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Environmental Assessment:

Vegetation Control: Non-Native Invasive Species and Shortleaf Pine Restoration Release

on the

Chattooga River Ranger District, Chattahoochee-Oconee National Forest

Banks, Habersham, Rabun, Stephens, Towns, Union and White Counties

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1.0 PURPOSE OF AND NEED FOR ACTION

1.1 Proposed Action

We proposed a project to control vegetation in young regeneration areas, wildlife openings, and areas where non-native invasive species are thriving. A total of approximately 131 sites covering about 653 acres was proposed for treatment.

Invasive species have been identified by the Chief of the Forest Service as one of the four significant threats to our Nation's forest and grassland ecosystems. One of the actions recommended in the "National Strategy and Implementation Plan" (October, 2004) is early detection and rapid response, including finding new infestations and eliminating them before they become established.

The Southern Appalachian Mountain region has one of the most unique floral regions in the world. There are presently many endemic, rare, and even common native plant species that are being displaced by introduced invasive species (Brian Bowen, under direction from the Southern Appalachian Man in the Biosphere, 2001).

This proposal is designed to be a first step toward reducing infestations of NNIS on National Forest System lands on the Chattooga River Ranger District in Georgia. The following is a brief summary of the Proposed Action, with a detailed description given in Chapter 2.

Non-Native, Invasive Species (NNIS) control in Wildlife Openings: Many of the wildlife openings on the District are now dominated by plants that are both non-native and extremely invasive within the openings and along access roads, meaning that their germinating seeds increase the area they cover each year, displacing plants that are much more beneficial to wildlife. These invasive plants include fescue, sericea lespedeza, crabgrass, foxtail grass, and Johnson grass. In addition, white grubs from the non-native Japanese beetles and June bugs continue to damage the roots of beneficial plant species. Current management using mowing, plowing, and burning has had limited success due to the aggressive persistence and reseeding capabilities of the weeds and attempts to re-establish species beneficial to wildlife have been short-lived at best.

This project would improve the condition of the wildlife openings so they produce high quality foods (instead of invasive and noxious weeds) for wildlife species. The Proposed Action included treatment of 57 wildlife openings totaling approximately 130 acres, using foliar spray with herbicides along with application of an insecticide when grub control is needed.

NNIS Sites: These include sites where exotic species are present and have a high potential to expand or proliferate, thereby reducing the growing space for native trees, shrubs, and herbaceous plants. The Proposed Action was designed to be a first step toward reducing infestations of non-native, invasive species on National Forest System lands on the Chattooga River Ranger District in Georgia.

Plants to be treated under the Proposed Action included kudzu, autumn olive, mimosa, oriental bittersweet, privet, Japanese stilt grass (microstegium), and wisteria. NatureServe ranks all of these species as having a medium to high ecological impact.

Young Regeneration Areas: The focus of this restoration is to return shortleaf pine and oaks to sites where it naturally occurred, creating a historical forest community. The Proposed Action included release of approximately 423 acres using a combination of methods including herbicides to control competition surrounding the shortleaf pine seedlings and oak sprouts and seedlings. Where shortleaf pine is not present, oaks and other hard mast producing trees would be released to create a diverse mixture of trees.

A second treatment is proposed and would be carried out if monitoring (visual and walk-through surveys) shows that the shortleaf pine and oaks within the area need additional competition control to be effectively free to grow into the overstory of developing forest community.

Southern pine beetle infestations over the past 12 years have eliminated many shortleaf pine communities over the entire Chattahoochee National Forest, and more specifically, in the forest communities proposed for treatment. The young regeneration areas proposed for treatment have been planted with pine and this vegetation control treatment is designed to enable pine species to reach the overstory (the tallest trees in a forest community) by reducing the competition immediately surrounding them.

Chestnut, southern red, scarlet, post, white, and black oaks along with pitch, table mountain, and loblolly pines would present in the mixture of trees eventually dominating these sites, and species of hickory, yellow poplar, blackgum, flowering dogwood, and others would add to the species diversity in the overstory and below.

On one site, a mixture of shortleaf pine and oak have been planted, and these planted trees would be released on this area.

1.2 Purpose and Need

The focus of the release treatment is to restore shortleaf pine – oak mixtures to sites where it naturally occurred. Other pines, especially pitch and Table Mountain pine may be released where shortleaf pine is absent. Species of oaks and other hard mast producing species would be released throughout the forest community where pines are not present. The release will also reduce the vulnerability to pests, including the southern pine beetle (SPB), by keeping the pines healthy. The Land and Resource Management Plan for the Chattahoochee-Oconee National Forests (2004) (Forest Plan) identifies these needs, as shown below:

Table 1: Purpose and Need for Shortleaf Pine Restoration Release

Desired Condition	Existing Condition	Proposed Action	Result
Goal 3: Restore disturbance – dependent forest types Objective 3.1: Restore shortleaf pine on the Chattahoochee National Forest where it once occurred.	19 young forest communities totaling approximately 291 acres that are being overtopped by competing trees and shrubs	Release shortleaf pine as well as other pines and oaks by selectively treating trees immediately adjacent to them using chemical spray twice over the next	These two treatments are expected to result in a mixture of shortleaf pine and oaks growing into the overstory of the forest along with a minor component of

Desired Condition	Existing Condition	Proposed Action	Result
		five years.	other species.
Goal 3 (see above) and 8: Maintain or restore native tree species (shortleaf pine) whose role in the forest ecosystems is threatened by insects (specifically the southern pine beetle (SPB)), fire exclusion, or forest succession. Objective 8.1: Maintain shortleaf pine forests on the Chattahoochee National Forest.	5 young forest communities that previously had heavy mortality due to the SPB and have competing and overtopping trees affecting survival and establishment.	Release shortleaf pine and other pines and oaks by spraying competing trees with chemicals twice over the next five years.	These two treatments are expected to result in a mixture of shortleaf pine and oak growing into the overstory of the forest along with a mixture of other species.

The proposed actions are designed to meet the forest plan goals by restoring forest composition, providing for forest health, wildlife habitat, and a more native and sustainable ecosystem.

NNIS treatment would include species now dominating sites across the Chattooga River Ranger District, including those species in wildlife openings and elsewhere. Goals 12 and 40 in the Forest Plan provide direction for this proposal. Goal 12 directs the Forest to minimize adverse effects of invasive native and non-native species and control such species where feasible. Goal 40 also emphasizes the reduction of populations of non-native pests.

This project would also improve the condition of the wildlife openings so they produce desirable habitat (instead of invasive and noxious weeds) for wildlife species. Clovers and small grains planted in these areas are utilized by a minimum of 54 species of birds and 14 species of mammals. Animals benefiting from these treatments would include white-tailed deer, wild turkeys, ruffed grouse, songbirds, black bears, cottontail rabbits, and other small mammals. These treatments allow the openings to function much more effectively as a buffer to the natural food supply that is affected by mast failures and harsh winters.

Other sites outside of wildlife openings currently have infestations of exotic species and have a high potential to expand or proliferate, thereby reducing the growing space for native trees, shrubs, and herbaceous plants.

Non-native invasive plants have a number of biological characteristics which render them difficult to control using fire, hand control, or mechanical controls alone. Non-native invasive plants typically exhibit rapid growth rates, lack natural predators, are very good competitors, and produce abundant and early seed. Most non-native invasive plants are perennials, with extensive tough runners or roots which readily resprout after cutting. Because of these factors, most landowners find that herbicide applications offer the best means of control, since herbicides will control roots (Miller, 2003; SE-EPPC, 2004).

The following is a description of some of the more common NNIS proposed for control, and their biological characteristics.

Mimosa was introduced from Japan as a small legume to medium sized deciduous tree that can reach 10-40 feet in height as single or multiple stems. The bark is light brown, smooth with lens shaped areas along the stem. The leaves are alternate, finely divided, fern-like, usually 6-16 inches long and about 3-5 inches wide. The fragrant flowers are showy bright pink, resembling pom-poms and arranged in clusters at the ends of branches. The fruits pods are flat with bulging seeds, initially light green, turning brown in the fall, tan in the winter and usually have 5-10 seeds. Mimosa often spreads by root sprouts or colonizes by seed into disturbed sites, and it tends to be found along stream banks, fencerows, roads, old home sites, right-of-ways, and forest edges. It is partially shade tolerant.

Kudzu is a high-climbing perennial legume from eastern Asia having alternate leaves and deep-purple, pea-like flowers. It frequently grows a foot each day climbing to the top of trees, shrubs, buildings, utility poles, and fences, killing or damaging most of the vegetation within its encompassing boundary. It has a large tuberous root system with a tremendous resprout capacity. Kudzu was widely planted for erosion control throughout the southeast during the early 20th century, known as the "miracle vine".

Chinese wisteria is an invasive, vigorous, showy, woody ornamental vine which was introduced from Asia as an ornamental in the early 1800's. Chinese wisteria is somewhat shade tolerant and can be found growing in disturbed areas, particularly around old homesites. This high-climbing, twining or trailing liana can cover trees, limited only by the height of trees. The flowers are fragrant, lavender to violet, dangling and showy, with stalked clusters appearing when the leaves emerge, and producing velvety seed pods. This plant forms dense infestations where previously planted, often with other non-native invasive plants. Wisteria colonizes by vine growth and runner sprouting, though spread by seed appears limited.

Chinese privet and ***Japanese privet*** are shade-tolerant, tall shrubs or small trees growing to about 30 feet tall. Chinese privet can grow in a variety of sites or disturbed areas, and can become particularly abundant in mesic soils. Chinese privet often forms dense thickets in bottomland forests, fencerows, rights-of-way, forest edges, etc. Chinese privet colonizes by root sprouting and abundant seed production, is widely spread by birds and animals. Chinese privet produces showy clusters of small white flowers in spring, yielding clusters of spherical dark- purple berries in the fall.

Russian and Autumn olive are tardily deciduous shrubs, 3 to 20 feet in height, with scattered thorny branches. The characteristic leaves are silvery-scaly beneath. Introduced from China and Japan in 1830, the species has been widely planted for wildlife habitat, and soil reclamation. It is a non-leguminous nitrogen fixer. The species exhibits rapid growth rates, tolerates droughty conditions and shade, and is spread readily by animal-dispersed seeds. They can be found scattered throughout the forest and will eventually form dense stands.

Sericea lespedeza is an erect semi-woody leguminous plant ranging from 3 to 5 feet tall. It was planted for soil improvement and stabilization. Once established it crowds out native plants and develops extensive seed banks in the soil. Studies have shown that the seeds may remain viable for twenty years or more. The locations proposed for treatment in this project are within wildlife openings and along and adjacent to roads accessing these openings.

Tall fescue is a cool season perennial grass that has been commonly planted along roadsides. It is a deep rooted, tufted, long-lived perennial with foliage that is dark green year-round. The purpose of controlling the species is to prepare sites (closed roads) for native, warm season grasses and/or to eliminate it from wildlife openings. It was introduced from Europe as a forage species and for soil stabilization. It spreads by seeds and short rhizomes.

Johnson grass was introduced to the United States from its native range around the Mediterranean Sea, and is regarded as a major agricultural weed occurring in cultivated and abandoned fields, forest edges, stream banks, roadsides, and disturbed ground. It aggressively crowds out native species, especially along river banks. When cut, the underground stems will resprout forming new plants. Spring burning may encourage regrowth and is therefore not recommended. The stems of Johnson grass are erect and can grow to 8 feet tall, leaf blades are long, flat, to 2 feet long with a white midrib, and the inflorescence is very large, up to 20 inches long, widely spreading, branched, with hairy flowering stalks and spikelets.

Bermuda grass is a non-native rhizomatous perennial grass commonly planted in lawns, for forage, and for erosion control, but it may be found in fields, roadsides and waste places. Bermuda grass originally came from the savannas of Africa, but today is found all over the world in warmer climates. Bermuda grass is a creeping grass, and will creep along the ground and root wherever a node touches the ground, forming a dense mat. It will also reproduce from roots under the ground, and from seeds. Bermuda grass will grow in poor soil, is tolerant of drought, and is considered a highly invasive and competitive weed in agricultural situations.

Japanese stilt grass (Microstegium, Nepalese browntop, Japanese grass) is a sprawling annual grass. It is native to temperate and tropical Asia, and was first identified near Knoxville, Tennessee around 1919 (Miller, 2003). This grass flourishes on alluvial flooplains and is commonly seen along forest edges, roadsides, and trailsides, as well as along damp fields, swamps, lawns, and ditches. It is shade-tolerant, and can readily displace native vegetation, including wetland species, as it forms dense patches. Each plant may produce from 100-1,000 seeds that remain viable in the soil for five or more years. Seed dispersal is primarily by animals, flooding, and deposition with fill dirt. This plant spreads rapidly into disturbed areas and can replace competing ground vegetation in 3-5 years. It will grow and produce seed in light levels as low as 5% of full sunlight.

Oriental bittersweet is an invasive vine, often associated with old homesites, from which it has escaped into surrounding natural areas. It was introduced into the U.S. in the 1860's as an ornamental plant. Oriental bittersweet is still widely planted and maintained as an ornamental vine, further promoting its spread. It is a serious threat to plant communities due to its shade tolerance, high reproductive rate, long range dispersal, ability to root sucker, and rapid growth rate. Climbing Oriental bittersweet vines severely damage native vegetation by constricting and girdling stems. Vines can shade, suppress, and ultimately kill native vegetation. Oriental bittersweet has been shown to hybridize with the relatively rare American bittersweet, which could lead to the loss of American bittersweet's genetic identity through introgression.

June and Japanese beetle grubs: After considering the monitoring conducted by the Georgia DNR under a previous decision that had included this control, the Interdisciplinary Team recommended to the District Ranger that we drop consideration of the treatment of these insects. Ongoing visual checks by

the DNR indicate these pests are infrequently found at infestation levels that cause noticeable damage to plants. As approved by the District Ranger, the treatment of these insects using carbaryl is dropped from the Proposed Action.

1.3 Decision to be Made

The purpose of this EA is to disclose environmental effects of the proposed action and alternatives. The Responsible Official, the District Ranger, will make a decision based on a review of the EA. The District Ranger must decide whether or not to select the Proposed Action or one of the action alternatives. Also, the District Ranger must determine whether or not the selected action (Proposed Action or one of the alternatives) will have a significant impact on the quality of the human environment. The decision and determination of impact will be documented in a decision notice (DN).

1.4 Scoping

Staff on the district gathered known locations of invasive species infestations between 2005 and 2006.

On December 2, 2005, a pre-scoping meeting was held to gather internal concerns. Attendees included Steve Cole (Forester), Dick Rightmyer (Forest Soil Scientist), Charlene Breeden (Forest Hydrologist), and Ron Stephens (Forest Silviculturist).

A public involvement letter was composed and sent out to individuals, groups, and other agencies on September 6, 2006. This letter was sent out to 121 entities (see project file). Other organizations and individuals who might have interest in this project were identified and three additional letters were sent out (see project file). Several responses were received during this scoping period, and are in the project file.

On October 16, 2006, the ID Team met to list preliminary issues, clarify these issues, and recommend significant issues to the District Ranger. Significant issues were approved by the District Ranger, and are listed below with the tracking measure that will be used to show responses.

Additional contacts were made during the process of identifying significant issues, formulating alternatives, and conducting the effects analysis:

- Discussing treatment options at the Davidson Creek site with the City of Toccoa, including Don Dye and Billy Morse.
- Contacts were made with the Georgia Department of Transportation regarding the treatment of NNIS infestations along Highway 76, Old Highway 441, and Highway 75.
- Discussed treatment with the Rabun County Roads Department regarding treatment of Kudzu along Warwoman Road.
- Received additional NNIS sites from Joe Gatins, Georgia Forestwatch Representative.
- Additional discussions were completed with the Georgia Department of Natural Resources regarding experiences in the treatment of NNIS within wildlife openings and the use of carbaryl for grub control.
- Numerous internal contacts were made to find out the methods to apply herbicides for the best likelihood of control of NNIS.

- Contacts with the Forest and Zone Archeologist, Forest Botanist, Forest Hydrologist, Forest Soil Scientist, and Forest Silviculturist were made repeatedly to formulate and refine alternatives and complete the effects analysis.

1.5 Significant Issues

1. Invasives (autumn olive) are proposed for partial control in some areas (Example: Sarah's Creek in Rabun County). Invasives will quickly spread back into the area, making treatment ineffective (WildLaw, et. al., 10/3/06). *Measure: Allowance in alternative to treat contiguous infestations of multiple species within 1/4 mile of each other (yes or no).*
2. Some sites and species that are invasive have not been identified in the Proposed Action. These need to be added to the proposal for complete control of invasive species (WildLaw, 10/3/06; Bunch, 9/23/06; Forest Service ID Team, 10/16/06). *Measure: Total acres of treatment of non-native, invasive species.*
3. Shortleaf pine restoration, within the Proposed Action, will result in the killing of naturally-occurring species, including many hardwoods. This treatment conflicts with the natural succession of the Forest (WildLaw, 10/3/06; Forest Service ID Team, 11/05/07). *Measure: Total acres of treatment for shortleaf pine restoration.*

1.6 Nonsignificant Issues

Issues were considered nonsignficant because of one or more of the following conditions:

- The issue was outside the scope of the proposal.
- The issue is already decided in law, or in the Forest Plan.
- The issue is not in conflict with the Proposed Action.
- The issue is not supported by scientific evidence.
- The issue is limited in duration, extent, or intensity.

An issue worksheet provides details of why issues were not considered significant. This worksheet is in Appendix 1.

2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1 Introduction

This chapter describes alternatives developed by the ID Team in response to the significant issues identified (Chapter 1). The ID Team considered nine preliminary alternatives. Three of these alternatives along with the Proposed Action were recommended to the District Ranger (Responsible Official) for detailed analysis (see project file for signed worksheet). The District Ranger approved this recommendation. Alternatives that were eliminated from detailed study and the rationale for being eliminated are listed in the chapter under the subheading, ***Alternatives Considered but Eliminated from Detailed Study.***

2.2 Proposed Action (detailed description)

The Proposed Action was described generally in Chapter 1, and is given here in detail, including mitigation measures and monitoring.

Treatments under the Proposed Action would include approximately 131 sites totaling an estimated 653 acres.

Proposed herbicide treatments are designed to treat only the targeted or unwanted vegetation. All herbicide applications would be done according to labeling information and site-specific analysis. This labeling and analysis are used to choose the herbicide, rate, and application method for the site. They are also used to select measures to protect human and wildlife health, non-target vegetation, water, soil, and threatened, endangered, proposed, sensitive and locally rare species. Site conditions may require stricter constraints than those on the label, but labeling standards are never relaxed. The method and timing of application are chosen to achieve project objectives while minimizing effects on non-target vegetation and other environmental elements.

Maps displaying the vicinity of the treatments can be found in Appendix 1, and specific methods are given below:

Table 2: Detailed Description of the Proposed Action

Description of area	Ac (est.)	Proposed Treatment	Management Prescription Direction
An estimated 19 young (1-2 years) shortleaf pine forest communities that are being adversely affected by overtopping trees of other species.	291	Release shortleaf pine and oaks (along with a small component of pitch and Table Mountain pine) using directed foliar spray with imazapyr on selected woody vegetation in the late summer twice over the next five years.	Areas are within Management Prescriptions 7.E.1, 8.A.1, 9.A.3, and 9.H. This treatment for the areas proposed is consistent with Prescription Emphasis, Objectives and Standards.
An estimated 5 young pine communities that have been killed by the southern pine beetle.	132	Release regenerating pine and oak (emphasis on shortleaf pine) by spraying stems of competing and overtopping trees using a mixture of triclopyr (ester) and imazapyr twice over the next five years.	Areas are within Prescriptions 9.A.1 and 9.H, and the specific treatment is consistent with the Prescription Emphasis, Objectives and Standards.
Approximately 39 areas infested by kudzu, a non-native, invasive species.	63	Foliar spray using clopyralid for four treatments over six years.	Areas are within Prescriptions 4.D, 4.F, 4.H, 7.A, 7.E.1, 7.E.2, 9.A.1, 9.A.3 and 9.H, and the specific treatment is consistent with these Prescriptions.
One area of kudzu, a non-native, invasive species, near Davidson Creek.	5	Clear kudzu into piles and prescribed burn; scatter piles following burn; foliar spray individual re-sprouting kudzu with an aquatic formulation of glyphosate annually during the growing season for up to ten years.	This area is within Prescription 4.H, and drains into Davidson Creek, a municipal water source for the City of Toccoa. (Treatment designed in collaboration with City of Toccoa officials)

Description of area	Ac (est.)	Proposed Treatment	Management Prescription Direction
An estimated three sites infested by privet, a non-native, invasive species.	12	Basal or cut-stem spray with a mixture of triclopyr ester and imazapyr for the first treatment. Foliar spray with a mixture of triclopyr and imazapyr up to four times over six years to control root suckers and sprouts.	Areas are within Prescriptions 4.F, 9.A.1 and 9.H, and the specific treatment is consistent with the Prescription Emphasis, Objectives and Standards.
One site (Sarah's Creek Campground, infested by autumn olive), treatment to reduce populations of this species.	5	Basal spray (stems less than six inches in diameter) or cut-stem/stump treatment (stems greater than six inches in diameter) with triclopyr ester during the late winter or early spring. Dead wood would be piled and burned, and root suckers would be treated with up to five annual treatments of imazapyr in the late summer.	Area is within Prescription 7.E.2, and the specific treatment is consistent with the Prescription Emphasis, Objectives and Standards.
Two sites infested by Microstegium, a non-native invasive species.	9	Three treatments over five years of selective foliar spray with glyphosate during the active growing season.	These areas are within the 9.H and 9.F Management Prescriptions, and this specific treatment is consistent with the emphasis and objectives in this zone.
One site of oriental bittersweet, a non-native, invasive vine.	0.10	Three treatments over five years of selective foliar spray with glyphosate late in the growing season	This area is within the 9.A.3 Management Prescription, and this treatment is consistent with the prescription.
One site of mimosa, a non-native, invasive tree.	0.25	Inject or cut-stem treatment with glyphosate for the first treatment; foliar treatment using glyphosate for up to five years thereafter.	This area is within the 4.H Management Prescription, and this treatment is consistent with this prescription.
One site of wisteria, a non-native vine.	0.50	Foliar spray using clopyralid for four treatments over six years.	This area is within the 9.H Management Prescription, and this treatment is consistent with this prescription.
Georgia Mountain Orchard, to reduce populations of Autumn olive, and privet.	5	Basal or cut-stem spray with a mixture of triclopyr ester and imazapyr once to control large autumn olive and privet. Foliar spray autumn olive and privet with a mixture of triclopyr and imazapyr during the late summer up to five times over ten years. (Control of encroaching shortleaf pine within wildlife openings along with prescribed burning have been removed from the Proposed Action due to existing and pending projects that eliminated this need.)	This area is within the 9.H Management Prescription, and this specific treatment is consistent with the emphasis and objectives in this zone.

Description of area	Ac (est.)	Proposed Treatment	Management Prescription Direction
Areas within and adjacent to 57 wildlife openings: Treatment of undesirable non-native species including tall fescue, Japanese stilt grass, Sericea lespedeza, foxtail grass, crabgrass, and Bermuda grass. *White grubs of June bugs, Japanese beetles, and chafer beetles, originally proposed to be treated with carbaryl, has been dropped from the Proposed Action.*	130	Foliar spray with glyphosate and sethoxydim during the growing season to control the undesirable and invasive species. *Due to infrequent outbreaks of grubs in wildlife openings (DNR monitoring, personal communication, Kevin Lowrey, 2/15/08) in this area, the treatment of beetles with carbaryl under the Proposed Action has been dropped.*	Goal 12 states "minimize adverse effects of invasive native and non-native species … control where necessary to protect national forest resources." Wildlife openings proposed for treatment are within the following Management Prescriptions: 2.A.3, 4.H, 5.A (Glassy Mountain), 7.E.1, 8.A.1, 8.A.2, 9.A.1, 9.H and 12.A. The specific treatments are consistent with desired conditions envisioned in the Forest Plan.

- *Imazapyr is an active ingredient currently found in Arsenal, Chopper, and several other brands.*
- *Triclopyr in the amine formulation is currently found in Garlon 3A, Tahoe 3A, and other products; triclopyr in the ester formulation is currently found in Garlon 4, Forestry Garlon 4, Tahoe 4E, and Pathfinder II.*
- *Clopyralid is the active ingredient found in the Transline.*
- *Glyphosate is the active ingredient in Roundup, Accord, Foresters non selective Herbicide, Rodeo (aquatic labeling), and other products.*
- *Sethoxydim is the active ingredient in the Poast.*

2.3 Alternatives to the Proposed Action

The following alternatives are described in detail and their effects on the environment will be documented in Chapter 3.

2.3.1 Alternative 1: No Action (Issue 3)

The "no action" alternative is defined as a continuation of current management activities in the area. It serves as a baseline from which to compare the action alternatives. The Proposed Action would not be implemented under this alternative. Management activities with prior approval under other environmental documents would continue to be implemented. Recreational activities such as hunting, camping, sightseeing, hiking, fishing, and mountain biking would continue. Dispersed recreational sites, trails, trailheads, and parking areas would continue to be used. Under this alternative, non-native invasive plant populations would persist and continue to spread to adjacent areas.

2.3.2 Alternative 2: Adaptive Management Strategy (Issues 1 and 2)

This alternative plans an adaptive (changing) treatment for non-native, invasive species along with the release of known regeneration areas as detailed in the proposed action. This alternative responds to Issues 1 and 2 as described below.

This alternative recognizes that NNIS infestations constantly change and evolve, making it difficult to keep a proposal and eventual decision current. The most complete inventory will never cover the entire potentially infested area. It is certain that not all infestations can and will be mapped. Even under the assumption that an inventory is 100% complete, by the time the inventory is finished, infestation size and number will already be changing in areas inventoried early in the survey.

Decisions that are specific to known locations and species of NNIS, such as the Proposed Action, do not allow for treatment of the areas that were unknown at the time of the decision. The time necessary to complete new and or additional analysis can take six months to a year. New populations can expand during this waiting period. Treatment costs can increase substantially or the opportunity of containing the populations can be lost.

NNIS Priorities: The priority for treatment under this alternative is based on the impact to the biodiversity in the area combined with a priority assessment for the rapid response to new species detected on the district. In addition, the location of the infestation will be prioritized.

Table 3 displays species already or likely to be present on the district, even though some species have not been detected. The I-Rank (rounded impact ranking) was used in combination with the Southern Region weed category to provide a general priority for treatment. In addition, the following considerations will be used to alter this treatment priority, when and where necessary:

- New species and/or new infestations detected within the District would make the infestation a high priority. This would include species not listed in Table 3, if detected on the District. Especially, species that have a "high" rounded I-ranking (see table below) and/or are in Regional Weed Category 1. This stipulation follows the "*National Strategy and Implementation Plan for Invasive Species Management*," where "early detection and rapid response" are one of four short-term actions outlined.
- All individual plants of a species within a contiguous area would be treated at one time to avoid re-infestation (Issue 1). The only exception to this would be where funding limits discontinued treatment. Under this alternative, a ¼-mile radius will be used to define "contiguous." For example, all autumn olive plants within the Sarah's Creek Campground area would be treated under one action. Another example would be treatment of Kentucky 31 tall fescue within wildlife openings that are within ¼-mile of each other. Limitations due to funding may not provide for treating all contiguous infestations. For example, Japanese stiltgrass infestations along some portions of the road system may break this rule since portions of this infestation may be contiguous over extensive portions of roads. Treatment of the contiguous portion may not be possible due to funding in any one fiscal year. In cases like this, treatment boundaries would be set to take in logical portions of the infestation that best limit the re-infestation of the area and also make use of existing funding during each fiscal year.
- Infestations of NNIS within or adjacent to the following Management Prescriptions will receive higher priority than other areas:
    1. Designated Wilderness Areas (MP 1.A) (only manual methods, ex: hand pulling)
    2. Recommended Wilderness Areas (MP 1.B) (same as above)
    3. Designated Wild and Scenic Rivers (MP 2.A)

4. Recommended Wild and Scenic Rivers (MP 2.B)
5. Inventoried Roadless Areas
6. Botanical – Zoological Areas (MP 4.D)
7. Rare Communities (MP 9.F)

- Treatments in areas of high traffic where the infesting NNIS could be spread widely without immediate treatment. These sites would be included in a planned treatment as a higher priority than sites of NNIS that are not as threatening for immediate spread. An example of this would be a Japanese stilt grass infestation along the parking lot at a trailhead, where immediate spread could easily occur.

Table 3. Priority based on species of non-native invasive plants (NNIS) of concern on the Chattooga River Ranger District, Chattahoochee-Oconee National Forests.

Scientific Species	Common Name	I-Rank* (Nature Serve)	Regional Weed Category	Priority Treatment
Celastrus orbiculatus	Oriental Bitter-sweet	High	1	1
Polygonum cuspidatum	Japanese Knotweed	High	1	1
Microstegium vimineum	Japanese Stilt Grass	High	1	1
Ligustrum sinense/vulgare	Chinese/European Privet	High	1	1
Elaeagnus umbellulata/pungens	Autumn/Thorny Olive	High	1	1
Sorghum halepense	Johnson grass	High	1	1
Lolium arundinaceum	Kentucky Fescue	High	1	1
Lonicera japonica	Japanese Honeysuckle	High	1	1
Spiraea japonica	Japanese Meadowsweet, Spiraea	High	2	2
Lespedeza cuneata	Sericea lespedeza, Chinese bushclover	Medium	1	3
Rosa multiflora	Multiflora Rose	Medium	1	3
Albizia julbrissin	Silk Tree, Mimosa	Medium	1	3
Ailanthus altissima	Tree-of-heaven	Medium	1	3
Pueraria montana var. lobata	Kudzu	Medium	1	3
Dioscorea oppositifolia	Chinese Yam	Unknown	1	4
Miscanthus sinensis	Chinese Silver Grass	Medium	2	5
Wisteria sinensis	Chinese Wisteria	Medium	2	5
Paulownia tomentosa	Princess Tree, Royal Paulownia	Medium	None	6
Digitaria spp.	Tropical crabgrass and smooth crabgrass	Not Yet Assessed	None	7

* *NatureServe, in collaboration with The Nature Conservancy and the U.S. National Park Service, assessed species individually for each specified region and assigned each an Invasive Species Impact Rank (I-Rank) of High, Medium, Low, or Insignificant to categorize its negative impact on natural biodiversity within that region.*

Locations: Locations of treatment would include all of the areas presented in the Proposed Action (see Table 2), additional areas identified since issuing the scoping letter (see below), and additional areas as defined in Table 4:

Additional sites identified since issuing the Proposed Action (from Joe Gatins, Georgia Forestwatch):

- Sites east of the Bartram Trail and south of the foot bridge on the West Fork of the Chattooga River. Privet and autumn olive has been noted at this sites.
- Wildlife openings in Page Fields, located south of the Warwoman Road bridge across the West Fork of the Chattooga River and west of the river itself. Privet and autumn olive have been noted at this site.
- Two wildlife openings along Wildcat Creek Road adjacent to Tray Mountain Wilderness. Autumn olive, privet, Kentucky 31 tall fescue, sericea lespedeza, and others have been noted in these sites.

Table 4. Other proposed non-native invasive species (NNIS) project areas on the Chattooga River Ranger District, Chattahoochee-Oconee National Forests.

Treatment Area Type	Sites	Miles (approx)	Affected Portion of District (%)	Acreage (approx)
Known and mapped sites (see attached maps and table)	135	- - -	0.27	748
Roads, including the area 100 feet on each side.	- - -	433	3.65	9,939
Trails, including the area 50 feet on each side.	- - -	239	0.86	2,352
Botanical – Zoological Areas (MP 4.D)	7	- - -	0.19	2,504
Rare Communities* (MP 9.F)	3	- - -	0.17	451
Former Domestic/Agricultural Locations	593	- - -	0.12	333
Totals…	**- - -**	**- - -**	**5.26**	**16,326**

***Includes known and mapped Rare Communities. Other unmapped communities are also included in this treatment area, but are not reflected in this acreage.**

Methods: Methods in this alternative would be as described under the Proposed Action, including release of young trees within regeneration areas.

Treatment methods for NNIS, in order of priority, would include the following:

- Manual methods (first priority): hand-pulling and hand-clipping/cutting designed to eradicate small infestations or as a follow-up treatment (contiguous areas of herbaceous plants of approximately 1/4 acre or less; small shrubs and trees of less than 10 individuals), when biologically and economically effective. Examples of tools that could be used under this method include grass clippers, loppers, pruning saws, machetes, brush hooks, sling blades, and sighs.

This method (manual, non-pesticide) would also be used exclusively in Wilderness Areas, Recommended Wilderness Study Areas, and the Appalachian National Scenic Trail Corridor.

- Mechanical methods (second priority): these methods would be used to control or eradicate small infestations (as defined above) or targeted at larger infestations where the cost is lower or comparable to pesticide applications. Examples of this method would include cutting by chainsaw, buzzsaw, string trimmers, or mowers. Additional treatment with a propane torch, on some sites, would also be included. Propane torches would be used only under periods of low fire danger, and primarily within bog communities which have a low potential to carry a fire.
- Pesticide methods (third priority): The objectives of pesticide use would be to control and possibly eradicate from the site NNIS infestations where manual or mechanical methods would be costly (compared with pesticide methods) and/or not effectively control the species on the site. Techniques for application would be the same as those described under the Proposed Action (see Table 2). The additional NNIS added into this alternative would be controlled as follows:

Table 5: Description of Treatment for Added NNIS under Alternative 2

NNIS	Proposed Treatment
Japanese knotweed, Japanese honeysuckle, Japanese meadowsweet, multiflora rose, Chinese yam,	Foliar spray with triclopyr amine during the growing season four times over a six year period.
Tree of heaven, princess tree (royal pawlonia)	Cut stem treatment with triclopyr amine during the growing season up to three times.
Chinese silver grass	Foliar spray with glyphosate during the growing season up to three times.

- *Triclopyr in the amine formulation is currently found in brand name Garlon 3A; triclopyr in the ester formulation is currently found in brand names Garlon 4, Forestry Garlon 4, and Pathfinder II.*
- *Glyphosate is the active ingredient in brand names such as Roundup, Accord and Rodeo (aquatic labeling).*

Due to the adaptive nature of this alternative, compliance with the Endangered Species Act (ESA) and the National Historic Preservation Act (NHPA) will be as follows:

Threatened and Endangered (ESA), Forest Service Sensitive and Locally Rare Species: A Forest Service biologist will examine and analyze all sites individually. The biologist will determine potential impacts to Proposed, Endangered, Threatened, or Sensitive (PETS) and locally rare (LR) species using information such as proximity to known locations of PETS and LR species, Forest Service and Georgia Natural Heritage Program (GNHP) inventory records, proximity to rare communities, and the quality of adjacent habitat. The biologist will analyze planned control measures and determine if additional inventories and/or additional documentation are necessary, if any additional species require analysis before any control activities are implemented, and will establish requirements for any additional mitigation measures.

Cultural/Heritage Resources: With the exception of two sites (Davidson Creek and Sarah's Creek), no ground disturbing activities are proposed.

No historic properties eligible for nomination to the National Register of Historic Places (NRHP) were found during cultural resource surveys at Davidson Creek and Sarah's Creek.

Other known and unknown (identified in the future) treatment sites will be submitted to the Forest Archeologist for review and consultation with the State Historic Preservation Officer (SHPO) and the Tribal Historic Preservation Officer (THPO), if needed. Treatment would not take place until it has been determined that the treatment will have no effect on historic properties eligible for or listed on the NRHP.

Timing: NNIS Treatments would be implemented incrementally on infested sites over the next 10-12 years. Treatments would be based on funding and available volunteer time (manual and mechanical methods). The anticipated annual treatment acres by treatment method are as follows:

- Up to 5 acres of manual treatments, such as hand-pulling, hand-cutting, or non-motorized mowing;
- Up to 100 acres of mechanical treatments, such as chainsaw, string trimmer, buzz saw, or motorized mowing;
- Up to 500 acres of pesticide application, all non-aerial and directed at selected individual plants or shrubs.

Release of seedlings within regeneration areas would be implemented within 5 years of the date of the Decision Notice, depending on available funding.

2.3.3 Alternative 3 (Issues 1, 2 and 3)

This alternative would replicate Alternative 2 as an Adaptive Management Strategy against NNIS, but would not include any shortleaf pine restoration release actions. This alternative would include all NNIS sites and species identified and mapped already (Proposed Action) and also allow for treatment of currently unmapped sites within the constraints (priorities, methods, locations, and timing) of Alternative 2 as described above.

This alternative would respond to all significant issues, but would not meet a part of the purpose and need designed to move toward Goals 3, 8, or 40 in the Forest Plan.

2.4 Mitigation Measures Common to the Proposed Action and Action Alternatives

All applicable mitigation measures would be carried out as detailed in the Forest Plan and the Best Management Practices for Georgia. Some selected important mitigation measures for the treatments described above include the following:

- Only selective treatments using aquatic-labeled herbicides would be used within the riparian corridor (and other wetland habitats) (Standard FW-022). Specifically, this would include the use of aquatic labeled formulations of glyphosate.
- All herbicides would be applied at the lowest rate effective in meeting project objectives and according to guidelines for protecting human and wildlife health (Standard FW-012). Application rate and work time would not exceed levels that pose an unacceptable level of risk to human or wildlife health.

- Herbicides and application methods have been proposed to minimize the risk to human and wildlife health and the environment. Vegetable oils would be used as the carrier for triclopyr used in its ester formulation (Standard FW-011).
- Mitigation of bare soil (where invasive plants are removed) will include re-vegetation to a minimum of 85% coverage within 30 days of completion (Standards FW-067 and FW-068). This would include seeding and mulching of the area to protect against raindrop erosion. Within riparian corridors, erosion control blankets would be used in place of mulch. In addition, if needed, one or more silt fences would be installed immediately adjacent to the bare soil in the direction of the runoff. An exception to this would be if the treatment is completed outside of the growing season. In this case, revegetation would be completed within the first growing season (Standard FW-068).
- Herbicide mixing, loading, or cleaning areas in the field would not be located in sensitive areas or within 200 feet of private land, open water or wells.
- For the Proposed Action and Alternatives 2 and 3, a spill plan (see project file) would be in place.

In addition to these Standards, additional mitigation would take place based on public and internal concerns:

- Sites treated with Clopyralid would avoid all recent (within one year) predator beetle release sites in order to avoid any accidental mortality on the various species of predator beetles being released to control the hemlock woolly adelgid.
- Any paths created by this project will be closed using a combination of berms, tank traps, brush, rocks, and other woody debris to deter illegal traffic.
- Foliar treatment using formulations of triclopyr would require developed campgrounds or dispersed campsites to be closed for 24 hours to ensure no unacceptable public contact with treated vegetation occurs. In addition, treatments will be during seasonal and weekly low points of recreational use.

2.5 Monitoring for Proposed Action and Alternatives

Monitoring is divided into three types: Implementation, effectiveness, and validation. Implementation and effectiveness monitoring are usually applicable to a project. The following monitoring is proposed to be conducted under the Proposed Action and alternatives, as applicable:

Implementation Monitoring:

1. Contract administration would include observations of the contractor mixing pesticide to the lowest effective rate (Standard FW-011) with oversight by a certified pesticide applicator. In addition, close attention is paid to the contractor when applying pesticide or conducting manual treatments. Proximity to watercourses is given particular attention, complying with Forest Plan Standards. Daily diaries would be completed periodically, and probable entry points are signed to notify the public of the treatment. Treatment dates, pesticide formulation, target species, and other pertinent data are documented in the contract file.
2. Forest Service crews have similar monitoring by a certified pesticide applicator.

Effectiveness Monitoring:

3. Sites or areas treated would have a visual survey completed during the middle of the subsequent growing season or later, noting the condition of the target as well as other vegetation. This information would indicate whether or not additional treatments are necessary and the equipment needed for these treatments. These surveys would be documented in the contract/project folder.
4. The two sites where ground disturbance is planned would be monitored to detect whether or not water control structures (silt fencing, hay bales, dips, surge stone, etc.) and revegetation (or mulch) cover 80% of the area within 30 days of the activity. Prompt measures would be taken if this level of cover is not present.
5. A small subset of sites or areas treated with pesticide would have water samples collected from area streams. Certified laboratories would analyze for the presence of the applied pesticide. Emphasis would be on picking sites on streams with the southern strain of brook trout.
6. An overall map would be maintained displaying known locations of NNIS. This map would reside at the Chattooga River District office, and would be updated internally and externally (public, DNR, contract inventory personnel) based on successful control actions as well as newly discovered locations, including all NNIS.
7. A walk-through survey would be performed on the 423 acres of young forest communities to determine if they need an additional treatment. Any areas that have a minimum of 150 shortleaf pine along with approximately 50 oak or other mast-producing trees would not be treated a second time (FW-089).

2.6 Alternatives Not Considered in Detail

The ID Team considered other alternatives, but did not bring them forward for detailed study. Reasons for not considering an alternative in detail includes:

- Illegal
- Fails to meet the purpose and need for the project
- Technologically infeasible
- Clearly unreasonable
- Duplication within the existing range of alternatives
- Unreasonable environmental harm
- Cannot be implemented
- Remote or speculative

The following preliminary alternatives were recommended to be dropped from detailed analysis. This recommendation was approved by the District Ranger as the Responsible Official. Below is a brief summary of the alternative and the reason for elimination:

- *An adaptive proposal using parathion instead of carbaryl to treat non-native invasive grubs:* Parathion has been voluntarily cancelled by the EPA for several uses. It is “very highly toxic” to birds, aquatic invertebrates, and honey bees. This alternative would clearly cause unreasonable environmental harm, and was dropped from further consideration.

- *Proposed Action modified to remove any treatment of grubs with carbaryl:* While this alternative would respond to preliminary issue k, this issue was not considered significant within the context of the overall project. This alternative was dropped, and then further research into the frequency of the need for the treatment in a past decision led to the Interdisciplinary Team recommending the dropping of this treatment in the Proposed Action as well as action alternatives. The District Ranger agreed, and so carbaryl treatment is no longer proposed.
- *Proposed Action or an Adaptive alternative substituting imidacloprid for carbaryl:* This substitution was contemplated as a response to preliminary issue k over the concern that carbaryl would cause mortality to other insects other than Japanese and June bug larva (grubs). Unfortunately, imidacloprid used in a broadcast treatment appears to also result in higher exposures to nontarget organisms in the soil and some adverse effects are plausible (Risk Assessment, page xvii). No selectivity could be found and so this alternative was not considered in detail.
- *Adaptive management strategy, without the use of carbaryl for grub control.* This alternative would be the same as Alternative 2 (see above) but would remove any use of carbaryl for treating grubs that can damage wildlife plantings in managed openings. See "*Proposed Action modified to remove any treatment of grubs with carbaryl.*" Carbaryl treatment has been removed from the Proposed Action and all alternatives.
- *Proposed Action plus all other known locations, without the use of carbaryl for grub control.* This alternative is totally duplicated within Alternative 2. Although this alternative does respond to a significant issue (adding more treatment sites), since it is duplicated in the adaptive alternative (which adds known as well as unknown sites), this alternative will not be considered in detail. See "*Proposed Action modified to remove any treatment of grubs with carbaryl.*" Carbaryl treatment has been removed from the Proposed Action and all alternatives.
- *Proposed Action plus all other known locations.* This alternative would include all sites in the Proposed Action (including release in regeneration areas) plus additional NNIS and sites where the ID Team can reasonably (in time) map these NNIS infestations or populations (Issue 2). See page 15 for the additional sites. This alternative would also treat ALL individuals of a NNIS within a contiguous area or within a ¼-mile vicinity, thereby responding to Issue 1. Since Alternative 2 is already more responsive to these issues (Alternative 2 includes known AND unknown sites), this alternative is completely duplicated, and there is no need for further consideration in detail.

2.7 Comparison of Alternatives

The following display compares the alternatives.

Table 6. Comparision of Alternatives

Tracking Measures and other statistics	Proposed Action	Alt. 1 – No Action	Alternative 2	Alternative 3
Significant Issue 1: Allowance in alternative to treat contiguous infestations of multiple NNIS within 1/4 mile of each other (yes or no)[1]	No	0	Yes	Yes
Significant Issue 2: Total estimated acres of treatment of NNIS[2]	230	0	2,528	2,528
Significant Issue 3: Total acres of treatment (release) for shortleaf pine restoration	423	0	423	0

Tracking Measures and other statistics	Proposed Action	Alt. 1 – No Action	Alternative 2	Alternative 3
Acres of treatment for grubs using the insecticide carbaryl	0	0	0	0
Net Present Cost, including costs of re-treatment, but not including program costs and overhead	$134,132	0	$280,801	$229,635

[1] This is a yes/no answer on whether or not individual as well as multiple NNIS can be treated contiguously, minimizing re-introduction. It is recognized that in most cases projected infestations of species like Japanese stilt grass, which may infest long segments of road or trail – sides, may not have a total contiguous treatment due to annual funding limitations, but ¼ -mile is used as a general for attainment.

[2] Total acres estimated to be treated is based on treatment of known infestations + 10 feet on each side of system roads + 5 feet on each side of system trails + 10% of Botanical Areas + 5% of Rare Communities + 50% of former domestic and agricultural sites. These assessments of actual treatment are based on professional judgement in consultation with the Forest Botanist, District Wildlife Biologist, District and Forest Silviculturist, and Zone Archeologist. The total amount of treatment represents a ceiling rather than an exact projection.

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 Introduction

This chapter describes the direct, indirect, and cumulative environmental effects, including the effectiveness of mitigation measures, that would result from implementing the Proposed Action and the alternatives to the Proposed Action.

3.2 Physical

3.2.1 Water, Soil, Riparian Resources, Wetlands, Floodplains

Current Situation

Extensive background information on these physical resources can be found in the Final Environmental Impact Statement for the Forest Plan (Forest Plan FEIS), pages 3-3 to 3-80.

Common Effects for Proposed Action and Action Alternatives

The treatments in this project include manual, mechanical, and chemical methods to control invasive plants. Because there is no ground-disturbing activity associated with manual removal methods, the effects to soil, water, and riparian resources is negligible. If a large amount of vegetation is removed in one area through these methods, erosion could be increased; however this is unlikely in this project based on the temporal and spatial separation of the treatment areas. Mechanical methods of removal will also be used. These methods can increase erosion and sedimentation if soil is exposed from plant removal, however, these effects are likely to be very small from any of the proposed activities.

This analysis focuses primarily on the environmental effects of the application of herbicides since it represents the bulk of the proposed treatments. Herbicides may affect soil productivity and water quality through soil erosion, nutrient leaching, and spray drift during application (from risk assessments). The amount, type of herbicide, and the method of application affect the effects of

herbicide on soil, water, and riparian resources. Adverse effects can occur when herbicides are used above the label rate, and when an herbicide not approved for use in wet environments is used against label instructions.

For all treatments, the beneficial uses of water in or near the project area will be protected, through the use of mitigation measures and BMPs in the transportation, mixing, application, and disposal of herbicides. Mitigation measures common to all alternatives follow both Forest Plan direction and Georgia Best Management Practices. These mitigation measures include the establishment of a riparian corridor a minimum of 100 ft (or more, based on site-specific analysis) on each side of the stream channel along perennial and intermittent streams and other bodies of water. In these riparian areas, an aquatic formulation of glyphosate (a chemical that does not persist in wet environments and has minimal harmful effects to aquatic ecosystems) will be used to minimize the effects of herbicide on water quality. Herbicides will not be directly applied to water bodies. Weather conditions will also be considered before herbicide application to reduce the possibility of drift into the riparian corridor (Georgia BMP manual). Herbicides will not be applied directly to bare soil, which will minimize effects to soil productivity.

The direct effects of chemical treatments can include drift (through the air) of fine mists during foliar applications. In some instances, especially just after treatments, there may be some movement of chemicals with water or soil particles.

Indirect effects for the chemical treatments are typically some loss in ground cover as the plants die and decompose. Due to the limited acreage and dispersed extent of the areas (including release sites), and the short half-lives of the chemicals proposed for use, the direct and indirect effects should be temporary and minor if BMPs are followed. Prompt re-vegetation would provide effective erosion and sediment control.

Another indirect effect of herbicide treatment is runoff into streams following rain events. The amount of herbicide that can potentially enter the stream system through storm runoff is dependent on the concentration of herbicide applied, the time since application, and the intensity and duration of precipitation. Storms with significant rainfalls usually produce low herbicide concentrations in streams because the active ingredient is diluted by the amount of rainfall received and the distance traveled to reach the stream. Small storms will generally not produce enough runoff in forested environments to move herbicides into water bodies. Storms of medium intensity and of long duration will generally produce the highest detectable stream concentrations. Care will be taken to apply herbicides during times when the probability of precipitation is small, and a 100-ft buffer will be used in application of herbicides that can negatively affect aquatic environments.

There is also some risk of herbicides seeping into groundwater through vertical seepage. A pollutant is considered to have polluted groundwater if water quality is affected to a degree that it is unsuitable for human use, or to injure or kill aquatic plants or animals. When applied at the lowest effective rates, herbicides should not seep into groundwater at concentrations exceeding the EPA's strictest drinking water standards. Risk to groundwater will be minimized through the mitigation measures, including the application of herbicides at the lowest effective rate.

The removal of non-native invasive species may also have the indirect effect of improving overall water quality and aquatic habitat on the project sites through the establishment of a more natural plant community. Some invasive species have sparse root mass, and are detrimental to stream bank stability. For instance, stream banks covered with kudzu appear stable because they are covered with vegetation. However, kudzu provides virtually no subsurface root structure, making banks more susceptible to erosion and slumping. Therefore, the removal of kudzu and the establishment of native plants on stream banks could reduce bank erosion.

Cumulative Effects

Since most of the treatments are to treat local infestations of plants and there is little surface disturbance associated with these activities, these treatments would add very little to the ongoing effects to soil and water resources from other past, ongoing, or future actions. In addition, these pesticides all have relatively short half-lives and thus will not persist on-site between treatments. Therefore, there would be no cumulative effects from the proposed action.

Differences in Effects Among Proposed Action and Alternatives

No Action

In the no action alternative, there would be no control of non-native invasive plants, and no shortleaf pine release activities. Non-native invasive plants would continue to spread with negligible direct effects to soil, water, and floodplains.

The indirect effects of the spread of non-native invasive plants include the changing of species composition in riparian areas, wetlands and floodplains. The species commonly associated with riparian area habitats include kudzu, oriental bittersweet, and Japanese stiltgrass, but other species can also proliferate in these areas. Another indirect effect of the continued proliferation of these species could be increased bank erosion.

One potential cumulative effect from the no-action alternative would be that rootstocks for some species of NNIS would become more enriched, making future treatments more difficult. This increase in the root stocks of undesirable species could also mean that more ground disturbing activity would be required to remove these plants than if activities were undertaken in the near future.

Alternative 2

Treatments in known areas as well as future sites will include areas outside and inside riparian corridors on an estimated 2,530 acres over 10 years. The treatments in alternative 2 include the application of herbicides and other mechanical methods to remove invasive species. 423 acres of shortleaf pine restoration release actions are also included in these treatments. The primary treatment in this alternative is pesticide application, however ground-disturbing activities are proposed at Davidson Creek and Sarah's Creek where the volume of kudzu and autumn olive will be reduced through mechanical methods.

The direct effects of these treatments include an initial reduction in plant cover, however, a more natural plant community in the riparian corridor would eventually be established and contribute positively to the overall health of the aquatic and terrestrial ecosystem. This change in plant community would also have the indirect effect of reducing erosion on banks where kudzu has proliferated.

If mitigation measures and BMPs are followed, these activities will have no cumulative effects on long-term soil productivity and water quality.

Alternative 3
The direct, indirect and cumulative effects of alternative 3 are similar to those in alternative 2, however there are no shortleaf pine restoration release actions included.

3.2.2 Heritage Resources

Information on the general affected environment for heritage resources can be found in Forest Plan FEIS, pages 3-525 to 3-529.

Within the context of the Proposed Action and alternatives, ground – disturbing activities are proposed on only two sites. These include the Davidson and Sarah's Creek sites, where bulldozer actions are to be used to assist in reducing the number of stems and slash from two NNIS.

At Sarah's Creek, Autumn olive has grown for decades and now is found in dense thickets of shrubs that reach 20-30 feet tall and wide on an estimated 10 acres. These shrubs provide screening for the improved campsites present in the area. In addition, there are other younger shrubs that are smaller in size throughout the campground and vicinity.

At the Davidson Creek site, Kudzu has overtaken approximately five acres near a small lake. The kudzu continues to expand outward, overtopping, shading, and eventually killing trees on the edges of the infestation.

There are no known heritage sites within these two treatment areas that would be affected by ground disturbing methods (pile and burn with heavy equipment). This is based on surveys of these areas (project file; available for review at the Chattooga River Ranger District office after sanitization by the Forest Archeologist).

3.2.3 Wilderness/Wild and Scenic Rivers

Current Situation

Known NNIS infestations are within the boundaries of the Wild and Scenic Chattooga River on the district. Privet and Autumn olive infestations are known within segments of the Chattooga River, and infestations of tall fescue and sericea lespedeza are present in wildlife openings along the Chattooga River. There is also a high probability of infestations along the Chattahoochee River and Overflow Creek, both of which are Recommended Wild, Scenic, and Recreational Rivers (Forest Plan, page 3-32).

No NNIS infestations are known within Wilderness Areas, however there is a possibility that NNIS will spread into Wilderness Areas in the future.

No shortleaf pine release areas are within Wilderness Areas or Wild and Scenic River segments.

Effects Common to the Proposed Action and Action Alternatives

Direct effects from the treatments would be minor. Chemical treatments (Wild and Scenic River segments) as well as manual (only treatment method allowed in Wilderness Areas) or mechanical treatments may cause slight contrast to the viewer immediately after the action, but viewer positions where this would be noticed would be few.

Indirectly, foliar treatments on NNIS would cause shrubs and saplings to wilt, turn red/brown, and eventually lose leaves. Basal treatments would cause a similar appearance during the growing season, or a lack of leaves if treated at the end of the growing season or in the winter/early spring.

Cumulative effects would be negligible for the Proposed Action and action alternatives since treatments would be spotty and not affecting viewer positions for long stretches on trails. Along watercourses, viewers from boats are likely to not notice any changes.

Effects Specific to the Proposed Action and Alternatives

The main difference in treatments would be the lack of future treatments of unknown infestations under the Proposed Action. Alternatives 2 and 3 would both allow for the treatment of future infestations found later during surveys, while the Proposed Action would not. Under the Proposed Action, there would initially be a slight reduction in NNIS, and then later an unchecked cumulative increase in NNIS, concentrated near past disturbances like roads, trails, reverted and existing openings, and possibly camping sites.

3.3 Biological

3.3.1 Vegetation

Current Situation

Major forest communities across the Chattooga River Ranger District are described in Forest Plan FEIS on pages 3-99 to 3-206.

The primary plant communities likely to be affected are permanent wildlife openings, including roadsides and campsites, trailsides, and forest communities adjacent to these disturbances.

Effects Common to the Proposed Action and Action Alternatives

Treatments would occur on approximately 653 acres under the Proposed Action, including 423 acres of release actions in young forest communities. Alternatives 2 and 3 would include treatments on an estimated 2,528 acres of NNIS infestations (Issues 1 and 2), with Alternative 2 including 423 acres of release and Alternative 3 having no release treatments (Issue 3).

All proposed herbicide release applications are to be applied directly to the targeted vegetation; therefore by correctly following application procedures, impacts to non-targeted species would be minimal. Herbicide spray equipment is designed to treat the target plants with a minimum of off target movement

of airborne droplets, called drift. Spray nozzles that are used are designed to produce large droplets because smaller droplets tend to remain airborne and may drift with air currents away from the target vegetation. Hand application equipment used for basal spray or cut-stem techniques do not produce spray but rather a directed stream of formulation. Thus, these techniques do not produce herbicide drift. Well directed ground applications conducted under conditions that do not favor off-site drift will probably have no impact on off-site plant species.

It is also important to note that only a small portion of the stand will actually be treated. Although 423 acres includes all of the forest communities where treatment would be completed, the actual acreage to be treated would be much less than the total acreage. And, referencing Table 7, many less stems than 1,200 are likely to be treated across the entire acreage, although it is expected that 1,200 stems would be treated on some acres where competition is heaviest.

No treatment would take place where selected pines or oaks are already free-to-grow into the overstory, or in patches where no pine or oak species are present. For example, if blackberries and black locust are the only species found in a ¼-acre area within one of the release areas, workers would walk through this area and not treat any of the woody vegetation present. The same outcome would take place where a mixture of shortleaf pine and oak are present and are free-to-grow (no competition within the developing crown of the tree) or where native grasses are present with no oaks or pines present.

Common direct effects would include herbicide application on the leaves and basal stems of NNIS, in some cases, causing wilting.

Indirect effects would include yellowing, browning, and loss of leaves from the target NNIS. The chemicals proposed for use target the photosynthetic mechanism of plants, and are likely to result in the mortality of plants with which they come into contact. Because the foliar spray applications would be direct foliar spray using backpack sprayers with wands, or direct cut-stem/basal spray application, non-target species immediately adjacent to target plants should be minimally affected. Repeated herbicide applications are planned, but over time no indirect or cumulative effects are predicted since the chemicals proposed for use do not accumulate in soils or in organisms. Glyphosate, sethoxydim, and triclopyr have essentially no soil activity and are not mobile in the environment. Imazapyr and clopyralid are soil active herbicides, so impacts to non-target plants are more likely. Some non-target plants intermingled with invasive plants would be affected especially by the foliar application methods.

Effects Specific to the Proposed Action and Alternatives

Alternative 1 is the no action alternative. Populations of non-native invasive species would continue to grow and spread. Under the no action alternative, there are no foreseeable effects from herbicides, although impacts of non-native invasive species on native plant diversity would continue to increase.

Non-native invasive species would occupy an increasing proportion of our terrestrial ecosystems throughout the Chattooga River Ranger District. No efforts would be made to control these plants on National Forest land. Non-native invasive plant populations would also grow onto the lands of adjacent landowners in the future and continue to impact native vegetation diversity, fire regimes, nutrient cycling, and natural hydrology. The cumulative effects of the no action would result in negative impacts to forest vegetation.

Alternatives 2 and 3 would treat many more infestations of NNIS due to the adaptive strategy of both of these alternatives. The Proposed Action would treat less than a third of the acreage (estimated) of these other action alternatives. Within the two levels of treatment, these actions would initially result in the top-killing of NNIS, increasing fuel loading on these sites. Some associated native vegetation may be directly trampled. The elimination of non-native invasive plants would result in the release of associated native vegetation resulting in an increase in native plant species diversity.

Alternatives 1 and 3 would not treat shortleaf pine competition, and these areas would develop into forests largely dominated by species other than shortleaf pine. Shortleaf pine forest communities would continue to decline across the Chattooga River Ranger District and regionally. This is contrary to the guidance and objectives in the Forest Plan, and these two alternatives would only partially meet the purpose and need for the overall project. Other native species including red maple, oaks, yellow poplar, blackgum, sourwood, Virginia pine, and other species would occupy the growing space within these areas that were once shortleaf pine forest communities.

The Proposed Action and Alternative 2 would treat competition of shortleaf pine and selected oak within the 423 acres of young forest communities. Due to the types of treatments (foliar and basal spray), the direct effects would be slight since no immediate vegetation manipulation would be conducted. Indirect effects would include no green-up during the next growing season for the selected woody stems treated, increasing the sunlight to the leaves of pines and oaks, allowing them to grow into the vacated growing space. Basal spray treatments during the growing season would include the indirect effect of browning and/or yellowing of leaves as the selected treated stems die.

Cumulative impacts considers other vegetative manipulation across the Chattooga River Ranger District on National Forest System land as well as other ownerships. Since the treatments for NNIS are small in size relative to the untreated forest surrounding these sites, the cumulative effects are low. When combining the treatment for NNIS with the shortleaf pine restoration release, there is an increase in acreage by 423 acres, but the vegetative manipulation is minor and not expected to contribute to an overall detectable cumulative effect on vegetation. The total treatment area for the Proposed Action is 653 acres (0.2% of the National Forest System land on the Chattooga River Ranger District), while Alternative 2 is estimated at 2,951 acres (1.1%) and Alternative 3 is 2,528 acres (0.9%). The NNIS treatments along with the shortleaf pine release are selective, small in size, and directed at individual plants or woody stems. In the case of the treatment of wildlife openings, the treatments may be broadcast, but are so small as to be of negligible cumulative impact.

The chemicals proposed for use will not accumulate in organisms or soils, so there are anticipated to be no cumulative effects to vegetation. Proposed actions involving the use of herbicides typically target non-native or native weedy or invasive vegetation. Non-native invasive species would generally continue to increase on private lands, where there is little financial incentive to control them. Since direct and indirect effects on vegetation are likely to be beneficial, so also are the cumulative effects, since the Proposed Action and Alternatives 2 and 3 are likely to result in an increase in vegetation diversity within the areas targeted for non-native invasive species control.

3.3.2 Herbicide Hazard Quotients and Effects to Human Health

For all herbicides, and for both cut surface applications and foliar applications, we have applied risk assessments developed for the Forest Service by Syracuse Environmental Research Associates (SERA). The details of the risk assessment results are included in the process record and additional information on this process can be found at www.fs.fed.us/foresthealth/pesticide/risk.htm. Two terms commonly referred to in this process are the **Reference Dose** (RfD) and **Hazard Quotient** (HQ).

RfD - Derived by US EPA, this is the maximum dose in mg of herbicide active ingredient per kg of body weight per day that is not expected to cause injury over a lifetime of exposure. In other words, it is, in EPA's opinion, a "safe" lifetime daily dose. This is a conservative estimate, and is designed to be protective.

HQ - This is the ratio of the estimated exposure dose to the RfD. A HQ of 1 equals exposure to the RfD; HQs less than 1 represent exposures to less than the RfD, while HQs greater than 1 represent exposures greater than the RfD. *HQs of 1.0 or less represent exposure levels that are not of concern.* HQs greater than 1.0 represent possible effects to be examined more closely. The assumptions for any exposures producing a HQ greater than 1.0 are examined to see if the exposures need to be mitigated or avoided. For the effects on wildlife, one must remember that these effects are constructed for individuals and not wildlife populations.

Current Situation

Currently, no pesticides are being used to control NNIS or restore shortleaf pine on National Forest System lands on the Chattooga River Ranger District.

In some areas, the insecticide imidacloprid is being injected into the soil for systemic control of the hemlock woolly adelgid. These areas, called Hemlock Conservation Areas (HCA's), involve the treatment of up to 180 hemlock trees in one or more locations within HCA's separated by an average of roughly three to five miles. These treatments are completed every 2-3 years.

Some imidacloprid is also being injected into the soil within developed campgrounds to maintain high-priority hemlock trees. This work is also completed every 2-3 years, depending on the effectiveness of treatment.

Common Effects for Proposed Action and Action Alternatives

Table 7 shows the basis for estimated application rates for the Proposed Action and Alternatives 2 and 3. This table was constructed to display all species and treatments being considered, so some applications may not be applicable to a given alternative. These rates were applied in the risk assessment process targeting the various species and addressing various methods of application.

Measures to ensure public safety are incorporated into project mitigation, contract specifications, and product labels which will be followed at all times. See pages 17-18 for some selected mitigation measures, and the Forest Plan, page 2-9 through 2-11 for others.

Contracted crews will be supervised by a certified pesticide applicator and will comply with all other state and Federal regulations regarding applicator certification, licensing and safety. Forest Service crewmembers will be trained in personal safety, proper handling and application of herbicides. All areas will be signed following herbicide application. Forest Service crews will carry additional emergency clothing, soap, wash water, eyewash bottles, and safety equipment to the field when applying herbicides. These measures are all designed to protect human health and safety.

The risk characterization for each of the herbicides is summarized below:

- Clopyralid – there is no evidence typical or accidental exposures will lead to dose levels that exceed the level of concern for workers. For members of the general public, none of the longer-term exposure scenarios approach a level of concern and none of the acute/accidental scenarios exceed a level of concern, based on central estimates of exposure (see risk assessment for Clopyralid, page xiv).
- Glyphosate – For both workers and members of the general public there is very little indication of any potential risk at the typical application rate of 2 lbs a.e./acre. This project would treat at levels below this under both the Proposed Action and action alternatives (see risk assessment for Glyphosate, page xvi).
- Imazapyr – Typical exposures to imazapyr do not lead to estimated doses that exceed a level of concern for either workers or members of the general public (see risk assessment for Glyphosate, page xiv).
- Sethoxydim – None of the exposure scenarios for workers result in levels that exceed the RfD. Thus, sethoxydim does not pose any substantial risk to human health (see risk assessment for Glyphosate, pages xii-xiii).
- Triclopyr – There is no indication that workers will be subject to hazardous levels of triclopyr at the typical application rate of 1 lb/acre and under typical exposure conditions. Application levels for this project, under all action alternatives and the Proposed Action, are less than this rate. There is no route of exposure or exposure scenario suggesting that the general public will be at risk from longer-term exposure to triclopyr. Two dermal exposures to the triclopyr ester (accidental spray over the legs of a woman and dermal contact with contaminated vegetation by a woman) exceed the level of concern at the central estimate of exposure. Once again, rates for this project are below levels of application under these scenarios. Project Hazard Quotients at rates of application are discussed below.

Results of the risk assessment for application of glyphosate, clopyralid, sethoxydim, and imazapyr at anticipated application rates were all less than one for human health hazard quotients, and therefore application of these chemicals is not likely to affect human health and safety. An acute HQ of 3.0 and a chronic HQ of 1.4 was projected in the scenario where triclopyr amine is used to treat Japanese knotweed (foliar application) when an adult female wearing shorts contacts the contaminated vegetation while hiking (Alternatives 2 and 3 only). Treatment of privet and olive species using the triclopyr amine in a foliar spray is predicted to have an acute exposure HQ for an adult female exposed to contaminated vegetation of 2.0, with a chronic exposure HQ of 1.2. Although these two scenarios predict hazard quotients over the threshold of 1.0, it is unlikely that these conditions would be present due to the following actions take to preclude their occurrence:

- Herbicide application areas are signed, giving the public direct notification of the herbicide application;
- Foliar treatment using formulations of triclopyr in developed campgrounds or dispersed campsites will be closed for 24 hours to ensure no unacceptable public contact with treated vegetation. In addition, treatments will be during seasonal and weekly low points of recreational use.
- Japanese knotweed infestations (Alternatives 2 and 3 only) have yet to be detected on the district, so future treatments are likely to be isolated and small (less than 0.1 acre);
- Foliar treatment of privet and olive species would take place only on small individual plants (less than seven feet tall), and the application will be directed at only that plant and not broadcast across the surrounding vegetation;
- Infestations of olive species located in wildlife openings would likely be treated first with removal by heavy equipment (under a past, separate NEPA decision), reducing the rootstock and potential suckering by these larger, established individual shrubs.

Cumulative effects include effects resulting from the use of herbicides on private land which is difficult to assess. Herbicides are typically applied on private land only for agricultural production, including crops and/or pine forests, but all herbicide label requirements should be followed in all cases. Non-native invasive plant control treatments are likely to be repeated on the same sites as much as 6 times during the next 10 years. Release treatments within young forest communities would be limited to two treatments over the next five years, and the second treatment only used if surveys show a need for an additional treatment. Since half-lives of all of the herbicides considered are low to moderate, especially in warm weather, and they do not accumulate in soils or organisms, the effects to human health and safety are likely to be small. Safety standards on herbicide labels will be followed in all cases. Therefore, the Proposed Action and Alternatives 2 and 3 should result in few or no cumulative effects to human health and safety.

Analysis on preliminary issues can be found on the Issues Worksheet in Appendix 1. This documents analysis of several issues that were considered for recommendation as significant issues. Preliminary issues a, b, c, d, e, f, g, h, i, j, t, and z were considered but dropped from further analysis based on information and data in the risk assessments.

Table 7. Application Rate Assumptions for Use in the Risk Assesssment

Cut stem or basal spray, for all applications						
Target Species	**Herbicide**	**Stems/ac**	**ml/stem**	**ml mix/ac**	**Lbs/ac @100%**	**Lbs/ac @50%**
Privet, olive (Autumn, other)	triclopyr ester	2000	0.5	1000	N/A	0.50
Privet, olive (Autumn, other)	imazapyr	2000	0.5	1000	N/A	0.50
Mimosa	glyphosate	50	3.0	150	N/A	0.16
Ailanthus (tree of heaven), princess tree (royal pawlonia)	triclopyr amine	500	1.0	500	N/A	0.20
Shortleaf pine competition	triclopyr ester	1200	0.25	300	0.32	0.16
Shortleaf pine competition	Imazapyr	1200	0.25	300	0.32	0.16
All species, riparian corridor	glyphosate	2000	0.5	1000	N/A	0.53

Foliar Spray					
Target Species	**Herbicide**	**Lbs ai/gal**	**% (fraction) in solution**	**Gallons of spray/acre**	**Lbs ai/acre**
Privet, olive (Autumn, other)	imazapyr	4	1.0	10	0.40
Privet, olive (Autumn, other)	triclopyr amine	3	1.0	25	0.75
Sericea lespedeza, tall fescue, Japanese stiltgrass, foxtail grass, crabgrass, Bermuda grass	glyphosate	4	3.0	5	0.60
Sericea lespedeza, tall fescue, Japanese stiltgrass, foxtail grass, crabgrass, Bermuda grass	sethoxydim	1	1.0	30	0.30
Kudzu	clopyralid	3	0.5	20	0.30
Wisteria	clopyralid	3	0.5	5	0.10
Japanese honeysuckle, Japanese meadowsweet, multiflora rose, Chinese yam	triclopyr amine	3	2.0	5	0.30
Mimosa, Oriental bittersweet	glyphosate	4	3.0	5	0.60
Japanese knotweed	triclopyr amine	3	2.0	15	0.90
Chinese silver grass	glyphosate	4	3.0	5	0.60
Shortleaf pine competition	imazapyr	4	1.0	10	0.40
All species, riparian corridor	glyphosate	4	3.0	5	0.60

Differences in Effects Among Proposed Action and Alternatives

Alternative 1, the no action alternative, allows no activities, so there would be no effects on human health and safety. There would be no cumulative effects on human health and safety.

Under the Proposed Action and Alternative 3, there would be less overall allowances for the use of herbicides. An estimate of the treated acreage of NNIS can be found in Table 6 (page 20), which has lists the Proposed Action at approximately 230 acres, and Alternatives 2 and 3 at an estimated 2,528 acres. Alternative 3 eliminates the treatment of shortleaf pine restoration areas, reducing the overall acreage by 423 acres.

Alternatives 2 and 3 include an adaptive strategy for control NNIS infestations, allowing the treatment of areas soon after they are detected, while still ensuring compliance with the Endangered Species Act and the National Historic Preservation Act by having reviews and surveys prior to treatment.

Cumulatively, Alternative 2, which includes both an adaptive approach to NNIS control as well as treatment of young forest communities to release selected pine, allows for the highest acreage of treatment. This treatment would be scattered out in treatment areas of a fraction of an acre for NNIS to 39 acres for one of the stands proposed for release. With the exception of wildlife openings, which are all eight acres or less, treatments would be directed at selected trees, shrubs, or plants, and not broadcast.

Alternative 3 would treat 423 acres less than Alternative 2, with no treatment of young forest communities to release shortleaf pine. Treatment areas would range from a fraction of an acre to approximately eight acres, and would include only selective treatments except for wildlife openings, as described above.

The Proposed Action would treat 230 acres of NNIS along with 423 acres of young forests for the release of shortleaf pine. The Proposed Action would treat much less total acres than Alternatives 2 and 3, but treatments would still be scattered over the same general area.

3.3.3 Terrestrial and Aquatic PETS and Locally Rare Species

Current Situation:

The information provided in this section will be used to disclose and analyze the potential effects any of the proposed alternatives may have on Proposed, Endangered, Threatened, Sensitive (PETS) and/or Locally Rare species, often referred to as "rare" species.

All rare species lists and information were compiled by: (1) consulting 14 years of U.S. Forest Service (FS) plant and animal inventory records, (2) consulting Georgia, North Carolina and South Carolina Natural Heritage Program (GNHP) element occurrence records, (3) consultation with other Federal, State and NGO biologists (4) reviewing U.S. Fish and Wildlife Service (USFWS) lists for potential species in Banks, Habersham, Lumpkin, Rabun, Stephens, Towns and White Counties (6) the references at the end of this document.

Initially, all rare terrestrial and aquatic species which are listed on the CONF were considered in this analysis. This initial list included 274 rare terrestrial and aquatic species. From this list, 244 species were dropped from further analysis because the alternatives in this proposal include mitigation measures and Forest Plan standards which preclude effects to these species. See Appendix II. The 244 "dropped" species include all rare plants and aquatic organisms which will be protected by project-level mitigation measures and Forest Plan standards, as well as, some mammals, birds, reptiles, amphibians and insects which do not have potential to occur in the project area. Therefore, there will be no direct, indirect or cumulative effect to the 244 dropped species listed in Appendix II. Specific project level mitigations and Forest Plan standards that will preclude effects to these plants and aquatic organisms are discussed on page 16 and 17 of this document. The most notable Forest Plan standard and project-level mitigation measure which were designed to protect rare plants and aquatic organisms include Forest Plan standard FW-022 which includes only using aquatic labeled herbicides within riparian corridors and other

wetland habitats (aquatic labeled herbicides become inactive when in contact with water) and conducting site-specific plant surveys prior to any treatments (if rare plants are found during surveys then appropriate mitigations would be implemented to avoid impacts to these species.)

The remaining 30 rare species which will be analyzed in detail for this project include 4 major classes or groups of animals which consist of: birds, mammals, herptiles and insects. These species were selected for detailed analysis because they could potentially be affected by one or more of the alternatives. Although these species may not be present within the project area during site-specific surveys, they could potentially utilize a recently treated area and therefore warrant additional analysis in this document. These species include 9 Regional Forester's Sensitive Species and 20 locally rare species. See Table 8.

Table 8. Rare species which will be analyzed in detail for this project.

Class	Common Name	Scientific Name	Rarity Listing
Bird	BACHMAN'S SPARROW	*Aimophila aestivalis*	Sensitive
Bird	PEREGRINE FALCON	*Falco peregrinus*	Sensitive
Bird	BALD EAGLE	*Haliaeetus leucocephalus*	Sensitive
Bird	CEDAR WAXWING	*Bombycilla cedrorum*	Locally Rare
Bird	COMMON RAVEN	*Corvus corax*	Locally Rare
Bird	CERULEAN WARBLER	*Dendroica cerulea*	Locally Rare
Bird	LEAST FLYCATCHER	*Empidonax minimus*	Locally Rare
Bird	WILLOW FLYCATCHER	*Empidonax trailii*	Locally Rare
Bird	ROSE-BREASTED GROSBEAK	*Pheucticus ludovicianus*	Locally Rare
Bird	GOLDEN-CROWNED KINGLET	*Regulus satrapa*	Locally Rare
Bird	RED-BREASTED NUTHATCH	*Sitta canadensis*	Locally Rare
Bird	WINTER WREN	*Troglodytes troglodytes*	Locally Rare
Bird	GOLDEN-WINGED WARBLER	*Vermivora chrysoptera*	Locally Rare
Bird	CANADA WARBLER	*Wilsonia canadensis*	Locally Rare
Mammal	RAFINESQUE'S BIG-EARED BAT	*Corynorhinus rafinesquii*	Sensitive
Mammal	EASTERN	*Myotis leibii*	Sensitive

	SMALL-FOOTED MYOTIS		
Mammal	SOUTHERN WATER SHREW	*Sorex palustris punctulatus*	Sensitive
Mammal	STAR-NOSED MOLE	*Condylura cristata*	Locally Rare
Mammal	LEAST WEASEL	*Mustela nivalis*	Locally Rare
Mammal	SOUTHERN APPALACHIAN WOODRAT	*Neotoma floridana haematoreia*	Locally Rare
Mammal	LONG TAIL OR ROCK SHREW	*Sorex dispar*	Locally Rare
Mammal	APPALACHIAN COTTONTAIL	*Sylvilagus obscurus*	Locally Rare
Mammal	RED SQUIRREL	*Tamiasciurus hudsonicus*	Locally Rare
Insect	TIGER BEETLE	*Cicindela ancocisconensis*	Sensitive
Insect	BARRENS TIGER BEETLE	*Cicindela patruela*	Sensitive
Insect	DIANA FRITILLARY BUTTERFLY	*Speyeria diana*	Sensitive
Herptile	S. APPALACHIAN SALAMANDER	*Plethodon teyahalee(=oconaluftee)*	Sensitive
Herptile	GREEN SALAMANDER	*Aneides aeneus*	Locally Rare
Herptile	COAL SKINK	*Eumeces anthracinus*	Locally Rare
Herptile	NORTHERN PINE SNAKE	*Pituophis m.melanoleucus*	Locally Rare

Effects Common to the Proposed Action and Action Alternatives:

This section will disclose and analyze the potential "common" effects in which the proposed action and action alternatives may have on the rare species listed above in Table 8.

With the exception of the no-action alternative, the proposed action and alternatives 2 and 3 are similar (common) in regards to using herbicides to control NNIS and other undesirable species. Each of these alternatives proposes to use herbicides to treat NNIS which include the active ingredients Clopyralid, Glyphosate, Imazapyr, Triclopyr and Sethoxydim. Therefore, each alternative will have a similar effect to rare species in this regard.

Human Health and Ecological Risk Assessments which have been produced by Syracuse Environmental Research Associates are used by the Forest Service to assess the effects of herbicides on human health and overall ecosystem health. Current risk assessments are available for all of the above mentioned

herbicide ingredients and will be used to analyze the potential effects these herbicides may have on rare species. The current risk assessments use surrogate wildlife species to disclose and discuss effects as it relates to "classes" or groups of species. The classes or groups of species primarily discussed in the risk assessments include: mammals, birds, insects, amphibians, fish, terrestrial plants and aquatic plants. For the purposes of this analysis, potential effects to mammals, birds, insects, reptiles and amphibians will be discussed, since, as mentioned earlier, plants and aquatic organisms will be protected from effects by adhering to Forest Plan Standards and project-level mitigation measures.

Species included in this analysis would most likely be exposed to one or more of the above mentioned herbicides by direct spraying, ingestion of contaminated media (vegetation, prey species or water), grooming activities or indirect contact with contaminated vegetation. Rare birds which could potentially be affected by one or more of the herbicides ingredients included in the proposed action and/or action alternatives include: Bachman's Sparrow, Peregrine Falcon, Bald Eagle, Cedar Waxwing, Common Raven, Cerulean Warbler, Least Flycatcher, Willow Flycatcher, Rose-Breasted Grosbeak, Golden-Crowned Kinglet, Red-Breasted Nuthatch, Winter Wren, Golden-Winged Warbler and Canada Warbler. Rare mammals which could potentially be affected by one or more of the herbicides ingredients included in the proposed action and/or action alternatives include: Rafinesque's Big-eared Bat, Eastern Small-footed Bat, Southern Water Shrew, Star-nosed Mole, Least Weasel, Southern Appalachian Woodrat, Long Tail Shrew, Appalachian Cottontail and Red Squirrel. Rare insects which could potentially be affected by one or more of the herbicides ingredients included in the proposed action and/or action alternatives include: Tiger Beetle, Barrens Tiger Beetle and Diana Fritillary Butterfly. Rare reptiles and amphibians which could potentially be affected by one or more of the herbicides ingredients included in the proposed action and/or action alternatives include: Southern Appalachian Salamander, Green Salamander, Coal Skink and Northern Pine Snake.

The below quotes were taken from current risk assessments and summarize the potential common affects the proposed action and alternatives 2 and 3 may have on the groups of rare species analyzed in this proposal:

1). Glyphosate – The current risk assessment for glyphosate generally supports the conclusions reached by U.S. EPA: *Based on the current data, it has been determined that effects to birds, mammals, fish and invertebrates are minimal* (Risk Assessment – Glyphosate).

2). Clopyralid – *[C]lopyralid appears to be relatively non-toxic to terrestrial or aquatic animals, is highly selective in its toxicity to terrestrial plants, and relatively non-toxic to aquatic plants. Thus, the potential for substantial effects on non-target species appears to be remote* (Risk Assessment – Clopyralid).

3). Imazapyr – *Adverse effects in terrestrial or aquatic animals do not appear to be likely. The weight of evidence suggests that no adverse effects in mammals, birds, fish, and terrestrial or aquatic invertebrates are plausible using typical or worst-case exposure assumptions at the typical application rate of 0.45 lb/acre or the maximum application rate of 1.25 lb/acre* (Risk Assessment – Imazapyr).

4). Sethoxydim – *None of the hazard quotients for mammals or birds approach a level of concern, even at the upper limits of exposure* (Risk Assessment – Sethoxydim).

5). Triclopyr – *For terrestrial mammals, the central estimates of hazard quotients do not exceed the level of concern for any exposure scenarios. At the upper range of exposures, the hazard quotients exceed the level of concern for large mammals and large birds consuming contaminated vegetation exclusively at the application site* (Risk Assessment – Triclopyr).

For all of the herbicides ingredients mentioned above, the potential affects to wildlife and aquatic species appear to be minimal. The rare species included in this analysis are rare by nature and highly unlikely to come into direct or indirect contact with the above mentioned herbicides, but even if they did come into contact with herbicides, either directly or indirectly, the most current scientific data suggests there will be a minimal risk of negative effects from exposure. Even in the worst case scenario of being exposed to Triclopyr at the upper range of exposures, triclopyr only "exceeds the level of concern for large mammals and large birds consuming contaminated vegetation exclusively at the application site." Again, it is highly unlikely that one or more of the rare species mentioned above will happen upon a treated area and forage exclusively at the application site. Therefore, based on the most current data, there will be no direct or indirect effects expected to occur to the rare species mentioned above as a result of implementation of the proposed action or action alternatives. Since there are no direct or indirect effects expected from the proposed action or action alternatives, there will not be any cumulative effects expected to occur either.

Effects Specific to the Proposed Action and Action Alternatives:

This section will disclose and analyze the potential "differing" affects each alternative may have on the rare species listed above in Table 8. This section compares effects among alternatives and disclose which alternative would have the least affect on rare species and vice versa.

The no-action alternative (Alternative 1) differs from the proposed action and action alternatives in that this alternative proposes no change to the current NNIS situation. Populations of non-native invasive species would continue to grow and spread. If the no action alternative were selected then there are no potential effects from herbicides, although impacts of non-native invasive species on native plant diversity would continue to increase. Under this alternative, NNIS and other undesirable species would continue to impact native vegetation diversity, fire regimes, nutrient cycling, and natural hydrology.

The proposed action differs from the other alternatives in that it defines specific NNIS areas to treat, but does not allow the flexibility to respond to changing conditions such as rapidly responding to new infestations. Since this alternative proposes to treat a finite number of sites, then most likely this alternative would require less herbicide application than the "more adaptive" alternatives 2 and 3, therefore, reducing the potential for unexpected herbicide effects on rare species. However, although herbicide application would be less under this alternative, the negative effects of NNIS would continue to increase in some areas that would not be treated as part of this alternative.

Alternative 2 differs from the other alternatives in that it proposes to treat all of the NNIS sites identified in the proposed action, plus new NNIS sites as they are discovered. This alternative would most likely require more herbicide application than the proposed action and the no action alternative, therefore, increasing the potential for unexpected herbicide effects on rare species. However, based on the most current information, the negative effects NNIS have on aquatic and terrestrial organisms far outweigh the potential unexpected negative effects of herbicide application. Therefore, this alternative would be

more effective than the proposed action and no-action alternatives in treating NNIS and would most likely benefit rare species and other wildlife habitats by reducing NNIS and restoring native vegetation.

The proposed action and alternative 2 are similar in one regard, but different from the other alternatives, in that these alternatives also include treating shortleaf pine regeneration areas with herbicides. The purpose of this activity is to release shortleaf pine and oaks into the overstory by killing back undesirable competition using herbicides. Although the objective of this activity is different from the other main objective of reducing populations of NNIS, the potential effects to rare species would be the same as when treating NNIS since the herbicide application would be the same as that used to treat NNIS. NOTE: all shortleaf pine regeneration areas were surveyed for rare plant and animal species prior to inclusion in this proposal.

Alternative 3 is identical to alternative 2, except this alternative does not include treating shortleaf pine regeneration areas. This alternative would most likely require more herbicide application than the proposed action and the no action alternative, but less herbicide application than alternative 2. The effects of herbicide application on rare species would be the same, but there would be slightly less potential for unexpected effects to rare species since this alternative does not include treating regeneration areas.

Based on the above analysis, Alternative 2 would include the most herbicide application, then followed by alternative 3, the proposed action and alternative 1, respectively. Although alternative 2 and 3 do propose the most herbicide application, therefore increasing the odds of unexpected effects to rare species, they are also the most effective alternatives in controlling the NNIS problem. The positive effects of alternatives 2 and 3 far outweigh any negative effects associated with herbicide applications. The positive effects of the proposed action also far outweigh any negative effects associated with herbicide applications, but the proposed action would not be nearly as effective in controlling the NNIS problem as would alternatives 2 and 3. Based on this analysis, the proposed action and the action alternatives included in this proposal will have no direct, indirect or cumulative effect to rare species included in this analysis. However, the no-action alternative could very well have direct, indirect or cumulative effects to rare species, if and when habitats are slowly invaded by NNIS.

3.3.4 Terrestrial and Aquatic MIS

Current Situation:

The information provided in this section will be used to disclose and analyze the potential effects any of the proposed alternatives may have on Management Indicator Species, often referred to as MIS.

MIS are selected and monitored because their population trends are thought to potentially be a result of the effects land management activities are having on important habitat components for those species.

Initially, all MIS species which are listed on the CONF were considered in this analysis. The CONF has a total of 15 MIS. A list of these species and their important habitat components are listed in Table 9. Of these species, only those species and their habitat's which might be directly or indirectly affected by one or more of the proposed alternatives will be analyzed in detail. This list includes 11 species which comprise 2 major classes of animals - mammals and birds (Table 9). Those species that will not be

analyzed further in this analysis (4 species) will be dropped because the alternatives in this proposal include mitigation measures and Forest Plan standards which preclude effects to these species or because the species or its habitat does not occur within the project area.

Table 9. Chattahoochee-Oconee National Forest Management Indicator Species List and Project-level Analysis Information.

CLASS	COMMON NAME	IMPORTANT HABITAT COMPONENT	PROJECT LEVEL ANALYSIS / REASON[1]
Mammal	Black Bear	Hardmast Forest, Early Successional Forest, Large Contiguous Forest Interior with Low Disturbance	**Yes / 1**
Mammal	White-tailed Deer	Hardmast Forest, Early Successional Forest	**Yes / 1**
Bird	Pileated Woodpecker	Standing Dead Trees (Snags)	**Yes / 1**
Bird	Ovenbird	Large Contiguous Deciduous Forest Interior	**Yes / 1**
Bird	Pine Warbler	Pine / Pine – Oak Forest	**Yes / 1**
Bird	Acadian Flycatcher	Mid – Late Successional Riparian Forests	**Yes / 1**
Bird	Hooded Warbler	Mid – Late Successional Mesic Forests	**Yes / 1**
Bird	Scarlet Tanager	Hardmast Forest	**Yes / 1**
Bird	Prairie Warbler	Early Successional Forest	**Yes / 1**
Bird	Swainson's Warbler	Early Successional Riparian Forest	No / 3
Bird	Field Sparrow	Woodland, Savanna and Grassland Habitat	**Yes / 1**
Bird	Red-cockaded Woodpecker	Longleaf Pine Woodland / Savanna	No / 3
Bird	Wood Thrush	Forest Interior	No / 3
Bird	Chestnut-sided Warbler	High Elevation Early Successional Forest	**Yes / 1**
Plant	Smooth Coneflower	Woodlands, Savannas and Prairies	No / 2

1 = species could potentially occur in the analysis area and this species could potentially be impacted by one or more alternatives in this analysis; therefore, species is analyzed in project – level effects analysis; 2 = Dropped - = project-level mitigation measures and Forest Plan Standards included as part of alternatives; therefore, species will not be impacted by one or more alternatives and will not be analyzed in project-level effects analysis; 3 = Dropped = species is not known to occur in the project area.

Species included in this analysis would most likely be exposed to one or more of the above mentioned herbicides by direct spraying, ingestion of contaminated media (vegetation, prey species or water),

grooming activities or indirect contact with contaminated vegetation. Rare birds which could potentially be affected by one or more of the herbicides ingredients included in the proposed action and/or action alternatives include: Pileated Woodpecker, Ovenbird, Pine Warbler, Acadian Flycatcher, Hooded Warbler, Scarlet Tanager, Prairie Warbler, Field Sparrow, Wood Thrush and Chestnut-sided Warbler. Rare mammals which could potentially be affected by one or more of the herbicides ingredients included in the proposed action and/or action alternatives include the Black Bear and White-Tailed Deer.

Effects of the Proposed Action and Action Alternatives on Forest-wide Population Trends of Selected MIS:

The effects of the proposed action and alternatives on terrestrial and aquatic species is discussed above under the "Terrestrial and Aquatic PETS" section. Although this section addresses the effects of the proposed action and alternatives on MIS rather than "PETS", the actual "effects" will be the same, regardless if a species is classified as MIS or PETS. The actual effects the proposed action and alternatives will have on MIS will be identical to those discussed in the above section, in that the proposed action and alternatives will have no direct, indirect or cumulative effect to the MIS included in this analysis. Therefore, the proposed action and alternatives will not affect the current population trends of the above mentioned species across the forest. A detailed list of current forest-wide population trends for MIS included in this analysis is described below:

1). Black Bear – The proposed action and action alternatives will not affect the black bear's forest-wide population trend of "stable to slightly increasing."

2). White-tailed Deer - The proposed action and action alternatives will not affect the white-tailed deer's forest-wide population trend of "stable."

3). Pileated Woodpecker - The proposed action and action alternatives will not affect the pileated woodpecker's forest-wide population trend of "stable."

4). Ovenbird - The proposed action and action alternatives will not affect the ovenbird's forest-wide population trend of "stable."

5). Pine Warbler- The proposed action and action alternatives will not affect the pine warbler's forest-wide population trend of "stable to slightly increasing."

6). Acadian Flycatcher- The proposed action and action alternatives will not affect the Acadian flycatcher's forest-wide population trend of "stable."

7). Hooded Warbler- The proposed action and action alternatives will not affect the hooded warbler's forest-wide population trend of "stable."

8). Scarlet Tanager - The proposed action and action alternatives will not affect the scarlet tanager's forest-wide population trend of "stable."

9). Prairie Warbler - The proposed action and action alternatives will not affect the prairie warbler's forest-wide population trend of "stable to slightly decreasing."

10). Field Sparrow - The proposed action and action alternatives will not affect the field sparrow's forest-wide population trend of "stable to slightly decreasing."

11). Chestnut-sided Warbler - The proposed action and action alternatives will not affect the chestnut sided warbler's forest-wide population trend of "stable to slightly increasing."

It should be noted, however, that although the proposed action and alternatives will not negatively affect the MIS population trends as listed above, the proposed action and action alternatives would likely, in some cases, benefit the above mentioned MIS by eliminating NNIS which compete and off-set the natural balances in which these species depend.

3.4 Social and Economic Effects

3.4.1 Visual and Recreation Resources

Effects Common to the Proposed Action and Action Alternatives

Visual impacts from dead and dying vegetation (indirect effects) along trails, roads and within and adjacent to developed recreation sites are the likely impacts from implementing the action alternatives. In addition, there could be disruption to recreational activities while applications of herbicide are made or areas are closed for a time following treatments (direct effects). Areas would be closed temporarily to minimize public contact with herbicide immediately following an application.

Differences in Effects Among the Proposed Action and Alternatives

Under the no-action alternative, there would be no disruption to the recreating public and no visual impacts. There would be no need to close developed or dispersed sites since herbicide would not be used.

Dense invasive vegetation could hinder physical movement especially in riparian areas but this effect would be isolated to small areas and is not considered significant.

There would be no significant cumulative adverse or positive effects from not treating these areas. There is no wide-spread program to reduce impacts of non-native invasive plants on other land ownerships associated with recreation use that would affect recreational activities on Forest system lands.

The primary effects of treating areas with herbicide relate to the visual impacts of seeing dead vegetation especially in areas in which the public engages in recreational activities. These effects are short term since the target vegetation would quickly deteriorate and be unnoticeable within a year after an application is made. The site-specific nature of applications would minimally impact native vegetation. Impacts would be most noticeable after the first application. Subsequent applications are intended to kill any residual target plants and to prevent sprouts from re-infesting the treated sites. Subsequent treatments would not be as noticeable as the first.

Long-term visual effects of herbicide application would be positive since areas targeted for treatment would kill invasive plants that have over-topped native vegetation. Plant diversity would increase once this vegetation is eliminated and other native vegetation reoccupies the available growing space. There would be a long-term visual benefit especially in riparian areas where additional moisture and better growing sites would result in greater plant diversity. In addition, the physical impediment posed by some of these invasive plants (especially in riparian areas) would be eliminated allowing easier access in and off of trails.

There is a chance that recreational activities could be impacted during application. These effects are slight given the nature of the proposal which targets specific species of plants and usually impacts small areas. However, some invasive plant patches to be treated are fairly large and there could be short term impacts to recreation especially in riparian areas. Developed recreation sites do not have large areas of invasive plants needing treatment. In addition, recreational areas are widely distributed and not all areas would be treated at the same time.

Signing required by Forest Plan Standards would inform the public of treatments in specific areas to reduce impacts and to avoid contact with recently treated areas.

Cumulative effects are negligible. Treatment of DNR managed wildlife openings using herbicides along with use of imidacloprid in small areas across the landscape are the only other known treatments. The accumulated treatments have negligible effects on visual quality.

3.4.2 Economic Effects

This analysis focuses on costs of implementing this project on the approximate acreage described in Chapter 2, and also including allowances for re-treatment as described for each alternative. The analysis includes only variable costs associated with the treatments over the next decade. Fixed costs such as general administration and program management are not included. Costs are based on past contract rates, herbicide contract prices, and professional estimates. A breakdown of costs is in the project file.

Proposed Action or Alternative	Net Present Cost
Proposed Action	$134,132
Alternative 1 – no action	0
Alternative 2	$280,801
Alternative 3	$229,635

3.5 Irreversible and Irretrievable Commitment of Resources

An irreversible commitment of resources refers to resources that are renewable only after a long period of time (such as soil productivity) or are non-renewable resources (such as heritage resources and minerals). There would be no irreversible commitment of resources under the Proposed Action or any of the alternatives in this analysis.

An irretrievable commitment of resources refers to losses of productivity or the use of renewable resources. This represents opportunities foregone for the period of time that the resource cannot be used. Irretrievable commitments are discussed throughout the effects section, and some of these commitments include:

- Increases in the loss of growth of native vegetation under Alternative 1 (no-action) where the NNIS continue to consume growing space.
- Loss of growth of individual woody plants competing with shortleaf pine under the Proposed Action and Alternative 2
- Loss of shortleaf pine trees under Alternatives 1 (no-action) and 3.

3.6 Civil Rights

None of the alternatives would have an effect on the civil rights of any individual. Women, Native Americans and other minority groups would not be impacted by any of the alternatives any differently than any other public groups.

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations*, requires Federal agencies to identify and address any disproportionate adverse human health or environmental effects of its projects on minority or low-income populations. None of the treatments would cause disproportionate, adverse impacts regarding environmental justice or protection of children.

4.0 LIST OF PREPARERS

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Appendix 1 – Issues Worksheet

Issue Description	Significant?	Reason for Non-Significance	Measure for Effects Analysis
a. Glyphosate may not completely control fescue and Bermuda grass, increasing the number of treatments necessary and increasing the overall project cost (Georgia Department of Natural Resources, Wildlife Division (GA DNR), 10/2/06.)	No	Glyphosate has practically no leaching tendency because it binds tightly to soil. Non-target terrestrial plants are not likely to be affected by runoff of glyphosate under any conditions (Glyphosate – Human Health and Ecological Risk Assessment (Risk Assessment), Final Report, page xxii). The risk assessment generally supports the conclusions reached by the U.S. EPA that based on the current data, effects to birds, mammals, fish, and invertebrates are minimal (Risk Assessment, page 4-42). This scientific information indicates that the extent, duration and intensity of possible retreatment is low, and is not a significant issue within the overall context of the project. The cost of re-treatment is also brought up, assuming that areas will need more treatments that using imazapyr (ex: Arsenal). Based on the experience of the GA DNR in carrying out treatments to control the same species, this concern is noted. However, this issue is judged to be not significant within the overall project.	
b. Imazapyr use at the Georgia Mountain Orchard would not benefit small mammal habitat (as much as mechanical clearing with a dozer, creating brush piles that provide habitat for rabbits and others), cost more, and will reduce species beneficial to wildlife. (autumn olive and the berries it produces and cover it provides) (GA DNR, 10/2/06)	No	The method of herbicide treatment was proposed to avoid extensive ground disturbance and reduce the overall project cost. Providing this specific habitat for wildlife (small mammal habitat) is not part of the stated purpose and need, and, due to the limited extent of this issue, is not considered significant. The concern over the cost in this issue may be based on one treatment, but a mechanical method would likely require repeated treatments, which would increase costs and cause soil exposure and possible erosion. This part of the issue is also not considered significant within the overall context of the project. Lastly, the elimination of autumn olive does have a trade-off of less fruit for wildlife. However, the fruit promotes the spread of this exotic species across the landscape. And, the result of the control of this species as well as others would be higher quality foods available for wildlife within the wildlife openings of the Georgia Mountain Orchard, reducing the overall environmental effect of this portion of the issue to negligible levels.	
c. Application of herbicides to hedge rows at the Georgia Mountain Orchard may eliminate native species including persimmon, dogwood, and the non-native saw tooth oak (GA DNR, 10/2/06)	No	The proposed action includes a one-time basal or cut-stem spray of autumn olive, privet, and selected shortleaf pine. This treatment is a selective treatment based on the physical application method, and therefore would not harm adjacent non-target trees in any significant way. Treatments proposed afterward are foliar sprays up to five times over the next ten years. Foliar sprays using backpack sprayers would not be broadcast across the entire hedge row; instead, they would be directed at the target species. This method would result in some mortality of non-target species, but this loss is not considered significant in its extent, duration, or intensity, especially when higher quality foods for wildlife within the wildlife opening would be the cumulative result. If a mechanical treatment is implemented, more non-target species are likely to suffer mortality. However, even this environmental effect is so limited in extent and duration that it is considered insignificant as an issue within this project.	

d. Chemical herbicides (Imazapyr) will persist in the soil for over one year and move readily in the soil, causing contamination of surface and ground water (Patton, 9/29/06).	No	In relatively arid areas, residual toxicity to sensitive plants may last for several months to several years (Risk Assessment, page xvii). However, in areas of relatively high rainfall rates including north Georgia, residual toxicity would be much shorter. Adverse effects in terrestrial or aquatic animals do not appear to be likely. The weight of evidence suggests that no adverse effects in mammals, birds, fish, and terrestrial or aquatic invertebrates are plausible using typical or worst-case exposure assumptions at the typical application rate of 0.45 lb/acre or the maximum application rate of 1.25 lb/acre. Adverse effects in workers, members of the general public, as well as terrestrial or aquatic animals do not appear to be likely (Risk Assessment, page xi). Longer term concentrations of imazapyr in surface water are substantially below the level of concern. This issue is limited in its duration due to the low residual toxicity. This issue is limited in extent due to the small areas being treated. Overall the area being treated with imazapyr totals less than 0.2% of the Chattooga River Ranger District, and the areas are spread out in numerous watersheds. This issue is limited in intensity due to the various treatment methods. The size of the areas to be treated range from 0.5 – 39 acres. Of the 28 areas to be treated with imazapyr, 9 areas will have a first treatment of basal spray or cut-stem/stump, a method directly applied to the stem of selected specific target species (autumn olive, privet, and shortleaf pine), thereby reducing the overall amount of active ingredient applied. The remaining 19 areas would have a first treatment of foliar spray to individual competing woody shrubs and trees in the immediate vicinity of the tree being released. Follow-up treatments on all 28 areas would be foliar applications directed at individual plants much smaller than those present in the application, and therefore much less active ingredient would be used. Within the context of this overall project, this issue is not considered significant.	
e. Imazapyr will persist in the environment and damages non-target plants and inhibits decomposition (Patton, 9/29/06).	No	As stated above for issue d, residual toxicity may last several months to several years in arid areas, but the sites proposed for treatment are in a relatively high rainfall area. The modeled concentration of imazapyr in a clay soil after an application of 1 lb/acre drops to 0.001 mg/kg over the course of 100-150 days in the precipitation range expected where sites would be treated. Imazapyr is relatively non-toxic to soil microorganisms, aquatic invertebrates, and fish. Imazapyr is not expected to bioaccumulate in the food chain. Non-target plants can and would be harmed by direct deposition on plants and picking up this herbicide by roots. Careful application and use of the lowest effective dosage is expected to result in negligible levels of damage to non-target plants. Therefore, this issue is considered so limited in extent, duration, and intensity that it is not significant within the overall context of the project.	
f. Imazapyr will jeopardize (kill or weaken) Endangered plant species (Patton, 9/29/06).	No	Plants protected by the Endangered Species Act (ESA) include Endangered and Threatened species officially listed over time in the Federal Register. All of these species plus Forest Service listed Sensitive Species (found in a Southern Region (8) list) are protected by the Forest Service under any planned project. A Biological Evaluation (BE) is completed for each project to ensure this protection. My staff has reviewed the Proposed Action, and compared the locations of Endangered, Threatened, and Forest Service listed Sensitive species. None of the methods on the specific sites are likely to affect populations of known Endangered, Threatened, or Forest Service listed Sensitive plant or animal species. Therefore, this issue is not significant within the context of this project. However, if an individual or population of Endangered, Threatened, or Forest Service listed Sensitive are found prior or during implementation, the project would be stopped, and re-designed to avoid any impact on the species.	

g. Triclopyr (TCP) can leach into and contaminate ground water, endangering children (Patton, 9/29/06).	No	Based on the available information and under the foreseeable conditions of exposure, there is no route of exposure or exposure scenario suggesting that the general public would be at risk from longer-term exposure to triclopyr (Triclopyr – Revised Human Health and Ecological Risk Assessments, Final Report (Risk Assessment), page xvii). Exposures to TCP based on modeling of water contamination from the application of both triclopyr and chlorpyrifos indicate that the peak exposure to TCP in water is below the concentration associated with the chronic risk value for TCP. Thus, there is no basis for asserting that the use of triclopyr with or without the use of chlorpyrifos will result in hazardous exposures of humans to TCP (Risk Assessment, page xviii). This concern is noted, however the extent, duration, and intensity of the effects on the human environment is limited, and is considered not significant.	
h. Clopyralid can leach into and contaminate ground water, endangering children (Patton, 9/29/06).	No	Although normal and reasonable care should be taken in the handling of this or any other chemical, the use of clopyralid does not appear to pose any risk of systemic toxic effects to workers or the general public in Forest Service programs (Clopyralid – Revised Human Health and Ecological Risk Assessments, Final Report (Risk Assessment), page xv). Based on the Risk Assessment, the intensity and duration of the environmental effect is insignificant, and the extent of the application is extremely low. Therefore, this issue is not considered to be significant.	
i. Clopyralid is toxic to insects including ladybugs, pirate bugs, and lacewings, and could harm predator beetles used to control the hemlock woolly adelgid (HWA) (Patton, 9/29/06).	No, but add mitigation measure	Studies surveyed for the Risk Assessment on birds, bees, spiders, and earthworms generally support the characterization of clopyralid as relatively non-toxic. An additional study of the toxicity of clopyralid to non-target invertebrates also suggests that clopyralid has a low potential for risk (Risk Assessment, page xvi). Therefore, this issue is not considered significant. ***However, the concern over predator beetle kill is noted and a mitigation measure will be included to avoid all predator beetle release sites during application implementation.***	
j. Plant resistance is increasing clopyralid, requiring 14 times the amount to kill the target species (Patton, 9/29/06).	No	Herbicide resistance is the inherited ability of a plant to survive and reproduce following exposure to a dose of herbicide that would normally be lethal to the wild type (Prather, Ditomaso, and Holt, "Herbicide Resistance: Definition and Management Strategies," Publication 8012, page 1). Although clopyralid is known to have lower efficacy on kudzu than some other herbicides, it also is a selective herbicide, allowing non-legume plants and trees to survive and flourish while controlling kudzu (Rader, 2001). Plant resistance may indeed be a minor problem within this project when clopyralid is applied, but the trade-offs in the loss of other vegetation from sites was factored into the formulation of the proposal. This issue is noted, however given the overall purpose and need of the project, this issue is not considered significant.	
k. Sevin (common name Carbaryl) is not species-specific, and will kill all beetle grubs and many other invertebrates as well (Bunch, 9/23/06)	No	The scoping letter stated "Foliar spray with glyphosate, sethoxydim, and carbaryl during the growing season to control the undesirable and invasive species." Experience with treatments of wildlife openings within Wildlife Management Areas has shown that the treatment of grub populations has not been needed since a previous decision in 2001. Although carbaryl use lacks the intensity, duration and extent to be considered as a significant issue, this treatment has been dropped from the Proposed Action as well as the action alternatives due to the monitoring and lack of need experienced by the Georgia DNR for the past six years.	

l. Sevin (Carbaryl) is ineffective in controlling Japanese Beetles (Bunch, 9/23/06).	No	The effectiveness of carbaryl in controlling Japanese beetles is not as good as some other insecticides, including imidacloprid, in control of white grubs from Japanese beetles and the masked chafer (data from *Insecticide and Acaricide Tests and Arthropod Management Tests,* Entomological Society of America, 2005). However, carbaryl had an average control of 72.8% based on 43 tests of efficacy. Although imidacloprid had results of 94-99% average control based on 100 tests, carbaryl can be integrated into the program of application when a known problem exists while imidacloprid is most effective as a preventative treatment, before a white grub problem is even known (personal communication, Kevin Lowrey, GA DNR). Because carbaryl is effective (72.8% efficacy) and flexible for use AFTER a problem is known, this issue is so limited in extent and intensity that it is considered not significant. However, in an effort to use pesticides only when absolutely necessary, carbaryl has been dropped from the Proposed Action and action alternatives (see preliminary alternative k).	
m. Invasives (autumn olive) are proposed for partial control in some areas (Example: Sarah's Creek in Rabun County). Invasives will quickly spread back into the area, making treatment ineffective (WildLaw on behalf of Georgia ForestWatch, the Chattooga Conservancy, the Southern Appalachian Biodiversity Project, the Southern Appalachian Forest Coalition, and Wild South, 10/3/06)	Yes		Allowance in alternative to treat contiguous infestations of multiple species within 1/4 mile of each other (yes or no)
n. Sites should be prioritized based on where the greatest need is present (examples include Wilderness Areas, Wild and Scenic Rivers, etc.) (Wildlaw, et.al, 10/3/06; Butler, 9/25/06)	No	The interdisciplinary team had brought up this same issue prior to issuance of the scoping letter. During environmental analysis, sites for treatment would be prioritized using a numerical system, and these rankings tagged to each site for eventual implementation. This issue is an important operational mechanism, but not a direct environmental issue since it does not conflict in any way with the proposed action or purpose and need. Therefore, as far as issues analysis, this issue is not considered significant.	
o. Sites should be prioritized based on proximity to each other (example: grouped by watershed), so immediate reinvasion does not occur (Wildlaw, et.al, 10/3/06; Butler, 9/25/06).	No	Several of the invasive species proposed to be treated can be spread by bird droppings or other animal movements (including humans) that see no boundaries. This spread is likely to occur across miles within the National Forest, so the term "proximity" can only relate to an extensive area, much larger than any watershed, and certainly not bounded by a watershed. Issue m is considered to be significant, and will be tracked by the percentage of the "area" treated or use of a ¼-mile proximity to try to start the reduction of non-native invasive species form the Chattooga River Ranger District (East Zone of the Chattahoochee National Forest). We find that there is no effective methodology for elimination of reinvasion due to the expansive area where animals may bring in more seed. In addition, this issue is very similar to m, which will be responded to with one or more alternatives and tracked using environmental effects analysis. Therefore, this issue is not considered significant.	

p. Monitoring is necessary to evaluate the success of the treatment, including short term (3-5 years) and long term (life of the Forest Plan) ((Wildlaw, et.al, 10/3/06)	No	Monitoring is not considered an environmental effect, and therefore is not a significant issue. However, it is noted that monitoring is an important part of the overall project operation. One of the monitoring questions that is listed in the Forest Plan includes the status and trend of forest health threats on the Forest (Appendix G, page G-9 & 10). One of elements within this question is the "effectiveness of treatments to eliminate or control invasive non-native species." Collection methods include post control treatment sample data collection. Within this project, monitoring will be added to the Proposed Action as well as action alternatives to conduct post-treatment evaluations on effectiveness of treatment. Pesticide treatments would include post-treatment evaluations also, checking to see if the treatment is meeting the objectives of the project. Implementation monitoring would also be carried out to track actions as they are being done in order to ensure that methods of pesticide application and other treatments meet Forest Plan Standards (including Best Management Practices). This would be accomplished through on-the-ground inspections during treatments and field reviews by applicable staff from the Supervisor's Office. Water quality monitoring would be conducted on a small subset of sites where pesticide is applied. Water samples would be collected and sent to a certified laboratory to detect the presence of the applicable active ingredient. Mitigations would be revised as needed based on these results.	
q. Re-vegetation may not be completed for 5-10 years, causing soil erosion and sedimentation (Wildlaw, et.al, 10/3/06)	No	This issue may be a misunderstanding of the wording in the scoping letter. On page 6 of the scoping letter, it is stated that "mitigation of bare soil (where invasive plants are removed) will include revegetation to a minimum of 85% coverage with 30 days of completion (Standards FW-067 and FW-068)." These two Standards, currently on page 2-22 in the Forest Plan, state "mitigate bare soil exposure prior to any suspension of project activity for 30 days or longer." FW-068 states that "re-vegetation to appropriate species will be completed to a minimum of 85% coverage within the first growing season following the completion of project activity." Completion here is simply the treatment of the site and not completion of treatment of all sites and areas within the project. The only exception to the 30-day Standard would be under conditions when a treatment is made outside of the growing season, when no grasses or forbs would germinate and/or grow. Under these cases, seeding operations may be delayed until early March, when a much higher germination rate is expected.	
r. Bare soil created by some of the treatments in the Proposed Action and re-seeded with exotics will waste tax dollars and not meet the purpose and need (Example: treating kudzu, and then re-seeding with Kentucky 31 Tall Fescue) (Wildlaw, et.al, 10/3/06)	No	Although non-native species are used in mixtures of species sowed in wildlife openings and other situations where soil is exposed, the species to be used in this proposal are not invasive. The Southern Region (8) maintains a list of species that are prohibited from use and this list includes all non-native, invasive species such as Kentucky 31 Tall Fescue and others. This list is available for review at the Chattooga River Ranger District offices. Due to the species that would be used in seed mixtures not being invasive, this issue does not apply to this project.	

s. Release of pines by treating hardwoods is inappropriate because the hardwoods are better adapted for these sites and will dominate without further treatments (Wildlaw, et.al, 10/3/06)	No	The purpose of this portion of this project is "to return shortleaf pine to sites where it naturally occurred, creating a historical forest community." (Scoping letter, page 1). Goal 8 in the Forest Plan states that we will contribute to the maintenance or restoration of native tree species whose role in forest ecosystems: (a) has been reduced by past land use; or (b) is threatened by insects and disease, fire exclusion, forest succession, or other factors. Both (a) and (b) apply to shortleaf pine, and thus we have proposed some selective control of adjacent trees to promote shortleaf pine into the eventual overstory on selected sites. Shortleaf pine along with some hardwood species are adapted for these sites, and we have chosen to establish shortleaf pine along with oak based on goals and objectives in the Forest Plan. This issue is in a direct conflict with the purpose and need for the project, and not a conflict based on environmental effects. Therefore, it is considered not significant.	
t. Release of pines by treating hardwoods is inappropriate because it risks residual effects by using herbicides (Wildlaw, et.al., 10/3/06)	No	See issue d and e for a discussion of this same concern. Typical exposures to imazapyr do not lead to estimated doses that exceed a level of concern for either workers or members of the general public at either the typical or highest application rate. Based on the available information and under the foreseeable conditions of application, there is no route of exposure or scenario suggesting that the workers or members of the general public will be at any substantial risk from longer-term exposure to imazapyr even at the upper range of the application rate considered in this risk assessment. Imazapyr is relatively non-toxic to soil microorganisms, aquatic invertebrates, and fish. Imazapyr is not expected to bioaccumulate in the food chain. In terrestrial animals and birds, imazapyr is practically non-toxic. In other words, no hazards associated with the direct toxic action of imazapyr can be identified for either terrestrial or aquatic animals (Risk Assessment, page xiv). This issue is not considered to be significant within the overall project.	
u. Release of pines by treating hardwoods is proposed because previous mechanical release failed (WildLaw, et. al., 10/3/06)	No	Most of these areas were treated with a mechanical treatment to prepare them for planting of shortleaf pine in an effort to restore these areas to forest communities dominated by this species. See issue s for reasoning behind the restoration efforts in these areas. This issue is in disagreement with the purpose and need for the project, and not related directly to environmental effects that may be caused by the Proposed Action. Therefore this issue is not considered significant.	
v. There is no mitigation for illegal ATV/ORV use at the Georgia Mountain Orchard site. This use could cause soil and water degradation as well as bringing non-native invasive species back into the area (WildLaw, et. al., 10/3/06)	No	This issue is limited to the Georgia Mountain Orchard site, which is extremely limited in geographic area. Due to the Orchard being within the Lake Russell Wildlife Management Area where there is additional law enforcement coverage by the Georgia DNR, this issue is of limited duration and intensity. Therefore, this issue is not considered significant. However, this concern is noted, and ***a mitigation measure will be included covering all actions within this project requiring any paths created to be closed using a combination of berms, tank traps, brush, rocks, or other woody debris to deter illegal traffic.***	

w. Site R-16 has no competition and does not need release (or very little) (WildLaw, 10/3/06)	No	This area was planted with a nearly equal mixture of shortleaf pine and white oak. Sweetgum and yellow poplar seedlings are competing with both of these species on this area, and both species (pine and oak) are in need of release actions. Oak seedlings are known to depend on release treatments to allow enough time to develop their roots and then start growing vertically and competing with their neighbors. "Planted oaks usually grow very slowly and vegetation control is needed for several years for planted oaks to become part of the new stand (Forest Plan, Appendix F, page F-36). ***In this case, the purpose and need statement for the Proposed Action does not cover oak seedlings, so we will revise this omission in the environmental assessment.*** Within the context of the overall project, this issue is extremely limited in extent (less than the 13-acre unit), duration, and intensity, and is therefore not considered significant.	
x. Some sites and species that are invasive have not been identified in the Proposed Action. These need to be added to the proposal for complete control of invasive species (WildLaw, 10/3/06; Bunch, 9/23/06; Forest Service ID Team, 10/16/06).	Yes		Total acres of treatment of non-native, invasive species.
y. The Proposed Action fails to include treatments for woodland restoration, which would require cut-stem treatment of a variety of species to reduce basal areas (the density of trees) down to a woodland level (Sullivan, 10/3/06, verbal by phone).	No	The woodland restoration project is speculative in nature at this point in time. While the district staff is currently working with other partners toward a proposal for woodland restoration, exact locations and methods remain to be determined. Furthermore, the Large Scale Analysis, a developing project underway for the district, is contemplating this same type of proposal, but has not made a final proposal for scoping. Lastly, this proposal may widen the scope of this project beyond a manageable level, possibly delaying effective and timely analysis as well as a decision that complies with the NEPA. Therefore, this issue is not considered significant because it is outside the original scope of the proposed action and because it is speculative as far as specific information on locations, methods, and timing.	

z. Drift (by air) and water flow may cause contamination of adjacent private land when using pesticides. (ID Team, 10/16/06)	No	Approximately 12 of the proposed treatment sites are within a proximity of 200 feet from private land. Mitigation measures to be employed during the project include the following: o Herbicides and application methods are chosen to minimize risk to human and wildlife health and the environment. Diesel oil will not be used as a carrier for herbicides. Instead, vegetable oils will be used as the carrier for the triclopyr ester as stated in the scoping letter (page 6). (FW-011, page 2-9 in the Forest Plan) o Herbicides are applied at the lowest rate effective in meeting project objectives and according to guidelines for protecting human and wildlife health. This includes application rates and work time that must not exceed levels that pose an unacceptable level of risk to human or wildlife health. (FW-012, page 2-9) o Weather, including temperature, humidity, and wind must meet guidelines specified in the Forest Plan (page 2-9) in order to minimize drift and maximize effectiveness of treatments. For backpack spraying, temperatures must be no higher than 98 degrees, humidity must be 20% or more, and wind must be 15 MPH or less. For mechanical treatments (boom sprayers), temperatures must be no higher than 95 degrees, humidity at or above 30%, and wind 10 MPH or less. (FW-013, page 2-9) o Nozzles that produce large droplets (mean droplet size of 50 microns or larger) or streams of herbicide are used to minimize drift. Nozzles that produce fine droplets are used only for hand treatment where distance from nozzle to target does not exceed 8 feet. (FW-014) o Application equipment, empty herbicide containers, clothes worn during treatment, and skin are not cleaned in open water or wells. Mixing and cleaning water must come from a public water supply and be transported in separate labeled containers. (FW-020, page 2-10 in the Forest Plan) o No herbicide is broadcast on rock outcrops or within sinkholes. (FW-021, page 2-10) o No herbicide is ground-applied within 100 feet of lakes, wetlands, or perennial or intermittent springs and streams. No herbicide is applied within 100 horizontal feet of any public or domestic water source. Selective treatments proposed can take place within these buffers for preventing noxious weed infestations when aquatic-labeled herbicides (see scoping letter, page 5) are used and with added site-specific analysis. (FW-022, page 2-10) o Herbicide mixing, loading, or cleaning areas in the field are not located in sensitive areas as identified in the project decision document, or within 200 feet of private land (see scoping letter, page 6). (FW-023, page 2-10) o Pesticide mixing, loading, or cleaning areas in the field are located at least 50 feet from ephemeral streams. (FW-024, page 2-10) o A certified pesticide applicator supervises each Forest Service application crew and trains crew members in personal safety, proper handling and application of herbicides, and proper disposal of empty containers. (FW-027, page 2-11 in the Forest Plan) o No herbicide is broadcast within 100 feet of private land or 300 feet of a private residence, unless the landowner agrees to closer treatment. Buffers are clearly marked before treatments so applicators can easily see and avoid them. (FW-028, page 2-11) Given the methods of use of the proposed pesticides under the Forest Plan Standards described above, there is no evidence that typical or accidental exposures of workers or the general public will lead to dose levels that would cause chronic or lifetime concerns: o For more information on Glyphosate, see issue a. o For more information on Imazapyr, see issues d, e, and f. o For more information on Clopyralid, see issues h and i. o For more information on Triclopyr, see issue g. o For more information on Carbaryl, see issues k and l. In conclusion, given the risk assessment conclusions and the routine Forest Plan Standards under which this project would operate, this issue is not significant within the context of the overall project.	

aa. There is considerable difference between the salutary efforts to eradicate invasive plants such as autumn olive and kudzu and the killing of hardwoods in order to perpetuate yet another pine plantation. This a completely different issue with the only commonality being herbicide use. Treating naturally occurring, native tree species conflicts with the natural succession of this forest (Wildlaw, et al, 10/13/06; ID Team, 11/5/07)	Yes		Acres of shortleaf pine restoration treatment.

APPENDIX 2 – Chattahoochee-Oconee NF Terrestrial and Aquatic Rare Species List.

THREATENED AND ENDANGERED SPECIES (2008)

Common Name	Scientific Name	Effects Analyzed in EA / Reason[1]
PLANTS:		
Smooth purple coneflower	*Echinacea laevigata*	No / 2
Rock gnome lichen	*Gymnoderma lineare*	No / 2
Swamp pink	*Helonias bullata*	No / 2
Small whorled pogonia	*Isotria medeoloides*	No / 2
Green pitcher plant	*Sarracenia oreophila*	No / 3
Large flowered skullcap	*Scutellaria montana*	No / 2
Persistent trillium	*Trillium persistens*	No / 2
Relict trillium	*Trillium reliquum*	No / 3
VERTEBRATES:		
Blue shiner	*Cyprinella caerulea*	No / 2
Etowah darter	*Etheostoma etowahae*	No / 2
Woodstork (foraging habitat)	*Mycteria americana*	No / 3
Gray bat	*Myotis grisescens*	No / 3
Amber darter	*Percina antesella*	No / 2
Goldline darter	*Percina aurolineata*	No / 2
Conasauga logperch	*Percina jenkinsi*	No / 2
Red-cockaded woodpecker	*Picoides borealis*	No / 3
MUSSELS:		
Fine-lined pocketbook	*Hamiota altilis*	No / 2
Alabama moccasinshell	*Medionidus acutissimus*	No / 2
Coosa moccasinshell	*Medionidus parvulus*	No / 2
Southern clubshell	*Pleurobema decisum*	No / 2
Southern pigtoe	*Pleurobema georgianum*	No / 2
Ovate Clubshell	*Pleurobema perovatum*	No / 2
Triangular kidneyshell	*Ptychobranchus greeni*	No / 2

REGIONAL FORESTER'S SENSITIVE SPECIES (2001 REVISION)

Common Name	Scientific Name	Effects Analyzed in EA
BIRDS:		
BACHMAN'S SPARROW	*Aimophila aestivalis*	**Yes / 1**
PEREGRINE FALCON	*Falco peregrinus*	**Yes / 1**
BALD EAGLE	*Haliaeetus leucocephalus*	**Yes / 1**
MIGRANT LOGGERHEAD SHRIKE	*Lanius ludovicia migrans*	No / 3
MAMMALS:		
RAFINESQUE'S BIG-EARED BAT	*Corynorhinus rafinesquii*	**Yes / 1**
SOUTHEASTERN BAT	*Myotis austroriparius*	No / 3
EASTERN SMALL-FOOTED MYOTIS	*Myotis leibii*	**Yes / 1**

SOUTHERN WATER SHREW	*Sorex palustris punctulatus*	**Yes / 1**
INSECTS:		
GEORGIA BELONEURIAN STONEFLY	*Beloneuria georgiana*	No / 2
TIGER BEETLE	*Cicindela ancocisconensis*	**Yes / 1**
BARRENS TIGER BEETLE	*Cicindela patruela*	**Yes / 1**
CHEROKEE CLUBTAIL DRAGONFLY	*Gomphus consanguis*	No / 2
MARGARITA RIVER CRUISER	*Macromia margarita*	No / 2
EDMUND'S SNAKETAIL	*Ophiogomphus edmundo*	No / 2
APPALACHIAN SNAKETAIL	*Ophiogomphus incurvatus*	No / 2
DIANA FRITILLARY BUTTERFLY	*Speyeria diana*	**Yes / 1**
CRAYFISH:		
OCONEE STREAM CRAYFISH	*Cambarus chaugaensis*	No / 2
A CRAYFISH	*Cambarus cymatilis*	No / 2
CHICKAMAUGA CRAYFISH	*Cambarus extraneus*	No / 2
LITTLE TENNESSEE CRAYFISH	*Cambarus georgiae*	No / 2
HIAWASSEE HEADWATERS CRAYFISH	*Cambarus parrishi*	No / 2
A CRAYFISH	*Cambarus speciosus*	No / 2
REPTILES/AMPHIBIANS:		
BOG TURTLE	*Clemmys muhlenbergii*	No / 2
S. APPALACHIAN SALAMANDER	*Plethodon teyahalee(=oconaluftee)*	**Yes / 1 (only known from summit of Rabun Bald).**
MUSSELS:		
BROOK FLOATER	*Alasmidonta varicosa*	No / 2
TENNESSEE HEELSPLITTER	*Lasmigona holstonia*	No / 2
GEORGIA PIGTOE	*Pleurobema hanleyianum*	No / 2
INFLATED FLOATER	*Pyganodon gibbosa*	No / 2
RIDGED MAPLELEAF	*Quadrula rumphiana*	No / 2
ALABAMA CREEKMUSSEL	*Strophitis connasaugaensis*	No / 2
ALABAMA RAINBOW	*Villosa nebulosa*	No / 2
FISH:		
OCMULGEE SHINER	*Cyprinella callisema*	No / 2
BLUESTRIPE SHINER	*Cyprinella callitaenia*	No / 2
ALTAMAHA SHINER	*Cyprinella xaenura*	No / 2
HOLIDAY DARTER	*Etheostoma brevirostrum*	No / 2
COLDWATER DARTER	*Etheostoma ditrema*	No / 2
TRISPOT DARTER	*Etheostoma trisella*	No / 2
WOUNDED DARTER	*Ethoestoma vulneratum*	No / 2
LINED CHUB	*Hybopsis lineapunctata*	No / 2
MOUNTAIN BROOK LAMPREY	*Ichthyomyzon greelyi*	No / 2
ROBUST REDHORSE	*Moxostoma robustum*	No / 2
POPEYE SHINER	*Notropis ariommus*	No / 2
HIGHSCALE SHINER	*Notropis hypsilepis*	No / 2
FRECKLEBELLY MADTOM	*Noturus munitus*	No / 2
FRECKLED DARTER	*Percina lenticula*	No / 2
OLIVE DARTER	*Percina squamata*	No / 2
FATLIPS MINNOW	*Phenacobius crassilabrum*	No / 2
PLANTS (Vascular):		
SCHERWIN'S FALSE INDIGO	*Amorpha schwerinii*	No / 2
GEORGIA ROCKCRESS	*Arabis georgiana*	No / 2
GEORGIA ASTER	*Aster georgianus*	No / 2
SPREADING YELLOW FALSE FOXGLOVE	*Aureolaria patula*	No / 2
AMERICAN BARBERRY	*Berberis canadensis*	No / 2
ALABAMA GRAPE FERN	*Botrychium jenmanii*	No / 2
MOUNTAIN BITTERCRESS	*Cardamine clematitis*	No / 2
STIFF SEDGE	*Carex biltmoreana*	No / 2
FORT MOUNTAIN SEDGE	*Carex communis* var. *amplisquama*	No / 2
WRETCHED SEDGE	*Carex misera*	No / 2
RADFORD'S SEDGE	*Carex radfordii*	No / 2
ROAN MOUNTAIN SEDGE	*Carex roanensis*	No / 2
CUTHBERT'S TURTLEHEAD	*Chelone cuthbertii*	No / 2
SMALL SPREADING POGONIA	*Cleistes bifaria*	No / 2
WHORLED STONEROOT	*Collinsonia verticillata*	No / 2
BROADLEAF TICKSEED	*Coreopsis latifolia*	No / 2

LARGE WITCHALDER	*Fothergilla major*	No / 2
WHITE-LEAVED SUNFLOWER	*Helianthus glaucophyllus*	No / 2
SMITH'S SUNFLOWER	*Helianthus smithii*	No / 2
HARPER'S WILD GINGER	*Hexastylis shuttleworthii* var. *harperi*	No / 2
TAYLOR'S FILMY FERN	*Hymenophyllum tayloriae*	No / 2
BUTTERNUT	*Juglans cinerea*	No / 2
FRASER LOOSESTRIFE	*Lysimachia fraseri*	No / 2
SWEET PINESAP	*Monotropsis odorata*	No / 2
SMALL'S BEARDTONGUE	*Penstemon smallii*	No / 2
WHITE FRINGELESS ORCHID	*Platanthera integrilabia*	No / 2
TENNESSEE LEAFCUP	*Polymnia laevigata*	No / 2
BEADLE'S MOUNTAIN MINT	*Pycanthemum beadlei*	No / 2
OGLETHORPE OAK	*Quercus oglethorpensis*	No / 2
APPALACHIAN ROSE GENTIAN	*Sabatia capitata*	No / 2
BAY STARVINE	*Schisandra glabra*	No / 2
PIEDMONT RAGWORT	*Senecio millifolium*	No / 2
OCONEE BELLS	*Shortia galacifolia* var. *galacifolia*	No / 2
BLUE RIDGE CATCHFLY	*Silene ovata*	No / 2
FALL GOLDENROD	*Solidago simulans*	No / 2
ASH-LEAF BUSH PEA	*Thermopsis mollis var. fraxinifolia*	No / 2
LANCE-LEAVED TRILLIUM	*Trillium lancifolium*	No / 2
LEAST TRILLIUM	*Trillium pusillum*	No / 2
ILLSCENTED TRILLIUM	*Trillium rugellii*	No / 2
JEWELED TRILLIUM	*Trillium simile*	No / 2
CAROLINA HEMLOCK	*Tsuga caroliniana*	No / 2
PIEDMONT STRAWBERRY	*Waldsteinia lobata*	No / 2
PLANTS (Nonvascular):		
A LIVERWORT	*Acrobolbus ciliatus*	No / 2
A LIVERWORT	*Drepanolejeunea appalachiana*	No / 2
A LIVERWORT	*Lejeunea blomquistii*	No / 2
A HORNWORT	*Megaceros aenigmaticus*	No / 2
A LIVERWORT	*Nardia lescurii*	No / 2
A LIVERWORT	*Pellia X appalachiana*	No / 2
A LIVERWORT	*Plagiochila caduciloba*	No / 2
A LIVERWORT	*Plagiochila echinata*	No / 2
SHARP'S LEAFY LIVERWORT	*Plagiochila sharpii*	No / 2
CAROLINA PLAGIOMNIUM	*Plagiomnium carolinianum*	No / 2
PRINGLE'S PLATYHYPNIDIUM	*Platyhypnidium pringlei*	No / 2
APPALACHIAN HAIRCAP MOSS	*Polytrichum appalachianum*	No / 2
A LIVERWORT	*Radula sullivartii*	No / 2
A LIVERWORT	*Riccardia jugata*	No / 2

LOCALLY RARE SPECIES (2008)

Common Name	Scientific Name	Effects Analyzed in EA
BIRDS:		
CEDAR WAXWING	*Bombycilla cedrorum*	**Yes / 1**
COMMON RAVEN	*Corvus corax*	**Yes / 1**
CERULEAN WARBLER	*Dendroica cerulea*	**Yes / 1**
LEAST FLYCATCHER	*Empidonax minimus*	**Yes / 1**
WILLOW FLYCATCHER	*Empidonax trailii*	**Yes / 1**
RED CROSSBILL	*Loxia curvirostra*	No / 3
ROSE-BREASTED GROSBEAK	*Pheucticus ludovicianus*	**Yes / 1**
GOLDEN-CROWNED KINGLET	*Regulus satrapa*	**Yes / 1**
RED-BREASTED NUTHATCH	*Sitta canadensis*	**Yes / 1**

WINTER WREN	*Troglodytes troglodytes*	**Yes / 1**
GOLDEN-WINGED WARBLER	*Vermivora chrysoptera*	**Yes / 1**
CANADA WARBLER	*Wilsonia canadensis*	**Yes / 1**
MAMMALS:		
STAR-NOSED MOLE	*Condylura cristata*	**Yes / 1**
LEAST WEASEL	*Mustela nivalis*	**Yes / 1**
SOUTHERN APPALACHIAN WOODRAT	*Neotoma floridana haematoreia*	**Yes / 1**
LONG TAIL OR ROCK SHREW	*Sorex dispar*	**Yes / 1**
APPALACHIAN COTTONTAIL	*Sylvilagus obscurus*	**Yes / 1**
RED SQUIRREL	*Tamiasciurus hudsonicus*	**Yes / 1**
REPTILES/AMPHIBIANS:		
GREEN SALAMANDER	*Aneides aeneus*	**Yes / 1**
HELLBENDER	*Cryptobranchus alleganiensis*	No / 2
COAL SKINK	*Eumeces anthracinus*	**Yes / 1**
4-TOED SALAMANDER	*Hemidactylium scutatum*	No / 3
MUDPUPPY	*Necturus maculosus*	No / 2
NORTHERN PINE SNAKE	*Pituophis m.melanoleucus*	**Yes / 1**
CRAYFISH:		
ETOWAH CRAYFISH	*Cambarus fasciatus*	No / 2
HIAWASSEE CRAYFISH	*Cambarus hiwasseensis*	No / 2
A CRAYISH	*Cambarus manningi*	No / 2
MUSSELS:		
DELICATE SPIKE	*Elliptio arctata*	No / 2
GEORGIA ELEPHANTEAR	*Elliptio dariensis*	No / 2
ALTAMAHA POCKETBOOK	*Lampsilis dolabraeformis*	No / 2
FISH:		
ROSYSIDE DACE	*Clinostomus funduloides*	No / 2
BLOTCHED CHUB	*Erimystax insignis*	No / 2
GREENFIN DARTER	*Etheostoma chlorobranchium*	No / 2
COOSA DARTER	*Etheostoma coosae*	No / 2
GREENBREAST DARTER	*Etheostoma jordani*	No / 2
REDLINE DARTER	*Etheostoma rufilineatum*	No / 2
ROCK DARTER	*Etheostoma rupestre*	No / 2
SNUBNOSE DARTER	*Etheostoma simoterum*	No / 2
BANDED DARTER	*Etheostoma zonale*	No / 2
BIGEYE CHUB	*Hybopsis amblops*	No / 2
SPECKLED CHUB	*Macrhybopsis hyostoma*	No / 2

RIVER REDHORSE	*Moxostoma carinatum*	No / 2
SICKLEFIN REDHORSE	*Moxostoma sp.2*	No / 2
BURRHEAD SHINER	*Notropis asperifrons*	No / 2
RAINBOW SHINER	*Notropis chrosomus*	No / 2
SILVER SHINER	*Notropis photogenis*	No / 2
TANGERINE DARTER	*Percina aurantiaca*	No / 2
BRONZE DARTER	*Percina palmaris*	No / 2
DUSKY DARTER	*Percina sciera*	No / 2
RIVER DARTER	*Percina shumardi*	No / 2
MUSCADINE DARTER	*Percina sp.3*	No / 2
UPLAND BRIDLED DARTER	*Percina sp. 9*	No / 2
RIFFLE MINNOW	*Phenacobius catostomus*	No / 2
BRASSY JUMPROCK	*Scartomyzon brassieus*	No / 2
GREATER JUMPROCK	*Scartomyzon lachneri*	No / 2
PLANTS:		
MOUNTAIN MAPLE	*Acer spicatum*	No / 2
YELLOW GIANT-HYSSOP	*Agastache nepetoides*	No / 2
PURPLE GIANT-HYSSOP	*Agastache scrophulariifolia*	No / 2
SHINING INDIGO BUSH	*Amorpha nitens*	No / 2
CAROLINA ANEMONE	*Anemone caroliniana*	No / 2
PORTER'S REED GRASS	*Calamagrostis porteri*	No / 2
BLUE RIDGE (or SILKY) BINDWEED	*Calystegia catesbiana ssp.sericata*	No / 2
WILD HYACINTH	*Camassia scilloides*	No / 2
MANHART'S SEDGE	*Carex manhartii*	No / 2
BROADLEAF SEDGE	*Carex platyphylla*	No / 2
PURPLE SEDGE	*Carex purpurifera*	No / 2
ROUGH SEDGE	*Carex scabrata*	No / 2
AMERICAN CHESTNUT (nut-bearing trees)	*Castanea dentata*	No / 2
INDIAN PAINTBRUSH	*Castilleja coccinea*	No / 2
GOLDEN SAXIFRAGE	*Chrysosplenium americanum*	No / 2
CAROLINA THISTLE	*Cirsium carolinianum*	No / 2
YELLOWWOOD	*Cladrastis kentuckea*	No / 2
SPREADING POGONIA	*Cleistes bifaria*	No / 2
CURLYHEADS	*Clematis ochroleuca*	No / 2
SWEET FERN	*Comptonia peregrina*	No / 2
AMERICAN LILY-OF-THE-VALLEY	*Convallaria majuscula*	No / 2
PALE CORYDALIS	*Corydalis sempervirens*	No / 2
FRASER SEDGE	*Cymophyllus fraserianus*	No / 2
YELLOW LADY'S SLIPPER	*Cypripedium parviflorum*	No / 2
SQUIRREL CORN	*Dicentra canadensis*	No / 2

BLEEDING HEART	*Dicentra eximia*	No / 2
GROUND CEDAR	*Diphasiastrum tristachyum*	No / 2
LEATHERWOOD	*Dirca palustris*	No / 2
SHOOTING STAR	*Dodecatheon meadia*	No / 2
LOG FERN	*Dryopteris celsa*	No / 2
GOLDIE'S WOOD FERN	*Dryopteris goldiana*	No / 2
FRINGED GENTIAN	*Gentianopsis crinita*	No / 2
COW PARSNIP	*Heracleum lanatum*	No / 2
APPALACHIAN FIR CLUBMOSS	*Huperzia appalachiana*	No / 2
ROCK CLUBMOSS	*Huperzia porophila*	No / 2
GOLDEN SEAL	*Hydrastis canadensis*	No / 2
LARGELEAF WATERLEAF	*Hydrophyllum macrophyllum*	No / 2
BLUE RIDGE ST. JOHN'S WORT	*Hypericum buckleyi*	No / 2
NAKED-FRUIT RUSH	*Juncus gymnocarpus*	No / 2
GROUND JUNIPER	*Juniperus communis spp. depressa*	No / 2
SHEEP LAUREL	*Kalmia carolina*	No / 2
SAND MYRTLE	*Leiophyllum buxifolium*	No / 2
SOUTHERN TWAYBLADE	*Listera australis*	No / 2
KIDNEY-LEAVED TWAYBLADE	*Listera smallii*	No / 2
GROUND PINE	*Lycopodium clavatum*	No / 2
CLIMBING FERN	*Lygodium palmatum*	No / 2
BROADLEAF BUNCHFLOWER	*Melanthium latifolium*	No / 2
VIRGINIA BLUEBELL	*Mertensia virginica*	No / 2
INDIAN OLIVE	*Nestronia umbellula*	No / 2
DWARF GINSENG	*Panax trifolius*	No / 2
SILVERLING	*Paronychia argyrocoma*	No / 2
SWAMP LOUSEWORT	*Pedicularis lanceolata*	No / 2
BROADLEAF PHLOX	*Phlox amplifolia*	No / 2
LARGE PURPLE-FRINGED ORCHID	*Platanthera grandiflora*	No / 2
FRINGELESS PURPLE ORCHID	*Platanthera peramoena*	No / 2
SMALL PURPLE-FRINGED ORCHID	*Platanthera psycodes*	No / 2
SPOTTED MANDARIN	*Prosartes maculatum*	No / 2
FIRE CHERRY	*Prunus pensylvanica*	No / 2
CHOKE CHERRY	*Prunus virginiana*	No / 2
VIRGINIA MOUNTAIN MINT	*Pycnanthemum virginianum*	No / 2
STAGHORN SUMAC	*Rhus typhina*	No / 2
DWARF PALMETTO	*Sabal minor*	No / 2
RED ELDERBERRY	*Sambucus racemosa spp. pubens*	No / 2
CANADA BURNET	*Sanguisorba canadensis*	No / 2
PURPLE PITCHER PLANT	*Sarracenia purpurea*	No / 2

BOTTOMLAND SKULLCAP	*Scutellaria nervosa*	No / 2
SHOWY SKULLCAP	*Scutellaria serrata*	No / 2
THREE-TOOTHED CINQUEFOIL	*Sibbaldiopsis tridentata*	No / 2
BILTMORE CARRIONFLOWER	*Smilax biltmoreana*	No / 2
WHITE GOLDENROD	*Solidago ptarmicoides*	No / 2
AMERICAN MOUNTAIN ASH	*Sorbus americana*	No / 2
HARDHACK	*Spirea tomentosa*	No / 2
OVAL LADIES' TRESSES	*Spiranthes ovalis*	No / 2
HEDGE NETTLE	*Stachys nuttallii*	No / 2
MOUNTAIN CAMELLIA	*Stewartia ovata*	No / 2
ROSY TWISTED-STALK	*Streptopus lanceolatus*	No / 2
DWARF FILMY FERN	*Trichomanes petersii*	No / 2
TUFTED CLUB RUSH	*Trichophorum cespitosum*	No / 2
STARFLOWER	*Trientalis borealis*	No / 2
PALE YELLOW TRILLIUM	*Trillium discolor*	No / 2
BARKSDALE TRILLIUM	*Trillium sulcatum*	No / 2
HORSE GENTIAN	*Triosteum aurantiacum*	No / 2
THREE-BIRDS ORCHID	*Triphora trianthophora*	No / 2
BEARBERRY	*Vaccinium erythrocarpum*	No / 2
AMERICAN FALSE HELLEBORE	*Veratrum viride*	No / 2
OZARK BUNCHFLOWER	*Veratrum woodii*	No / 2
AMERICAN DOG VIOLET	*Viola conspersa*	No / 2
TURKEYBEARD	*Xerophyllum asphodeloides*	No / 2

1 = species could potentially occur in the analysis area and this species could potentially be impacted by one or more alternatives in this analysis; therefore, species is analyzed in project – level effects analysis; 2 = Dropped - = project-level mitigation measures and Forest Plan Standards included as part of alternatives; therefore, species will not be impacted by one or more alternatives and will not be analyzed in project-level effects analysis; 3 = Dropped = species is not known to occur in the project area.

SIGNIFICANT ISSUES AND ASSOCIATED MEASURES:

1. ***Invasives (Example: Autumn olive) are proposed for partial control in some areas (Example: Sarah's Creek in Rabun County). Invasives will quickly spread back into the area, making treatment ineffective (WildLaw, et. al., 10/3/06).*** **Measure: Allowance in alternative to treat contiguous infestations of multiple species within 1/4 mile of each other (yes or no).**
2. ***Some sites and species that are invasive have not been identified in the Proposed Action. These need to be added to the proposal for complete control of invasive species (WildLaw, 10/3/06; Bunch, 9/23/06; Forest Service ID Team, 10/16/06).*** **Measure: Total acres of treatment of non-native, invasive species.**
3. ***Shortleaf pine restoration, within the Proposed Action, will result in the killing of naturally-occurring species, including many hardwoods. This treatment conflicts with the natural succession of the Forest (WildLaw, 10/3/06; Forest Service ID Team, 11/05/07).*** **Measure: Total acres of treatment for shortleaf pine restoration.**