackwell, and Hank Belew; American Chestnut Foundation exhibit.

Watershed Update

AMENDMENT 14 – RECREATIONAL BOATING USE ON THE CHATTOOGA WILD AND SCENIC RIVER

The Forest Service has released their Environmental Assessment analyzing proposed changes to the management of boating on the Chattooga River. Comments on the assessment were due at the end of May, and a decision is expected in the near future. The changes to the 1985 Sumter Forest Plan being considered are: adjusting the daily limits for private boaters, increasing flexibility for the commercial rafting companies, and granting more commercial shuttle permits.

The alternative preferred by Michael Crane, District Ranger of the Andrew Pickens District, is outlined in the environmental assessment. Private boating limits on Section III would be established at 175 people per day on weekends and 125 on weekdays.

Section IV allocations would be increased to 160 per day on weekends and 75 on weekdays. Hourly capacities for both sections would be dropped. If those limits are exceeded, the following year a reservation system, with a required fee, would be put into effect. Allowing more than one shuttle permit is also in the "preferred alternative." For commercial raft trips, the change to the current definition of "raft" would allow for the use of inflatable kayaks ("duckies"). Individual trip limits would be raised from 30 customers to 40, although daily limits remain the same.

Commercial trips would be permitted to move from Sections III and IV to Sections I or II. Twelve craft, up from the current seven, would be allowed on Sections III and IV based on water levels.

The Chattooga Conservancy strongly objects to Amendment 14. This proposal is based on demand, rather than consideration of the wilderness experience that the Wild and Scenic Rivers Act was written to preserve. Opportunities for self-reliance, the development of outdoor skills and a place to restore the soul through solitude are part of the experience the river management plan is tasked with preserving. We believe that private boating best fulfills these goals set forth by Congress, and that commercial allocations should be reduced to equal private boating limits. Additional shuttle permits would increase the number of *de facto* commercial outfitters (shuttle permittees who could outfit, drop off and pick up their customers) and

also poses a safety risk, making it easier for uninformed and/or unskilled boaters to access the river. The environmental impact of increased trip size and commercial trips on Sections I and II cannot be dismissed. The Chattooga River was declared a Wild and Scenic river in order to protect and preserve the natural beauty and habitat we are fortunate to enjoy. Over commercialization will only destroy this rare opportunity for all, today and for generations to come.

HEMLOCK WOOLLY ADELGID – YOU CAN HELP

There is an initiative in Washington to fund the USDA Forest Service with \$25 million over the next five years, which would be earmarked to fight the hemlock woolly adelgid. These funds may be attached to the fiscal year 2003 budget. To make it to the floor of Congress, the funds

will have to be approved by the Natural Resources and Appropriations Committees. You can help by lobbying your legislators with telephone calls and letters asking them to support this funding. Please contact the following Chattooga River watershed federal delegates, who are on the Appropriations Committee:

Representative Charles Taylor (NC)
231 Cannon House
Office Building
Washington, DC 20515

Senator Ernest Hollings (SC)
US Senate
Washington DC 20515



Private paddlers best fit the wilderness experience that the Wild and Scenic Rivers Act was written to preserve.

Please see also the article on pp. 5-6 to learn more about the devastating effects of the hemlock woolly adelgid.

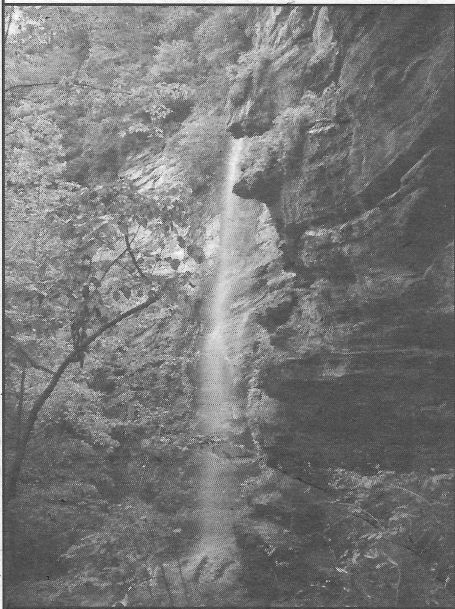
RABUN COUNTY BOARD OF EDUCATION GRANTED LAND

Rabun County Board of Education was granted 45 acres of Chattahoochee National Forest land off of Boggs Mountain Road by the Forest Service, under the Education Land Grant Act. A new elementary school will be built on the site. The Chattooga Conservancy is concerned about future land trades of the isolated Forest Service tracts on Boggs Mountain created by this land grant. Land swaps of those tracts could lead to development on steep slopes that certainly would exacerbate the serious and chronic pollution problems of Stekoa Creek. We urge the Forest Service to retain in the national forest system those tracts that lie above and along Stekoa Creek.

Watershed Update

RABUN COUNTY POWER LINE UPDATE THE BATTLE GOES ON

On April 15th, Judge Struble struck down the Rabun County High Voltage Moratorium Ordinance, which had been in place since June 2000. Rabun County is appealing the ruling to the Supreme Court of Georgia. Robert Denham, attorney for Rabun County, argues that the moratorium does not negate eminent domain, but rather it dictates what type of power lines Georgia Transmission Corporation can build. Denham claims the power companies still "have the power of eminent domain if what they use it for is reasonably necessary and appropriate." His argument is that the future needs of Habersham Electric Membership Cooperative (HEMC) customers can be met by lower voltage distribution lines. According to Dr. Robert Broadwater, an electrical engineer contracted by the Chattooga Conservancy, Georgia Transmission Corporation's (GTC) 115 kV proposal is seven to 10 times what is needed.



This pristine forest protects drinking water for residents downstream of Tiger and Timpson Creeks.

Impact Statement of GTC's request to use our public lands for their private profit. The old growth forest that protects the drinking water sources for Tiger and Timpson Creek residents is no place for a power line.

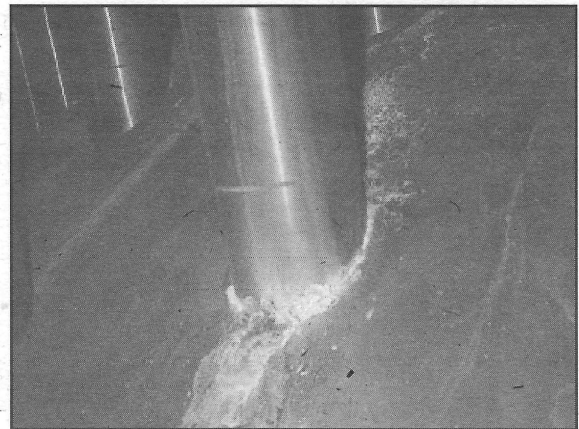
CHICKENS COME HOME TO ROOST

Our readers may recall the Chattooga Conservancy's challenge (in 1998) of the re-licensing proceedings for the Oconee Nuclear Station, which is located close by the Chattooga River watershed (the entire Chattooga watershed

While Rabun County awaits a Supreme Court decision, GTC is waiting for the Forest Service to permit their power line through old growth forests and sensitive habitat on the Chattahoochee National Forest. The Forest Service expects to complete an Environmental Assessment by July of this year. We urge citizens to request that the Forest Service perform a full Environmental

lies within the nuclear station's 50-mile evacuation zone).

We filed a "petition to intervene," giving reasons why the nuclear station's license to operate should not be extended beyond its original decommissioning time of 2013. Our concerns were that standard nuclear reactor operating conditions involve extreme temperatures, pressures, and radiation bombardment, causing cracks and other safety problems with reactor vessel components and cooling systems. We argued that these known engineering failures, as well as other potential problems, presented risks to the



Damage recently found on a reactor head control rod nozzle at the Oconee Nuclear Station.

public that would grow greater as the nuclear station aged. So, surely the Oconee Nuclear Station should not continue to operate beyond its intended "shelf life." But both the Nuclear Regulatory Commission and the industry vigorously denied the validity of our concerns, and the extension was granted.

In May 2002 we learned that 23 new cracks were recently discovered at the Oconee Nuclear Station's three reactors. The cracks were in the "control rod nozzles," which enter the reactor core from the top and serve to stop the nuclear chain reaction. Control rod nozzle cracking causes water to leak from the reactor head, where a catastrophic failure could lead to water pouring out faster than it could be replaced by emergency cooling systems. In a worst-case-scenario, a meltdown could occur and radiation would be released into the surrounding environment. Industry experts stated "it was material degradation that wasn't expected."

The Chattooga Conservancy joins experts at the Union of Concerned Scientists in asking the Nuclear Regulatory Commission to take real steps to protect public health and safety, by mandating the replacement of reactor vessel heads having defective nozzles, and upgrading nuclear plants' monitoring systems. Of course, we still believe that the Oconee Nuclear Station should be shut down as originally designed, or sooner.

Member's Page

MANY THANKS to all who recently renewed their membership, or joined the Chattooga Conservancy. Your generous contributions will help us continue to work on all of the important conservation issues facing the watershed.

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Spring 2002

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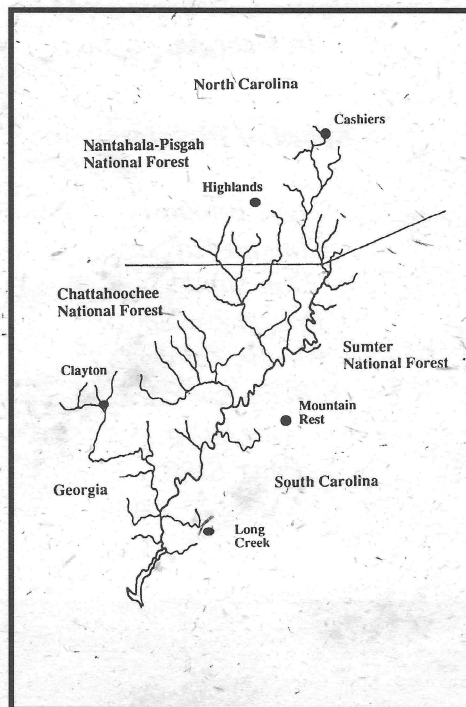
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Purpose: To protect, promote and restore the natural ecological integrity of the Chattooga River watershed ecosystem; to ensure the viability of native species in harmony with the need for a healthy human environment; and, to educate and empower communities to practice good stewardship on public and private lands.

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- Monitor the U.S. Forest Service's management of public forest lands in the watershed
- Educate the public
- Promote public choice based on credible scientific information
- Promote public land acquisition by the Forest Service within the watershed
- Protect remaining old growth and roadless areas
- Work cooperatively with the Forest Service to develop a sound ecosystem initiative for the watershed

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