GEORGIA FORESTWATCH
Our mission is to protect and restore the native ecosystems of Georgia's Mountain and Piedmont public lands, and to inform the citizens of Georgia about the values of these landscapes.
Who's watching your forest?

Kathleen Atkinson; CONF Forest Supervisor July 4, 2005
HWA Team
1755 Cleveland Highway
Gainesville, GA 30501

Dear Kathleen & the CONF HWA team,

We would like to thank you again for your prompt and professional approach to dealing with the potentially devastating problem posed by the Hemlock Woolly Adelgid to our native hemlock stands. It is obvious much time and effort has gone into this Environmental Assessment and we congratulate the HWA Team on a job well done. Our concerns fall into several areas as follows and will be presented in the same order as the layout of the EA using the original numeric system presented therein.

1.1 Background

The FS proposes 'a separate but related effort of germplasm collection' for several reasons, but does not describe what these may be. We would like to know the details of what this refers to. We encourage long range planning for success and for failure of the EA proposed treatments and would suggest that everything from Hemlock seed collection and long term storage to fully netted nurseries to genetic research on breeding for HWA resistance be considered, planned and implemented. Perhaps we may need to fully reintroduce this fine tree species back into its native range, if all efforts fail and after HWA has fully run its course and we should plan for such. As other techniques, technologies and opportunities become available we should not hesitate to trial them for appropriate later, wider use. The big vision here should be to not allow our eastern hemlocks to slip into the permanent void of extinction.

1.4 Details of the Proposed Actions

1.4.1 Objectives

The overall choice of treating stands spatially across the landscape for reasons of protecting genetic variability is sound even if that base genetic variability is small, as some scientists believe, because it also is reflective of how hemlock occurs as a natural component within the landscape. One of our concerns is the proposed approximate five mile spacing 'chosen because of an estimated maximum dispersal distance for hemlock pollen flight'. If five miles is the true maximum and the goal is continued successful pollen transfer than it seems a closer spacing of stands chosen for treatment may be necessary to insure the greatest success. As this goal over-arches other stand selection criteria such as ecological and social factors more stands may need to be selected just for their placement on the landscape rather than

1.6.2 Other Issues

There needs to be a public education and information campaign about HWA.

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We encourage the forest service to do all that is possible in the area of educating and informing the public, elected officials, media etc. and we propose you engage in a close collaboration with those groups interested in partnering with the CONF, such as Georgia ForestWatch, with the goal of raising funds for Georgia's own beetle rearing lab. This effort may need to be sustained over many years and as state and federal funding for such a large undertaking will most likely be inadequate the private sector will need correct information and an opportunity to become part of the solution. Georgia ForestWatch welcomes such a collaborative approach.

2.1 Alternatives Considered In Detail

2.1.1 Alternative 1 – No Action

This Alternative is unacceptable to Georgia ForestWatch at this time.

Note: the map provided with this No-Treatment Alternative should be, we assume, comprehensive and show all reasonably large stands of hemlock on the forest but when compared to other maps, such as the Alternative 2 map, stands on important streams such as the Conasauga & Jacks rivers on the Cohutta District and Noontootla & Rock creeks on the Toccoa District appear to have been left out. This is confusing and creates concern that the beginning point for mapping to determine important stands for treatment and monitoring may be missing important elements.

2.1.2 Alternative 2 – The Proposed Action

This Alternative rates as our second choice. Although not as comprehensive as Alternative 4 we believe this choice could be successful in time, if adequate funding for a full scale chemical control program and predatory beetle rearing are found and that predatory beetle introductions successfully depress HWA populations below harmful levels.

2.1.3 Alternative 3 – Modified Proposed Action But Beetles Only

This Alternative is unsatisfactory at this time. Due to a lack of available beetles for introduction into current HWA infested stands and a lack of solid evidence that beetles can quickly and ultimately suppress HWA populations below a damaging threshold we believe that the use of specific insecticides are unfortunately necessary to protect important stands across the landscape for an interim period until alternative, successful treatments are shown effective. Though the use of chemicals poses known and perhaps unknown risks, we believe these can be carefully addressed and mitigated and that their overall negative potential is greatly out weighed by the fact that their use is our only tool to date for maintaining live trees until we discover other techniques that work.

2.1.4 Alternative 4 – Modified Proposed Action

This is our Preferred Alternative. As the Alternative that appears most comprehensive in treatment strategy and number of important sites reflecting wider criteria for inclusion, we feel this is the best choice for action in dealing with the threat of HWA on the National Forest in the mountains of north Georgia. Of course, like any Alternative, barring a choice of Alternative 1 No Action, success will depend on many factors, one of the most primary being funding.

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2.1.5 Alternative 5 – Modified Proposed Action But No Wilderness
This Alternative is unacceptable. As an invaluable and unique ecological component of riparian and stream corridors, crucial elements of scenic beauty and local historical heritage and at the extreme southern end of the hemlock's native range in eastern North America, all hemlock stands, even those within Wilderness areas, are important and deserving of treatment for controlling HWA. Many of our finest stands of hemlock on the National Forest in Georgia, some being our finest examples of this forest-type and some as old growth stands, occur in our Wilderness areas. To avoid treatment in these areas seems counter productive and perhaps an overly restrictive interpretation of the Wilderness Act. We understand your challenge and concern when addressing the guidance of the Wilderness Act. Our original response to the prior public scoping for HWA Suppression states our position well.

"Perhaps the most sensitive issue addressed in your notice is that of intervening on federal Wilderness Areas to deal with HWA infestations. Sufficient authority within the Wilderness Act itself allows such activity; Section 4(d) (1), "such measures can be taken as may be necessary in the control of fire, insects, and disease, subject to such conditions as the Secretary deems desirable." We understand the challenge this presents in conducting treatments, insecticidal or biological, while maintaining the "untrammeled" definition of Wilderness but considering the extraordinary threat that HWA poses, we encourage you to seriously consider hemlock stands within Wilderness as an important and key part of your proposal. Stands of hemlock growing within Wilderness boundaries most likely contain some of our largest, oldest and genetically most important stands, protecting many of our steepest mountain slopes and streams. Wilderness hemlock stands will be needed for continuity of treatment sites across the forest when pollen exchange is considered. We would expect that decisions to conduct management activities of this kind, within Wilderness Areas in the future, be done on a case by case basis and that this proposal and action would not be used as a precedent for future action. We also expect that no motor vehicles would be used and that all ancillary actions, materials and equipment would be handled in a manner appropriate within the guidance of the Wilderness Act. The Regional Forester's decision to proceed with an HWA control program in the Congressionally designated Wilderness areas of the Nantahala and Pisgah National Forests would appear to serve as a reasonable guide on how to approach this part of the control effort on the Chattahoochee."

We are pleased to see a serious consideration of Wilderness areas for both chemical & biological treatment and if anything, would request a closer look for important stands within these areas. We assume that hemlock stand maps are generated from CISC (Complete Inventory of Stand Conditions) data, which in our experience can have a high degree of incorrect information. This concern holds true across the forest. If we can be of assistance by having volunteers investigate areas for potentially important unidentified hemlock stands, on the forest, please let us know.

3.1.1 Watersheds
We are pleased the Forest Service is approaching the widespread problem of HWA infestation from a watershed perspective across the landscape.

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3.1.2 Soils

We trust that the FS knows the correct dosage and administration protocols for the use of Imidacloprid and simply misstated them in the EA! The description of soil injection methodology does not reflect standard protocol (p28) Standard application procedure is one ounce diluted solution per inch DBH, and one ounce per injection site. Page 95 recites .75 ounce active ingredient per inch DBH: Per label directions, the correct dosage is .025 to .05 oz per inch DBH. The EA does not state the rate of dilution to be used; rate of dilution is considered an important factor in migration of the chemical from the application site to surface water.

Though the loss of soil invertebrates is mentioned it appears minimized. Are their scientific studies that warrant the claims made in the last paragraph of page 28? No mention of impacts to soil mycorrhizal associations is mentioned and we have some concerns here though perhaps insecticides have no impacts on fungi and/or there are no scientific studies to indicate that. We understand that use of any insecticide can have negative effects and must be weighed against "the big picture" but we would like to know the full story when such broad scale use of a pesticide on the publics lands are being considered.

3.2.5 Existing Conditions
Imidacloprid

Soil Injection – Proximity to Water

There is clearly a consensus that imidacloprid is highly toxic to aquatic invertebrates. Therefore, soil injection of the chemical in the proximity of water needs careful examination. The FS will evaluate permeability of soils by taking samples of the general area, but will also need to avoid attempting soil injection where a particular tree's situation warrants – e.g. near water if the tree is perched on rock with shallow soil or porous sandy loam soils.

There is a lack of specific data on the movement of soil-injected imidacloprid. It is generally believed to bind well to soil particles, more so to rich organic soils typical of the forest floor than to sandy soils.

The EA cites Burkingstock (p28) as authority that it would not reach groundwater (this work is not generally available but references to it suggest it concerned aerial sprays made a significant distance from water). In this discussion, the Forest Service states that the chemical "could spread downward in the soil a few feet from the injection sites…"

However, in describing its protocol, the FS states that soil injection will be used where there is not "direct vegetative contact" with surface water, which seems to indicate an unacceptable risk of contamination.

The general "Best Practice" for soil injection generally is often cited as 50' from surface water. This figure is apparently based upon general water protection guidelines rather than upon imidacloprid specifically. In my opinion, (Sarah Linn, arborist) 50' is a far greater distance than is reasonably necessary to avoid water contamination. I consider the soil texture, slope, and density of vegetation between the proposed soil-injection site and surface water. I cannot recommend a specific buffer distance, but something more than a lack of direct vegetative contact would logically be prudent particularly considering the relatively pristine condition of the waters in question, and the tendency for hemlock streams to have higher populations of aquatic invertebrate taxa.

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The FS noted in a telephone discussion the significantly higher cost of trunk injection over soil injection. Not only does trunk injection cost more per treatment, it also must be repeated sooner. The best solution, though, may be to let more streamside trees die, rather than to risk contaminating the waters.
The EA states that water samples would be analyzed for imidacloprid movement into streams (p19). I would like to know the timing of the sample analysis and what levels are considered unacceptable.

Toxicity of Imidacloprid to Humans and Wildlife

The EA goes to some length to emphasize the relative safety of imidacloprid and indeed it is safer than many other chemical pesticides. This text may, however, be misleading. Imidacloprid is classified as "Moderately Toxic". It is not classified as a "reduced risk" pesticide as advocated in one of the resources cited in the EA (Felsot 2001). It has higher toxicity to insects than to animals because insects have a higher number of the neural receptors on which it acts. The EA includes statements that imidacloprid is not toxic to birds (p44), deer (p51), or mammals (p52). Available information indicates that all of these statements are untrue; I suspect that the intention was to reflect that these animals will not be directly exposed to the chemical.

Appendix C Treatment Area Details
On these spreadsheets what does a 0 birthyear mean?

Thank you for all the hard work evidenced by this Environmental Assessment. We look forward to working with you every way possible for the saving of the greatest number of hemlock stands across our forest. These are historic times in our southern woods and we are entering into uncharted territory but we must engage in this effort as this challenge calls us to act, now. Giving it our best we can rest assured that those who come after us will appreciate that we did not shrink from this calling.

Following are some exceptional stands which we believe should receive special consideration for treatment.

EXCEPTIONAL HEMLOCK STANDS ON THE CHATTAHOOCHEE NATIONAL FOREST

Conasauga Creek & West Forks Jacks River: At these two sites logging operations bypassed the hemlocks; consequently these sites now support some of the best collections of uncut or old-growth hemlocks remaining on the Forest. Please see previous description and comments for further information.

Birch Creek & Chestnut Creek: Two of the main headwater streams of the Conasauga River, both of these streams lie entirely within the Cohutta Wilderness. The operations of the Conasauga Lumber company did not cut either of these, so these drainages now support some of the finest remaining original hemlock stands in the forest. In both stands trees reach large sizes, a 145.5' tall tree on Chestnut Creek is the tallest known hemlock in the wilderness area and a former state champion grows on Birch Creek, and great age; trees on Birch Creek in particular show signs of exceeding 300 years of age. Consequently, even if treatment options for the adelgid improve significantly in coming years, several generations

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will pass before forests like these regenerate if they are not protected now. The great age and lack of artificial selection in these stands suggest their potential as reservoirs of genetic information. The location of these stands and the great impact hemlocks have on the physical condition of streams make them important for protecting one of the least disturbed watersheds remaining in the state. Hiking trails through the Chestnut Creek stand and at the lower edge of the Birch Creek stand also make these stands significant recreational resources.

Big Bald Cove: This stand appears to be one of the least disturbed hemlock forests in Georgia. The stand lies just within the edge of the Brasstown Wilderness in Big Bald Cove at the location indicated by the more southerly blue line on the attached map. In this small stand, neither hemlocks nor their hardwood associates were cut during past timbering operations, and no other signs of human disturbance occur in the stand. Again, even if treatment options for the adelgid improve significantly in coming years, several generations will pass before forests like these regenerate if they are not protected now. The great age and lack of artificial selection in these stands suggest their potential as reservoirs of genetic information. The stand also has exceptional aesthetic value. Steep slopes boarder the stand on both sides, and two small cascades and the rock wall between them demarcate the upper edge of the stand. The hemlocks and rhododendron compliment the topography and lack of human disturbance to give the stand a very secluded and idyllic feel. Included below is an outline of the stand taken from a Georgia Forestwatch report on old-growth stands occurring in the forest.

Big Bald Cove (cascades)

Site Visits: Three, most recently on 12/20/04. Core Samples: one. Photographs: several.

(FT) Acidic Cove **(GP)** At the confluence of two streams in Big Bald Cove, around 3200' elevation, bounded above by two cascades and a connecting rock wall, and centered at approximately N34*52'46.8" W83*49'10.1" **(CS)** *Tsuga canadensis* 234, 88.5cm dbh **(SHD)** None are apparent **(SCDB)** Minor debris present **(RLT)** *T. canadensis* dominates most of the stand with *B. lenta, Magnolia fraserii* and *Tilia heterophylla* being locally important. Old *L. tulipifera* and small *B. alleghaniensis* and *Halesia tetraptera* are scattered throughout the canopy. The slope on the northeast side of the stream is largely angiosperm dominated. *Tsuga canadensis* reaches 133cm dbh and 46.7m tall **(Shr)** Dense *R. maximum* throughout **Comments:** *Adelges tsugae* had reached the area by the last visit to the site, and reached low to moderate densities; however, crowns of mature trees had not begun to thin. This stand differs from most uncut stands in north Georgia in being easily accessed by logging equipment and very productive; a turn around loop at the end of an old road remains just a few hundred meters downstream with no intervening barrier, and this stand contains the greatest density of *Tsuga* biomass of any known stand in Georgia. The stand also includes the second tallest known *Tsuga canadensis* in the state. The dense *Tsuga* shade and *Rhododendron* produce substantial aesthetic appeal, and the cascades and secluded atmosphere of the stand add to the recreational appeal.

Noontootla Creek: Nine separate stands, all but one dominated by eastern hemlock, occur scattered Noontootla Creek that qualify as old-growth by the region eight guidelines, their precise position given by the blue outlines on the attached map. Incomplete core samples taken from hemlocks in the stand suggest ages exceeding 300 years. Again, even if treatment options for the adelgid improve significantly in coming years, several generations will pass before forests like these regenerate if they are not protected now. The great age and lack of

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artificial selection in these stands suggest their potential as reservoirs of genetic information. The Appalachian Trail passes through one stand, camping occurs in another, and trout fishing occurs in Noontootla Creek, so the area already has great recreational appeal, much of which is derived from or enabled by the hemlock forests. A Forest Service system road paralleling the stream also provides excellent access to these stands making them likely the easiest to treat old growth hemlock stands in the state. Included below is an outline of the stands taken from a Georgia Forestwatch report on old-growth stands occurring in the forest.

Noontootla Creek

Site Visits: Two on 6/11/03 and 12/31/03. Core Samples: six. Photographs: five.

(FT) Hemlock **(GP)** Along Noontootla Creek and Chester Creek at locations 2, 4, 5, 6 upstream of the mouth of an unnamed tributary, 8 except at the downstream end and near the mouth of Davis Creek, and 9 **(CS)** *Tsuga canadensis* 217 years (i), 82cm dbh; *T. canadensis* 259 years (i), 70cm dbh **(SHD)** Most of these areas are bounded on the east by a gravel Forest Service, and small extensions of the stands cross the road. Significant silt washes of the road in areas and affects Noontootla Creek and the portions of the stands on the east side of the creek. A gated road also crosses through stand eight. Stone rings and minor litter indicate camping in some of the areas, but most camping occurs on more disturbed stretches of the Creek and rarely occurs on the west side of the stream **(SCDB)** A few standing snags occur in stand 8, but *Castanea dentata* appears to have been scarce in these areas **(RLT)** Old *T. canadensis* dominates all of these areas and individuals frequently exceed 90cm. *Oxydendrum arboreum* and *Betula lenta* grow abundantly in the midstories of some of the stands. *Liriodendron tulipifera* is likely the second most abundant canopy species in these areas, and *Quercus alba* and *Acer rubrum* also occur as minor components of some of them. The most diverse of these stands, 9 and sections of 8, resemble acidic cove forest **(Shr)** *Rhododendron maximum* is common in all of the stands, and *Kalmia latifolia* mixes with it in some of the stands. A few areas have relatively open understories **Comments:** The ease of access to these stands and the size of the trees make the undisturbed nature of the canopy in these stands surprising. The relatively low value of *T. canadensis* as a timber species and, more recently, the recreational popularity of the area may be contributing factors.

(FT) Hemlock-White Pine **(GP)** Along Noontootla Creek and Chester Creek at locations 1, 6 downstream of the mouth of an unnamed tributary, 7, and 8 at the downstream end and just upstream of the mouth of Davis Creek **(CS)** *Pinus strobus* 182 years (i), 86cm dbh **(SHD)** Most of these areas are bounded on the east by a gravel Forest Service, and small extensions of the stands cross the road. Significant silt washes of the road in areas and affects Noontootla Creek and the portions of the stands on the east side of the creek **(RLT)** Old *T. canadensis* and *P. strobus* dominatea all of these areas and individuals frequently exceed 90cm. The two species reach 42m and 45m in height respectively. *Oxydendrum arboreum* and *Betula lenta* grow abundantly in the midstories of some of the stands. *Liriodendron tulipifera* is likely the second most abundant canopy species in these areas, and *Quercus alba* and *Acer rubrum* also occur as minor components of some of them **(Shr)** *Rhododendron maximum* is common in all of the stands, and *Kalmia latifolia* mixes with it in some of the stands. In some areas with more open understory conditions, *Gaylussacia* sp. is common **Comments:** The existence of large, old *P. strobus* in such an easily accessible area is puzzling.

(FT) Submesic Oak **(GP)** In a small, rocky, southwest cove that drains into Noontootla Creek at approximately 2240' elevation, location 3, and at the southern end of location 2 **(CS)** No core samples were collected in these areas, but one *Q. alba* that was cut after falling across the road showed approximately 200 rings **(SHD)** A gravel Forest Service road passes through

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these stands **(RLT)** *L. tulipifera* and *Q. alba* form most of the canopy in these areas **(Shr)** The understory is generally open in these stands.

Mill Creek (tributary of Rock Creek): The riparian corridors along Mill Creek and some of its larger tributaries were not logged, and consequently continue to support old growth, hemlock dominated forest. These stands are unusual for old-growth on the forest in that they occur on relatively gentle terrain on a high productivity site. Again, even if treatment options for the adelgid improve significantly in coming years, several generations will pass before forests like these regenerate if they are not protected now. The great age and lack of artificial selection in these stands suggest their potential as reservoirs of genetic information. Since hemlocks greatly affect the physical characteristics of streams, the loss of hemlocks in this area could have a major impact on the Rock Creek fish hatchery, which is located at the mouth of Mill Creek. Included below is an outline of the stands taken from a Georgia Forestwatch report on old-growth stands occurring in the forest.

Mill Creek

Site visits: Two on 6/19/03, 6/20/03. Core samples: four.

(FT) Acidic Cove **(GP)** In a corridor along Mill Creek and its tributaries from 675m to 770m on the main stem of the stream, and up to 840m on one tributary **(CS)** *Liriodendron tulipifera* 170 years (i), 85cm dbh; *Pinus strobus* 125 years (e), 95cm dbh; *Quercus alba* 162 years (e), 78cm dbh; *Tsuga canadensis* 94 years (i), 84cm **(SHD)** None were seen in the area **(SCDB)** Uncut debris locally common, but sprouts rare **(SF)** Fire char seen on the inside of a hollow *T. canadensis* near the W edge of the stand. The hemlock is on the slope away from the stream **(RLT)** *P. strobus* reaches 118cm dbh and 47m tall. *T. Canadensis* reaches 120cm dbh and 45m tall, but is usually significantly shorter. *L. tulipifera* reaches 120cm dbh and *Q. alba* reaches 88cm dbh. *Oxydendrum arboreum* in the midstory reaches 54cm dbh and 26m tall. **(Shr)** *Rhododendron maximum, Kalmia latifolia,* and *Gaylussacia* sp. occur in patches throughout the stand. *R. maximum* is denser on N aspects than S aspects. **(HR)** Low with *Thelypteris noveboracensis, Monotropa uniflora* and, near the western edge of the stand, *Listera smallii* **(AS)** Game trails are common, and bear claw marks were seen on a large *Liriodendron tulipifera.* **Comments:** This stand is relatively level and accessible and supports commercially valuable trees. The stands position directly upstream of a fish hatchery is probably responsible for the lack of cutting in the area. **(RA)** This stand structurally and compositionally resembles the Cooper Creek Scenic Area several kilometers to the E, but has less *P. strobus.* Soil conditions at the two sites appear to be similar.

Cliff Creek: A tributary of the Chattooga River, the lowest mile or two of the stream supports exceptional forests with abundant hemlock. The second-growth hemlocks on the steam north-facing slopes on the south side of the creek have grown at exceptional rates indicating this site is exceptionally good. Flats on the north side of the creek shaded by the steep slopes to the south, an unusual topography for the lower Chattooga, should provide even better growing conditions. Those flats are currently dominated by a forest of young hemlocks, perhaps 50 years old, with emergent white pines. Even though adelgid first entered the region farther upstream on the Chattooga and many organisms use rivers as migration corridors, the adelgid was absent or at extremely low levels in this stand as of winter 2004-2005.

Cliff Creek flows past a series of steep, short, north facing slopes on the streams way to the Chattooga River, the northernmost section of the Georgia-South Carolina state line. Despite the

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rough topography along the creek, the creek's gradient remains low, around 100' per mile, and broad ridges and shallow valleys make up most of the surrounding section of Rabun County GA. Bedrock exposed in the shows that either granite or granitic gneiss, with some prominent pegmatites, underlies at least part of that area.

Both private land owners and the Forest Service own large sections of the watershed. Since no state parks or trail networks promote activity in the area, public interest in the area is largely restricted to the immediate vicinity of the one highway through the area and whitewater rafting on the Chattooga river. However, the forest service has not forgotten about the area. Dirt roads extend throughout the region, except in the Wild and Scenic River corridor, and many more clearcuts have occurred in the past thirty years there than in most sections of the Chattahoochee NF. The gentle topography also allowed easy access for earlier logging efforts, so a survey for old growth conducted in the mid 90's included only a few small stands from the area. Consequently, a mosaic of second and third generation forests occupy the area.

The flats along the creek, probably the most productive forest in the area, are structurally and compositionally reminiscent of Pine Flats in the smokies, but have not reached the same stature yet. White pines, scattered but common, reach far greater heights than the other species in flats. Young hemlocks, usually under five feet cbh, form most of the main canopy layer; tuliptree, black birch and sourwood frequently grow amongst them along with smaller numbers of shortleaf pines, red maple, and sweetgum. Patches of dog-hobble and small clumps of rhododendron grow in the hemlock shade, but little vegetation impedes travel through the flats. Christmas fern grows in the acidic much, but most other herbaceous plants in the flats have ceased activity for the year. In Pine Flats, more abundant white pine forms a supercanopy rather than a collection of emergent trees. Hemlock, while possibly the most numerous species in pine flats, generally has not reached the main canopy level yet, so the second most prominent group of species at Cliff Creek, forms the main canopy at Pine Flats. The understory at the latter site probably includes more small trees, but is overall very similar. The herbaceous layer along Cataloochee creek may also be somewhat richer. Some rock piles and various small, old, man-made paths on the adjacent slopes suggest farmers may have occupied the flats along Cliff Creek, but the flats are fairly small for farming and no evidence of larger structures is immediately evident. The disturbance that cleared pine flats 125 years ago has not been determined as far as I know.

While one small section of the slopes along Cliff Creek resembles the flats with a white pine-shortleaf pine-hemlock canopy, most of the slopes differ markedly from the flats. The steep north facing slopes also support white pine and hemlock, but at lower densities than the flats. Those conifers grow amongst a mixture of hardwoods that includes beech and northern red oak as well as many individuals that appear larger in diameter and older than the trees in the flats. A dense understory of rosebay rhododendron also gives the north aspect slopes a different character. Contrastingly, only a few small patches of dwarf rhododendron grow in the understory of the south facing slopes. White oak occupies the greatest proportion of the canopy on those slopes, but several other hardwoods and small stands of shortleaf pine also inhabit the slopes.

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Cbh	Height	Species
4'1"	104.2	Birch, Black
NA	127.0'	Hemlock, Eastern
NA	135.5'	Hemlock, Eastern
3'5"	55.8'	Hornbeam, American
5'7"	107.7'	Oak, Southern Red
8'3"	139.6'	Pine, Eastern White
NA	151.8'	Pine, Eastern White
NA	152.6'	Pine, Eastern White
7'9"	156.9'	Pine, Eastern White
7'11"	157.4'	Pine, Eastern White
NA	118.8'	Pine, Shortleaf
5'0"	128.8'	Pine, Shortleaf
5'3"	134.7'	Pine, Shortleaf
3'4"	95.3'+	Sourwood

The black birch is the second tallest known of the species in the state. While the hemlocks do not approach the state height record, they are exceptionally tall for second growth trees. I'm very curious to see what heights the white pines have reached on richer or older sites in the area. As far as I know, 121.2' was the previous height record for shortleaf pine in Georgia, but entire stands at this site may average that height. The sourwood is also a new state height record. All of these trees were measured in a couple of hours along a section of creek less than half a mile long.

Cliff Creek flows through the lower section of the Chattooga River watershed where the river has cut down into an old plateau. I had previously assumed that that section of the watershed was too far away from the high rainfall center farther up the river and the gentle topography would offer two little shelter from storms to allow trees to reach great heights. Cliff Creek and a similar site on the other side of the Chattooga that likely has slightly taller conifers have shown the error of that assumption. The upper part of the Chattooga, in particular the lower East Fork, has long been recognized as exceptional conifer habitat. However, I am beginning to wonder if the lower Chattooga has even better growing conditions. Growth rates for white pine appear comparable along both sections of the river, but young hemlocks may grow much faster at the lower elevation sites. Also, shortleaf pine appears more competitive on good sites in the lower section than on good sites in the upper section, so the species can take greater advantage of the overall good conditions. Only more data will tell.

Camp Creek: A tributary of the Chattooga slightly upstream from Tugaloo Lake, Camp Creek supports exceptional hemlock forest on its lower reaches. Between a bend in the stream at approximately W83*19'37" and W83*20'11" the forest along the creek is continuously dominated by hemlock, often in nearly pure stands. Height to diameter ratios of tree often offer a good estimate of site productivity, and the height to diameter ratios of some of the hemlocks along Camp Creek are exceptional high for the species. The absolute growth along the creek is also exceptional with hemlocks reaching 144.1', the highest known for second-growth hemlock in Georgia and possible the highest known for second-growth hemlock anywhere. These factors indicate that the area contains some of the best, if not the best, growing conditions for hemlock in the state. The rare barren strawberry (*Waldsteinia lobata*) also thrives in the hemlock shade. The hemlock forests also shelter small pockets of extremely

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diverse hardwood forest, an oddity in the Chattooga watershed, that occur on flats by the stream. An attached e-mail provides additional information on the exceptional nature of the forest along the stream. Even though adelgid first entered the region farther upstream on the Chattooga and many organisms use rivers as migration corridors, the adelgid was absent or at extremely low levels in this stand as of winter 2004-2005.

In the vicinity of Cliff Creek and Opossum Creek, Camp Creek empties into the Chattooga River at slightly below 1000' elevation. The lowest mile of the stream flows in a narrow ravine produced after the Chattooga River captured the headwaters of the Chattahoochee River dropping the stream's base level and accelerating downcutting. Old logging roads parallel the Camp Creek through dark, moist forest dominated by eastern hemlock. Near the Chattooga, white pine and sweetgum are also major canopy components, but tuliptree and basswood are more abundant along most of the sheltered section of the stream. Not surprisingly, rhododendron lines much of the stream, but large open areas also occur. Partridge berry, christmas fern, and barren strawberry are the most widespread herbaceous species along the creek; the latter species is endemic to a small section of Georgia, South Carolina, and one county in North Carolina. Small rich pockets directly on the stream support dense herbaceous layers including stinging nettle, plantain-leaved sedge, blue cohosh, foam flower, and glade fern, a scarce species in Georgia.

Species	**Cbh**	**Height**	**Comment**
Ash, Green	NA	114.3’	
Basswood, White	7’11”	~104.5’	
Basswood, White	10’2”	~116’	3rd largest cbh in state
Basswood, White	NA	129.1’	4th tallest known in state
Beech, American	11’7.5”	109.8’	
Beech, American	NA	125.8’	3rd tallest known in state
Birch, Black	3’2”	101.0’	4th tallest known in state
Hemlock, Eastern	4’4”	114.1’	83:1 HDR
Hemlock, Eastern	5’5”	122.1’	
Hemlock, Eastern	4’9”	123.7’	82:1 HDR
Hemlock, Eastern	8’5”	135.0’	
Hemlock, Eastern	NA	136.3’	
Hemlock, Eastern	NA	142.7’	
Hemlock, Eastern	NA	144.1’	
Hickory, Bitternut	5’11”	131.5’	2nd tallest known in state
Hickory, Mockernut	5’6”	127.5’	2nd tallest known in state
Oak, White	6’6”	124.0’	3rd tallest known in state
Pine, Shortleaf	4’8”	125.9’	3rd tallest known in state
Pine, White	8’5”	154.9’	
Pine, White	9’9”	165.2’	
Sweetgum	NA	120.9'	
Tuliptree	NA	140.1’	
Tuliptree	NA	141.7’	

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Camp Creek

White Pine	165.2’
Hemlock	144.1’
Tuliptree	141.7’
Bitternut	131.5’
Basswood	129.1’
Mockernut	127.5’
Shortleaf Pine	125.9’
Beech	125.8’
White Oak	124.0’
Sweetgum	120.9'

Rucker Index 133.57’

Using the point system based on maximum known cbh and height of a species within a certain area, discussed a few months ago on the listserve, the basswood listed above earns 180 points for Georgia and the beech 178. The Rucker Index is the third highest documented so far for a site in Georgia. Due to the similarity of the forests and close proximity, this site could be considered part of a larger lower Chattooga site that would also include Cliff Creek and Camp Branch in South Carolina, although Camp Branch is generally moister than the other sites. Several other factors also point to unusual conditions in the area. In addition to the occurrence of species with restricted distributions such as barren strawberry and glade fern, other species occur in unusual settings; the abundance of basswood would be expected in a rich, mid-elevation, north facing cove, but not along a low elevation creek in a region known for conifers. The abundance of conifers along the Chattooga often correlates with lower herbaceous diversity, but this site maintains moderate diversity even under pure hemlock canopies. The hemlocks themselves appear to thrive at the site to an exceptional degree. The high height to diameter ratios point to favorable conditions for the species, and the 144.1' tree is one of the tallest second -growth individuals thus far located anywhere. Surprisingly, hemlock woolly adelgid infestation remains low or nonexistent at the site even though farther up river trees are succumbing to the insect.

Glade Fern Ravine, a formally unnamed stream that flows into Tugaloo Lake south of and parallel to Moccasin Creek, and the gorge on Cedar Creek, in Stephens County, may support forests with exceptional qualities similarly to Camp Creek.

LEGEND:

(FT) Forest Type
(CS) Core samples
(e) Extrapolated age
(SCDB) Signs of *Castanea dentata* Blight
(BA) Basal Area
(Shr) Shrub layer
(AS) Animal Sign
(RA) Related Areas
(GP) Geographic Position
(i) Incomplete core
(SHD) Signs of Human Disturbance
(SF) Signs of Fire
(RLT) Range of Large Trees
(HR) Herbaceous Richness
(S) Substrate
dbh Diameter at Breast Height

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Maps of these various areas can be provided upon request.
Georgia ForestWatch would like to heartily thank Jess Riddle for his efforts in locating and reporting these special sites.

Respectfully Yours,

Wayne Jenkins

Smith Creek/*Photo by BillGoldstrohm*

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