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Director's Page

Buzz Williams

Hot issues. There is certainly no shortage of hot topics related to conservation. So many in fact, that controversy seems to be a "constant" in our field of work. The general public is often frustrated with the endless debate and conflict. The Chattooga Conservancy is constantly looking for a fresh approach to reframe issues aimed at conflict resolution. Our goal is always action.

The best example of this "Conservancy" strategy is how we might address the issue of whether or not we humans are a

causal factor in global warming. This is an important issue because after years of denial, even our government has concluded that there can no. longer be any doubt that major changes in the Earth's climate are now a reality. Today the debate has shifted from asking "whether" it is a reality to "why" it is occurring. Science seems to be split on the question, but many prominent scientists make a strong case for concern. Meanwhile evidence is mounting that the consequences of global climate change may be disastrous.

If the debate plays out like the recent controversy over the cause of the great fire season out West, it will be misfortunate for the environment. In that debacle, finger-pointing and the ensuing battle of experts fomented a stalemate. When the industry dominated Congress left for summer recess, they vowed upcoming legislation that will exclude the public while turning the "timber beast" loose to solve the problem with chainsaws.

We cannot afford to make the same mistakes with the global warming issue. Take a look at what is happening in northern Alaska around the Chuckhi Sea below the Artic Circle. There, where the average temperature has risen about 7 degrees in the last 30 years, the sea ice has retreated by 14 percent and the ice has thinned by 40 percent since the 1960's as a result of global warming. Consequently, the village of Shishmaref is now actually sinking into the ocean. Villagers will soon hold a vote on the question of the possibility of relocating the whole village. North of Anchorage, a four million acre spruce forest is dying from

"The air is precious to the red man, for all things share the same breath — the beast, the tree, the man, they all share the same breath. The white man does not seem to notice the air he breathes. Like a man dying for many days, he is numb to the stench."

-Chief Seattle

the spruce bark beetle because of more favorable conditions for infestation as a result of temperature increases. Hundreds of miles of the Alaska pipeline are threatened by melting permafrost and wildfires are predicted to sweep across an area of dead trees twice the size of Yellowstone National Park. There is no doubt that these catastrophic events are underway in Alaska as a result of global warming, and are a harbinger of the worldwide consequences of climate change.

How then do we frame the debate over the cause of global warming to avoid paralyzing conflict? I would argue that

given the risks as exemplified by the results of warming in Alaska, action should be taken now in the event that we are part of the problem. Action may be motivated by common sense, ethics, and out of concern for the risk we take with our children's future. Those actions would be to drastically reduce "green house" gas emissions and to put an end to corporate domination of our planet's natural resources. The key will be in the hands of citizens who advocate for conservation, who live . according to this ethic, and who participate in society by voting according to a land ethic. The result would mean honest politics, reduced consumption, voluntary population control and locally based economic development. If we are part of the problem and we do nothing, the consequences are grave. If perchance we are not part of the global warming problem, we

would be in a much better position to weather environmental changes--so we should be doing something either way.

Enjoy the rest of the summer and this *Chattooga Quarterly*. The staff and board of the Chattooga Conservancy greatly appreciate your confidence in our work through your membership. We strive constantly to give you information and fresh perspectives to advocate for our common goals. Together, let's be a part of breaking the gridlock of endless debate by taking decisive action personally and as an organization.

Red Wolves in the Smokies: A Worthy Experiment

Shauna Baron Biologist / Outreach Coordinator, USFWS Red Wolf <u>Re</u>covery Program

Say the word "wolf" and what usually comes to mind is the image of the gray wolf, *Canis lupus*, with a thick fur coat and mysterious golden eyes staring down at us from the calendar hanging on the office wall. Many are unaware that North America is home to another species of wolf, the less famous and smaller cinnamon colored wolf known as the red wolf, *Canis rufus*.

If you are lucky, you may have been blessed with more than just a vision of a calendar wolf. Maybe you have had a fleeting glance of a wolf in the wild, or you have heard the beautiful sound of a howl on a still night. For a few short years, the Great Smoky Mountains National Park was home

once again to the sound and presence of the magnificent red wolf.

The story of the Smokies red wolf recovery effort began in the early 1970's, when biologists discovered that the red wolf was nearing extinction. Once numbering in the thousands, the red wolf roamed the eastern United States from New England to Florida and as far west as Texas. Indiscriminate killing, aggressive predator control programs and habitat destruction by humans created the initial decline of the red wolf. Further alterations in the landscape caused by lumbering practices, mineral explorations and agriculture struck the final blow to the red wolf by creating favorable habitat for the more adaptive coyote,

Canis latrans. Historically, red wolves and gray wolves in the central US provided a buffer that kept the coyote confined to the west. As the wolf numbers continued to decline, the buffer began to break down and the coyote migrated east. As a result, some of the remaining red wolves began to interbreed with the more abundant coyote. In desperation to find a mate, the red wolf was breeding itself out of existence. By 1970, the entire red wolf population was believed to be less than 100 animals confined to a small area of coastal Texas and Louisiana. The red wolf had reached the brink of extinction.

In a last-ditch effort to save the species from extinction, the U.S. Fish and Wildlife Service (USFWS) set out to capture the few remaining red wolves and bring them into captivity. Only 17 animals met the criteria established to define the red wolf species, thus standing between survival and extinction. Fourteen of these animals became the foundation of a unique captive breeding program led by the Point Defiance Zoo and Aquarium in Tacoma, Washington.



By 1970, the red wolf population had been reduced to less than 100 animals. Photo courtesy USFWS Red Wolf Recovery Program.

By 1980, the last of the remaining red wolves were removed from the wild and the red wolf was declared extinct in the wild. Fortunately, the red wolf bred readily in captivity and by the mid-nineteen eighties, the captive red wolf population had grown to nearly 65 wolves. But could the red wolf be returned to the wild? Red wolves were eradicated so early in US history that little was known about them, or how to restore and manage red wolves in the wild. In 1987, the USFWS released four pairs of captive-born red wolves into the wilderness of Alligator River National Wildlife Refuge (ARNWR) in northeastern North Carolina and the ultimate test of survival had begun.

Restoring captive-born wolves to the wild was difficult in the beginning because many of the wolves had a hard time adjusting. Some of the wolves were a bit too tolerant of

> humans and were returned to captivity. But in 1988, a few of the wolves of Alligator River proved they could take care of themselves by acquiring food and producing the first wild red wolf litter. As each new litter of red wolf pups were born and raised in the wild, the wolves began to take on more wild characteristics and the population began to grow.

> After showing great success in establishing a red wolf population in northeastern North Carolina, the USFWS decided to step into new ground by attempting a second recovery effort in the Great Smoky Mountains National Park on the border of North Carolina and Tennessee. The park covers 500,000 acres of pristine forest '

habitat, with many areas accessible only by foot. The park also has an extensive system of lakes and streams offering a rich diversity of wildlife. Given such a rich environment, the park appeared to be the ultimate red wolf utopia.

In 1991, the Smokies Red Wolf Recovery Project began with a one-year experimental release and recapture of a family of red wolves consisting of an adult pair and two female pups. The objective of the experimental release was to allow the USFWS to gather information on humanrelated issues in the area, to evaluate the potential threat to livestock and to study wolf and coyote interactions. After one year, the wolves were recaptured and the results of the study were presented to the USFWS and the National Park Service (NPS). Initial results showed that red wolf restoration was feasible.

In October 1992, six wolves consisting of two adults and four juveniles were released into the park in an area known

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Red Wolves in the Smokies

as Cades Cove. The following year a second family of red wolves was released 11 km west of the cove in the Tremont area of the park. The red wolves in Cades Cove immediately began to displace the local coyotes as the wolves took up permanent residence. Unfortunately, the Tremont wolf group showed no affinity for each other or their locale. Some of the Tremont wolves left the safety of the park, sending biologists on lengthy tracking excursions to recapture the wolves and return them safely to the park. After several capture and release attempts, three of the four juvenile Tremont wolves continued to leave the park and were subsequently transferred to Alligator River National Wildlife Refuge.

In April of 1993, a monumental event occurred. Wild red wolf pups were born in the Smoky Mountains for the first time in over one hundred years. Both the Cades Cove and Tremont families produced a litter of pups. The pups were

captured at 10 weeks of age and appeared healthy and vibrant. Each pup was surgically implanted with a transmitter in order to monitor its movements.

To successfully establish a red wolf population in the Smokies, the wolves must be able to successfully reproduce on their own. Wild born pups must survive many challenges that include disease, parasites and competition with other predators. Therefore, all hopes for a Smokies recovery of the red wolf was riding on these small pup-sized shoulders.



USFWS biologists weigh new-born wolf pups. Photo courtesy USFWS Red Wolf Recovery Program.

By the end of 1993, high hopes turned to disappointment. Seven out of sixteen free-roaming wolves had died of various causes. The domestic dog disease parvovirus had been the suspected killer of all four pups of the Cades Cove litter. An adult female had died as a result of a territorial* dispute with other wolves. A coyote is presumed to have killed a fifth pup, and an adult male had ingested poison.

By 1997, the harsh reality was becoming clear. Pup survival was alarmingly low overall. Some pups were found alive – but were in extremely poor health, many showing signs of malnutrition and high parasite infestation. Yet by spring of 1998, biologists had achieved some success in establishing a red wolf family in the Smokies by vaccinating the pups and providing food supplements.

Aside from the success with these few individuals, the project still faced another obstacle; wolves continued to leave the park. It is likely that low availability of food in the steep mountainous terrain of the park forced the wolves to move into lower elevations searching for prey outside of the park.

In October of 1998, the USFWS announced the cancellation of the Smokies Red Wolf Recovery Project due to low pup survival, and the inability of wolves to establish home ranges within the park. The lack of consistent prey within the park is considered a contributing factor to the wolves' inability to establish home ranges. Biologists then set out to capture the few remaining wolves. Some of the wolves were incorporated into the captive breeding program, and others were released into Alligator River National Wildlife Refuge.

The end of the Smokies project was disappointing for all involved, but it was a worthy experiment and an important learning experience. The extensive public education efforts

made by the USFWS and National Park Service taught Smoky Mountain residents and visitors the importance of the red wolf. More importantly, the information gained was invaluable to the USFWS in understanding how to manage red wolves in areas of high human use, livestock operations, and a variety of habitat types by providing essential data on habitat use, movements, disease and behavior of red wolves. The experience and knowledge gained from both the Smokies and northeastern North Carolina projects now serve as a model for other

species recovery efforts worldwide.

Today, the howl of wild red wolves can only be heard in northeastern North Carolina. The USFWS continues to focus on ensuring the success of the only wild red wolf population. Northeastern North Carolina is now home to over 100 free-roaming red wolves, including wolves from the Smokies program. They now comprise approximately 20 packs living throughout 1.5 million acres in five counties. Although interbreeding between red wolves and _ coyotes continues to threaten red wolves, the USFWS is showing great success in managing the threat. It is hoped that eventually red wolves will become numerous enough to once again displace coyotes, reduce the threat of interbreeding and survive on their own with minimal help from biologists. In the meantime, the wild red wolf population continues to grow, and the howls of four generations of red wolves can now be heard in the still night .

Hemlock Woolly Adelgid Update

On June 27th representatives of 8 organizations and 2 senators' aides met at Clemson University to discuss the plight of our Eastern and Carolina hemlocks. The chief focus of the meeting was to devise a plan to open a lab to mass-produce predator beetles in an effort to combat the highly destructive non-native Hemlock Woolly Adelgid (HWA). The conference resulted in a cooperative proposal between the US Forest Service, Clemson University, the Chattooga Conservancy and the Jackson-Macon Conservation Alliance to use Clemson lab space and possibly graduate students to run the facility. The Chattooga Conservancy is the fiscal agent for the project, and has been invited by the National Forest Foundation to submit a grant proposal to the Foundation's 2002 Matching Awards Program for \$100,000 to get the project going. If awarded, this grant will be totally contingent upon the Chattooga Conservancy and cooperating organizations raising another \$100,000 to match the Foundation's funds. Please consider making a contribution, earmarked for the Hemlock Woolly Adelgid Biological Control Project.

Rusty Rhea, Forest Service entomologist, suggested that the most effective strategy to control adelgid infestation would be to build a beetle rearing facility in each state. The North Carolina Department of Agriculture is currently in the process of establishing a lab in Raleigh. There is nothing in the works for Georgia yet, but perhaps a successful South Carolina operation will incite Georgia to follow suit.

Overall, the outlook is hopeful in the fight against the HWA. There is no guarantee the beetle will produce the results we want, but Forest Service research in the Northeast has shown that the predator beetle, Pseudoscymnus tsugae, has reduced adelgid populations by 47% - 87% in test forests. Though P. tsugae seems to be the most promising biological control agent, three other predatory beetle species are currently under study. The Forest Service is presently conducting field tests on the three species, and they plan to release them in natural settings soon. A combination of predators may prove to be the most effective means of keeping HWA in check. Even if the beetles do not successfully establish themselves, they will certainly buy some time while scientists search for other treatments. 'The Western hemlock's natural resistance to HWA is a subject of particular interest to researchers, as well. If scientists can isolate a gene or determine what makes the Western hemlock resistant, it may be possible to produce HWA resistant strains of Eastern and Carolina hemlocks. However, this is a long term project requiring all the borrowed time predator beetles can offer.

There is currently an initiative in Congress to allocate \$25 million to the Forest Service for controlling HWA. It is important that this money be approved, and given to the proper department within the Forest Service. Please ask your Member of Congress to support this funding, and that the \$\$ goes to State and Private Forestry Forest Protection.

HEMLOCK WOOLLY ADELGID FACTS

⇒ What do I do if I find Hemlock Woolly Adelgids in my hemlocks?

DON'Ts

Don't panic. The hemlock woolly adelgid is relatively new to our area. Hope is on the horizon if we can breed and release sufficient numbers of *Pseudoscymnus tsugae*, a beetle that preys exclusively on adelgid species. Until then, chemical control by spraying the adelgid in forest settings and on trees greater than 80 feet tall is ineffective, because the infestation must be thoroughly drenched with insecticide. Trees less than 30 feet tall may be drenched by a backpack sprayer or a garden hose sprayer, but taller trees may require the services of a professional arborist with a hydraulic sprayer.

It is important to note that regardless of the size of the tree, the adelgid infestation begins in the lower branches of the tree and moves upward toward the crown. Therefore, at the first sign of infestation, the drenching of the lower branches of taller trees may retard the spread of the adelgid to the upper branches. Also, if you have the first signs of infestation on just a few branches of an ornamental hemlock or small tree, you can drench the branches individually by dipping them in a small bucket of mixed insecticide.

Don't apply petrochemical insecticides to an infested hemlock, THIS IS IMPORTANT. County Extension Services will recommend a variety of petrochemical insecticides, such as lindane or dursban, diazinon or fluvalinate, whereas horticultural soaps and oils are just as effective and safer to humans and the environment. Petrochemical insecticides poison by contact or ingestion. The horticultural soap or oil selectively kills soft bodied insects, such as the adelgid, by covering the victim with a film which impedes its ability to exchange air. Unlike petrochemical insecticides, horticultural oils and soaps are relatively safe to the applicator. The hemlock tree, with its dense foliage, is a microenvironment. There is a wide variety of beneficial insects that inhabit hemlock trees and these insects are eaten by a variety of rare or endangered birds. Petrochemical insecticides unnecessarily threaten the lives of the insects and birds.

Don't spray your <u>uninfested</u> hemlocks with chemical pesticides before you see evidence of adelgids. Because of their relatively short life in the environment, chemical pesticides offer little or no protection from invasion by the hemlock woolly adelgid.

Don't wait to spray. Since the adelgid propagates and injures hemlocks so quickly, it is advisable to spray or drench branches as soon as possible after a new infestation is detected. All life stages of the adelgid are susceptible to

Hemlock Woolly Adelgid Update

control by pesticides.. Sprays can be applied at any time of the year, weather permitting. After the first thorough drenching, one yearly application thereafter may suffice, if there are no other infested hemlocks within 100 yards from which other adelgids could disperse. Two thorough spray treatments each year, after the initial application, are necessary in most situations. An effective strategy is to spray in early April and in late June. Another option is to spray in late September and early June. Either of these schedules will target the two yearly generations of the adelgid and minimize the impact of migration.

Don't be discouraged if you see the wool of the adelgid on the branch after drenching. The adelgid nymphs are

immobile and firmly attached to the branches even after death. The presence of wool on the twig ean persist for several months after the adelgid has been killed. The simplest way to determine if control measures are effective is to disregard the tattered, off-color wool on older twigs and look at young twigs for the fluffy, whitewool produced by living adelgids.

Don't apply a nitrogen fertilizer to an infested tree. While the application of a nitrogen fertilizer will improve the growth and vigor of uninfested hemlocks, fertilizing an infested tree with nitrogen has been found to enhance adelgid reproduction and survival.

Don't allow your hemlocks to dry out. Since good growing conditions can play an important role in the survival of your hemlock, make sure that your hemlocks

receive at least one inch of water per week (including rainfall) over the area beneath the drip line of the crown.

Don't feed birds or squirrels around your hemlocks. Birds, squirrels and deer are the-principal dispersal agents of the Hemlock Woolly Adelgid. Any effort to discourage these animals from visiting your hemlocks will reduce the risk of new infestation.

Don't harvest or remove the hemlocks at the first sign of infestation. A study done by the University of Connecticut Department of Natural Resource Management and Engineering in cooperation with the USDA Forest Service has found that some hemlocks can recover from adelgid infestations. Site characteristics indicate that the health of the trees plays and important role in their resistance to longterm damage caused by the adelgid. Hemlocks in valleys and on north or northeast slopes appear to have the greatest resistance to adelgid damage. Hemlocks on ridge tops and upper slopes are believed to be less resistant because the soil is drier, thinner, more acidic and less fertile than hemlocks



A Hemlock Woolly Adelgid feeds at the base of a hemlock needle.

in adjacent valleys. With the drought in the Southern Appalachians, hemlocks on such ridge tops and upper slopes may be already stressed from poorer growing conditions.

Don't clip woolly covered boughs from your trees. Once you see wool on your hemlock branches, you probably have HWA "crawlers" all over the tree. Clipping off woolly boughs unnecessarily damages the tree while doing nothing to thwart the infestation.

Don't move plants, logs or firewood from infested areas on your property to areas not infested with the adelgid.

\Rightarrow What is this I've heard about injecting or implantation of trees?

Injection and implantation are alternatives to spraying and have definite drawbacks. The tree injection technique involves drilling small shallow holes into the root flares at the base of the tree and inserting pressurized plastic capsules of a concentrated liquid pesticide, such as acephate, bidrin or metasystox, into these holes. The pesticide moves up the tree and kills the adelgid when it is ingested. The implantation technique réquires drilling deeper holes around the trunk of the tree. A plastic cartridge containing a powdered pesticide, such as acephate, within a gelatin capsule is inserted into each hole and, as the sap flow dissolves the

capsule, the pesticide is carried throughout the tree. Both of these techniques can control the adelgid for about six months. Two considerations restrict their use. First, since they depend upon sap flow, they are only effective on newly infested, uninjured trees, since the feeding of the adelgid restricts the tree's ability to uptake and distribute water. Second, the drilling injures the tree and makes it susceptible to other diseases. These techniques are only available through professional arborists.

\Rightarrow What about soil treatment?

This technique involves the introduction of systemic pesticides into the roots of infested hemlocks. A pesticide, usually imidacloprid, is injected or drenched in the soil beneath the crown and taken up by the roots and distributed in the branches and twigs of the tree. It can control the adelgid for five months. Unlike injection or implantation of the trunk, it does not wound the tree, but the tree must have a healthy sap flow for the soil treatment methods to be effective.

Where Has All Our Rain Gone?

Dave Martin

Everyone knows that the Southeast has been in a drought for the last four years, but exactly how bad is our situation in the Chattooga watershed from an historical perspective? Is this a trend that we can expect to become the new climate of the Southern Apps? In a time when so many of our climactic and environmental problems are the direct result of our own industry and overpopulation, it is easy to point a ... finger at global warming, urban heat islands, and other such phenomena as the cause of our dire straits. While these factors are certainly a large part of the equation, it is important to remember that normal weather patterns are always changing and may be doing so in a way that can be explained independently of human influence. There is no doubt that we are contributing to global warming. But let's put this issue on the back burner for a minute and explore some components of our natural weather cycles.

In order to understand the Chattooga watershed's weather patterns, we must first look at the entire Southeast as a region, and then try to understand what happens locally. Any boater of our beloved river can tell you that when there are hurricanes off the east coast, especially around the mouth of the Savannah River, it's time to break out the duct tape and get the paddling gear ready for some sick days at the office. Most of our rain, however, comes from thunderstorms that build up in the Gulf of Mexico and are carried up here by the sub-tropical Jet Stream. It would make sense, then, to look at what affects these systems in order to understand how weather comes our way.

Scientists are now able to look at weather trends from the past and identify patterns that occur annually with the change of seasons. These annual weather patterns are affected by even longer-term trends that vacillate through decades or even greater lengths' of time. Understanding these trends, which can sometimes last the course of a whole lifetime, is important if we are to understand how "normal" weather patterns behave in our area. A considerable amount of our knowledge of these long-term trends is speculative, because we only have about 150 years of recorded data to draw from. In some cases, this is only enough time to analyze two or three cycles of one of these weather patterns.

In the absence of empirical data, scientists are able to project models into the past based on geologic records of natural disasters and other significant climate changes. It is generally accepted, for example, that some of these phenomena that affect global climate variability, called "teleconnection patterns," have occurred for over 13,000 years. While we do not yet fully understand the impact of many of these teleconnection patterns, their components, such as large high and low pressure systems, occur with such regularity that climatologists are able to use them as tools for predicting weather trends many months in advance.

El Niño is one such global weather anomaly that has

received quite a bit of publicity in recent years. Even though it is a phenomenon that occurs in the Pacific Ocean, its effect can be felt around the globe. Normally, the sun heats the waters of the Pacific Ocean off the coast of Indonesia and Australia and causes massive hot, moist air currents to rise. As the air cools, it sheds its moisture in the form of monsoons in the South Pacific. Subsequently, the drier air continues to rise, and moves east across the ocean. It cools and condenses even more as it travels, and by the time it reaches the west coast of North and South America, it begins to sink, causing a high-pressure system. It then flows back out to sea as the Trade Winds. As these Trade Winds move west, they actually push the warm surface waters west towards Indonesia, where the process starts all over again. This cycle is known as the Walker Circulation, after the scientist who first observed the relationship between weather patterns off the coasts of South America and Australia. During a year where there is a strong El-Niño, the Walker Circulation slows, or stops completely. Without the Trade Winds to push the warmest surface waters back out to sea, the sea surface temperature off the west coast of the Americas increases, until it reaches a point where the warm, moist air rises all at once. This causes severe rainstorms up and down the Pacific coast. Polar Jet Stream currents are pushed farther North into Canada, so the Northern U.S. experiences unusually warm cold seasons. Sub-tropical Jet Stream currents also pushed farther North, which means they do not pick up as much moisture as they would in a normal course over the Gulf of Mexico. A strong El Niño usually means that tropical storms in the Atlantic cannot build significantly. For this reason, fewer hurricanes occur along the East Coast.

El Niño's sibling, La Niña, has just the opposite effect. During years with a strong La Niña, the Pacific Trade Winds are warmer than usual, driving an even greater amount of warm water westward. Tropical Jet Stream currents are generally weaker during a strong La Niña, so storms brewing in the mid-Atlantic rarely meet resistance as they build and head west towards our coast. As a result, a strong La Niña usually means a more active hurricane season for the Southeast. Unfortunately, weaker Tropical Jet Stream currents also mean less rain will come inland from the Gulf of Mexico. Weather patterns tend to be much less predictable across much of North America during a strong La Niña because of the absence of Sub Tropical Jet Stream currents.

Another long-term weather cycle that has a significant effect on the weather in the Southeast is the North Atlantic Oscillation (NAO). This phenomenon is the result of the interplay between a sub-tropical high pressure system over the Azores Islands in the mid-Atlantic, and a sub-polar low pressure system near Iceland. When the temperature between these two systems is greater, the NAO is said to have a positive index. This trend results in mild and wet winter conditions for the Eastern U.S. A negative NAO

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index implies that there is a weak sub-tropical high and a weak sub-polar low, and results in colder, drier winters for the East. Altogether, the National Oceanic and Atmospheric Administration (NOAA) recognizes 13 teleconnection patterns in the Northern Hemisphere.

Once we consider all of these global influences, we still have to consider more local issues that may affect our weather patterns to determine when our water table might see some relief. When we tune down the scope of our inquiry to a local perspective, human influences on the climate unfortunately become much more apparent. The Goddard Space Flight Center at NASA released a report on July 18, 2002 stating that large urban areas create heat islands which cause on average a 28% increase in rainfall downwind of the area from 30 to 60 kilometers (18 to 36) miles). If rain falls in such an eddy immediately downwind of these urban areas, that means areas farther downwind will receive only hot, dry air. The jury is still out on whether or not the Chattooga watershed is directly affected by these urban heat islands, but the Goddard Center's report cited Atlanta as one of the most significant occurrences of these heat islands in North America. Common sense would lead one to believe that a large asphalt heat fence between the Southeastern Blue Ridge Escarpment and the Gulf of Mexico must be robbing of us of at least some of our rain.

four most severe El Niños of 23 in the 20th century occurred between 1980 and 1998.

So what does all this mean for the immediate future? The NOAA's Prognostic Discussion for Long Term Outlooks, which looks at three factors -- soil moisture, the El Niño /La Niña phenomenon, and current weather trends, (or simply "trend") -- says that there is a measurable temperature anomaly in the Pacific of +1 degree Celsius, which indicates a weak or moderate El Niño this season. Without taking Atlantic teleconnection patterns into consideration, it predicts, "abnormally wet, and in some areas cold conditions across much of the South through the winter and into the spring of 2003." The Northern Atlantic Oscillation index for the fall and winter indicates a return to the negative, which points toward a break in the regional drought, and a return to cooler weather this fall and through the winter. According to science, hope is in sight for the Southeast in the coming months. As far as anthropogenic climate change is concerned, we are all responsible for looking much farther down the road at the way our society is growing. There is no doubt that we are changing our own climate, and it is up to each of us to encourage business practices that conserve our natural resources and seek to reduce the amount of waste we produce.

Global warming is, of course, a reality that even our -

Commander in Chief. George Bush, has acknowledged. The Intergovernmental Panel on Climate Change, an organization established jointly by the World Meteorological Organization and the United Nations Environment Programme in 1988 to monitor the human impact on global climate change, concluded that the 1990's was the warmest decade on record, since the records began in 1867, and that the global temperature rise that can be attributed to human influence measures between 1.4 and 6.3 degrees Celsius. Climate change due to human industry has a measurable effect on the teleconnection pattern's, but the effects vary according to the patterns' characteristics. For one reason or another, the



Hot Dam!

Carol Greenberger

Paddling the two miles down Lake Tugaloo to the boat ramp after boating Section IV of the Chattooga River gives you time to think. Time to daydream, time to ponder the universe, time to reminisce. Plenty of time....

As the child of an engineer, I have memories of visiting dams on any family vacation with a dam nearby. My Dad found these feats of engineering incredibly fascinating. Aside from the fact that this allowed my brothers, sister and me to say the word "dam" aloud in front of our parents, we were less than enthralled. Now however, I find myself curious about the building of the dam at Tugalo and what once lay beneath the still waters of the lake.

A moment for semantics and clarification. -The dam is named Tugalo. The lake, however, is called several different names. Georgia maps and Georgia Power Company call the lake Tugalo. South Carolina maps and documents name it Lake Tugaloo, the same as the river below the series of dams. Locals refer to the lake as Bull Sluice Lake, and this is backed up by old Oconee County maps naming the road to the lake in South Carolina "Bull Sluice Lake Road." For the purpose of this article I'll be calling it Lake Tugaloo, as I am now a South Carolinian.

Stories abound that the Chattooga River's original Bull Sluice and Sock'em Dog rapids were once downstream of Section IV, and are now under the lake. These names were moved to rapids upstream when the dam was erected. The river bottom drops steeply at the confluence of Bad Creek and the Chattooga, and this logically may have been the site of a rapid. A little farther downstream, Worse Creek also



A sizeable rapid existed below the confluence of the Tallulah and Chattooga Rivers.

comes in on river right and a rapid may have existed there. Below the confluence of the Chattooga and Tallulah Rivers, a long rapid can be seen in the Georgia Power photograph of the dam construction.



Workers were housed next to the dam construction site.

In his memoir, *Sound Wormy*, Andrew Gennett, a lumberman in the Chattooga River watershed in the early 1900s, reminisces about that area of the river. Surveyors "...in a sense of humor, named the streams just below Camp Creek 'Bad Creek,' 'Wuss Creek,' and 'Wusser Creek.' I remember that at the mouth of Wuss Creek, at a big bend in the river, there was a deep hole where the water ran sluggishly and placidly that was known as the "Deep Hole of Sock-in-Dog." It was said to have obtained its name from an old Indian who 'socked in' his dog at this place and made him swim out." It is not clear if this is the Sock'em Dog rapid thought to have been in that area, possibly at low water, but this recollection is one of the few written pieces of history to be found.

History does tell of the war in 1760 between South Carolina and the Cherokee that resulted in the destruction of most ofthe Lower Cherokee villages in this area. Following the Revolutionary War, settlers received land grants along the Tugaloo River in what is today Oconee County, South – Carolina. The area under Lake Tugaloo seems to have been uninhabited by settlers and thickly forested.

In the early 1900s demand for electricity in Atlanta was increasing. Georgia Railway and Power Company officials saw the potential for power generation from the swiftly flowing streams in north Georgia and began to buy rights to the land surrounding them. Ultimately six hydroelectric power plants were built in a stair-step fashion along a continuous 28 mile stretch of the Tallulah and Tugaloo Rivers. The first dam at Tallulah Falls was opened in 1913. The Tugalo Hydroelectric Plant is about two miles south of the Tallulah Plant, just below the confluence of the

Hot Dam!

Chattooga and Tallulah Rivers. Construction of the dam began in late 1917, but was soon halted due to World War I. Work was resumed in 1922 and the dam began producing electricity in 1923. The dam created a 597 acre lake with 18 miles of shoreline. The gravity concrete dam stands 155 feet high and spans 940 feet across the river. The plant has four generating units, producing a total of 45,000 kilowatts.

Dam construction played a big role in the economics of the area. Hundreds of laborers were employed, many living in small two or three room "shacks" constructed near the dam sites. Families accompanied many of the workers, and photographs show homey porches filled with potted flowers and vegetables. In the October 17, 1918 *Clarkesville Advertiser*, the local newspaper for Habersham, Rabun and

Town Counties, a help wanted advertisement read "Wanted to employ 200 laborers. Will pay \$2.25 per day, board 50 cents per day. Apply to J.E. Harvey, Tallulah Falls." Although it's not clear if this help wanted ad was for workers on the dam or some other project, it does paint a picture of the times.

There are approximately 80,000 dams in the United States. Only 2,400 of these are used to generate power. About onethird of the dams are used for recreation, followed by stock or farm ponds, flood control, public water supply and

irrigation. Worldwide, 20% of all electricity is generated by hydropower. Countries that

meet almost all of their power needs with hydroelectricity include New Zealand at 75% and Norway at 99%. In the United States, 10% of all electricity comes from this source, meeting the needs of 28 million households. This is the equivalent of nearly 500 million barrels of oil. The first hydroelectric power plant in Appleton, Wisconsin was built in 1882 to light two paper mills and a home.

Creating hydroelectricity is virtually emission free, and the question of whether or not to use an existing dam for power is a separate issue from the controversy surrounding building dams in general. However, several undesirable environmental effects of hydroelectric plants do exist. The plants' turbines can cause fish injury and mortality. Hydropower plants can cause low dissolved oxygen levels in the water and water temperature is also affected. Not surprisingly, many organizations have been formed to halt the erection of dams, as well as to "free the rivers" from current impoundment. Many aspects of dam building concern nature and river lovers. Damage to the surrounding

Tugalo Dam circa 1922.

areas from the actual construction itself is one such issue. Impact on a watershed's many animal species during and after building a dam is a hot topic. River health itself is another point of contention. The flow of nutrients within a river system is restricted by a dam. Water stored behind dams tends to accumulate silt and sedimentation. Phil Garner, in an article in the *Atlanta Journal & Constitution* magazine about the Chattooga River, said "[Lake] Tugaloo, especially at low water resembles not a lake, but a long sand bar. Backed up behind a Georgia Power Company dam, the impoundment has filled in over the years with the sand and silt washed down by the wild river. For long stretches the water is only inches deep." He concluded, "It was as though the river were slyly winning out over a hated obstacle and eventually would cut its own way once again."

> Another hot dam topic, gaining attention now in the Chattooga River watershed, is that of "whose water is it?" Inter-basin water transfers, diverting water from one watershed to another, are being contested across the country. Human water consumption is eight times greater than it was one hundred years ago. As Atlanta and other cities continue to grow, they look for new sources of water to augment their inadequate supplies. Recently, Habersham County in Georgia applied to the U.S.

Corps of Engineers to withdraw 12,5 million gallons of water a day from Lake

Tugaloo. The water would be diverted to the Chattahoochee Basin to "supply the citizens and businesses of that region with their present and future water needs." The General Assembly of South Carolina passed a resolution asking the U.S. Congress to stop this request. The fights over water transfers will continue to escalate as world population continues to grow.

The two mile paddle down Lake Tugaloo led me in many "dam" directions. The research led me to new knowledge about hydropower, dam construction, some history of this area and water issues. I even drove down the three mile curvy dirt road to see the dam itself. I heard a few stories passed down to the grandchildren of men who worked on the dams. I read newspapers from the era and gazed at photographs that painted a picture of our community's past. And though I still was not enthralled by dams themselves, I was fascinated by the role Tugalo dam has played in the history of the Chattooga River watershed.

All photos courtesy of Georgia Power Land Department Photo Archives.

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Chattooga Quarterly

Dixie Trout

Tedd Williams Reprinted with permission from Blue Ridge Press

On a warm March morning I crouched beside a stream high in Great Smoky Mountains National Park, cradling a brook trout in the icy current. In sunlight, muted by the kind of cloud bank that gave these mountains their name, the belly of the little fish glowed with impossible shades of orange. The Yankee trout that I knew had two or three rows of red spots along their chestnut flanks, but this one had seven. The dorsal fin was broader and marked with strange but lovely black stripes. Underfins, with the familiar cream trim, seemed larger.

In the water two Park Service biologists, Matt Kulp and Joe Beeler, slogged around, stunning fish with 600 volts from gasoline-powered backpack generators. They were looking for rainbow trout and happy not to be finding them.

Apparently rainbows had never been stocked here, and a downstream waterfall was keeping them out. In previous summers Kulp, Beeler and their colleagues had sorted out the rainbows from other park streams, releasing them below natural barriers.



habitat [629 miles] just isn't practical." Among the reasons: lack of natural barriers and the proliferation of brown trout, aliens from Europe that

40 miles," says

Moore.

project leader Steve

"Restoration of the

rest of the original

can leap over waterfalls rainbows can't negotiate.

To many the southern brook trout is the South's most beautiful fish.

Why would they do such a thing when rainbows grow bigger, fight harder, and when the Park Service had gone to all the trouble and expense to plant them?

Well, values change. These days the mission of the Park Service, unique among state and federal agencies, is to preserve and restore "naturally functioning native ecosystems." Rainbow trout, which the park quit stocking in 1975, don't belong here. They evolved in the Pacific Northwest.

The slice of mountain sunrise I was holding in my hand quickly revived and darted back into the flow. At seven inches it was a giant among southern Appalachian brook trout—a subspecies isolated these past three million years in the high country of Virginia, Georgia, the Carolinas and Tennessee.

Because of competition from the stronger, larger rainbows, this unique fish, the South's only native trout, is now confined to high-elevation streams where it is particularly vulnerable to acid rain. In Great Smoky Mountains National Park only about 15 percent of the brook trout are pure southerners because before 1975 the park also polluted Sam's Creek, scene of the latest and most spectacular success, was too big to restore with just electroshocking. But when the park proposed to kill the rainbows with a selective, short-lived, utterly safe fish poison called Antimycin, some anglers were outraged.

its waters with brook trout of the northern race.

The restoration process has been arduous—a tough sell to

anglers who lack what Aldo Leopold called an "ecological

"bigger" and "better" are synonyms. But a trout is no more

conscience." To many of them a trout is a trout, and

trout at all; it's a char descended from an Arctic char

a trout than a tree is a tree. In fact, a brook trout isn't a

prototype landlocked by ancient glaciers. That's why it

fontinalis, means "dweller of springs." The vanishing

So far the park has restored 11.1 miles of brook trout

seeks out frigid water and why its generic name, Salvelinus

southern subspecies is a national treasure, no less valuable

than California's redwoods or Minnesota's timber wolves.

habitat on nine streams. "We already had about 121 miles

of brook trout water, and we're shooting to restore another

Last fall, after a painstaking environmental review and public comment process, the park completed the job, but not before shocking and evacuating most of the native brook trout and opening the stream to unrestricted rainbow fishing. Patient and intelligent public education, by the park and a private outfit aptly called Trout Unlimited, has turned attitudes around. When all comments were in, the approval rate for the first Antimycin treatment was 81 percent.

Now anglers with new values are contributing money and time to save their native trout. Not because it is a better gamefish than the aliens that suppress it (it is smaller and weaker), not because it is more beautiful (although it is), but because it is part the South's purple, cloud-wrapped mountains and Earth's genetic wealth, because it belongs.

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Brookies in the Chattooga Watershed

Eric Orr

Known affectionately to many as speckled trout or "specks," southern brook trout once thrived in almost every stream in the Chattooga River watershed. Now, after a barrage of destructive human activity, our beloved native brookies struggle to survive as their fragile habitat has been reduced to a handful of creeks.

Non-native competition and the high water temperatures, excessive nutrient levels, and sedimentation associated with ecologically unsound logging and development have critically degraded most of our trout streams. The presence and population density of southern brook trout is a key

indicator of water quality, as they are much less tolerant of chemical pollutants than most fish species. Though brook trout are not always directly affected by high nutrient levels, non-native rainbow and brown trout sometimes benefit from the added nutrients of runoff and sewage, which makes competition stiff for brookies. The foreign trout are more aggressive and more omnivorous. Southern brookies simply do not do well with other fish present. In fact, they usually exist as the only fish species in their native habitat.

undocumented brook trout populations. As a result, nine streams were added to the list of known brookie habitat in the watershed. The study also identified high quality streams where absent brook trout populations could potentially be restored.

After the McLarney study was completed in 1996, the Conservancy presented the results to the Forest Service and proposed a southern brook trout restoration plan using money from the Chattooga River Watershed Restoration Project. Ideally, existing habitat and suitable future habitat would be preserved by obliterating unnecessary roads in sensitive areas and by giving these areas a heightened level of protection and/or wilderness status. Existing brook trout



To date, the Forest Service has completed one brook trout restoration project. It consisted mainly of the addition of erosion controls to a short stretch of road near a known brookie stream.



Large waterfalls prevent non-natives from swimming upstream into brook trout habitat.

The concept that the southern brook trout is a different subspecie than its northern counterpart has long been a subject of debate amongst scientists. Though the southern strain has not been awarded its own unique Latin name, the consensus is that they are indeed different. The two varieties are nearly identical in appearance, but they differ in genetic composition. Even among the few remaining brook trout streams in the Southern Appalachians, the southern strain is less common than the northern. Along with rainbows and browns, the northern brook trout has been widely stocked in southern creeks, and in most cases the two "sub-species" have interbred. Peter Galbreath, director of the Mountain Aquaculture Research Center at Western Carolina University, estimates that only 10-15% of the brook trout in the Chattooga watershed are of pure southern lineage. Population studies are currently being conducted in North Carolina and Georgia.

In 1995, the Chattooga Conservancy hired biologist Bill McLarney to perform a brook trout survey in the Chattooga watershed. One objective was to discover previously Sedimentation is certainly a threat to native trout, but natural buffers are much more effective than a manmade attempt to stop erosion from a road that should not exist in the first place. Watershed restoration money should be spent on projects that actually restore the original ecosystem. Now with Hemlock Woolly Adelgids threatening high elevation water quality, active protection for brook trout is needed more than ever.

Southern brook trout are now among a frighteningly large number of disappearing species. They are as much a part of our natural heritage as the clear tumbling waters where they swim and they deserve our aid. Now the Smokies restoration project has set a tremendous precedent for southern brook trout. If you would like to see native habitat restored for our southern brookies, please write Randy Fowler at the Tallulah Ranger Station, 809 Highway 441 South, Clayton, GA 30525, and let him know that you feel watershed restoration money should be used to restore the brookies' native ecosystem.

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Watershed Update

OVERFLOW HEADWATERS IN DANGER OF BEING LOGGED

The Tallulah Ranger District is proposing creating early successional habitats (ESH) in three areas of the Chattahoochee National Forest. ESHs are open environments, created by removing up to 80% of the existing tree canopy. One of the three areas being proposed for several "openings" is in a stand of old growth timber near the confluence of Overflow and Clear Creeks. Why has the Tallulah Ranger District proposed to remove some of our oldest trees in the name of wildlife, when so many of our pines are dying as a result of the Southern Pine Beetle, already opening up the forest canopy? This unique area does not need an ESH.

The area around the confluence of Overflow and Clear

Creeks was assessed for old growth in 1995 for the Forest Service in the Carlson Report. It was found to contain huge, old yellow poplar, along with white, black, chestnut, northern red and scarlet oaks. One of the oldest black oaks found in the assessment project is in this area along with trees that are over 200 years old. The entire 125-acre area assessed at the junction of Overflow and Clear Creeks is the largest old growth stand found outside of the Ellicott Rock Wilderness Area. It is the keystone to what many consider one of our most sensitive and complete ecosystems in the watershed. If you

choose one environmental issue to get involved with this year, let this be the one. Write Dave Jensen of the Tallulah Ranger District as soon as possible and let him know that you want to see this area between Overflow and Clear Creeks, and all old growth forests, preserved as an important aspect of the Chattooga River watershed's native ecosystem.

POWER LINE UPDATE

The Georgia State Supreme Court is scheduled to hear the *Rabun County versus Georgia Transmission Company* (GTC) power line case on September 17th. Attorney Bob Denham will be handling the appeal *pro bono* for Rabun County, seeking to uphold the county's moratorium against the construction of a 115KV transmission line.

Recently, the Forest Service released an Environmental Assessment (EA) for the proposed transmission line route through the Chattahoochee National Forest. GTC hired a consultant to write the Forest Service's assessment. The Chattooga Conservancy has two main concerns with the Forest Service process in this issue. First, the Forest



Amendment 14—Recreational Boating and Commercial Use on the Chattooga Wild and Scenic River

The Chattooga Conservancy has recently learned that District Ranger Michael Crane of the Andrew Pickens Ranger District, has issued four "temporary permits" that allow commercial operations to charge a fee for shuttling private boaters to and from the Chattooga River. The 1985 Sumter Forest Plan allows a concession for one such permit, but Ranger Crane has increased the number of permits, and to cater to a mythical increased public demand

in order to assuage "suffering customer service." Outfitters who

have this permit and rent boats encourage novice boaters with little or no whitewater experience to place themselves in remote, dangerous circumstances with no professional guidance. Is the Forest Service willing to take responsibility for the safety of these customers?

What can you do? The real issue is plain: 'the drought has caused a decrease in commercial outfitters' business over the last four years, and the few individuals that DO make money off of these operations are pushing for concessions. If you would like to comment on this decision which was made without any type of public inquiry, please contact Ranger Crane at 864-638-9568. Tell Mr. Crane that the Chattooga is not a theme park.

Appendix M of the 1985 Sumter Forest Plan, and the Development Plan for the Chattooga Wild & Scenic River both decree that the river will be managed by the Forest Service with adventure and solitude in mind, and that the river will be preserved and protected as a vestige of wild America. Our national treasure must not be managed as a cash cow, by favoring a few venture capitalists over the general public's right to experience solitude and wilderness.

Pairing shuttle service and boat rentals may get novice paddlers in over their heads.



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George & Jane Polk

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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Summer 2002

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Your contribution is greatly appreciated! Donations will be used to support the Conservancy's work, and guarantee you delivery of the *Chattooga Quarterly*. We're a nonprofit organization, and all contributions are tax-deductible.

THANK YOU!

Send to: Chattooga Conservancy, Inc. 2368 Pinnacle Dr. Clayton, Georgia 30525

Chattooga Conservancy

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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.

Made Possible By: Members and Volunteers Merck Family Fund Turner Foundation Norcross Wildlife Foundation Smithsonian Institution CTSP Katherine John Murphy Foundation Environmental Systems Research Institute Patagonia, Inc.



Goals:

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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