APPENDIX I

BIOLOGICAL EVALUATION

BIOLOGICAL EVALUATION FOR THE REVISION OF THE CHATTAHOOCHEE-OCONEE NATIONAL FOREST LAND AND RESOURCE MANAGEMENT PLAN

1. INTRODUCTION

This Biological Evaluation (BE) is prepared in compliance with policy outlined at FSM 2670. This policy is designed to avoid impacts that may cause a trend toward listing of a species under the Endangered Species Act, or loss of species viability. A comprehensive analysis of effects of plan revision alternatives on habitats, and the implication of these effects to species viability, is included in the Environmental Impact Statement (EIS) prepared with the revised plan. This Biological Evaluation relies heavily on that analysis, but also incorporates additional species-specific considerations where warranted. This BE addresses expected effects under the preferred alternative (Alternative I) only. Relative effects of alternatives on Sensitive Species and other species of potential viability concern can be found in the EIS.

In support of the terrestrial species viability analysis in the EIS, a database was prepared through a Participating Agreement with NatureServe, previously the science information branch of The Nature Conservancy. This database provides information on the status and habitat relationships of Sensitive Species. Information in this database was referenced during preparation of this BE, and is incorporated here by reference. Similarly, for the aquatic species viability analysis, a database was prepared that identified species' sensitivity to environmental factors, their distribution by watershed, and an assessment of indicators of watershed condition by watershed. This information was also referenced during preparation of this BE, and is incorporated here by reference.

The direction in the revised Forest Plan is general and does not preclude or replace the requirement for specific, project-level consideration of Sensitive Species. Projects will be evaluated for the need to inventory project areas for these species in accordance with the Region 8 supplement to the Forest Service Manual §2672. This

project level consideration provides another facet of protection for these species in addition to plan direction. Analysis of effects in this biological evaluation includes the expectation that these project-level processes will be appropriately followed during plan implementation.

2. DESCRIPTION OF PLANNING AREA

The planning area for this analysis consists of the 749,755 acre Chattahoochee National Forest and the 115,210 acre Oconee National Forest. The Chattahoochee NF is located across the northern portion of the state with lands in 18 counties. The Oconee NF is located in the central portion with lands in eight counties. The two national forests in Georgia are administered by one Forest Supervisor, which is headquartered in Gainesville, GA.

The Chattahoochee NF comprises approximately 750,000 acres in north Georgia. It is generally characterized by Appalachian oak forest typical of the southernmost reaches of the Appalachian Mountains. The westernmost portion of the forest is somewhat different. It is located in the Ridge and Valley ecological section, and consists of an oak-hickory-pine forest type. The southeastern corner of the forest is also distinctive. Upper Piedmont topography and an oak-hickory-pine forest type characterize this area. Features of notable significance on the Chattahoochee NF include Brasstown Bald (the highest point in Georgia), the crest of the Blue Ridge Mountains, the majority of cold-water trout fisheries, and over 150,000 acres of Congressionally-designated areas. The Chattahoochee NF is contained in the headwaters of four major river basins that begin in Georgia; the Tennessee, Chattahoochee, Coosa, and Savannah Rivers. Water from each of these basins provides essential domestic and industrial water supplies for numerous cities and towns downstream of National Forest lands.

The lands on the Chattahoochee NF are usually found in large blocks on the mountainsides and ridges, with private lands in the valleys. There are occasional, usually small, private parcels that are partly or completely surrounded by national forest land. Similarly, there are forest parcels that are isolated from the larger blocks and are partially or completely surrounded by private lands.

The Oconee NF consists of approximately 115,000 acres south of Athens and east of Atlanta, Georgia. The lands are generally in large blocks, but with a generous interspersing of private lands. The private lands are sometimes in fairly large blocks of farmland or lands owned or managed by large timber companies. This forest occurs as two separate sections; a northern section near Madison and Greensboro, and a southern section near Monticello and Eatonton. Interstate Highway 20 creates an east-west boundary between the two sections of National Forest. The Oconee is a Piedmont forest with predominantly pine vegetation on the uplands and wide hardwood bottomlands. Features of notable significance on the Oconee NF include Murder Creek Research Natural Area (RNA), Scull Shoals Historic Area, Scull Shoals Archeological Area, and an endangered species, the red-cockaded woodpecker. Two

major river basins flow through the Oconee National Forest, the Ocmulgee and the Oconee. These two basins include reservoirs managed for hydroelectric power production, recreation and water supply. Much of the private lands surrounding the lakes have experienced increasing development for residential and recreational uses. The two basins flow together south of the Forest to form the Altamaha River, which flows to the Atlantic Ocean between Savannah and Brunswick, GA.

3. PROPOSED MANAGEMENT ACTIONS

As required by the National Forest Management Act of 1976 (NFMA), the Chattahoochee-Oconee National Forest proposes to revise the 1985 Land and Resource Management Plan (LRMP) for all of the land resources. The existing LRMP was approved April 1, 1985, and there are currently 20 amendments to the 1985 LRMP. The Code of Federal Regulations (36 CFR 219.10[g]) implementing NFMA instructs the Regional Forester to make periodic revisions to the plan and to provide the basis for any revision. The Southern Appalachian Assessment (SAMAB 1996) supports the revision of forest plans by describing how the lands, resources, people, and management of the national forests interrelate within the larger context of the Southern Appalachian area. The revised LRMP guides all natural resource management activities to meet the objectives of federal law, regulations, and policy. The revision updates the management goals, objectives, standards, and monitoring requirements for the ten- year planning period, which begins when the plan is approved. Objectives in the LRMP are geared toward restoring major forest communities and are designed to begin to restore habitat structure, composition, and distribution to a desired condition needed to maintain viability of associated species. It is recognized that compensation for significant ecological changes (loss of American chestnut, lack of large tree structure, presence of invasive species, etc.) cannot be expected in the short term.

4. SPECIES CONSIDERED

Sensitive Species are species “identified by a Regional Forester for which population viability is a concern…” (FSM 2670.5(19)). The Regional Forester’s list of Sensitive Species is periodically updated to reflect improved knowledge of species’ status and to focus on those species most at risk. The most recent Sensitive Species list was issued August 7, 2001. Species on that list that occur or potentially occur on the Chattahoochee-Oconee National Forest are evaluated in this document (Table 1).

TABLE 1. CHATTAHOOCHEE NATIONAL FORESTREGIONAL FORESTER'S SENSITIVE SPECIES (2001 REVISION

Common Name	Scientific Name
BIRDS	
BACHMAN'S SPARROW	*Aimophila aestivalis*
PEREGRINE FALCON	*Falco peregrinus*
MAMMALS	
RAFINESQUE'S BIG-EARED BAT	*Corynorhinus rafinesquii*
SOUTHERN ROCK VOLE	*Microtus chrotorrhinus carolinensis*
SOUTHEASTERN BAT	*Myotis austroriparius*
EASTERN SMALL-FOOTED MYOTIS	*Myotis leibii*
SOUTHERN WATER SHREW	*Sorex palustris punctulatus*
INSECTS	
GEORGIA BELONEURIAN STONEFLY	*Beloneuria georgiana*
DIANA FRITILLARY BUTTERFLY	*Speyeria diana*
A TIGER BEETLE	*Cincindela ancocicsonensis*
BARRENS TIGER BEETLE	*Cincindela patruela*
CHEROKEE CLUBTAIL DRAGONFLY	*Gomphus consanguis*
MARGARITA RIVER SKIMMER	*Macromia margarita*
EDMUND'S SNAKETAIL	*Ophiogomphus edmundo*
APPALACHIAN SNAKETAIL	*Ophiogomphus incurvatus*
CRAYFISH	
OCONEE STREAM CRAYFISH	*Cambarus chaugaensis*
A CRAYFISH	*Cambarus cymatilis*
CHICKAMAUGA CRAYFISH	*Cambarus extraneus*
LITTLE TENNESSEE CRAYFISH	*Cambarus georgiae*
HIAWASSEE HEADWATERS	*Cambarus parrishi*
A CRAYFISH	*Cambarus speciosus*
REPTILES/AMPHIBIANS	
BOG TURTLE	*Clemmys muhlenbergii*
S. APPALACHIAN SALAMANDER	*Plethodon teyahalee (=oconaluftee)*
MUSSELS	
BROOK FLOATER	*Alasmidonta varicosa*
TENNESSEE HEELSPLITTER	*Lasmigona holstonia*
GEORGIA PIGTOE	*Pleurobema hanleyianum*
RIDGED MAPLELEAF	*Quadrula rumphiana*
ALABAMA CREEKMUSSEL	*Strophitis connasaugaensis*
ALABAMA RAINBOW	*Villosa nebulosa*
FISH	
HOLIDAY DARTER	*Etheostoma brevirostrum*
COLDWATER DARTER	*Etheostoma ditrema*
TRISPOT DARTER	*Etheostoma trisella*
WOUNDED DARTER	*Ethoestoma vulneratum*
LINED CHUB	*Hybopsis lineapunctata*

Common Name	Scientific Name
MOUNTAIN BROOK LAMPREY	*Ichthyomyzon greelyi*
POPEYE SHINER	*Notropis ariommus*
HIGHSCALE SHINER	*Notropis hypsilepis*
FRECKLEBELLY MADTOM	*Noturus munitus*
FRECKLED DARTER	*Percina lenticula*
OLIVE DARTER	*Percina squamata*
FATLIPS MINNOW	*Phenacobius crassilabrum*
PLANTS (Vascular)	
GEORGIA ROCKCRESS	*Arabis georgiana*
GEORGIA ASTER	*Aster georgianus*
SPREADING YELLOW FALSE	*Aureolaria patula FOXGLOVE*
AMERICAN BARBERRY	*Berberis canadensis*
ALABAMA GRAPE FERN	*Botrychium jenmanii*
MOUNTAIN BITTERCRESS	*Cardamine clematitis*
BILTMORE SEDGE	*Carex biltmoreana*
FORT MOUNTAIN SEDGE	*Carex communis var. amplisquama*
MISERABLE SEDGE	*Carex misera*
RADFORD'S SEDGE	*Carex radfordii*
ROAN MOUNTAIN SEDGE	*Carex roanensis*
CUTHBERT'S TURTLEHEAD	*Chelone cuthbertii*
SMALL SPREADING POGONIA	*Cleistes bifaria*
WHORLED STONEROOT	*Collinsonia verticillata*
BROADLEAF TICKSEED	*Coreopsis latifolia*
MOUNTAIN WITCH ALDER	*Fothergilla major*
SMITH'S SUNFLOWER	*Helianthus smithii*
WHITE-LEAVED SUNFLOWER	*Helianthus glaucophyllus*
HARPER'S WILD GINGER	*Hexastylis shuttleworthii var. harperi*
TAYLOR'S FILMY FERN	*Hymenophyllum tayloriae*
BUTTERNUT	*Juglans cinerea*
FRASER LOOSESTRIFE	*Lysimachia fraseri*
SWEET PINESAP	*Monotropsis odorata*
SMALL'S BEARDTONGUE	*Penstemon smallii*
MONKEYFACE ORCHID	*Platanthera integrilabia*
TENNESSEE LEAFCUP	*Polymnia laevigata*
BEADLE'S MOUNTAIN MINT	*Pycnanthemum beadlii*
ROSE GENTIAN	*Sabatia capitata*
PIEDMONT RAGWORT	*Senecio millifolium*
BAY STARVINE	*Schisandra glabra*
OCONEE BELLS	*Shortia galacifolia var. galacifolia*
OVATE CATCHFLY	*Silene ovata*
GRANITE DOME GOLDENROD	*Solidago simulans*
ASH-LEAF BUSH PEA	*Thermopsis mollis var.fraxinifolia*
LEAST TRILLIUM	*Trillium pusillum*

Common Name	Scientific Name
SOUTHERN NODDING TRILLIUM	*Trillium rugellii*
SWEET WHITE TRILLIUM	*Trillium simile*
CAROLINA HEMLOCK	*Tsuga caroliniana*
PIEDMONT STRAWBERRY	*Waldsteinia lobata*
PLANTS (Nonvascular)	
A LIVERWORT	*Acrobolbus ciliatus*
A LIVERWORT	*Drepanolejeunea appalachiana*
A LIVERWORT	*Lejeunea blomquistii*
A LIVERWORT	*Nardia lescurii*
A LIVERWORT	*Pellia appalachiana*
A LIVERWORT	*Plagiochila caduciloba*
A LIVERWORT	*Plagiochila echinata*
SHARP'S LEAFY LIVERWORT	*Plagiochila sharpii*
CAROLINA PLAGIOMNIUM	*Plagiomnium carolinianum*
PRINGLE'S PLATYHYPNIDIUM	*Platyhypnidium pringlei*
APPALACHIAN HAIRCAP MOSS	*Polytrichum appalachianum*
A LIVERWORT	*Radula sullivanti*
A LIVERWORT	*Riccardia jugata*

TABLE 2. OCONEE NATIONAL FOREST -REGIONAL FORESTER'S SENSITIVE SPECIES (2001 REVISION)

Common Name	Scientific Name
BIRDS	
BACHMAN'S SPARROW	*Aimophila aestivalis*
MIGRANT LOGGERHEAD SHRIKE	*Lanius ludovicia migrans*
INSECTS	
MARGARITA RIVER SKIMMER	*Macromia margarita*
APPALACHIAN SNAKETAIL	*Ophiogomphus incurvatus*
MUSSELS	
INFLATED FLOATER	*Pyganodon gibbosa*
FISH	
OCMULGEE SHINER	*Cyprinella callisema*
BLUESTRIPE SHINER	*Cyprinella callitaenia*
ALTAMAHA SHINER	*Cyprinella xaenura*
ROBUST REDHORSE	*Moxostoma robustum*
PLANTS (Vascular)	
SCHWERIN'S FALSE INDIGO	*Amorpha schwerinii*
OGLETHORPE OAK	*Quercus oglethorpensis*
BAY STARVINE	*Schisandra glabra*

5. SPECIES EVALUATION AND DETERMINATION

In this section, each Sensitive Species is addressed individually in terms of 1) its status, distribution, and trend, 2) its habitat relationships and likely limiting factors, 3) potential effects of management, and 4) a determination of effect and supporting rationale.

Status, distribution, and trend information is based on a variety of sources that represent the best information currently available. It is expected that the quality of this information will be maintained or improved during plan implementation, in compliance with FSM 2670.45(4), through inventory and monitoring programs.

Habitat relationships of Sensitive Species were defined during species viability evaluation for the EIS. Each terrestrial Sensitive Species was linked to habitat elements, and each aquatic Sensitive Species was linked to watersheds and key environmental factors. This biological evaluation is based on these habitat relationships. Risks from these habitat relationships are assessed along with other non-habitat factors to identify what are believed to be the most critical factors limiting populations.

The EIS includes analysis of management effects to habitats important to Sensitive Species. Each of the terrestrial habitat elements was analyzed for current and future distribution and abundance, the general likelihood that they would be limiting to associated species, and effects of management. Similarly, each watershed was analyzed for potential effects relative to key environmental factors. The details of these analyses are not repeated here, but results, as relevant to each Sensitive Species, are summarized in the narrative and in Attachments A and B. Overall effects to habitats are disclosed, as are the general likelihood that activities conducted as part of plan implementation will directly impact individuals. The role of national forest management activities in cumulative effects to the species is also addressed.

Determinations represent the overall expected effect of plan implementation on each Sensitive Species. Unlike the viability evaluations in the EIS, which focus on risk from overall habitat outcomes across landscapes and watersheds, determinations in this document reflect the effect of national forest management actions only. As a result, analysis from the EIS may indicate that many habitats are potentially limiting and resulting in risk to species in spite of positive effects of national forest management. This situation is in most cases due to factors beyond the control of the agency, including the extensive modification of habitats across the larger landscapes within which the national forest occurs, the infeasibility of quickly restoring all of the habitats on national forest lands, and invasive and epidemic insects and diseases for which no effective controls exist. However, because ecological sustainability and species viability were one of the primary drivers used to define plan goals, objectives, and standards, it is expected that plan effects to most Sensitive Species will be beneficial.

Sensitive Plants on the Oconee National Forest

Oglethorpe oak (*Quercus oglethorpensis*)

Distribution, Status, and Trend

The main range of this species is in western South Carolina and adjacent to Georgia, with populations occurring in Mississippi and Louisiana. This species also occurs within the Piedmont of Georgia and South Carolina (NatureServe 2003). It has been recorded within five counties of Georgia. Two of these counties are within the Oconee National Forest, Jasper and Greene Counties. This species is located within the 5th level watersheds known as the Ocmulgee River-Rum Creek and Oconee River-Greenbrier Creek. It occurs within low woods over Iredell soils - habitat that is commonly known as the "Monticello Glades" (Patrick et. al.1995). Oglethorpe oak is ranked as imperiled within the state of Georgia (NatureServe 2003). It has a viability ranking of 4 (moderate risk) within late successional riparian habitats and a 2 (high risk) within bogs, fens, seeps and seasonal pond habitats on the Oconee. It has an F rank of F2, which means it is very rare, with 6-20 known occurrences on the Oconee.

Habitat Relationships and Limiting Factors

This species is found on poorly drained, heavy clay soils of seasonally wet Piedmont seepage, swamps, often with cherrybark oak. It sometimes is found in surrounding uplands on stream terraces associated with chalk maple (*Acer leucoderme*). Some oaks have been identified within pine stands associated with Iredell soils. The limiting factors to this tree species would be lack of preferred soil type. The effects of management that be may be detrimental to this species are competition from other vegetation and drainage of the site. Populations are currently threatened by habitat alteration resulting from commercial and residential development, silvicultural practices, and conversion to agricultural lands or pastures. Dam construction created by humans and beavers is also a threat to this species (NatureServe 2003). The Oconee National Forest has only a few acres with the specific clay soils called Iredell soils. This soil-specific habitat is identified and labeled as the Monticello Glades.

Potential Management Effects

Plan direction provides for protection and management for lakeshores, wetlands, and riparian areas. The revised forest plan would provide for these habitats to be protected and restored. These areas would have minimal or no habitat disturbance, except for restoration and watershed improvements. Areas would be evaluated by project-level analysis prior to implementation. Cumulatively, some of these habitats on private lands are not likely to be treated so favorably, making their presence on the forest increasingly important to the species.

Determination and Rationale

Plan direction provides for protection and management for lakeshores, wetlands, and riparian areas. Overall, implementation of the plan is expected to have no impacts to this species because: 1) the plan provides for the protection of the habitat, 2) the potential for adversely impacting the species is discountable, and 3) restoration and enhancement of these ecosystems is provided.

Scherwin's false indigo (*Amorpha schwerinii)*

Distribution, Status, and Trend

This plant is in the legume family and is found in Alabama, Georgia, Mississippi, North Carolina and South Carolina. It is ranked as imperiled in Georgia by NatureServe (2003). As far as we know, we currently do not have any of these plants within the Oconee National Forest. It has a forest viability ranking of FP, meaning it could possibly occur. It has no viability risk ranking on the Oconee.

Habitat Relationships and Limiting Factors

This plant occurs in forests and woodlands that are primarily xeric (dry) and rocky for the most part. Habitat that it prefers is dominated by oak species such as white oak, post oak, scarlet oak, blackjack oak, pignut hickory, mockernut hickory, Virginia pine, and shortleaf pine. The understory layer includes such species as red maple and sourwood. The shrub layer within this community is patchy and includes squawberry, huckleberry and mountain laurel. The herbaceous layer is generally containing spotted wintergreen, beggar lice and oat grass (NatureServe 2003).

Habitat alterations may result from silvicultural practices, residential development, military training operations and fire suppression. While unrestricted heavy logging could pose a threat, selective logging can apparently benefit the species in some areas, especially those where disturbance from fire has been suppressed (NatureServe 2003).

The Oconee National Forest does not have large amounts of habitat associated with the plant community mentioned above. Upland hardwoods are limited on the Oconee National Forest. Past surveys have not identified any record of this species. The nearest known location where it was identified is located within Greene County at the Greensboro Flat Rock Area near Mosquito Crossing, which is considered a granite outcrop, located outside the Oconee National Forest. This area is greater than 25 miles from the nearest boundary of the Oconee National Forest.

Potential Management Effects

Efforts to restore some canopy gaps and establish prescribed fire on the forest should have a positive effect on this legume. Fire suppression (or the exclusion of natural and planned ignition man-caused fires) may have altered the structure and vegetative composition of plant communities where this species once occurred. Restoration of some areas by prescribed burning is possible (NatureServe 2003). Activities used to achieve habitat improvement for this plant may disturb a few individuals in the short term, but improved and restored habitat conditions will help restore populations over time. Restoration and protection on the forest is important cumulatively, since this species will probably not receive such favorable treatment on private lands.

Determination and Rationale

Implementing the revised forest plan is expected to have beneficial effects to this legume plant because some disturbance-dependent habitat and prescribed burning activities are planned within its range.

Bay starvine or Magnolia vine (*Schisandra glabra)*

Distribution, Status, and Trend

Bay starvine is a vine that occurs in the Atlantic and Gulf Coastal plains from North Carolina south to northern Florida, west to the Mississippi Embayment to western Tennessee and eastern Arkansas. This species is endemic to the southeast piedmont. It is ranked as imperiled in Georgia (NatureServe 2003). To the best of our knowledge and information provided by plant surveys, we currently do not have any of these plants within the 5th level watersheds listed on the Oconee National Forest. The nearest location is within Morgan County at Hard Labor Creek, which is located approximately 10 miles northwest of the nearest tract of the Oconee National Forest. Currently, we have approximately only about 400 acres of land within Morgan County. This land is currently known as Swords Boat Ramp and is located on Lake Oconee, approximately 15 miles south of Hard Labor Creek. According to past surveys, no identification of this plant has been made on the Oconee National Forest. It is ranked as FP on the Oconee, meaning it possibly could occur on the Oconee. The viability ranking is a 0, not rated because it is not known to occur. On the Chattahoochee National Forest, it is ranked as a F1, having 1-5 occurrences. Its viability risk ranking is 3 (moderately high risk) for late successional riparian habitat.

Habitat Relationships and Limiting Factors

Habitat requirements for this species are rich forested bottomlands and adjacent slopes. The species is normally associated with mountain laurel and rhododendron. Falling Creek, located on the Hitchiti and the Ocmulgee River may have sparse locations of mountain laurel (per conversation with Tom Patrick in September 2003). These specific areas around the Falling Creek area and Ocmulgee River may have sandy or mesic, bouldery woods, or rocky areas along a creek. There is very little habitat availability for this species on the Oconee National Forest. Throughout the Oconee National Forest, several invasive plants, such as honeysuckle and privet may compete with this native plant. Other threats to this species are development and agricultural management (NatureServe 2003).

Potential Management Effects

The revised plan direction provides for protection and management for lakeshores, wetlands, and riparian areas. Management activities that open canopies or disturb the litter layer may adversely affect this species. However, prescriptions allocated to areas occupied by this species would result in little to no management-induced disturbance of forest canopies or litter layers. Cumulatively, some of these types of habitat may occur on private land where they would not be expected to have the same amount of protection afforded to them.

Determination and Rationale

Implementation of the revised forest plan is expected to have **no impacts** on this vine if it occurs on the forest because: 1) protective measures for the type habitat it occurs in are in place, and 2) the likelihood of management-induced disturbance of its preferred habitat is low.

SENSITIVE ANIMALS ON THE OCONEE NATIONAL FOREST

Bachman's sparrow (*Aimophila aestivalis*)

Distribution, Status, and Trend- The main range of this species is from Missouri, Illinois, Indiana, Ohio, southwestern Pennsylvania, and Maryland south to Texas, Gulf Coast, and south-central Florida. This species may also be present within the southeastern United States, where it is fairly common, but local in the outer Coastal Plain, and rare in the Piedmont. This species is listed as vulnerable in Georgia (NatureServe 2003). It is known to occur within the Ocmulgee River-Rum Creek watershed within the Oconee National Forest according to Breeding Bird Census Reports by the State Wildlife Resources Division and Neotropical Bird Points done by Forest Service biologists. On the Oconee it is ranked F2, which means it is very rare on the forest, with 6-20 occurrences. The viability risk is a 3, moderately high risk. It is not known to occur on the Chattahoochee National Forest, but it has potential to occur there.

Habitat Relationships and Limiting Factors

Bachman's sparrow is a ground nesting bird requiring thick, grassy, and brushy cover throughout its breeding range. This species occurs in abandoned fields and slashings partially overgrown with young pines, and with open spots covered with broom sedge and other grasses. Some wildlife openings and open habitat near the road could support the species. There is currently a small amount of suitable habitat within the Oconee National Forest. The limiting factor for this species is the lack of early successional habitat (Hamel 1992).

Potential Management Effects

Prescribe burning, vegetation management, and restoration of ecosystems would create the earlier successional habitat that is required for this species. Manipulation of vegetation to create open forest canopy and reduce high basal areas (where land base does not offer early successional habitat) would create habitat for this bird. The management for the RCW will provide management activities to maintain and improve habitat for this sparrow also. Cumulatively, habitat improvement and maintenance for this species may not be afforded such positive management possibilities on some private lands, which make their presence on the forest increasingly important.

Determination and Rationale

Implementation of the revised forest plan is expected to have a beneficial effect on this bird because: 1) some early successional habitat restoration is likely to be

accomplished, providing preferred habitat, and 2) RCW management with prescribed burning will maintain and enhance habitat form this bird.

Migrant loggerhead shrike (*Lanius ludovicia migrans)*

Distribution, Status, and Trend

The loggerhead shrike can be found throughout the United States. The loggerhead shrike is currently listed as "apparently secure" (NatureServe 2003). There are two Georgia Populations; a year round breeding population (relatively small), and a winter population that includes the non-migrant birds along with the birds migrating short distances from the north. Both are high conservation priorities (per conversation Nathan Klaus, June 2003). Point surveys have identified the species within the Jasper and Greene County, which are located within the Ocmulgee-Rum Creek and Oconee River-Greenbrier Creek watersheds. It has a viability ranking of four on the Oconee National Forest.

Habitat Relationships and Limiting Factors

Loggerhead shrikes can be expected to occur near agricultural landscapes where there is open country in the surrounding landscape. There are several acres of pasture and open country in the surrounding area and near the forest that could support a population. These birds are most likely to be found near early-mid successional habitat. Limiting factors or declines in population may be contributed to reforestation and loss of open habitat. Other factors that may add to declines are pesticides and herbicides, wintering habitat quality, and/or dependency on roadside habitat, which may also be associated with high predation pressure (NatureServe 2003).

Potential Management Effects

Management prescriptions listed within the revised plan should be beneficial for this species. Roadways, right of ways, and corridors that provide habitat for this bird are found throughout the Oconee National Forest and adjacent private lines. The revised plan also provides for management of range-lands (which are improved pastures) that could be utilized as habitat. These open areas also provide for needs of the species by containing barbed wire, brambles, and vegetation that provide opportunities for the shrikes to impale their prey. The range allotments where no permits have been re-issued will be maintained as wildlife openings. These large open allotments, along with other wildlife openings, corridors, and roadsides will provide habitat that is suitable for the species by creating a variety of food sources for the species (such as insects, lizards, small rodents, etc). Cumulatively, habitat for this species occurs on both private and federal lands. However, proper management to maintain its preferred habitat is more likely on the forest.

Determination and Rationale

Overall, implementation of the plan is expected to have no impacts to this species because: 1) maintenance of its preferred habitat is expected to occur, and 2) potential for adversely impacting the species is discountable

AQUATIC SPECIES ON THE OCONEE

Altamaha shiner (*Notropis xaenurus*)

Distribution, Status, and Trends

This species occurs in the upper Altamaha River Drainage in north-central Georgia. The only area where this species is known includes both the north-central Ocmulgee and Oconee Systems. From past and surveys in 2003 by the Center for Aquatic Technology Transfer (CATT) team this shiner is known from eleven 5th level watersheds these are: 307010106, 307010107, 307010109, 307010111, 307010110, 307010114, 307010115, 307010116, 307010117, 307010310 and 307010313. This species of fish is listed as imperiled in Georgia (NatureServe 2003).

Habitat Relationships and Limiting Factors

The preferred habitat for this species is rocky and sandy pools in creeks and small rivers. There is existing habitat for this species in the streams on the forest. According to Chris Skelton, identification of the Altamaha shiner was found within the Murder Creek tributary (per conversation on October 20, 2000), which is in Putnam County.

Limiting factors include the loss of water quality and high loads of sedimentation due to erosion. Currently, there is a high rate of urban development and poorly maintained and unpaved road systems within the watershed drainage area where this species is found. Within the Oconee National Forest administrative boundary there are several hundred miles of county road systems and private land development that are creating high rates of sedimentation and erosion. Out of eleven watersheds where this species occurs, six are ranked as excellent and five are ranked as average. There are some opportunities to improve conditions in watersheds where this fish occurs.

Potential Management Effects

Management actions that are most likely to create adverse effects to aquatic species are those that disturb soil or litter, potentially leading to sedimentation, and those that reduce vegetative cover over streams, potentially leading to increased water temperature. The riparian prescription included in the revised plan provides direction designed to maintain or enhance water quality and associated beneficial uses. Therefore, plan implementation should have little potential for adverse impacts to individuals. Cumulatively, many streams on private lands are currently in a degraded state due to increased development and agricultural use, making the presence of quality habitats on National Forest land increasingly important to the species.

Determination and Rationale

Overall implementation of the revised forest plan is expected to have beneficial effects to all aquatic species because: 1) protection measures for streams and riparian zones will provide maintenance of high quality sites occupied by these

species, 2) opportunities exist for the riparian prescription to improve existing conditions.

Ocmulgee shiner (*Cyprinella callisema*)

Distribution, Status, and Trend

This fish is found in a small range of streams in Georgia. In preferred habitat within the Altamaha River watershed, it is locally common. However, it is uncommon in the Ogeechee River watershed. It occurs in all 5th level watersheds on the Oconee National Forest. The CATT team found the Ocmulgee shiner in 9 of 10 streams that were sampled for the fish in September, 2003. This species of fish is currently listed as vulnerable in Georgia (NatureServe 2003).

Habitat Relationships and Limiting Factors

This species is usually found in larger streams in open sand (usually) and/or gravel bottomed channels with little if any vegetation. Sandy and rocky rivers of small to medium size may also contain habitat for this species (NatureServe 2003). Some rivers and creeks on the Oconee are likely to have habitat that would meet these requirement. This fish has been identified by the DNR and the CATT team within the Ocmulgee and Altamaha River drainages. Limiting Factors or threats to this species of fish include pollution, drought, and impoundments (NatureServe 2003). Management actions that would propose or create adverse effects would be those that disturb soil, potentially causing erosion and sedimentation levels to increase. Vegetation alterations from urban development, pollution and agricultural activities within the watersheds would potentially increase sedimentation into streams. Six of the 11 HUCs where this species occurs are ranked as excellent watersheds. Five are average, but some opportunities for watershed quality improvements are possible on the forest.

Potential Management Effects

The riparian prescription included in the Revised Plan provides direction designed to maintain and enhance water quality. Therefore, plan implementation should have little potential for adverse impacts to individuals. Cumulatively, many streams on private lands are currently in a degraded state due to increase development and agricultural use, making the presence of quality habitats on national forest land increasingly important to the species.

Determination and Rationale

Overall implementation of the revised forest plan is expected to have beneficial effects to all aquatic species because: 1) protection measures for streams and riparian zones will provide maintenance of high quality sites occupied by these species, 2) opportunities exist for the riparian prescription to improve existing conditions.

Robust redhorse (*Moxostoma robustrum*)

Distribution, Status, and Trends

This species is known to occur from the Savannah River below Augusta, Georgia and the Pee Dee River in South Carolina. The only known viable population occurs in the Oconee River with approximately 1,000-3,000 adults in a section of the river (NatureServe 2003). This area is south of the Oconee National Forest. This species is ranked as critically imperiled and vulnerable in Georgia (NatureServe 2003). The State Department of Natural Resources reintroduced approximately 4,000 robust redhorse in the Ocmulgee River in 2002. It occurs in HUCs 306010401, 307010310 and 307010313.

Habitat Relationships and Limiting Factors

The preferred habitat for this fish is rocky and sandy pools in warm creeks and small to medium rivers. Fish surveys conducted in September 2003 by the Center for Aquatic Technology Team (CATT) found that the Ocmulgee, Oconee, and Little River areas had potential habitat. However, no robust redhorse was identified. This species can also occur in impoundments. Limiting factors or threats to the species are lack of habitat due to erosion, sedimentation, pollution, and predation (NatureServe 2003). There are limited amounts of habitat that meet the criteria for spawning areas on the forest. Its spawning areas must have small gravel pools free of sedimentation, which is a limited area within the Piedmont. In addition, an introduced species, the flathead catfish (*Pylodictis olivaris*) occurs in some Piedmont streams and it is a known predator of the robust redhorse. All three HUC where this species occurs are ranked as having an excellent watershed condition. Although sedimentation is a potential concern to the species, conditions exist for the forest to make improvements in the watershed under the revised plan.

Potential Management Effects

Management actions most likely to create adverse effects to this fish are those that disturb soil or litter, potentially leading to sedimentation, and those that reduce vegetative cover over streams, potentially leading to increased water temperature. The riparian prescription included in the revised plan provides direction designed to maintain or enhance water quality and associated beneficial uses. Cumulatively, some streams flowing through private lands are in a degraded state, making the presence of this species on the forest increasingly important to the species.

Determination and Rationale

Overall implementation of the revised forest plan is expected to have beneficial effects to all aquatic species because: 1) protection measures for streams and riparian zones will provide maintenance of high quality sites occupied by these species, 2) opportunities exist for the riparian prescription to improve existing conditions.

Inflated floater (*Pyganodon gibbosa*)

Distribution, Status, and Trend

Inflated floaters are endemic to the Altamaha River and Ocmulgee River Drainages. Any major changes to this river system could alter the distribution of this species. This species of mussel is listed as vulnerable within Georgia. (NatureServe 2003). It occurs in HUCs 307010106 and 307010107.

Habitat Relationships and Limiting Factors

The inflated floater is a freshwater mussel that lives in soft mud and sand within sand bars, and it is generally found in slow moving water. The limiting factors and threats to this species include the loss of water quality and high loading of sedimentation due to erosion. Currently, there is a high rate of urban development along with poorly maintained and unpaved roads within the watershed drainage area. Within the Oconee National Forest administrative boundary, there are several hundred miles of county roads and numerous land development projects that are creating soil erosion and sedimentation of streams. Both watersheds where this mussel occurs are ranked in excellent condition, with some opportunities for improving watershed quality where necessary.

Potential Management Effects

Management actions most likely to create adverse effects to this mussel are those that disturb soil or litter, potentially leading to sedimentation, and those that reduce vegetative cover along the stream bank, potentially leading to increased water temperature. The riparian prescription includes in the revised plan provides direction designed to maintain or enhance water quality and associated beneficial uses. Therefore, plan implementation should have little potential for adverse impacts to individuals. Cumulatively, many private lands are currently in a degraded state due to increase development and agricultural use, making the presence of quality habitats on national forest land increasingly important to the species.

Determination and Rationale

Overall implementation of the revised forest plan is expected to have beneficial effects to all aquatic species because: 1) protection measures for streams and riparian zones will provide maintenance of high quality sites occupied by these species, and 2) opportunities exist for the riparian prescription to improve existing conditions.

SENSITIVE TERRESTRIAL ANIMAL SPECIES ON THE CHATTAHOOCHEE NATIONAL FOREST

Peregrine falcon (*Falco peregrinus*)

Distribution, Status and Trend
This raptor is widespread, with many populations in many areas. Since the 1970's, captive breeding and reintroduction programs have had some success, helping to reduce the problems associate with reproduction failure from pesticide poisoning. This threat has been reduced for the most part and populations have recovered in some areas and are increasing in most other areas. It is listed as critically imperiled in Georgia (NatureServe 2003). It has a forest viability ranking FP, possibly could occur on the forest. Viability risk is a 0, not ranked, since it is not known to occur on the forest.

Habitat Relationships and Limiting Factors

This falcon prefers a variety of habitats that include open situations from tundra, seacoasts, especially where there are suitable nesting cliffs, in mountains, open forests and human population centers (AOU 1983). There were old records of a hacking project on the forest but bird failed to return to the original hack site, and despite monitoring follow-ups, none are known to nest on the forest. There are some breeding pairs inside the metro-Atlanta city area. When not breeding, they often occur in areas where prey concentrate, including farmlands, marches, lakeshores broad river valleys, cities and airports. They often nest on ledges, rock face cliffs, and they will utilize man-made structures such as the ledges of buildings (Cade 1987). Threats to this species include loss of wetland habitat for prey abundance, poachers robbing nests, shooting by hunters, food chain contamination, although this threat is now rare (NatureServe 2003).

Potential Management Effects

The revised forest plan should provide adequate protection for this falcon, because if and when this bird chooses a nest site on the forest, preferred habitat along cliffs and rock face locales will be maintained disturbance free and protected. As a result, nesting habitat for this bird is expected to be maintained as a result of implementing the plan. Also, wetlands that this bird prefers to hunt prey in are also protected under direction provided in the plan. Cumulatively, habitat occurring on private lands may not be protected to the same extent, making occurrences on the forest increasingly important to the species.

Determination and Rationale

Overall, if this species occurs on the forest, implementation of the plan is expected to have no impacts on this falcon because: 1) nesting habitat will be maintained and protected, 2) abundance and distribution of wetlands where this bird hunts will be

maintained, and 3) the likelihood of management-induced disturbance to suitable nesting habitat is very low.

Bog turtle (*Clemmys muhlenbergii*)

Distribution, Status and Trend

This turtle ranges from New York and southwestern New England discontinuously to extreme northern Georgia. It is not as rare as once thought, but still uncommon with many occurrences not representative of viable populations. It is considered critically imperiled in Georgia (NatureServe 2003). There is only one record of a bog turtle population on the forest, and it is located on the Wolf Creek Zoological Area on the Brasstown Ranger District. It is given a Forest Ranking of F1, meaning it is extremely rare, with only 1-5 occurrences.

Habitat Relationships and Limiting Factors

This species prefers a moist to wet bog type habitat, and this habitat is uncommon on the forest. All bog habitat areas on the forest have been trapped to determine if bog turtles are present, but none have been found (except for the one site mentioned previously). Habitat manipulation by girdling trees and prescribed burning within bog sites seems to be improving conditions for the turtle. Although it is doubtful there is a viable population on the forest, evidence of reproduction is encouraging. Limiting factors for the species seem to be habitat loss, degradation of habitat, successional changes and urban development (NatureServe 2003).

Potential Management Effects

The implementation of the revised plan provides optimal protection and management for all bogs and bog turtle potential habitat areas on the forest. All know and suspected sites will continue to be protected and carefully managed for the species. As a result, habitat conditions for this species are expected to be maintained and improved over the implementation period of the plan. All project implemented in compliance with the plan present a discountable potential for direct impacts to individuals because: 1) all known and suspected sites will be protected, and 2) the likelihood of this rare species occurrence in any project area other than the stands being treated for habitat improvement is extremely low.

Determination and Rationale

Overall, the implementation of the plan should have no impacts on this turtle because: 1) known and existing bog turtle sites will be fully protected and, 2) potential for adversely impacting individuals is discountable.

Southern Appalachian salamander (*Plethodon teyahalee* or *oconaluftee*)

Distribution, Status and Trend

This salamander has a small range in Georgia, North Carolina, South Carolina and Tennessee, manly in the Blue Ridge physiographic province of North Carolina, but also occurring in north Rabin County, Georgia. It is classified as critically imperiled in Georgia (NatureServe 2003). For the viability analysis, it was given a Forest Rank of F1, meaning it is extremely rare, with 1-5 known occurrences. It has a viability ranking of 3, moderately high risk.

Habitat Relationships and Limiting Factors

Occurs in birch-beech-hemlock forests with witch hazel, mountain laurel and rhododendron understory. This species also utilizes some downed wood on the forest floor. It typically has a retreat hole in which to hide (Nishikawa 1990). The highest densities occur in mature, mesic hardwood forests (Petranka 1998). This salamander was historically threatened by clearcutting. Excessive foot traffic in preferred habitat could also be detrimental to this species (NatureServe 2003).

Potential Management Effects

Although clearcutting may have caused direct and indirect harm to this species in the past, no clearcutting is scheduled under the plan. EIS effects analysis indicates mature mesic hardwoods will be maintained in general distribution and abundance over time, and downed wood is also expected to increase. Limited management activities that provide some canopy gaps and disturb the litter layer may adversely affect a few individuals of this species. However, prescriptions allocated to areas (northern Rabun County) occupied by this species would result in little or no management-induced disturbance of the forest canopies or litter layers. Therefore, plan implementation would result in discountable potential for adverse impacts to individuals to individuals. Because of its limited range, cumulative effects are primarily limited to those occurring on national forest or national park land resulting in relatively low overall risk to the species.

Determination and Rationale

Overall, implementation of the plan is expected to have no impacts on to this species because: 1) suitable habitat is found in abundance within its limited range, and 2) the likelihood of management-induced disturbance of suitable habitat is low.

Rafinesque's big-eared bat (*Corynorhinus rafinesquii*)

Distribution, Status and Trend

This bat is widespread over the southern states, but generally it is at low density and found in scattered locations. It is thought to be declining in many areas (NatureServe 2003). In July and early August, 2001, Dr. Susan Loeb mist netted bats for 40 net nights on 18 locations on the Chattahoochee National Forest. No Rafinesque's big-eared bats were found in 2001. However, from 48 net nights of sampling in 2002, and while netting near a field and a pond in Rabin County, one was netted near Hick's Creek (Loeb, pers. comm.). Bat surveys conducted in the 1980's by researchers from the University of Georgia did not record its occurrence on the

Oconee National Forest. Then another survey done in 2001 in Greene County was conducted, and none were identified with the use of Anabat Sensoring equipment and mist nets. For the viability analysis it was given a Forest Rank of F1, meaning it is extremely rare, with only 1-5 know occurrences. It has a viability ranking of 2 (high risk) for lakeshores, caves and mines, and den trees on the Chattahoochee, and it has an FP (possibly could occur) ranking on the Oconee.

Habitat Relationships and Limiting Factors

Viability evaluation indicates this species uses a variety of habitat components, roosting in caves, hollow trees and other structures. It forages over open water and in riparian areas for the most part. Caves and open wetlands are the habitat components most likely to be limiting due to their rarity on the landscape. Protection of roosts from disturbance is a primary need (NatureServe 2003).

Potential Management Effects

The revised plan provides optimal protection and management for caves, wetlands and lakeshores. All den trees are protected from cutting and are expected to increase over time. Distribution and abundance of late-successional riparian forest would be maintained. Additional standards protect known roost sites of this species. As a result, habitat conditions for this species are expected to improve as a result of plan implementation. Projects implemented in compliance with this plan present a discountable potential for direct impacts to individuals, because: 1) known and potential roosting sites in caves and den trees will be protected, 2) management activities in late-successional riparian forests will be limited, and 3) the likelihood of species occurrence in any project area is low. Cumulatively, many of these habitats on private lands are not likely to be treated so favorably, making their presence on national forest land increasingly important to this species.

Determination and Rationale

Overall, implementation of the plan is expected to have no impacts on this species because: 1) protection measures for caves, den trees and known roosts are incorporated, 2) abundance and distribution of den trees and late-successional riparian forests are expected to improve or be maintained, and 3) potential for adversely impacting individuals is discountable.

Southeastern bat (*Myotis austroriparius*)

Distribution, Status and Trend

This small bat is fairly widespread in the southeastern U.S., but the vast majority of the known population in located in northern Florida. It is considered rare and local outside of the Gulf Coastal Plain (NatureServe 2003). Brown (1997) reported that this bat is adaptable and seems to be holding its own in the southeast. Georgia has 12 old records before 1970, and only one record since 1970 (NatureServe 2003). Recent bat surveys conducted in 2001 and 2002 did not reveal its presence on the Chattahoochee National Forest. It was given a FP Forest Rank, meaning it possibly

could be present on the forest. The viability ranking is a 0, not ranked, since it is not known to occur.

Habitat Relationships and Limiting Factors

This species occurs in caves for the most part, but for maternity colonies outside of the northern Florida area, they are generally smaller and are located in hollow tress and other non-cave sites (NatureServe 2003). These bats use buildings and other structures, mines and hollow trees for spring and summer roosts. They can also roost in small groups over water, in such places as under bridges or in culverts, or in boathouses (Barbour and Davis 1969). Improper cave gating, disturbance by humans, flooding and clearcutting around roost areas may cause local population declines (Gore and Hovis 1992).

Potential Management Effects

The revised plan provides optimal protection and management for caves, wetlands, and lakeshores. All den trees are protected from cutting and are expected to increase in abundance over time. Distribution and abundance of late-successional riparian forests would be maintained. Additional standards protect known roost sites of this species. As a result, habitat conditions for this species are expected to improve as a result of plan implementation. Projects implemented in compliance with this plan present a discountable potential for direct impacts to individuals, because: 1) known and potential roosting sites in caves and den trees are protected, 2) management activities in late-successional riparian forests will be limited, and 3) the likelihood of species occurrence in any project area is low. Cumulatively, many of these habitats on private lands are not likely to be treated so favorably, making their presence on national forest land increasingly important to this species.

Determination and Rationale

Overall, implementation of the plan is expected to have no impacts on this bat species because: 1) protection measures for caves, den trees and known roost sites; 2) abundance and distribution of den trees and late successional habitat, which are expected to be maintained or improved and; 3) potential for adversely impacting individuals is discountable.

Eastern small-footed bat (*Myotis leibii*)

Distribution, Status and Trend

This small bat is fairly widespread in southeastern Canada and eastern United States, but it is very spotty in distribution and rarely found in large numbers. Total numbers counted are very low when compared to the total number of caves and mines surveyed. It is listed as imperiled in Georgia (NatureServe 2003). After 40 net-nights on 18 locations on the forest in 2001, and then again after 48 net nights conducted in 2002, only two individuals were captured each year. It was given a Forest Rank or F1, meaning it is extremely rare, with only 1-5 known occurrences. The viability ranking is a 2 (high risk) for caves and mines and rock outcrops and cliff habitats.

Habitat Relationships and Limiting Factors

Habitat is mostly in hilly or mountainous terrain, in or near deciduous or evergreen forest and near open farmland. Unpublished data from Kentucky Heritage Program indicated summer roosts included caves, coal mines, buildings and bridges over rivers. They also may use hollow trees or spaces under loose bark (NatureServe 2003). Perhaps the most serious threat to cave-dwelling bats is human disturbance during hibernation. Even low levels of light and noise may cause disturbance that depletes energy, and repeated disturbance can cause individuals to perish, especially juveniles (NatureServe 2003).

Potential Management Effects

Plan direction provides for optimal protection and management of caves and wetland foraging areas. All den trees are protected form cutting, and are therefore expected to increase in the future. Distribution and abundance of late-successional riparian habitat forests would be maintained. As a result, habitat conditions for this bat are expected to improve as a result of plan implementation. Plan projects present a discountable potential for direct impacts to individuals because: 1) management-induces activities in late-successional riparian habitats will be limited, 2) known and potential roosting sites are protected, and 3) the likelihood of this species occurrence in any project area is low.

Determination and Rationale

Overall, the implementation of the plan revision is expected to have no impacts on this species because: 1) protection measures for caves, den trees and known roost sites are incorporated, 2) abundance and distribution of den trees and late-successional habitat is expected to be maintained and improved over time, and 3) the potential for adversely impacting individuals is discountable.

Southern water shrew (*Sorex palustris punctulatus*)

Distribution, Status and Trend

This species is reported to occur in Maryland, North Carolina, Pennsylvania, Tennessee, Virginia and West Virginia. Few individuals have been collected, suggesting small population sizes where it does occur. Not reported in Georgia by NatureServe (2003). It has a FP ranking on the forest, which means it possibly could occur, but it has no viability risk ranking, since it is not known to occur.

Habitat Relationships and Limiting Factors

This small mammal is found mainly along mountain streams, especially shaded sections in northern hardwood and sub-alpine forests. It is generally associated with swift, rocky streams, often with moss covered rocks and rhododendron on the banks. General habitat includes creeks, riparian forests with fallen log/debris probably utilized (NatureServe 2003). Possible threats include acidification of habitat due to precipitation, probably linked closely to the availability of aquatic prey. Other threats include fragmentation of suitable habitat, siltation from logging, clearing for agricultural and road building (Handley 1991).

Potential Management Effects

Plan direction provides for optimal protection and management of riparian, wetlands and maintains or increases downed woody debris associated with riparian habitat and late-successional forests. Prescription allocations to areas that might host this species would result in little to no management-induced disturbance of the forest canopy or forest floor. Therefore, the revised plan would result in discountable potential for adverse impacts to individuals. Because of its limited range and small population sizes, cumulative effects are primarily limited to those occurring on the forest or in national park lands resulting in relatively low risk to the species.

Determination and Rationale

Overall, implementation of the plan is expected to have no impacts on the species if it occurs on the forest because: 1) protection measures for preferred habitat are in place, 2) the likelihood of management-induced disturbance of its suitable habitat is very low, and 3) the potential for adversely impacting individuals is discountable.

Southern rock vole (*Microtus chrotorrhinus carolinensis*)

Distribution, Status and Trend

This small rodent occurs in scattered populations in patches of suitable habitat in the Appalachian Mountains. Its status appears to be stable, but little data is available. It is found in Maryland, North Carolina, Tennessee, Virginia and West Virginia (NatureServe 2003). It is not listed as occurring in Georgia, and it therefore ranked FP, which means it possibly could occur on the forest. Viability risk is a 0, not ranked, since it is not known to occur.

Habitat Relationships and Limiting Factors

Rock outcrops and cliffs are considered suitable habitats. Mixed woodlands with burrowing soils and fallen debris are also habitat components. Habitat is generally not suitable for human use or development. Abundance is unknown due to insufficient sampling, and the U.S. Fish and Wildlife Service has concluded that too little is known to access population trends and it is categorized as “stable” (NatureServe 2003).

Potential Management Effects

Forest plan implementation might include some high elevation canopy gap restoration to restore some early successional habitat. None of this type of habitat restoration will be scheduled for rock outcrop and cliff line areas. If this rodent does occur on the forest, plan implementation would result in discountable potential for adverse impacts to individuals. Because of its limited range, cumulative effects are mainly limited to those occurring on national forests or national park land in the Appalachian Mountains, resulting in relatively low overall risk to the species.

Determination and Rationale

Overall, plan implementation is expected to have **no impacts** on the species, if it does occur on the forest because: 1) protective measures along rock outcrops and cliff lines will help protect habitat, and 2) the likelihood of management-induced disturbance of suitable habitat is very low.

Diana fritillary butterfly (*Speyeria Diana*)

Distribution, Status and Trend

This butterfly occurs throughout the southern Appalachians. There are historic reports of this species in White, Union, Fannin, Habersham and Rabun Counties (Harris 1972). For the past decade, this species has been observed in numerous locations throughout the forest and on private land in a variety of different habitats (C. Wentworth, personnel observations). This insect is classified as imperiled in Georgia (NatureServe 2003). It has a forest ranking of F3, meaning rare and uncommon on the forest, with 21-100 occurrences. Viability risk is a 5, low risk in mature, mesic hardwood forests and canopy gap habitats.

Habitat Relationships and Limiting Factors

Opler (1992) states that males may use a variety of habitats, but primary habitat consists of openings and fields in wet, rich woods. Roads and other openings in moist woods provide nectar plants for this butterfly (Broadwell 1993). Violets serve as the host plant for the larvae stage of this butterfly (Scott 1986). Violets are found throughout the forest, with some occurring in early successional habitat, and others occurring in more mature forest. A major factor in Diana's rarity is due to gypsy moth eradication programs, and not a lack of nectar plants or violets for the larvae development stage (NatureServe 2003).

Potential Management Effects

Efforts to restore canopy gaps and maintain some early successional habitats in a variety of different forest and grassland area should help provide, maintain and even increase foraging areas for this butterfly. Activities used to achieve and maintain this restoration may disturb individuals in the short term, but they should improve overall habitat conditions in the long run. This is not a highly visible species and it is not likely to be given much attention on private lands within its range. For this reason, protecting and maintaining habitat on the forest is likely to be important in moderating cumulative effects from non-protective lands out side of the forest.

Determination and Rationale

Plan implementation is expected to have no impact on this species due to maintaining, restoring and increasing open areas that provide foraging plants for this insect to utilize.

Barrens tiger beetle (*Cicindela patruela)*

Distribution, Status and Trend

This insect ranges from the Midwest, to the mid-Atlantic region and then down through the Appalachian chain to North Carolina. This species has a limited and somewhat ephemeral habitat type, existing is small populations. It is not listed as occurring in Georgia (NatureServe 2003), but there are records of its occurrence in Rabun and White Counties, Georgia. It is ranked as FP on the forest, meaning it has a possibility of occurring on the forest. Its viability risk is 0, meaning not ranked because no populations are known on the forest.

Habitat Relationships and Limiting Factors

This beetle has a specialized habitat, usually made up of sandy/course gravel or eroding sandstone. It is usually found in pine-barrens or open, mixed deciduous woodlands with open ground, such as that found along trails, outcrops or ridge openings dominated by lichens and dry mosses. The main threat to this species is habitat destruction from deforestation or fire suppression and ecological succession can also eliminate some habitats (NatureServe 2003).

Potential Management Effects

Habitat for this species occurs on the forest and project-level analysis will help ensure that activities will not impact populations. Individual and cumulative activities will not result in a trend toward listing and will not cause a loss of viability. This species is somewhat obscure and probably will not be given attention on private lands. For this reason, protective efforts on the forest will be important to moderating cumulative effects to populations that may occur on the forest.

Determination and Rationale

Implementation of the forest plan may impact individuals, but is not likely to cause a trend toward listing or loss of viability. Because of the obscure nature of this beetle, some general activities may harm an individual (if it does occur on the forest) along a trail or in an opening, but habitat destruction that would effect a population is not likely.

Tiger beetle (*Cicindela ancocisconensis*)

Distribution, Status and Trend

This insect is found from Quebec and western Maine and New York, Pennsylvania to Georgia and west into Ohio (Pearson et al. 1997). NatureServe (2003) does not list it as occurring in Georgia. There is however, one reported occurrence of this species in Rabun County, Georgia. It has a ranking of FP, for “possibly could” occur on the forest. It is ranked 0 for viability ranking, “unranked” as it is not known to occur on the forest.

Habitat Relationships and Limiting Factors

This beetle is a habitat specialist, preferring open sand and cobble material near medium sized rivers. It is usually associated with rocky, mountain streams in partially shaded areas and sand bars. Because they are such habitat specialists, they are spotty in most of their range and somewhat declining.

Potential Management Effects

The plan direction provides for adequate protection and management of riparian and streamside management zones. Therefore, plan implementation would result in discountable potential for adverse impacts to individuals. Because of its limited range and specialized habitat requirements, cumulative effects are primarily limited to those occurring mainly on the forest and this should result in relatively low overall risk to the species if it does occur on the forest.

Determination and Rationale

Overall, implementation of the plan is expected to have no impacts on this species if it does occur on the forest because: 1) protective measures for riparian zones are in place, 2) the likelihood of management induced disturbance of suitable habitat is low, and 3) the potential for adversely impacting individuals is discountable.

SENSITIVE PLANTS ON THE CHATTAHOOCHEE NATIONAL FOREST

A liverwort (*Pellia appalachiana*)

Distribution, Status and Trend

This non-vascular plant is known from northernmost South Carolina and Georgia, adjoining the North Carolina border. It was also reported from eastern Minnesota. This taxon may represent a partially stabilized hybrid species. It is unranked in Georgia (NatureServe 2003). It has a forest ranking of F1, extremely rare on the forest, with only 1-5 occurrences. It has a viability risk of high for rock outcrops and cliffs, and a 3, moderately high risk ranking for late successional riparian habitat.

Habitat Relationships and Limiting Factors

This species occurs in permanently damp to wet soils, mostly where submersion will not occur, but where plants are not subject to drought (NatureServe 2003). This plant is intrinsically threatened by its limited distribution (Southern Appalachian Species Viability Project 2002).

Potential Management Effects

Management actions that would most likely create adverse impacts to this species are those that would disturb the wet or damp soils where this species is expected to occur. Damp rock outcrop and cliff lines areas and moist, late successional riparian habitat provide the most likely habitat for this plant, and the revised plan has protective measures outlined in the management prescriptions to protect these habitats types from excessive disturbance. Cumulatively, the same level of protection

for these types of habitats are not ensured on private lands, making the presence of this plant on the forest all that much more important to the species.

Determination and Rationale

Overall, the implementation of the revised plan is expected to have **no impacts** on this species because: 1) protection of preferred habitat will take place, and 2) potential for adversely impacting individuals is discountable.

A liverwort (*Acrobolbus ciliatus*), A liverwort (*Lejeunea blomquistii*), A liverwort (*Nardia lescurii*)

Distribution, Status, and Trend

These species occur in the Southern Appalachians. In Georgia, they are known to occur on the spray cliff communities of the Chattooga River Basin in Rabun County. They were collected in the summer of 1995 during an inventory of these communities (Zartman and Pittillo 1995). *A. ciliatus* and *L.blomquistii* were given a Forest Rank of F1, meaning they are extremely rare, with 1-5 known occurrences. The viability risk ranking for these is a 3 (moderately high risk) for late successional riparian habitat. *N. lescurii* has a forest ranking of F2, which mean it is very rare, with 6-20 occurrences. It has a viability risk ranking of moderately high risk for spray cliff habitat.

Habitat Relationships and Limiting Factors

These species are known to occur in waterfall spray zones on cliffs behind or near the falls (Zartman and Pittillo 1995).

Potential Management Effect

Plan direction provides protection for wet areas, including waterfall spray zones. Prescription allocations to areas occupied by these species would result in no management-induced disturbance of the wet surface where these plants are found. Therefore, plan implementation would result in discountable potential for adverse impacts to the individuals occurring on the forest.

Determination and Rationale

Overall, implementation of the plan is expected to have no impacts on this plant species if it occurs on the forest because: 1) protection measures for preferred habitat are provided, 2) the likelihood of management-induced disturbance of suitable habitat is low, and 3) the potential for adversely impacting individuals is discountable.

A liverwort (*Drepanolejeunea appalachiana*)

Distribution, Status and Trend

This liverwort is known from the southern Appalachians in North Carolina, South Carolina, Virginia, Tennessee and Georgia. It also has one occurrence in Puerto Rico. It is unranked in Georgia by NatureServe (2003). It has a F1 ranking on the forest,

meaning it is extremely rare, with only 1-5 occurrences. The viability risk ranking is a 3 (moderately high risk in late successional riparian areas, and a 1 (very high risk) for mature hemlock forest habitat.

Habitat Relationships and Limiting Factors

This plant is usually restricted to sites near flowing water. It is found in gorges, mainly on the bark of twigs and branches (NatureServe 2003). Its limited distribution puts it at high risk, viability wise (Southern Appalachian Species Viability Project 2002).

Potential Management Effects

The revised forest plan provides for optimal protection of riparian and gorge habitat where this species might occur. Current distribution and increased abundance of late successional riparian habitats in the future should be maintained. As a result, habitat conditions for this plant are expected to improve as a result of plan implementation. Cumulatively, many of these habitats on private lands are not likely to be protected, making their presence on the forest increasingly important to the species.

Determination and Rationale

Overall, implementation of the revised plan is expected to have **no impacts** on this species because: 1) preferred habitat will be protected and abundance should increase, and 2) potential for adversely impacting individuals is discountable.

Gorge leafy liverwort (*Plagiochila caduciloba*)

Distribution, Status and Trend

This liverwort has a narrow range in the southern Appalachians. It is known from 21 extant occurrences, most of them in North Carolina where the center of its range is located (NatureServe 2003). It has a forest ranking of F1 (extremely rare) having only 1-5 occurrences. The viability rankings for this species are a 3 (moderately high risk) for mature, mesic hardwood forests, and a 2 (high risk) for rock outcrops and cliff habitats.

Habitat Relationships and Limiting Factors

This species most often occurs on shaded, damp rocks (vertical rock walls or undersurface of ledges), usually in areas with high humidity. It often is near the edge of cascading streams or near waterfalls that receive no direct sunlight, near the spray zone, but not directly in it. It is threatened by development (NatureServe 2003).

Potential Management Effects

The plan provides for direction to ensure that habitats preferred by this species will be protected. Cumulatively, such moist areas around cliffs and rock outcrops may not receive such protection on private land. Therefore, their presence on the forest will become increasingly important for the species.

Determination and Rationale

Implementation of the revised plan should have no impacts on this species because the likelihood of disturbing its habitat is discountable, due to protective measures in place.

A liverwort (*Plagiochila echinata*)

Distribution, Status and Trend

This species is known from North Carolina, South Carolina and Tennessee. It is not known to occur on the forest, so it has a FP ranking, meaning it could possibly occur on the forest. There is no viability ranking for this species since it is known to occur on the forest.

Habitat Relationships and Limiting Factors

This species of liverwort is found on moist, shaded rock faces and crevices in mountain gorges, above cascades and near waterfalls (Hicks 1992). It is also associated with rock outcrops and cliffs. It probably is threatened by habitat alteration as a result of development, and its narrow range.

Potential Management Effects

Waterfalls, cliff lines and riparian-type habitats (areas where this species is expected to occur) will be protected by directives in the revised forest plan. Cumulatively, habitats found on private lands might be developed and not protected to the same extent, meaning that their presence on the forest will be increasingly important if they occur on the forest.

Determination and Rationale

Overall, implementation of the revised plan is expected to have **no impacts** on the species if it does occur on the forest because: 1) its moist habitat where is likely to occur will be protected, and 2) the potential for development or disturbance of its habitat is discountable.

A liverwort (Radula sullivantii)

Distribution, Status and Trend

This species of liverwort is endemic to the Appalachian mountains of North Carolina, South Carolina, Georgia and Tennessee (Hicks 1992). It is ranked as F1 on the forest, meaning it is extremely rare, with only 1-5 occurrences. It has a viability risk ranking of 2 (high risk) for spray cliffs and rock outcrops, and a 3 (moderately high risk) for late successional riparian habitat.

Habitat Relationships and Limiting Factors

This liverwort plant is known from shaded rock outcrops around streams and waterfalls in the mountains (Hicks 1992). It is probably threatened by development.

Potential Management Effects
The EIS effects analysis for the revised plan indicates that waterfalls, and habitat associated with riparian habitats preferred by this species will be protected. Cumulatively, the same level of protection on private lands is not likely, making its presence on the forest increasingly important to the species.

Determination and Rationale
Overall, plan implementation is expected to have **no impacts** on the species because its preferred habitat will be protected.

A liverwort (*Riccardia jugata*)

Distribution, Status and Trend
This southern Appalachian endemic is found in Tennessee and North Carolina (Hicks 1992). It has no ranking of status in Georgia because it is not known to occur there. Because it was found in North Carolina, which was within 0.1 mile of the Georgia border, it has potential to occur on the forest.

Habitat Relationships and Limiting Factors
This liverwort is found on moist wood and humus layers in moist areas and humid gorges. Limiting factors would probably include development and habitat alterations caused by urban-interface into the Appalachian Mountains.

Potential Management Effects
The revised forest plan provides for the protection of gorges and other wet areas where this species would be expected to occur. If it does occur on the forest, it will be protected. Since the same level of habitat protection is not available on private lands, cumulatively its presence on the forest would be important for the species.

Determination and Rationale
Overall, implementation of the plan is expected to have **no impacts** on this species if it is found on the forest, because: 1) preferred habitat will be protected, and 2) potential for adversely impacting individuals if they do occur on the forest is discountable.

Georgia aster (*Aster georgianus*)

Distribution, Status and Trend
The Georgia aster is known from the Carolinas, Alabama, Florida, and Georgia (NatureServe 2003). Georgia aster is a species of the southeastern U.S. with about 60 known populations. Most of these are small, consisting of stands of only 10-100 stems. Many populations are vulnerable to accidental destruction from road maintenance activities such as herbicide application, and from road expansion. Other populations are threatened by residential development and/or encroachment of invasive exotic plants. On the Chattahoochee National Forest, it is found primarily on

road banks. It was given a Forest Rank of F2, meaning it is very rare, with 6-20 known occurrences on the Chattahoochee. The viability risk ranking of 3 (moderately high risk was given for woodlands, savannas and grassland habitat, and it was assigned a 2 (high risk) for glade and barren habitats. On the Oconee, it is ranked as FP, possibly could occur. It has a viability risk ranking of 0, since it is not known to occur on the Oconee National Forest.

Habitat Relationships and Limiting Factors

Weakley (2000) describes Georgia aster habitat as dry, rocky woodlands and borders, road banks, power line rights-of-way, primarily in places that formerly would have burned and likely been post oak or blackjack oak. This plant is probably a relict species of the post oak-savanna communities that existed in the region prior to fire suppression and the eradication of large native grazing animals (Nature Serve 2003).

Potential Management Effects

The revised plan provides opportunities to expand populations by enhancing existing oak-savanna habitat. Adequate project-level analysis will be completed to ensure activities do not result in a loss of viability. This plant is rare on the forest, and protective measures are important to help moderate cumulative effects to any populations that might occur on private land.

Determination and Rationale

Plan implementation is expected to have no impacts on this species because oak-savannah habitat will be enhanced and expanded, and adverse effects to known individuals will be avoided through project-level analysis.

Georgia rockcress (*Arabis georgiana*)

Distribution, Status and Trend

Populations of Georgia rockcress are known from the Gulf Coastal Plain, Piedmont, and Ridge and Valley physiographic provinces of Alabama and Georgia (USFWS 2000). Extensive searches have been conducted for this species throughout these provinces in Alabama and Georgia for over 5 years (Allison 1995). Georgia rockcress is rare throughout its range. Allison (1995) surveyed 205 sites over nine counties in Georgia and discovered only four new populations. During surveys, Allison (1999) found that populations of this species typically have a limited number of individuals restricted over a small area. Of the nine known populations in Georgia, six of them consist of only 3 to 25 plants; the remaining three populations have 51 to 63 individuals (Allison 1995). No known populations of Georgia rockcress occur on the Chattahoochee National Forest. It is given a FP ranking, meaning it possibly could occur on the forest. It therefore, has no viability risk ranking.

Habitat Relationships and Limiting Factors

Georgia rockcress grows in a variety of dry situations, including shallow soil accumulations on rocky bluffs, ecotones of gently sloping rock outcrops, and in sandy loam along eroding riverbanks. It is occasionally found in adjacent mesic woods but it

will not persist in heavily shaded conditions. This species is adapted to high or moderately high light intensities and occurs on soils that are circumneutral, to slightly basic (Allison 1995, Allison in litt. 1999, Patrick et al. 1995).

Potential Management Effects

The primary threat to this species is the ongoing degradation of its habitat. Disturbance of most of the known sites has provided opportunities for the invasion of aggressive exotic weeds, especially Japanese honeysuckle (*Lonicera japonica*). Disturbance, associated with timber harvests, road building, and grazing may create favorable conditions for the invasion of exotic weeds that compete with this species. Efforts to restore canopy gaps and create some early successional habitat should increase habitat for this species. Some individuals may be disturbed in the short term, but it should improve habitat for this plant in the future.

Determination and Rationale

Plan implementation is expected to have no impacts on this species if it does occur on the forest, because some disturbance-dependant habitat will be restored, and adverse effects to the population will be avoided through project-level analysis.

Spreading yellow false foxglove (*Aureolaria patula*)

Distribution, Status, and Trend

This plant has a limited range in central Kentucky and Tennessee, south to Alabama and Georgia. Many previously unknown populations were found in Kentucky during the 1995 field season and the species is now considered to be fairly secure there. It is considered critically imperiled in Georgia (NatureServe 2003). It has FP ranking for the forest, meaning it possibly could occur on the forest. It has viability risk ranking of 0, meaning it is unranked since it is not known to occur on the forest.

Habitat Relationships and Limiting Factors

This species prefers moist, shady soils for the most part. Logging is said to destroy overstory shading and then allow invasion of exotic weeds. Erosion from unrestricted development is probably detrimental also. This plant has a narrow range with limited habitat and some habitats along rivers may have been lost (Southern Appalachian Species Viability Project 2002).

Potential Management Effects

Plan direction provides for optimal protection and management of areas with moist soils and riparian habitat. Prescriptions allocated to these kinds of areas with these plants would result in little to no management-induced disturbance of the forest canopy. Therefore, plan implementation would result in discountable potential for adverse impacts to individuals. Because of its limited range, cumulative effects are primarily limited to those on the forest, resulting in relatively low overall risk to the species.

Determination and Rationale

Overall, implementation of the plan is expected to have a no impacts on this plant if it does occur on the forest, because: 1) protective measures for moist soil habitats are in place, and 2) the likelihood of management-induced disturbance of suitable habitat is low.

American barberry (*Berberis canadensis*)

Distribution, Status, and Trend

This species distribution is the Southeast United States: Georgia, North Carolina, Tennessee, Virginia, and West Virginia, with scattered, and remnant populations in Illinois, Indiana, Kentucky, and Missouri. It is considered extirpated from Alabama (NatureServe 2003). There are no known occurrences of this species on the Chattahoochee National Forest. It is given a FP ranking on the forest, which means it possibly could occur on the forest. It has a viability risk ranking of 0, meaning it is unranked, since it is not known to occur on the forest.

Habitat Relationships and Limiting Factors

This species occurs in open woods, on bluffs and cliffs and along river banks in the eastern and central United States (Gleason and Cronquist 1991, Cook et al. 1987, Fernald 1970, Small 1933). Formerly an inhabitant of savannas and open woodlands, fire suppression has significantly restricted its habitat to sites with shallow soil (such as glades and cliffs) or areas with mowing or other canopy-clearing activities (such as powerline corridors, railroad/road right-of-ways and riverbanks).

Potential Management Effects

Habitat for this species needs protection from urbanization, agricultural activities, destructive recreational activities, land development, indiscriminate pesticide application, excessive grazing and exotic species. Management for this species should include the use of prescribed fire, selective thinning of the canopy or controlled mowing in order to maintain high light levels and eliminate woody plant encroachment (NatureServe 2003). Efforts to restore some canopy gaps and the use of planned controlled burning should increase habitat for this species.

Determination and Rationale

Plan implementation is expected to have no impacts on this species, if it happens to occur on the forest, because of the use of prescribed fire, selective thinning of the canopy or controlled mowing that should help maintain high light levels and eliminate woody plant encroachment.

Mountain bittercress (*Cardamine clematitis*)

Distribution, Status, and Trend

Mountain bittercress is endemic to the southern Appalachians, is restricted to a high elevation riparian habitat, and its response to documented threats to its habitat are unknown (NatureServe 2003). There are no known occurrences of this species on

the Chattahoochee National Forest. It was given a FP ranking for possibly could occur on the forest. The viability risk ranking is 0, since none are known to occur on the forest.

Habitat Relationships and Limiting Factors

This plant is associated with mossy or moist soils that occur in, or along rocky stream banks or seeps within spruce and spruce-fir-hardwood forests at elevations above 4000 feet.

Potential Management Effects

It is threatened by land-use conversion, habitat fragmentation, and forest management practices (NatureServe 2003).

Determination and Rationale

There are no known occurrences of this species on the Chattahoochee National Forest. Plan implementation is expected to have no impacts on this species because if this plant does occur on the forest, adverse effects to known individuals will be avoided through project-level analysis.

Biltmore sedge (*Carex biltmoreana*)

Distribution, Status and Trend

Globally, there are a number of occurrences, with a number of populations adequately protected. It occurs in Georgia, North Carolina, South Carolina and Virginia. In Georgia, it is listed as critically imperiled by NatureServe (2003). It is ranked as F1 (extremely rare) on the forest, with 1-5 occurrences. The viability risk ranking for this plant is a 2, high risk.

Habitat Relationships and Limiting Factors

Habitat seems to be rocky areas. There is a potential for impacts to the plants by rock climbers (Southern Appalachian Species Viability Project 2002).

Potential Management Effects

EIS effects analysis indicates that steep and rocky habitats likely to host this sedge will be protected. Adequate project-level analysis will be important since protection on private lands is not likely. For this reason, as well its apparently narrow distribution in Georgia, protective efforts on the forest are likely to be important to moderate cumulative effects elsewhere.

Determination and Rationale

Implementing the plan should have **no impacts** on the species because: 1) protective measures for preferred habitat are included, and 2) the likelihood of management-induced disturbance of suitable habitat is low.

Fort Mountain sedge (*Carex communis* var. *amplisquama)*

Distribution, Status and Trend

This species occurs frequently (but local) across its range, which includes North Carolina, South Carolina, and Georgia. It is listed as vulnerable in Georgia (NatureServe 2003). It has a forest ranking of F1 on the forest, with a viability risk ranking of /2/.

Habitat Relationships and Limiting Factors

This species occurs in upland oak-hickory-pine forests (Georgia DNR, Natural Heritage Program). Clearcutting may reduce and impact habitats for this species (Southern Appalachian Viability Project 2002).

Potential Management Effects

Adequate project-level analysis will be important to ensure that activities do not result in a trend toward listing or loss of viability. This sedge is obscure and may be overlooked on private lands. For this reason, as well as its apparently limited range in Georgia, protective measures on the forest are likely to be important to moderate cumulative effects to the population.

Determination and Rationale

Implementation of the plan may impact individuals, but is not likely to cause a trend toward listing or loss of viability. Impact to individuals is possible, since this plant occurs in general areas. Project level analysis will help ensure no loss of viability for the species.

Mountain witch alder (*Fortergilla major*)

Distribution, Status and Trend

This shrub is distributed from Arkansas to Alabama, Tennessee, Georgia, and North Carolina, where it occurs associated with mid-elevation, dry, ridgetop forests in the mountains, as well as upper slopes in the Piedmont (Weakley 2000). This species is rare throughout its range (NatureServe 2003). Despite 11 years of plant inventories, the mountain witch alder has only been found in 1 roadside location on the Chattahoochee Forest. It was given a Forest Rank of F1, meaning it is extremely rare, with 1-5 known occurrences. It has a viability risk ranking of 3 (moderately high risk) for late successional riparian and mature oak forests, and a 2 (high risk) for woodlands, savannas and grasslands on the forest.

Habitat Relationships and Limiting Factors

Radford et al. (1983) describe the species' habitat as dry woods.

Potential Management Effects
Because of its rarity, identification and protection of known sites during project planning is important for providing opportunities for population protection and expansion. Cumulatively, this type of protection is not likely on private lands.

Determination and Rationale
Plan implementation is expected to have no impacts on this species because it will be protected, and any adverse effects to known individuals will be avoided through project-level analysis.

Smith's sunflower (*Helianthus smithii*)

Distribution, Status and Trend
This plant has been documented in Alabama, Tennessee, and Georgia. GNHP records show there is only 1 historical location known of this species on the Chattahoochee, despite 11 years of plant inventories. It is located in a protected, designated botanical area. It has a forest ranking FH, which means it has historical occurrence on the forest, and it may be rediscovered. Viability risk ranking is 0, unranked, since it currently is not known to occur on the forest.

Habitat Relationships and Limiting Factors
This plant is found primarily in open, oak-hickory-pine uplands. Soils are well-drained, dry sands, sandy loams, or sandy clay loams (NatureServe 2003).

Potential Management Effects
Kral (1983) states that thinning or cutting the overstory may be beneficial to the species. Efforts to restore canopy gaps and creating early successional habitat should help increase potential habitat for this plant. Protective and proactive management efforts on the forest are likely to be important to moderate cumulative effects to the populations that might occur elsewhere.

Determination and Rationale
Plan implementation is expected to have **no impacts** on the species because of some disturbance-dependant habitat that will be restored. Adverse effects to the population will be avoided through project-level analysis.

Fraser's loosestrife (*Lysimachia fraseri*)

Distribution, Status, and Trend
Although rare throughout its range, Fraser's loosestrife can be found locally in populations of over 500 individuals. Many occurrences are stable, and the plant is not very vulnerable to extinction in some locations (NatureServe 2003). This species is distributed throughout the central and southeastern United States, reaching its northwestern limit in the extreme southern tip of Illinois (Herkert 1991) and extending from there into Kentucky, Tennessee, North and South Carolina, Georgia,

and Alabama (Simpson et al. 1983). There are 5 sites of the Fraser's loosestrife on FS land in Georgia. An additional 5 populations are known on islands in the Chattooga River, and 3 on the banks of the Chattooga. It has a forest ranking of F1, meaning it is extremely rare, with only 1-5 occurrences on the forest. It has a viability risk ranking of 3 (moderately high risk) for mature oaks and canopy gap habitats, with a 2 (high risk) for woodlands, savannas and grasslands.

Habitat Relationships and Limiting Factors

This plant is generally found in wet areas such as alluvial meadows, moist stream and riverbanks, flats along streams, moist pastures, and roadside ditches (Herkert 1991). It is also known from rocky upland and hardwood forests (Weakley 1994) and alluvial soil (Radford et al. 1968). The greatest threats to populations in general are shading and competition from successional growth. However, streamside populations can also be threatened by disruption of hydrological processes, and roadside populations are threatened by road maintenance and construction (NatureServe 2003).

Potential Management Effects

Fraser's loosestrife is largely a disturbance plant. It often occurs in areas where a disturbance regime, such as periodic fire or flood, creates and maintains favorable habitat (NatureServe 2003). Management that mimics natural processes, such as cutting and mowing, has been demonstrated to be beneficial to populations of this species (NatureServe 2003).

Determination and Rationale

Plan implementation is expected to have no impacts on this species because disturbance-dependent habitats will be restored, and adverse effects to known individuals will be avoided through project-level analysis.

Ash-leaf bush pea (*Thermopsis mollis var. fraxinifolia*)

Distribution, Status, and Trend

A Southern Appalachian endemic, this species is known from three to five occurrences in Tennessee, all occurring on roadsides in the Cherokee National Forest. During analysis for the species, Ivey (2001) found 4 locations of the plant on the forest in Rabun, Murray, and Gilmer Counties in Georgia. In addition, there are historical records on the forest from Fannin and Lumpkin Counties. It is ranked as a F1, meaning it is very rare.

Habitat Relationships and Limiting Factors

Ivey (2002) states that the habitat for the species is primarily montane, oak-hickory forest or in other oak-dominated forests. Ivey (2002) also notes the ash-leaf bush pea can occur along shaded roadsides, and several of the populations found on the Chattahoochee occur in this habitat.

Potential Management Effects

This plant is potentially a victim of habitat loss and lack of disturbance (a speculative threat - it seems to need edges). It may also be threatened by unknown causes of decline, but the characteristics of pre-human influenced populations are unknown (NatureServe 2003). Because of its rarity, identification and protection of known sites during project planning is important for providing opportunities for population expansion.

Determination and Rationale

Plan implementation is expected to have no impacts on this species because any adverse effects to known individuals will be avoided through project-level analysis.

Miserable sedge or Wretched sedge (*Carex misera*)

Distribution, Status, and Trend

This species distribution is the Southeast United States, found in Georgia, North Carolina, and Tennessee. It is listed as critically imperiled in Georgia (NatureServe 2003). Patrick et al. (1995) report its range is the Southern Appalachian Mountains of Georgia, North Carolina and Tennessee, with a record of occurrence from one county in Georgia. It has a forest raking F1, extremely rare, with only1-5 occurrences on the forest. The viability risk ranking is 1 (very high risk) for bogs, fens, seep, and seasonal ponds, and a 2 (high risk) for rock outcrops and cliffs.

Habitat Relationships and Limiting Factor

This plant is found at high elevations on seepy, granitic rock ledges and landslide slopes. It is associated with northern hardwoods, such as yellow birch and sugar maple, and understory heaths with huckleberry, mountain laurel and rhododendron (Patrick et al. 1995). It may also be found in mountain balds.

Potential Management Effects

Wretched sedge has narrow leaves and clumped habitat that resembles many other grasslike plants. This plant will tolerate only hand thinning of shading trees in its immediate vicinity. It is usually found in locations that are too rocky for mechanized logging equipment (Patrick et al. 1995). The main threat to this plant is direct disturbance. Efforts to restore some canopy gaps at higher elevations for early successional species may occur in areas near where this species might occur. However, management-induced activities are not likely to occur in habitats preferred by this species. Project-level analysis will help ensure protection of this plant in the higher elevation management prescription areas. Cumulatively, and because this plant is fairly obscure and not easy to identify, populations found on private lands will probably not be afforded protective status, making its presence on the forest that much more important.

Determination and Rationale

Overall, implementation of the revised plan is expected to have no impacts on this sedge species because: 1) protection measures are in place for high elevation, steep

slope areas that this plant prefers, and 2) the potential for adversely impacting individuals is discountable.

Roan Mountain sedge (*Carex roanensis)*

Distribution, Status, and Trend

This sedge is known from 4 recently (since 1985) verified populations, 2 in Tennessee, and 1 each in North Carolina and Georgia. It is also known from Virginia, where it is apparently less rare. All the non-Virginia known populations are small, and the plants are not abundant anywhere (NatureServe 2003). It has a forest ranking of F1, extremely rare with 1-5 occurrences. It has a viability risk ranking of 3 (moderately high risk) within mature, mesic hardwood forest habitats.

Habitat Relationships and Limiting Factors

This plant is usually found in rich soils of mesic forests. It is associated with beech and birch trees up to an elevation of approximately 4700 feet (NatureServe 2003).

Potential Management Effects

The EIS effects analysis indicates this species is found in mature, mesic hardwood habitats at higher elevations and it will be maintained, protected and maintained over most of the forest. Adequate project-level analysis will be done prior to any projects where this species might occur. This plant is probably not likely to get protective status on private lands. For this reason, as well as its apparently narrow distribution with small populations, protective measures on the forest are likely to be important to moderating cumulative effects to the population.

Determination and Rationale

Overall, implementing the plan should have **no impacts** on this species because preferred habitat in higher elevation will be protected.

Broadleaf tickseed (*Coreopsis latifolia*)

Distribution, Status, and Trend

This species is found in the Southeastern U.S. known from the Blue Ridge Mountains, occurring in western North Carolina southward into South Carolina, northeastern Georgia and Tennessee (NatureServe 2003). It has a forest ranking of F1, extremely rare, with only 1-5 occurrences on the forest. The viability risk ranking is a 2 (high risk) for mature high elevation, mesic hardwood forests, and a 3 (moderately high risk) for mature mesic hardwood forest habitats.

Habitat Relationships and Limiting Factors

This plant grows in rich, moist, deep, well-drained and shaded, sandy loam soils. Threats to this species include habitat alteration, agriculture, some silvicultural practices, roadside maintenance and widening of road banks (Sutter 1989).

Potential Management Effects
If some activity is planned for habitats associated for this species, adequate project level analysis will be important to ensure that any activity, individually or cumulatively, does not result in a trend towards listing or result in a loss of viability.

Determination and Rationale
Overall, implementation of the plan is expected to have **no impacts** on this plant species if it occurs on the forest because: 1) protection measures for preferred habitat are provided, 2) the likelihood of management-induced disturbance of suitable habitat is low, and 3) the potential for adversely impacting individuals is discountable.

Harpers wild ginger (*Hexastylis shuttleworthii var. harperi*)

Distribution, Status, and Trend-
This plant is endemic to Southeastern U.S. in Alabama, Mississippi and Georgia (NatureServe 2003). It is mainly a coastal plain species occurring in Piedmont Plateau of Georgia nearly to South Carolina. It has been recorded from 20 counties in Georgia (Patrick et al. 1995). It has a forest rating of F3.

Habitat Relationships and Limiting Factors
This plant is usually found on peaty soils at the edges of forested bogs on the Piedmont. Moist hammocks and bases of bluffs on forest slopes along and within floodplains of the coastal plain are habitat preferences (Patrick et al. 1995). It is also found on the Chattooga Ranger District along a streamside zone associated with mesic forest associates (C. Wentworth pers. observation). It is threatened by hardwood forest degradation, drainage and conversion of wetlands and development activities (Southern Appalachian Species Viability Project 2002).

Potential Management Effects
The revised forest plan provides protection for habitat associated with this species for the most part. Distribution and abundance of mature mesic habitat associated with peaty soils, bogs or riparian areas will be maintained over time. As a result, habitat conditions for this species are expected to improve as a result of plan implementation. Projects implemented in compliance with this plan present a discountable potential for direct impacts to individuals because: 1) management activities within mature mesic sites in wet areas will be minimal or non-existing, and 2) adequate project level analysis prior to implementing management activities will help assure protection of these plants. Cumulatively, some of the habitats occupied by this plant may not receive the same level of protection on private lands, making their presence on the forest increasingly important.

Determination and Rationale
Plan implementation is expected to have no impacts on this plant species because: 1) habitat preferred by this species will be protected by riparian prescription

direction, and 2) potential for adversely impacting individuals is discountable after project-level analysis is conducted.

Taylor's filmy fern or Gorge filmy fern (*Hymenophyllum tayloriae)*

Distribution, Status, and Trend

This species occurs in the Southern Appalachian Mountains in Tennessee, Georgia, Alabama, and South Carolina. Only a few, extremely small sites have been found (NatureServe 2003). It has a forest ranking of F1, meaning it is extremely rare with only 1-5 occurrences known on the forest. It has a viability ranking of 2, which is high risk within rock outcrops and cliffs.

Habitat Relationships and Limiting Factors

This fern grows directly on rocks and is restricted to deeply sheltered, continuously moist habitats. It occurs on moist grotto ceilings and cliff crevices in narrow stream gorges, and in waterfall spray zones on cliffs behind or near water falls (NatureServe 2003). Limiting factors are probably drainage of wet areas and trampling of plants directly.

Potential Management Effects

Plan direction provides protection for wet areas, especially those along the cliff line. Prescription allocations to areas occupied by this species would result in no management- induced disturbance of forest canopy or the wet surface where this plant can be found. Therefore, plan implementation would result in discountable potential for adverse impacts to individuals if they actually occur on the forest.

Determination and Rationale

Overall, implementation of the plan is expected to have no impacts on this plant species if it occurs on the forest because: 1) protection measures for preferred habitat are provided, 2) the likelihood of management-induced disturbance of suitable habitat is low, and 3) the potential for adversely impacting individuals is discountable.

Butternut (*Juglans cinerea*)

Distribution, Status, and Trend

This species occurs throughout the central and eastern United States and southeastern Canada. It occurs in New Brunswick, Quebec, and southern Ontario, extending westward to Michigan, Minnesota, and North Dakota, ranging south to Iowa, Missouri, Tennessee, the Carolinas, Georgia, Mississippi, and Arkansas (Fernald 1950, Brown and Kirkman 1990, Gleason and Cronquist 1991). There are more than 100 occurrences from at least 17 states within the range of the species. However, its abundance and condition are both in rapid decline due to butternut canker disease, which has no known remedy at this time (NatureServe 2003). It was given a Forest Rank of F1, meaning it is extremely rare, with 1-5 known occurrences.

Viability risk rankings are 3 (moderately high risk) for late successional riparian and mature mesic hardwood forests, and 1(very high risk) for basic mesic forest habitat.

Habitat Relationships and Limiting Factors

This species occurs in late successional riparian areas and mature mesic hardwood forests (NatureServe 2003). Butternut is shade-intolerant, achieving its best growth in full sunlight and requires some form of disturbance, such as soil disturbance and the creation of canopy gaps for successful reproduction and establishment (Skilling 1993). High mortality and higher rates of infections, along with rapid loss of the remaining uninfected trees to timber cutting are the main limiting factors (NatureServe 2003).

Potential Management Effects

This species is critically threatened by the rapid spread of a canker fungus (*Sirococcus clavigignenti-juglandacearum*), which is killing trees (including sprouts and seedlings) throughout its range (Ostry et al. 1994). A majority of trees throughout the range may be infected with butternut canker, and recovery will be difficult. Many stands of butternut trees have been seriously impacted, leaving small clusters of very vulnerable individuals. The range of infection has apparently increased dramatically in recent time. For example, 77 percent of the trees have recently died in North Carolina and Virginia (Anderson 1993). A treatment with no known value (Skilling 1993) is the culling of infected trees to attempt to prevent the spread of the disease to other individuals within a stand or area. Anderson (1978) reported that the fungus is associated with dieback in branches and twigs, causing deformation but not tree mortality. Although butternut canker is the primary global threat to this species, butternut is also threatened to some extent by plant succession in areas where the pre-settlement disturbance regime no longer exists, preventing the creation of open conditions necessary for the successful reproduction of this shade-intolerant species (NatureServe 2003). Protective efforts for this species on the national forest is likely to be important to moderate cumulative effects to populations on private lands where they may not receive protection.

Determination and Rationale

Plan implementation is expected to have a beneficial effect on this species because some disturbance-dependent habitats that create canopy gaps are planned for restoration, thus helping to limit plant succession and provide additional habitat.

Sweet pinesap (*Monotropsis odorata*)

Distribution, Status, and Trend

This plant is a monotypic endemic centered in the Appalachians. It occurs more frequently in North Carolina and Virginia, and becomes more rare as it reaches the limits of its range, which is from Maryland and West Virginia south to Alabama, Georgia and possibly Florida (NatureServe 2003). It was given a Forest Rank of F1, meaning it is extremely rare, with 1-5 known occurrences on the forest. It has a viability risk ranking of 3 (moderately high risk) for mature oak forests and mature

mesic hardwood forest habitats, with a 2 (high risk) for woodlands, savannas and grassland habitats.

Habitat Relationships and Limiting Factors

This species occurs in woodlands, savannas, grasslands, mature oak forests and mature mesic hardwood forests (USDA, Forest Service 2003).

Potential Management Effects

The EIS effects analysis for the plan indicates mature mesic hardwood forests will be maintained and even increased over time. If some activity is planned for habitats associated for this species, adequate project level analysis will be important to ensure that any activity, individually or cumulatively, does not result in a trend towards listing or result in a loss of viability.

Determination and Rationale

Overall, implementation of the plan is expected to have no impacts on this plant species because: 1) preferred habitat for this species will be maintained and increased, 2) the likelihood of management induced disturbance of suitable habitat is low, and 3) adverse effects to individual plants will be avoided through project level analysis.

Small's beardtongue (*Penstemon smallii*)

Distribution, Status, and Trend

This species is restricted to the southern Appalachians (Kartesz 1999). It is most common in North Carolina and South Carolina (Weakley 2000), and rare in the rest of its range in Alabama, Georgia, and Tennessee (NatureServe 2003). The only stable population occurs in the mountains of western North Carolina (Southern Appalachian Species Viability Project 2002). It was given a Forest Rank of F1, meaning it is extremely rare, with only 1-5 known to occur on the forest. It has a viability risk ranking of a 1 (very high risk) for glade and barren habitats, and a 2 (high risk) ranking for rock outcrops and cliffs.

Habitat Relationships and Limiting Factors

This species occurs on rock outcrops, glades, and cliffs (USDA Forest Service 2003).

Potential Management Effects

Plan direction provides protection for the cliff line and rock outcrops. Prescription allocations to areas occupied by this species would result in no management-induced disturbance where this plant can be found. Therefore, plan implementation would result in discountable potential for adverse impacts to individuals if they actually occur on the forest.

Determination and Rationale

Overall, implementation of the plan is expected to have no impacts on this plant species if it occurs on the forest because: 1) protection measures for preferred

habitat are provided, 2) the likelihood of management-induced disturbance of suitable habitat is low, and 3) the potential for adversely impacting individuals is discountable.

Monkey faced orchid or White fringeless orchid (*Platanthera integrilabia*)

Distribution, Status, and Trend

This plant is currently known from about 50 irregularly scattered occurrences in the southeastern U.S., primarily on the Cumberland Plateau of Tennessee and Kentucky. It also occurs in Alabama, Georgia, Kentucky, Mississippi, South Carolina, and Tennessee (NatureServe 2003). Many occurrences consist of fewer than 100 plants. The species is rare throughout its range, and is presumed extirpated in North Carolina and Virginia. Most surviving populations are not vigorous and exhibit very poor seed set and reproduction (reproduction is nearly exclusively sexual in this species) (NatureServe 2003). It was given a Forest Rank of F1, meaning it is extremely rare, with 1-5 known occurrences. It has a viability risk ranking of 1 (very high risk).

Habitat Relationships and Limiting Factors

The habitat for this species includes bogs, fens, seeps, and seasonal ponds (USDA Forest Service 2003). The habitat where this species grows has often been drained or turned into farm ponds or hog lots or has experienced residential and commercial construction (NatureServe 2003). Development, canopy closure, and invasive exotic plants such as kudzu (*Pueraria lobata*) remain threats (NatureServe 2003).

Potential Management Effects

Active management may be required to inhibit woody succession and prevent canopy closure at sites where the species is found. However, timber harvest must be carried out carefully to protect the species from damage. Plan direction provides protection for wet areas, especially bogs and seeps. Prescription allocations to areas occupied by this species would result in no management- induced disturbance of forest canopy or the wet surface where this plant can be found. Therefore, plan implementation would result in discountable potential for adverse impacts to individuals if they actually occur on the forest. Protective measures on the forest are likely to be important to moderate cumulative effects on private lands where these plants may not receive such protection.

Determination and Rationale

Overall, implementation of the plan is expected to have no impacts on this plant species if it occurs on the forest because: 1) protection measures for preferred habitat are provided, 2) the likelihood of management-induced disturbance of suitable habitat is low, and 3) the potential for adversely impacting individuals is discountable.

Tennessee leafcup (*Polymnia laevigata*)

Distribution, Status, and Trend

This plant occurs in Georgia, Florida, Missouri, Alabama, Kentucky, and Tennessee (NatureServe 2003). There are few known occurrences in a relatively large range and few protected populations (NatureServe 2003). It appears to be mainly centered in the southern Cumberland Plateau of Tennessee and possibly Alabama and Georgia (based on known distribution) (Nature Serve 2003). No known populations of this species are known on the Chattahoochee National Forest, so it is ranked FP, for possibly could occur on the forest. Viability risk ranking is 0, no ranking.

Habitat Relationships and Limiting Factors

Habitat for this species includes rock outcrops and cliffs (USDA Forest Service 2003). This species also occurs mainly on rich wooded slopes in light to dense shade of mixed mesophytic woods. In Tennessee, where it is most abundant, its habitat ranges from limestone bluffs, ridges, rocky creek bottoms, and mixed mesophytic forest slopes on the Cumberland Plateau. In Kentucky it occurs on rich, mesic wooded slopes on loess or alluvial slopes along the Mississippi and lower Ohio rivers (NatureServe 2003). The best habitat appears to be in the shade of mixed mesophytic forest on moist loamy and rocky substrates (NatureServe 2003).

Potential Management Effects

Active management of most sites is probably not necessary (NatureServe 2003). Plan direction provides protection for the cliff line and rock outcrops. Protection efforts on the forest are likely to be important to moderating cumulative effects since the same level of protection on private lands is not expected.

Determination and Rationale

Overall, implementation of the plan is expected to have no impacts on this plant species if it occurs on the forest because: 1) protection measures for preferred habitat are provided, 2) the likelihood of management-induced disturbance of suitable habitat is low, and 3) the potential for adversely impacting individuals is discountable.

Radford sedge (*Carex radfordii*)

Distribution, Status and Trend

This sedge is a recently described species, endemic to the Blue Ridge Escarpment of southwestern North Carolina, northwestern South Carolina and northeastern Georgia. Most of the few known sites are located in limited soils with high concentrations of calcium and magnesium, with a high soil pH compared to the generally acid soils in the region (NatureServe 2003). It is listed as critically imperiled in the state of Georgia by NatureServe (2003). It is F ranked as F1, meaning it is extremely rare on the forest, with only 1-5 occurrences. It has a viability risk ranking of 3 (moderately high risk).

Habitat Relationships and Limiting Factors

This plant prefers calcareous, often rocky, well-drained soils of mesic cove forests and woodlands. Most known sites are underlain by rock formations, which have weathered to produce very nutrient-rich, alkaline or neutral soils (NatureServe 2003). It is intrinsically at risk due to its extreme rarity, limited range, and pristine habitat requirements. Threats to this species include land-use conversions, habitat fragmentation and forest management practices (Southern Appalachian Species Viability Project 2002).

Potential Management Effects

Forest plan direction provides for protection of most areas where this species is expected to occur. Since this plant is associated with such a limited range and has a fairly distinct soil habitat requirement, project-level analysis will help ensure its future on the forest. Cumulatively, this species has probably lost habitat on private lands, making their presence on the forest increasingly important to the species.

Determination and Rationale

Overall, the implementation of the plan is expected to have no impacts on the species because: 1) protective measures and project-level analysis will be conducted in suitable habitat where projects are planned, and 2) potential for adversely impacting individuals is discountable.

Carolina plagiomnium or Mountain wavy-leaf moss (*Plagiomnium carolinianum*)

Distribution, Status and Trend

This moss is known to occur in Georgia, Tennessee, North Carolina and South Carolina and it also occurs in the Dominican Republic. This species has a limited distribution and it has an imperiled status in Georgia (NatureServe 2003). It has a forest ranking of F2, meaning it is very rare and uncommon, with 6-20 occurrences known on the forest. Viability risk ranking are 3 (moderately high risk) for mature, high elevation mesic hardwood forests and rock outcrops and cliffs, but it has a 4 (moderate risk) for late successional riparian habitats.

Habitat Relationships and Limiting Factors

The occurrences that are in the gorges under the Forest Service's management do not appear to be threatened. However, other occurrences, such as those on Duke Power land are threatened by the potential of the construction of new dams (NatureServe 2003). It is limited in distribution and highly threatened by land-use conversion and habitat fragmentation and habitat loss from impounding streams in the Appalachian gorges (Southern Appalachian Species Viability Project 2002).

Potential Management Effects

Direction in the plan provides for protection of steep, moist areas and riparian zones associated with places where this moss occurs. Prescriptions allocated to areas likely

to have this plant present will have adequate project-level analysis to prevent adverse impacts to individual moss plants. Little, if any, management-induced disturbance of this species habitat is expected, and implementing the plan would result in a discountable potential for adverse impacts to plants. This species occurring on private lands may not be afforded the kind of protection it receives on national forests and national parks. Therefore, protection is likely to be important to moderate cumulative effects to the population.

Determination and Rationale

Overall, implementing the revised forest plan is expected to have no impacts on this moss because1) protection measures for its preferred habitat within gorges on the forest are in place, and 2) the likelihood of any management-induced disturbance of this species or its habitat is very low.

Pringle's platyhypnidium (*Platyhypnidium pringlei*)

Distribution, Status and Trend

This moss is known from nineteen extant occurrences in North Carolina, South Carolina and Georgia, and probably numerous occurrences in Mexico. It has also been reported from the Grand Canyon in Arizona. Although it is restricted in its eastern range, the moss is well established and in healthy condition wherever it is found. Despite this, it is considered critically imperiled in Georgia (NatureServe 2003). It has forest ranking of F1, extremely rare, with only 1-5 occurrences on the forest. The viability risk ranking for this moss is a 3 (moderately high risk) in late successional riparian habitats and a 2 (high risk) in rock outcrop and cliff habitats.

Habitat Relationships and Limiting Factors

This moss attaches itself to acid rocks, generally in swift running streams, sometimes in the spray of waterfalls or year-round seepages, but always on rock surfaces. It is found in both open and more shaded sites, but always in hemlock-hardwood vegetative types (NatureServe 2003). NatureServe (2003) also reports that all of the eastern occurrences of this species are in protected Forest Service lands, and there are currently no threats to the species.

Potential Management Effects

The revised forest plan provides optimal protection and management for all streams and waterfalls where this moss may occur. Cumulatively, similar habitats on private lands are not likely to be protected as much, making their presence on the forest increasingly important to the species.

Determination and Rationale

The implementation of the plan is expected to have no impacts on this species because: 1) protective measures are in place to prevent adverse effects to the species, and 2) potential for adversely impacting individual moss plant is discountable.

Cuthbert turtlehead (*Chelone cuthbertii*)

Distribution, Status and Trend

There are fewer than 100 occurrences recorded for this species. It occurs in a threatened habitat for the most part, and in a somewhat restricted range. It is found in Georgia, North Carolina, South Carolina and Virginia. In Georgia, is as critically imperiled (NatureServe 2003). It has a forest ranking of FP, because it possibly could occur on the forest. The viability risk ranking for this species on the forest is 0, because it is not known to occur on the forest.

Habitat Relationships and Limiting Factors

This figwort plant is found mainly in wetland areas and associated bogs. The species is significantly rare throughout its range. It is especially vulnerable to land-use conversion and habitat fragmentation. Drainage of wetlands and bog succession are the main threats to this species (Southern Appalachian Species Viability Project 2002).

Potential Management Effects

Direction in the revised plan provides for the optimal protection and management of all wetlands, riparian areas and bogs. Prescription allocations to areas that might be occupied by this species would result in little to no management-induced disturbance of the ground layer where this plant would be found. Therefore, plan implementation would result in discountable potential for adverse impacts to individuals. Because of its very restrictive range, cumulative effects are primarily limited to those occurring on national forest or national park land resulting in relatively low overall risk to the species.

Determination and Rationale

Overall, implementation of the revised plan is expected to have no impacts on this species if it is found on the forest because: 1) protective measures for wetlands and bogs are in place, 2) the likelihood of management-induced disturbance of suitable habitat is low, and 3) the potential for adversely impacting individuals is discountable.

Small spreading pogonia (*Cleistes bifaria*)

Distribution, Status and Trend

This orchid is widespread but uncommon. Its range includes Alabama, Florida, Georgia, Kentucky, Louisiana, North Carolina, South Carolina, Tennessee, Virginia and West Virginia. In Georgia, it is considered critically imperiled (NatureServe 2003). On the forest it has a ranking of F1, meaning it is extremely rare, with only 1-5 occurrences known on the forest. The viability risk ranking for this flower is a 2 (high risk) within woodland, savannas and grassland habitats.

Habitat Relationships and Limiting Factors
This species is somewhat threatened by land-use conversion, habitat fragmentation, certain forest management practices and succession. It may benefit from prescribed burns (Southern Appalachian Species Viability Project 2002).

Potential Management Effects
Since this species benefits from prescribed burns and is somewhat threatened by succession, efforts to restore canopy gaps in the forest and maintenance of some prescribed fire management areas should provide increased habitat and establishment opportunities for this plant. Activities used to achieve this restoration may disturb individuals in the short term, but improves conditions for the population in the long term. Because of its uncommon status, project-level analysis previous to project implementation should result in little or no impacts to individuals. Cumulatively, habitat protection and management on private land is not likely, making their presence on the forest increasingly important.

Determination and Rationale
Implementation of the plan is expected to have beneficial effects to this plant species because some disturbance-dependent habitats will be restored through successional set- back management and the use of prescribed fire on the forest.

Stoneroot or Whorled horse-balm (*Collinsonia verticillata*)

Distribution, Status and Trend
This plant is in the mist family and is known from Georgia, Kentucky, Maryland, North Carolina, Ohio, South Carolina, Tennessee and Virginia. It can be locally abundant but is scattered and rare throughout its range. It is listed as vulnerable in Georgia (NatureServe 2003). On the forest, it has a ranking of F3, rare and uncommon, with 21-100 occurrences known. The viability risk ranking for this plant is a 5 (low risk) for mature, mesic hardwood forest habitat, and a 3 (moderately high risk) for basic mesic forest habitat types.

Habitat Relationships and Limiting Factors
This plant is considered a late successional plant in moist forests and it may persist in forest openings or open forests (Miller and Miller 1999). Mining activities may threat this species habitat. Forest management practices such as clearcutting and site preparation for reforestation could impact this species. Land-use conversion and habitat fragmentation are also threats (South Appalachian Species Viability Project 2002).

Potential Management Effects
Distribution and abundance of late-successional habitat is expected to increase over time under the revised forest plan. This should likewise increase habitat conditions for this plant species. Habitat conditions for this plant are probably not as favorable on private lands, making habitat protection and management on the forest important to moderate cumulative effects to the population.

Determination and Rationale

Overall, the implementation of the plan is expected to have no impacts on this species because: 1) abundance and distribution of late-successional habitat on the forest is expected to be maintained and even increase, and 2) potential for adversely impacting individuals is discountable because of project-level analysis for any new projects where this species might occur.

Sharp's leafy liverwort (*Plagiochila sharpii*)

Distribution, Status and Trend

This liverwort is found in a limited area in Southern Appalachians and is known from ten extant and 42 historical sites in that area. It is also known from a restricted range in Japan, Europe and the neotropics (Southern Appalachian Species Viability Project 2002). Many of the historical occurrences reported for the Appalachians may be extant. Most of these sites have not been visited and may be found with intensive searching. The majority of these extant occurrences are protected in the Great Smoky Mountains National Park and some also occur in the Nantahala National Forest and Ellicott Rock Wilderness. It is considered critically imperiled in Georgia (NatureServe 2003). It has a forest ranking of F1, extremely rare, with only 1-5 occurrences. The viability risk ranking is a 2 (high risk)

Habitat Relationships and Limiting Factors

Occurring on rocks in streams of the Appalachian Mountains, this liverwort has a limited area where it occurs. There are no immediate threats to the species, but changes in the stream where it occurs could threaten the plants habitat. Logging, clearcutting and road building upstream could negatively impact this plant (NatureServe 2003). Some occurrences of this species are on Duke Power Company land, and those plants have a potential threat due to development or impoundment of streams where it is found (Hicks and Amoroso 1996).

Potential Management Effects

Management actions that most likely would create adverse effects to this liverwort are those that disturb soil or litter, potentially leading to sedimentation, and those that reduce vegetative cover over streams where it occurs. The riparian prescription included in the revised plan provides direction designed to protect the habitat required by this species. Cumulatively, some of the habitat for this plant that might be found on private lands is not afforded such protection, making their presence on the forest increasingly important.

Determination and Rationale

Overall, implementation of the revised forest plan is expected to have no impacts on this species because: 1) protection measures are in place to protect riparian areas and streams where this liverwort might occur, and 2) potential for adversely impacting individuals is discountable.

Carolina hemlock (*Tsuga caroliniana*)

Distribution, Status and Trend

This conifer tree occurs in western areas of Virginia, North Carolina and South Carolina, as well as parts of Georgia and Tennessee. Its range is limited and the habitat within its range is also limited (Elias 1980). It is listed as critically imperiled in Georgia (NatureServe 2003). It has a forest rankng of FP, possibly could occur. It has a viability risk ranking of 0, since it is not known to occur on the Forest.

Habitat Relationships and Limiting Factors

This species grows in moist areas usually associated with more mature, mesic hardwood and cove dwelling species in the mountains. A serious threat to the species is probably the hemlock woolly adelgid, an insect that originated in Asia (NatureServe 2003). During the last decade, the adelgid has become a major killer of Canadian and Carolina hemlock in forests from Maine to Virginia (Cohn 1993).

Potential Management Effects

The revised forest plan provides for maintenance and distribution of the mature, mesic forest that this species prefers. Management prescriptions allocated to areas where this species is expected to occur would result in little to no management-induced disturbance to the species. Therefore, implementing the plan should result in discountable potential for adverse impacts to individuals. Because of its limited range and narrow distribution, protective efforts on the forest are likely to moderate cumulative effects to the population. In the meanwhile, the forest will monitor and consider forest health solutions to problems associated with the hemlock woolly adelgid.

Determination and Rationale

Overall, plan implementation is expected to have no impacts on this tree because: 1) protection of areas preferred by this species are in place, 2) the likelihood of management-induced disturbance of suitable habitat is low, and 3) the potential for adversely impacting individual trees is discountable.

Piedmont strawberry or Lobed barren-strawberry (*Waldsteinia lobata)*

Distribution, Status and Trend

This plant is a member of the rose family and is endemic to the Piedmont and Blue Ridge Mountains of Georgia and adjacent northwestern South Carolina. Most occurrences (about 20) are from Georgia. It is listed as imperiled in Georgia (NatureServe 2003). It has a forest ranking of F1, extremely rare, with only 1-5 occurrences on the forest. The viability risk ranking for this species is a 3 (moderately high risk) for late successional riparian and mature, mesic hardwood forest habitats.

Habitat Relationships and Limiting Factors

This species is a perennial herb that prefers high, steep slopes and terraces above watercourses where conditions of high humidity and shade prevail. It may often be a part of the shallow mantle of moss and duff that covers rocks or river bluff ledges. These sites are often in association with rhododendron and mountain laurel (NatureServe 2003). There are risks to the species due to limited range and low numbers of occurrences. It is also subject to competition from weedy Piedmont species on private lands that are subject to logging. Logging and site preparation are very detrimental to this species (Southern Appalachian Species Viability Project 2002).

Potential Management Effects

Direction in the revised plan provides for the protection of the preferred habitat for this species. Riparian protection guidelines should result in the protection of this plant. Cumulatively, similar wet habitat that it prefers on private land might be afforded the same level of protection, which makes their presence on the forest increasingly important.

Determination and Rationale

Overall, implementation of the plan is expected to have no impacts on this species because: 1) protection measures to protect wet areas where this species is likely to occur are in place, 2) the likelihood of management-induced disturbance of suitable habitat is low, and 3) the potential for adversely impacting individuals is discountable.

Rose gentian or Rose pink (*Sabatia capitata)*

Distribution, Status, and Trend

This species occurs on the Cumberland Plateau and adjacent foothills of the Ridge and Valley of northwestern Georgia, central and northeastern Alabama, and adjacent Tennessee. Recorded from seven counties in Georgia. It has been found to date at about 14 locations in the state. It is rare throughout its limited range (Georgia DNR Natural Heritage 1995). It was given a Forest Rank of FP, meaning it possibly could occur on the Chattahoochee National Forest. The viability risk ranking is 0, not ranked since it is not known to occur on the forest.

Habitat Relationships and Limiting Factors

This species is found in wet meadows and openings in oak-hickory-pine forests, persisting in maintained rights-of-way and along roadsides in thin soils over sandstone. It has sustained significant habitat loss due to fire suppression or to conversion of its habitat to agricultural land

Potential Management Effects

Limit encroachment of woody vegetation by controlled burning. Hand thinning of shading trees in its vicinity, if done carefully, may be beneficial to this species. Where plants occur in maintained rights-of-way (roadsides, power lines, etc.), a mowing

regime tailored to the plant's growing season would be beneficial (e.g., mow in mid- to early spring and/or late autumn) (Georgia DNR Natural Heritage 1995). Cumulatively, this plant may not be afforded the same level of protection on private lands, making its presence on the forest increasingly important.

Determination and Rationale

Overall, implementation of the plan is expected to have a beneficial effect on this plant species if it occurs on the forest because: 1) preferred habitat for this species will be maintained and increased, 2) the likelihood of management induced disturbance of suitable habitat is low, and 3) adverse effects to individual plants will be avoided through project level analysis.

Piedmont ragwort (*Senecio millifolium*)

Distribution, Status, and Trend

Blue Ridge Mountains of Georgia, South Carolina, and North Carolina; also Ridge and Valley of southwestern Virginia. The only occurrence in Georgia is from Rabun County (Georgia DNR Natural Heritage 1995). It was given a Forest Rank of F1, meaning it is extremely rare, with only 1-5 known occurrences on the forest. It has a viability risk ranking of 1 (very high) for glade and barren habitat, a 2 (high risk) for rock outcrops and cliff habitat, and a 3 (moderately high risk) for mature oak forest habitat.

Habitat Relationships and Limiting Factors

This plant is found mostly on dry, granite outcrops and rocky glades in the “high” mountains (above 3,000 feet in Georgia). In Virginia, it is found on limestone glades at much lower elevations (Georgia DNR Natural Heritage 1995).

Potential Management Effects

Hand thinning of shading trees in its vicinity, if done carefully, may be beneficial to this species. However, the sole Georgia site is probably self-maintaining due to the shallowness of the soil. This species is obscure and is not likely to be given the same level of protection on private lands within its range. For this reason, as well as its apparently narrow distribution, protective efforts on the forest are likely to be important to moderating cumulative effects to populations.

Determination and Rationale

Overall, implementation of the plan is expected to no impacts on this plant species if it occurs on the forest because: 1) protection measures for preferred habitat are provided, 2) the likelihood of management-induced disturbance of suitable habitat is low, and 3) the potential for adversely impacting individuals is discountable.

Oconee bells (*Shortia galacifolia var galacifolia*)

Distribution, Status, and Trend

This species is restricted to the drainage area of the Keowee River in northwestern South Carolina and adjacent regions in Georgia and North Carolina. It has a very limited distribution but can be locally common. Recorded in Rabun County only in Georgia (Georgia DNR Natural Heritage 1995). It was given a Forest Rank of F1, meaning it is extremely rare, with 1-5 known occurrences on the forest. It has a viability ranking of 1, at very high risk within mature hemlock forest habitat.

Habitat Relationships and Limiting Factors

This species is found in woods along mountain streams, usually growing under rosebay (*Rhododendron maximum*) and mountain laurel (Georgia DNR Natural Heritage 1995). It is threatened by illegal collection and damming of rivers (NatureServe 2003).

Potential Management Effects

At most, this species will tolerate only hand thinning of trees in its immediate vicinity, and only if done carefully. The control of exotic weeds, such as Japanese honeysuckle, and overall avoidance of direct disturbance is recommended. Of horticultural interest, this plant needs protection from removal by irresponsible persons (Georgia DNR Natural Heritage 1995). Cumulatively, protection of populations on private lands is probably lacking, meaning their presence on the forest can be expected to be more and more important.

Determination and Rationale

Plan implementation is expected to have no impacts on this species because: 1) adverse effects to known individuals will be avoided through project-level analysis, and 2) riparian prescription direction should protect habitats where this species is expected to occur.

Ovate catchfly or Mountain catchfly *(Silene ovata)*

Distribution, Status, and Trend

This species is restricted to Alabama, Arkansas, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, Virginia and usually occurs in small population sizes (NatureServe 2003). It was given a Forest Rank of F1, meaning it is extremely rare, with only 1-5 known occurrences on the forest. It has a viability risk ranking of 3, moderately high risk within mature, mesic hardwood forest habitat.

Habitat Relationships and Limiting Factors

This species occurs in rich woods, mature mesic hardwood forests, and early successional forests (USDA Forest Service 2003). Grazing, flooding by creating impoundments, clearcutting, construction and mining are threats to this species because of habitat disturbance (NatureServe 2003).

Potential Management Effects

Projects implemented in compliance with this plan present a discountable potential for direct impacts to individuals because: 1) adequate project-level analysis will help protect this plant, and 2) distribution and abundance of mature mesic hardwoods is expected to be maintained and even increase over time. Cumulatively, management and protection of this plant on the forest will become increasingly important because the same level of protection on private land is not expected.

Determination and Rationale

Overall, implementation of the plan is expected to have no impacts on this plant species because: 1) preferred habitat for this species will be maintained and increased, 2) the likelihood of management induced disturbance of suitable habitat is low, and 3) adverse effects to individual plants will be avoided through project level analysis.

Granite dome goldenrod (*Solidago simulans)*

Distribution, Status, and Trend

This plant is endemic to granitic domes in the vicinity of the North Carolina-South Carolina-Georgia tri-state boundary. It occurs at only a few sites, only one of which is protected. This species occurs in Rabun County, Georgia (NatureServe 2003). It was given a Forest Rank of F1, meaning it is extremely rare on the forest, with 1-5 known occurrences. It has a viability risk ranking of a 2 (high risk) for rock outcrop and cliff habitats.

Habitat Relationships and Limiting Factors

This species occurs on rock crevices and granite domes with somewhat seepy, thin soil mats. It is threatened by its extremely limited distribution and human disturbance on the domes where it occurs (NatureServe 2003).

Potential Management Effects

The revised plan provides protection for habitats where this species is likely to occur. Projects implemented in compliance with the plan present a discountable potential for direct impacts to individuals because: 1) the likelihood of the species occurring in any project area is low, and 2) project level analysis will help protect this plant. Cumulatively, habitat for this plant that occurs on private lands will probably not receive the same level of protection, making their presence on the forest even more important.

Determination and Rationale

Overall, implementation of the plan is expected to have no impacts on this plant species if it occurs on the forest because: 1) protection measures for preferred habitat are provided, 2) the likelihood of management-induced disturbance of suitable habitat is low, and 3) the potential for adversely impacting individuals is discountable.

Least trillium (*Trillium pusillum*)

Distribution, Status, and Trend

A distinctive, widespread but rare trillium that occurs in Alabama, Arkansas, Georgia, Kentucky, Maryland, Mississippi, Missouri, North Carolina, Oklahoma, South Carolina, Tennessee, Virginia, West Virginia (NatureServe 2003). It was given a Forest Rank of FP, meaning it possibly could occur on the Chattahoochee National Forest. It has a viability risk ranking of 0, meaning it is not ranked since it is not known to occur on the forest.

Habitat Relationships and Limiting Factors

This species occurs in late successional riparian areas and mature mesic hardwood forests (USDA Forest Service 2003). Threats include clearcutting mixed bottomland hardwoods, grazing, and habitat loss due to residential and industrial development (NatureServe 2003).

Potential Management Effects

The revised forest plan provides for the protection and maintenance of late successional riparian habitat on the forest. Over time, we also expect to see increased acreages of mature mesic hardwoods on the forest. Adequate project-level analysis should help protect this flower. Cumulatively, trilliums and their habitats may not be protected at the same level they receive on the forest. This makes their habitat and presence on the forest increasingly important.

Determination and Rationale

Plan implementation is expected to have no impacts on this species if it does occur on the forest, because any adverse effects to known individuals will be avoided through project-level analysis.

Southern nodding trillium (*Trillium rugellii*)

Distribution, Status, and Trend

This wildflower species occurs in Georgia, Alabama, Tennessee, South Carolina and North Carolina. It is locally abundant in parts of Georgia, but rare elsewhere in its small range (NatureServe 2003). It was given a Forest Rank of F1, meaning it is extremely rare, with only 1-5 known occurrences on the Chattahoochee National Forest. The viability risk rankings are 3 (moderately high risk) for mature, mesic hardwood forest habitats, and 1 (very high risk) for basic mesic forest habitat on the Chattahoochee National Forest. It is FP on the Oconee National Forest, meaning it possibly could occur there, but with no viability risk ranking on the Oconee, since it is not known to occur there.

Habitat Relationships and Limiting Factors

It is found in mesic forests of the mountains and piedmont of North Carolina and Tennessee, south to Alabama, Georgia and South Carolina (NatureServe 2003). The

general habitat is moist, but well drained. This trillium is found at lower slope elevations, over limestone, dolomite, or marble. Forest vegetation is dominated by closed or nearly closed canopy of mesophytic trees including calciphilic or basophilic species (Schafale and Weakley 1990). This species is currently threatened by habitat alteration resulting mainly from silvicultural practices, commercial and residential development, and other construction projects. Logging in areas occupied by the species is a significant threat as are utility and power line rights-of-way. Trampling of plants and compaction of soil are also of concern. Land-use change to commercial and residential development is present in some potential habitat areas. Although this pressure is presently not a severe threat, in some areas it will increase as rural areas continue to become more developed (NatureServe 2003).

Potential Management Effects

Effects analysis for the revise plan indicates that mature mesic hardwood forests will be maintained in general distribution and abundance throughout the forest and over time. Adequate project-level analysis will help ensure that this flower is protected in the future. This species is not likely to be given the same level of protection on private lands as development of more and more private lands occurs. For this reason, as well as its apparent narrow distribution, protective efforts on the forest are likely to be important to moderate cumulative effects to populations.

Determination and Rationale

Overall, implementation of the plan is expected to have no impacts on this plant species because: 1) preferred habitat for this species will be maintained and increased, 2) the likelihood of management induced disturbance of suitable habitat is low, and 3) adverse effects to individual plants will be avoided through project level analysis.

Sweet white trillium (*Trillium simile*)

Distribution, Status, and Trend

This wildflower is endemic to the Southern Appalachians in Georgia, North Carolina, South Carolina, and Tennessee where it occurs on very rich soils over mafic or calacreous rocks, often near seepage (Weakley 2000). This species is rare across most of its narrow range (NatureServe 2003). It has a forest ranking of F2, very rare, with 6-20 occurrences. The viability risk ranking for this flower is a 4 (moderate risk) within mature, mesic hardwood forest habitats.

Habitat Relationships and Limiting Factors

This species occurs in mature mesic hardwood forests (USDA Forest Service 2003) on very rich soils over mafic or calacreous rocks, often near seepage (Weakley 2000). This species has a narrow range in the vicinity of the Smoky Mountains and the southern edge of the Blue Ridge Mountains, making is especially vulnerable to land-use conversion and habitat fragmentation, such as second home developments. Forest management practices are a low-level threat to this species (NatureServe 2003).

Potential Management Effects
Adequate project-level analysis will help ensure that this species will be protected on the forest. Effects analysis for the revised forest plan indicates that mature mesic habitat like that preferred by this species will be maintained in general distribution and abundance over time. Cumulatively, protection of its habitat is not as likely on private land, due mainly to development in the mountains and piedmont where it may occur. This makes its presence on the forest increasingly important to the population.

Determination and Rationale
Plan implementation is expected to have no impacts on this species because any adverse effects to known individuals will be avoided through project-level analysis.

Alabama grapefern (*Botrychium jenmanii*)

Distribution, Status and Trend
This fern is moderately widespread across the southeast, but rare across its range. It is listed as "reported" in the state of Georgia (NatureServe 2003). It was given a F2, meaning it is very rare, having 6-20 occurrences on the forest. The viability risk ranking for this fern are 4 (moderate risk) for mixed landscapes, mature oak and canopy gap habitats, and a 3 (moderately high risk) for woodlands, savannas and grassland habitats.

Habitat Relationships and Limiting Factors
The viability evaluation links this species with canopy gaps in moist woods, and open woodlands and grasslands on drier sites. Both of these conditions are less abundant now than they were historically due to dense re-growth of cutover forests near the turn of the century, and decades of fire suppression. This species, however, is associated with a wide variety of disturbed conditions, occurring in lawns and along roadsides (NatureServe 2003), which are not in short supply across its range. Reasons for this plants rarity are not well understood (NatureServe 2003).

Potential Management Effects
Efforts to restore canopy gaps in mature mesic forests, woodlands, savannahs and grasslands, as provided in the revised forest plan, should provide increased habitat for this species. Activities used to achieve this restoration may disturb a few individuals in the short term, but improved habitat conditions for the species would increase in the long term. Because of its rarity, project-level analysis prior to project implementation is important for providing opportunities for populations to expand.

Determination and Rationale
Plan implementation is expected to have no impacts on this species because: 1) disturbance-dependent habitats will be restored, and 2) adverse effects to known individuals will be avoided through project-level analysis.

White-leaved sunflower (*Helianthus glaucophyllus*)

Distribution, Status and Trend

This flowering plant is known in the Blue Ridge Mountains of western North Carolina and eastern Tennessee. It also is known from South Carolina and historically in Alabama. It may occur in Georgia, but it has no status ranking from there in NatureServe (2003). It has a F1 ranking on the forest, extremely rare, with only 1-5 occurrences. The viability risk ranking is a 3 (moderately high risk) for mature, mesic hardwood forest and canopy gap habitats.

Habitat Relationships and Limiting Factors

This flower is found in the cool, moist forests of the Blue Ridge Mountains. It typically occurs at moderate elevations in mesic hardwoods. It has not been found on the Chattahoochee National Forest, but it has potential to occur. It has a narrow range with few populations, making it especially vulnerable to forest management practices such as logging and site preparation (Southern Appalachian Viability Project 2002).

Potential Management Effects

Habitat preferred by this plant should be protected from most sources of disturbance since moist soils are not planned for intensive management. Adequate project-level analysis will help protect the flowering plant if it does occur on the forest. Cumulatively, protection on private lands is not likely, making it possible presence on the forest increasingly important.

Determination and Rationale

Overall, implementing the revised forest plan is expected to have no impacts on the species because of the protective status assigned to moist woodland habitat where this may occur.

Beadle's mountain mint (*Pycnanthemum beadlei*)

Distribution, Status and Trend

This plant is in the mint family and is restricted to the mountains of southwestern Virginia, and south as far as Georgia. It has a status rank of "reported" in Georgia (NatureServe 2003). On the forest it has a F1 ranking, which means it is extremely rare, with only 1-5 occurrences on the forest. The viability risk ranking is a 3, moderately high risk for mature oak forest habitat.

Habitat Relationships and Limiting Factors

This plant is found in mountainous areas of the Appalachians. It is somewhat threatened by land-use conversion and habitat fragmentation (Southern Appalachian Species Viability Project (2002).

Potential Management Effects
This plant should be protected through project-level analysis. Because of it rarity, identification and protection of known sites during project planning is important for providing opportunities for population expansion.

Determination and Rationale
Plan implementation is expected to have no impacts on the species because known sites will be protected and project-level analysis will help prevent adverse impacts to individuals.

Appalachian haircap moss (*Polytrichum appalachianum*)

Distribution, Status and Trend
This moss is known only from the Blue Ridge province of North Carolina and Tennessee, and a single collection from the Upper Piedmont of North Carolina. This species is characteristic of mosses that occur on scrub balds and it is exceedingly abundant along the rugged upper ridges of Grandfather Mountain in North Carolina. It has no rank or status in Georgia according to the NatureServe (2003) database. It has a F1 ranking on the forest, meaning it is extremely rare, with only 1-5 occurrences on the forest. Its viability risk ranking is a 2 (high risk) for rock outcrops and cliff habitats.

Habitat Relationships and Limiting Factors
This moss is most abundant in craggy, rock terrain where trees and shrubs, if any, are dwarfed and stunted, usually associated with balds (NatureServe 2003). It is threatened by human disturbance and the decline of Fraser fir caused by balsam wooly adelgid (Southern Appalachian Species Viability Project 2002).

Potential Management Effects
The habitat associated with this moss is very rare on the forest. Project-level analysis will help ensure protection of this plant, and no adverse impacts to this species are expected to occur on the forest. Cumulatively, habitats on private land containing this plant species may not be afforded the same level of protection. This makes their presence on the forest increasingly important in the future.

Distribution and Rationale
Implementation of the revised forest plan is expected to have no impacts on this species because: 1) protection for balds and likely habitat are in place, and 2) the likelihood of management-induced disturbance of suitable habitat is low.

Attachment A. Terrestrial Sensitive Species, Their Habitats, And Expected Outcomes Under Alternative I

Chattahoochee National Forest

Scientific Name	Common Name USFS	Habitat Element	Likelihood of Limitation	Management Effect	Viability Risk
Corynorhinus rafinesquii	Rafinesque's big-eared bat	Lakeshores	M	1	2
Corynorhinus rafinesquii	Rafinesque's big-eared bat	Open Wetlands	H	1	1
Corynorhinus rafinesquii	Rafinesque's big-eared bat	Caves and Mines	M	1	2
Corynorhinus rafinesquii	Rafinesque's big-eared bat	Late Successional Riparian	L	3	3
Corynorhinus rafinesquii	Rafinesque's big-eared bat	Den Trees	M	2	2
Microtus chrotorrhinus carolinensis	Southern rock vole	Rock Outcrops and Cliffs	M	1	0
Microtus chrotorrhinus carolinensis	Southern rock vole	Downed Wood	L	2	0
Myotis austroriparius	Southeastern bat	Lakeshores	M	1	0
Myotis austroriparius	Southeastern bat	Late Successional Riparian	L	3	0
Myotis austroriparius	Southeastern bat	Open Wetlands	H	1	0
Myotis austroriparius	Southeastern bat	Den Trees	M	2	0
Myotis leibii	Eastern small-footed bat	Caves and Mines	M	1	2
Myotis leibii	Eastern small-footed bat	Late Successional Riparian	L	3	3
Myotis leibii	Eastern small-footed bat	Rock Outcrops and Cliffs	M	1	2
Sorex palustris punctulatus	Southern water shrew	Bogs, Fens, Seeps, Seasonal Ponds	H	1	0
Sorex palustris punctulatus	Southern water shrew	Late Successional Riparian	L	3	0
Sorex palustris punctulatus	Southern water shrew	Downed Wood	L	2	0
Aimophila aestivalis	Bachman's sparrow	Woodlands, Savannas, and Grasslands	M	2	0
Falco peregrinus anatum	Peregrine falcon	Rock Outcrops and Cliffs	M	1	0
Falco peregrinus anatum	Peregrine falcon	Remoteness	M	3	0
Clemmys muhlenbergii	Bog turtle	Bogs, Fens, Seeps, Seasonal Ponds	H	1	1
Clemmys muhlenbergii	Bog turtle	Open Wetlands	H	1	1
Plethodon teyahalee	Southern Appalachian salamander	Downed Wood	L	2	3

Chattahoochee National Forest					
Scientific Name	Common Name USFS	Habitat Element	Likelihood of Limitatio	Management Effect	Viability Risk
Plethodon teyahalee	Southern Appalachian salamander	Mature Mesic Hardwood Forests	L	2	3
Cicindela ancocisconensis	Tiger beetle	River Channels	H	1	0
Cicindela patruela	Barrens tiger beetle	Glades and Barrens	H	1	0
Cicindela patruela	Barrens tiger beetle	Rock Outcrops and Cliffs	M	1	0
Cicindela patruela	Barrens tiger beetle	Woodlands, Savannas, and Grasslands	M	2	0
Speyeria diana	Diana fritillary	Mature Mesic Hardwood Forests	L	2	5
Speyeria diana	Diana fritillary	Canopy Gaps	L	2	5
Arabis georgiana	Georgia rockcress	Glades and Barrens	H	1	0
Aster georgianus	Georgia aster	Woodlands, Savannas, and Grasslands	M	2	3
Aster georgianus	Georgia aster	Glades and Barrens	H	1	2
Aureolaria patula	Spreading yellow false foxglove	Rock Outcrops and Cliffs	M	1	0
Berberis canadensis	American barberry	Woodlands, Savannas, and Grasslands	M	2	0
Berberis canadensis	American barberry	Glades and Barrens	H	1	0
Botrychium jenmanii	Alabama grape fern	Mixed Landscapes	L	3	4
Botrychium jenmanii	Alabama grape fern	Woodlands, Savannas, and Grasslands	M	2	3
Botrychium jenmanii	Alabama grape fern	Mature Oak Forests	L	3	4
Botrychium jenmanii	Alabama grape fern	Canopy Gaps	L	2	4
Cardamine clematitis	Mountain bittercress	Bogs, Fens, Seeps, Seasonal Ponds	H	1	0
Cardamine clematitis	Mountain bittercress	Mature High-Elevation Mesic Hardwood Forests	M	3	0
Carex biltmoreana	Biltmore sedge	Rock Outcrops and Cliffs	M	1	2
Carex communis var. amplisquama	Fort Mountain Sedge	Woodlands, Savannas, and Grasslands	M	2	2
Carex misera	Wretched sedge	Rock Outcrops and Cliffs	M	1	2
Carex misera	Wretched sedge	Bogs, Fens, Seeps, Seasonal Ponds	H	1	1
Carex radfordii	Radford's sedge	Mature Mesic Hardwood Forests	L	2	3
Carex roanensis	Roan Mountain sedge	Mature Mesic Hardwood Forests	L	2	3

Chattahoochee National Forest					
Scientific Name	Common Name USFS	Habitat Element	Likelihood of Limitatio	Management Effect	Viability Risk
Chelone cuthbertii	Cuthbert's turtlehead	Bogs, Fens, Seeps, Seasonal Ponds	H	1	0
Cleistes bifaria	Small spreading pogonia	Woodlands, Savannas, and Grasslands	M	2	2
Collinsonia verticillata	Whorled horsebalm	Mature Mesic Hardwood Forests	L	2	5
Collinsonia verticillata	Whorled horsebalm	Basic Mesic Forests	H	1	3
Coreopsis latifolia	Broadleaf coreopsis	Mature High-Elevation Mesic Hardwood Forests	M	3	2
Coreopsis latifolia	Broadleaf coreopsis	Mature Mesic Hardwood Forests	L	2	3
Fothergilla major	Witch alder	Late Successional Riparian	L	3	3
Fothergilla major	Witch alder	Woodlands, Savannas, and Grasslands	M	2	2
Fothergilla major	Witch alder	Mature Oak Forests	L	3	3
Helianthus glaucophyllus	White-leaved sunflower	Mature Mesic Hardwood Forests	L	2	3
Helianthus glaucophyllus	White-leaved sunflower	Canopy Gaps	L	2	3
Helianthus smithii	Smith sunflower	Mountain Longleaf Pine Forests	H	2	0
Hexastylis shuttleworthii var.harperi	Harper's wild ginger	Bogs, Fens, Seeps, Seasonal Ponds	H	1	1
Hexastylis shuttleworthii var.harperi	Harper's wild ginger	Late Successional Riparian	L	3	3
Hymenophyllum tayloriae	Gorge filmy fern	Rock Outcrops and Cliffs	M	1	2
Juglans cinerea	Butternut	Basic Mesic Forests	H	1	1
Juglans cinerea	Butternut	Late Successional Riparian	L	3	3
Juglans cinerea	Butternut	Mature Mesic Hardwood Forests	L	2	3
Lysimachia fraseri	Fraser's loosestrife	River Channels	H	1	1
Lysimachia fraseri	Fraser's loosestrife	Mature Oak Forests	L	3	3
Lysimachia fraseri	Fraser's loosestrife	Woodlands, Savannas, and Grasslands	M	2	2
Lysimachia fraseri	Fraser's loosestrife	Canopy Gaps	L	2	3
Monotropsis odorata	Sweet pinesap	Mature Oak Forests	L	3	3
Monotropsis odorata	Sweet pinesap	Mature Mesic Hardwood Forests	L	2	3
Monotropsis odorata	Sweet pinesap	Woodlands, Savannas, and Grasslands	M	2	2

Chattahoochee National Forest					
Scientific Name	Common Name USFS	Habitat Element	Likelihood of Limitatio	Management Effect	Viability Risk
Penstemon smallii	Small's beardtongue	Glades and Barrens	H	1	1
Penstemon smallii	Small's beardtongue	Rock Outcrops and Cliffs	M	1	2
Platanthera integrilabia	White fringeless orchid	Bogs, Fens, Seeps, Seasonal Ponds	H	1	1
Polymnia laevigata	Tennessee leafcup	Mixed Landscapes	L	3	0
Polymnia laevigata	Tennessee leafcup	Rock Outcrops and Cliffs	M	1	0
Pycnanthemum beadlei	Beadle's mountain mint	Mature Oak Forests	L	3	3
Sabatia capitata	Rose pink	Woodlands, Savannas, and Grasslands	M	2	0
Sabatia capitata	Rose pink	Glades and Barrens	H	1	0
Schisandra glabra	Magnolia vine	Late Successional Riparian	L	3	3
Senecio millefolium	Piedmont ragwort	Glades and Barrens	H	1	1
Senecio millefolium	Piedmont ragwort	Rock Outcrops and Cliffs	M	1	2
Senecio millefolium	Piedmont ragwort	Mature Oak Forests	L	3	3
Shortia galacifolia var. galacifolia	Oconee bell	Mature Hemlock Forests	H	4	1
Silene ovata	Mountain catchfly	Mature Mesic Hardwood Forests	L	2	3
Silene ovata	Mountain catchfly	Early-Successional Forests	L	2	3
Silene ovata	Mountain catchfly	Mixed Landscapes	L	3	3
Solidago simulans	Granite dome goldenrod	Rock Outcrops and Cliffs	M	1	2
Thermopsis mollis var.fraxinifolia	Ash-leaf bush pea	Mature Oak Forests	L	3	4
Thermopsis mollis var.fraxinifolia	Ash-leaf bush pea	Woodlands, Savannas, and Grasslands	M	2	2
Trillium pusillum	Least trillium	Late Successional Riparian	L	3	0
Trillium pusillum	Least trillium	Mature Mesic Hardwood Forests	L	2	0
Trillium rugelii	Southern nodding trillium	Mature Mesic Hardwood Forests	L	2	3
Trillium rugelii	Southern nodding trillium	Basic Mesic Forests	H	1	1
Trillium simile	Sweet white trillium	Mature Mesic Hardwood Forests	L	2	4
Tsuga caroliniana	Carolina hemlock	Carolina Hemlock Forests	H	4	0

Chattahoochee National Forest					
Scientific Name	Common Name USFS	Habitat Element	Likelihood of Limitatio	Management Effect	Viability Risk
Waldsteinia lobata	Lobed barren-strawberry	Late Successional Riparian	L	3	3
Waldsteinia lobata	Lobed barren-strawberry	Mature Mesic Hardwood Forests	L	2	3
Acrobolbus ciliatus	A liverwort	Late Successional Riparian	L	3	3
Drepanolejeunea appalachiana	Liverwort	Late Successional Riparian	L	3	3
Drepanolejeunea appalachiana	Liverwort	Mature Hemlock Forests	H	4	1
Lejeunea blomquistii	Liverwort	Late Successional Riparian	L	3	3
Nardia lescurii	Liverwort	Spray Cliffs	M	1	3
Nardia lescurii	Liverwort	Late Successional Riparian	L	3	4
Nardia lescurii	Liverwort	Rock Outcrops and Cliffs	M	1	3
Pellia appalachiana	Liverwort	Rock Outcrops and Cliffs	M	1	2
Pellia appalachiana	Liverwort	Late Successional Riparian	L	3	3
Plagiochila caduciloba	Liverwort	Mature Mesic Hardwood Forests	L	2	3
Plagiochila caduciloba	Liverwort	Rock Outcrops and Cliffs	M	1	2
Plagiochila echinata	Liverwort	Rock Outcrops and Cliffs	M	1	0
Plagiochila echinata	Liverwort	Late Successional Riparian	L	3	0
Plagiochila sharpii	Liverwort	Late Successional Riparian	L	3	3
Plagiochila sharpii	Liverwort	Mature High-Elevation Mesic Hardwood Forests	M	3	2
Plagiomnium carolinianum	Mountain wavy-leaf moss	Mature High-Elevation Mesic Hardwood Forests	M	3	3
Plagiomnium carolinianum	Mountain wavy-leaf moss	Late Successional Riparian	L	3	4
Plagiomnium carolinianum	Mountain wavy-leaf moss	Rock Outcrops and Cliffs	M	1	3
Platyhypnidium pringlei	Moss	Late Successional Riparian	L	3	3
Platyhypnidium pringlei	Moss	Rock Outcrops and Cliffs	M	1	2
Polytrichum appalachianum	Appalachian haircap moss	Rock Outcrops and Cliffs	M	1	2
Radula sullivantii	Liverwort	Late Successional Riparian	L	3	3
Radula sullivantii	Liverwort	Spray Cliffs	M	1	2

Chattahoochee National Forest					
Scientific Name	Common Name USFS	Habitat Element	Likelihood of Limitatio	Management Effect	Viability Risk
Radula sullivantii	Liverwort	Rock Outcrops and Cliffs	M	1	2
Riccardia jugata	Liverwort	Downed Wood	L	2	0
Riccardia jugata	Liverwort	Late Successional Riparian	L	3	0

Oconee National Forest					
Scientific Name	Common Name	Habitat	Likelihood of Limitation	Management Effect	Viability Risk
Corynorhinus rafinesquii	Rafinesque's big-eared bat	Lakeshores	M	1	0
Corynorhinus rafinesquii	Rafinesque's big-eared bat	Den Trees	M	2	0
Corynorhinus rafinesquii	Rafinesque's big-eared bat	Late Successional Riparian	L	3	0
Corynorhinus rafinesquii	Rafinesque's big-eared bat	Caves and Mines	M	1	0
Corynorhinus rafinesquii	Rafinesque's big-eared bat	Open Wetlands	H	1	0
Aimophila aestivalis	Bachman's sparrow	Woodlands, Savannas, and Grasslands	M	2	3
Lanius ludovicianus migrans	Migrant loggerhead shrike	Woodlands, Savannas, and Grasslands	M	2	4
Amorpha schwerinii	Scherwin's false indigo	River Channels	H	1	0
Amorpha schwerinii	Scherwin's false indigo	Glades and Barrens	H	1	0
Amorpha schwerinii	Scherwin's false indigo	Mature Oak Forests	M	2	0
Aster georgianus	Georgia aster	Woodlands, Savannas, and Grasslands	M	2	0
Aster georgianus	Georgia aster	Glades and Barrens	H	1	0
Schisandra glabra	Magnolia vine	Late Successional Riparian	L	3	0
Quercus oglethorpensis	Oglethorpe oak	Late Successional Riparian	L	3	4
Quercus oglethorpensis	Oglethorpe oak	Bogs, Fens, Seeps, Seasonal Ponds	H	1	2
Trillium rugelii	Southern nodding trillium	Mature Mesic Hardwood Forests	M	2	0

[1]Likelihood of Limitation – General likelihood that the habitat element will be limiting to viability of associated species based on its expected abundance and distribution after 50 years of plan implementation. Please see EIS text for a detailed description of the process used to determine likelihood of limitation. L = Low, M = Moderate, H = High.

[2]Management Effect – Values used to categorize the role of management effects on each habitat element for each forest plan revision alternative.

1 = Abundance and distribution of the habitat element is maintained or improved by providing optimal protection, maintenance, and restoration to all occurrences (with limited exceptions in some cases). Little additional opportunity exists to decrease risk to viability of associated species because management is at or near optimal.

2 = Abundance and distribution of the habitat element is improved through purposeful restoration, either through active management or passively by providing for successional progression. Opportunity for decreasing risk to associated species is primarily through increasing rates of restoration, where possible.

3 = The habitat element is maintained at approximately current distribution and abundance, though location of elements may shift over time as a result of management action or inaction. Opportunity to reduce risk to viability of associated species is primarily through adopting and implementing objectives to increase abundance and distribution of the habitat element.

4 = Regardless of management efforts, the habitat element is expected to decrease in distribution and abundance as a result of factors substantially outside of Forest Service control (e.g., invasive pests, acid deposition). Opportunity to reduce risk to viability of associated species is primarily through cooperative ventures with other agencies and organizations.

5 = The habitat element is expected to decrease in distribution and abundance as a result of management action or inaction. Opportunity to reduce risk to viability of associated species is primarily through adopting and implementing objectives to maintain or increase this habitat element.

[3]Viability Risk—The relative risk to viability of the species as a result of its relationship with a particular habitat element. Risk rating is a combination of species rarity and a habitat's likelihood of limitation. Please see EIS text for detailed description of the process used to define viability risk. 0 = Not rated because no populations are known to occur, 1 = Very High Risk, 2 = High Risk, 3 = Moderately High Risk, 4 = Moderate Risk, 5 = Low risk.

AQUATIC SPECIES ON THE CHATTAHOOCHEE NATIONAL FOREST

Little Tennessee River crayfish (*Cambarus georgiae*)

Distribution, Status and Trend

This crayfish's range is limited to the Little Tennessee watershed in Georgia and North Carolina. In Georgia it is known to occur in Rabun County, Skelton in 2003 surveys found this species only to occur in Betty's Creek. It is listed as critically imperiled in Georgia (NatureServe 2003). On the Chattahoochee National Forest, it is found within one mile of Forest lands in Hydrological Unit Code (HUC) 601020201, the Little Tennessee River Drainage.

Habitat Relationships and Limiting Factors

This species of crayfish is a benthic dweller that inhabits pools and moderate gradient creeks within the Tennessee River drainage area. It is associated with debris in slower parts of swift streams and areas that lack other competing crayfish. It typically hides in trapped leaf debris and is unable to compete with the more common *Cambarus bartonii* in riffle habitat. It has been shown to be intolerant to point source pollution (NatureServe 2003). The watershed where this species occurs is ranked as average, with sediment concerns. The forest has a chance to improve conditions for this watershed under the revised plan, which should benefit aquatic species that occur there.

Potential Management Effects

Management actions that are most likely to create adverse effects to this aquatic species are those that disturb the soil and potentially cause sedimentation and siltation. The riparian guidelines outlined in the revised, forest plan provides direction designed to maintain or enhance water quality and prevent sediment from reaching streams. No point source pollution should occur from any proposed actions. Therefore, plan implementation should have little potential for adverse impacts to individuals. Adherence to the riparian guidelines is expected to maintain and improve water quality within Forest Service ownership in the Little Tennessee River drainage and watershed area where this species occurs. Cumulatively, many of the aquatic habitats on private lands are not protected from point source pollution and sedimentation, making maintenance of water quality on the forest increasingly important to this species.

Determination and Rationale

Overall, implementation of the plan is expected have no impacts on this crayfish because: 1) protective measures for streams and riparian areas will provide and maintain water quality for this species, and 2) opportunities under the revised plan exist for improving water quality throughout the forest.

Hiawassee headwaters crayfish or Parrish crayfish (*Cambarus parrishi*)

Distribution, Status and Trend

This aquatic species has a very restricted range with five localities in Georga (Hobbs 1981). It occurs in the headwaters of the Hiawassee River. Skelton in 2003 surveys found this species in Soapstone Creek on Forest. It is listed as critically imperiled in Georgia (NatureServe 2003). On the Chattahoochee National Forest it is found in HUC 602000201.

Habitat Relationships and Limiting Factors

This crayfish occurs in benthic zones of creeks with a moderate gradient. It is restricted to very swift, clear waters flowing over a bed of sand and rocks. Although it occurs in riffle areas, it is most common in the rocky areas between riffles, under rocks and in debris trapped by the rocks. This apparently allows it to occur with the more common sympatric *C.bartnoni* (NatureServe 2003). This species has a very restricted range and was probably never abundant. It needs healthy water quality to survive. The watershed ranking is average, and although sediment is a concern, the opportunity for the forest to measurably affect the watershed is limited.

Potential Management Effects

Actions that would most likely create adverse effects to this aquatic species are those that disturb soil in the riparian areas and along the steam banks where this crayfish occurs. Such unrestricted activities could cause sedimentation increases and increases in stream temperature. The riparian guidelines included in the forest plan revision provide direction that will maintain or improve water quality in streams where this species occurs. Therefore, plan implementation should have little potential for adverse impacts to individuals of this species. Cumulatively, streams with this species occurring on private lands may not be afforded the same protection as those on the forest, making the maintenance of quality aquatic habitat increasingly more important to this species.

Determination and Rationale

Overall, implementation of the plan is expected to have no impacts on this aquatic species because: 1) protective measures for streams and riparian areas will help maintain water quality needed by this species, and 2) the guidelines will provide opportunities to improve existing conditions where needed.

A crayfish (*Cambarus speciosus*)

Distribution, Status and Trend

This crayfish is likely to be endemic to the Coosawattee River system (Hobbs 1981). All populations are well off Forest in HUCs 315010203, 315010202 and 315010201 (Skelton, personal communication, 2003).

Habitat Relationships and Limiting Factors

This crayfish is a benthic dwelling invertebrate that likes creeks with a moderate gradient. It prefers clear to slightly cloudy water flowing swiftly over a rocky bottom with sand and rocks as substrate. It is not present in small headwaters and most specimens collected were taken from under rocks or in beds of *Podostemum*. The dam on Carter's Lake and other regulation dams are said to be destroying habitat for this species (NatureServe 2003).

Potential Management Effects

Management activities most likely to create adverse effects to this aquatic species are those that disturb soil and cause excessive siltation. Dams that restrict water flow and change streamalso create problems for this crayfish. The riparian guidelines within the revised plan provide protective measures designed to maintain or enhance water quality, and maintain stream gradient flow and temperature. If any new dams are proposed in the future, project-level analysis will be conducted to make sure this species is not adversely affected. Therefore, plan implementation should have little potential for adverse impacts to individuals. Cumulatively, streams with crayfish habitat on private lands may not be afforded the same kind of protection, making the presence of quality habitat on the forest all that more important for this species.

Determination and Rationale

Overall, implementation of the plan is expected to have no impacts on this crayfish because: 1) protective measures in place will provide for the maintenance of existing habitat for this species, and 2) the plan provides opportunities to improve existing watershed conditions throughout the forest.

Oconee stream crayfish (*Cambarus chaugaensis*)

Distribution, Status and Trend

This crayfish is extremely restricted in its range to Savannah River watershed. It is recorded from one location in Rabun County, Georgia and 18 localities in Oconee County, South Carolina. It is considered to be critically imperiled in Georgia (NatureServe 2003). On the Chattahoochee-Oconee National Forest, it is found in HUC 306010201. However, surveys by Skelton in 2003 did not find this species in the historical Georgia site.

Habitat Relationships and Limiting Factors

This species likely occurs in tributaries of the Savannah River drainage. Other than the fact that it is vulnerable to water quality degradation, and it is extremely restricted in where it occurs, it has no immediate threats (NatureServe 2003). Hobbs (1981) reported that this species was not found in recent collections of tributaries of Warwoman Creek and other Chattooga River tributaries, but he suggests it likely occurs in a number of lower tributaries of that watershed. This watershed is ranked average, but the forest may have opportunities to improve localized watershed conditions under direction of the revised plan.

Potential Management Effects

The management actions that would be expected to create adverse effects to this aquatic species are those ground-disturbing activities that would result soil movement into streams (siltation) where it occurs. Since the revised plan has a riparian prescription that provides direction that is designed to maintain and enhance water quality and associated beneficial uses, plan implementation is expected to have little or no potential for adverse impacts to individuals of this species. Cumulatively, the same protection on private lands is not always apparent, making the presence of quality aquatic habitats on the forest that much more important.

Determination and Rationale

Overall, implementation of the revised forest plan is expected to have no impacts on this crayfish because: 1) protective measures for streams and associated riparian zones will provide and maintain high quality aquatic habitat for this species, and 2) there may be opportunities for the revised plan to improve some existing watershed conditions.

Conasauga blue burrower (*Cambarus cymatilis*)

Distribution, Status, and Trend

It is known historically from only three Georgia localities and a single site in Tennessee (Hobbs 1981). Skelton in past surveys and in 2003 reported it to still be extant in two of the three Georgia locations as well as in a new location. HUCs with occurrence: 315010101, 315010102 and 315010104. This species only known, to occur off of the Forest. The Georgia Heritage Status Rank is S1, meaning five or fewer occurrences.

Habitat relationships and Limiting Factors

This species has been found in open grassy areas with a high water table, such as flooded fields or near houses and gardens (NatureServe 2003). It constructs elaborate burrows that can be over a mile from the nearest stream. The viability evaluation indicates that two watersheds are ranked excellent with low risk. HUC 315010104 is classified as only average in condition ranking. However, the forest may have opportunities to improve this watershed.

Potential Management Effects

Management actions most likely to create adverse effects to aquatic species are those that disturb soil or litter, potentially leading to sedimentation, and those that reduce vegetative cover over streams, potentially leading to increased water temperature. The Riparian Prescription included in the Revised Plan provides direction designed to maintain or enhance water quality and associated beneficial uses. Therefore, plan implementation should have little potential for adverse impacts to individuals of this species. In HUC 315010104, implementation of the riparian prescription is expected to improve stream conditions at local sites. Cumulatively, many of these habitats on private lands are currently in a degraded state, making

presence of quality habitats on National Forest land increasingly important to this species.

Determination and Rationale

Implementation of the plan is expected to have no impacts on this species because: 1) protection measures for streams and riparian zones will provide maintenance of high quality sites potentially occupied by this species, and 2) opportunities exist for the Riparian Prescription to improve existing conditions.

Chickamauga crayfish (*Cambarus extraneus*)

Distribution, Status and Trend

This crayfish is endemic to the South Chickamauga Creek Watershed in northwestern Georgia and southeastern Tennessee. Hobbs (1981) reported this species from 13 localities in Georgia. Skelton in 2003 surveyed at new localities in South Chickamauga Creek watershed and found the species to be fairly common and stable. All populations occur off Forest in HUC 602000109. It is ranked as imperiled in Georgia according to NatureServe (2003).

Habitat Relationships and Limiting Factors

This crayfish is found in moderately flowing, small, shallow and rock-littered streams. It is also found among trapped leaf litter in these streams (NatureServe 2003). It is extremely limited in where it is found, making it unique and localized to just a fairly small area in Georgia and Tennessee. Water quality is also important to this species. The HUC in which it is found is reported to be in excellent condition. The forest has only a limited opportunity to improve conditions there because the amount of the watershed on private lands.

Potential Management Effects

Management actions that are most likely to create adverse effects to this species are those that disturb soil near streams where it occurs, potentially leading to sedimentation. Also, reducing vegetative cover along streams could lead to increased water temperature, which could impact the crayfish and other organisms in the stream. The riparian prescription in the revised plan provides direction designed to maintain or enhance water quality and associated beneficial uses. Therefore, plan implementation would result in discountable potential for adverse impacts to individuals. Because of its extremely limited range, cumulative effects are primarily limited to those occurring on the national forest, resulting in relatively low risk to the species.

Determination and Rationale

Overall, the revised plan is expected to have no impacts on this crayfish because: 1) protection measures for streams and riparian zones are in place, 2) the likelihood of management-induced disturbance of suitable habitat is very low, and 3) the potential for adversely impacting individuals is discountable.

Georgia beloneurian stonefly (*Beloneuria georgiana*)

Distribution, Status and Trend

This insect is known from less than ten occurrences in higher elevation spring seeps of the southern Appalachians of Georgia, North Carolina, and possibly South Carolina. There are two Georgia records from Rabun and Murray county, both on or near the Forest. It is listed as imperiled in Georgia and North Carolina (NatureServe 2003). On the Chattahoochee National Forest, there is potential habitat in 21 different HUCs (Appendix F of the FEIS).

Habitat Relationships and Limiting Factors

This species requires clean watershed conditions for the aquatic portion of its life stages. Potential impacts to this species may include acid deposition (NatureServe 2003). Of the 21 watersheds where this species could potentially occur, 13 are in excellent condition. Eight have an average ranking, with opportunities under the revised plan to improve sedimentation conditions on the forest.

Potential Management Effects

Plan direction provides for optimal protection and management of streamside management zones and riparian areas. Therefore, water quality would be maintained or enhanced over time. Cumulatively, the same level of water quality protection may not be expected on private lands.

Determination and Rationale

Implementation of the revised forest plan is expected to have no impacts on this species because: 1) protection of watersheds and water quality are planned, 2) the likelihood of management-induced disturbance of suitable habitat is low, and 3) the potential for adversely impacting individuals is discountable.

Mountain river cruiser or Margarita river skimmer (*Macromia margarita*)

Distribution, Status and Trend

This dragonfly has been recorded from Alabama, Georgia, North Carolina, South Carolina, Tennessee and Virginia (Roble 1997). There are limited numbers of occurrences, but its range is more extensive than previously thought. The single Georgia record for this species was collected in 1939 in Lumpkin County (Kormandy 1960). With Chattahoochee National Forest ownership, it could potentially occur in 31 HUCs and 10 HUCs on the Oconee National Forest (Appendix F of the FEIS).

Habitat Relationships and Limiting Factors

This insect is usually found in creeks and medium sized rivers with a moderate gradient. Small streams to large rivers that are rocky with some silt deposits are preferred. Degradation of water quality due to erosion are primary threats.

Potential Management Effects

Actions that are most likely to create adverse effects to this species are those that disturb soil near the streams where they occur. The riparian prescription for the revised forest plan provides direction designed to maintain or enhance water quality and associated benefits. Therefore, implementation of the plan should have little potential for adverse impacts to individuals. Cumulatively, similar aquatic habitats on private lands may not afford this species with adequate protective measures, making its presence on the forest increasingly important to maintain and protect.

Determination and Rationale

Overall, the implementation of the revised plan is expected to have no impacts on this dragonfly because: 1) protective measures to assure water quality will maintain habitat for this species, and 2) the plan provides opportunities to improve existing localized watershed conditions.

Edmund's snaketail (*Ophiogomphus edmundo*)

Distribution, Status and Trend

This dragonfly is found in higher elevations in Tennessee, North Carolina and Georgia. There are 2 records in Georgia: the Alaculsy Valley in the Conasauga River and in the Chattahoochee River north of Helen, Georgia, both occur on or near the Forest. On the forest, it could potentially occur in 20 different HUCs (Appendix F of the FEIS).

Habitat Relationships and Limiting Factors

This dragonfly likes clear, moderately flowing mountain streams and rivers with fairly stable substrate. It is susceptible to alterations of stream flow, and declining because of the general sensitivity of the *Ophiogomphus* larvae to flood scouring and pollution. Deforestation, siltation and pesticides are also threats to the species (NatureServe 2003).

Potential Management Effects

Management activities most likely to create adverse effects to this dragonfly are those that disturb soil and cause sedimentation and turbidity. The revised plan has riparian guidelines in place that maintain and enhance localized conditions of watersheds. Therefore, implementing the plan should have little potential for adverse impacts to individuals. Cumulatively, many streams with dragonfly habitat that occur on private lands may not be afforded the same protection, making their presence on the forest increasingly important.

Determination and Rationale

Overall, plan implementation is expected to have no impacts on this dragonfly because: 1) protective measures to help assure water quality are in place, and 2) some areas will have improved water quality conditions as a result of plan guidance.

Appalachian snaketail (*Ophiogophus incurvatus*)

Distribution, Status and Trend

This dragonfly occurs in Georgia, Maryland, North Carolina and South Carolina. It has a ranking of "unranked" in Georgia by NatureServe (2003). There is much taxonomic uncertainty with this species complex with a great deal of intergradation among specimens (Krotzer and Krotzer 1995). The subspecies *Ophiogomphus incurvatus* has a single record of occurrence that was collected near Helen, Georgia in 1978 (Carle 1982). On the Chattahoochee National Forest, it could potentially occur within 30 HUCs and within 10 HUCs on the Oconee National Forest (Appendix F of the FEIS).

Habitat Relationships and Limiting Factors

This species occurs mostly in shallow riffles of low gradient streams with a sand and gravel substrate. The riffles generally have a moderate flow rate and are generally less than 18 inches deep, with a stable substrate (S. Krotzer, pers. comm. with Keith Wooster). Similar to other dragonflies, this species needs good water quality to survive.

Potential Management Effects

Activities that would most likely adversely affect this insect are those that cause siltation and erosion near streams where it occurs. The riparian prescription included in the revised forest plan provides direction designed to maintain or enhance water quality and associated beneficial uses. Therefore, implementing the plan should have little potential for adverse impacts to individuals of this species. Cumulatively, some streams on private land that may contain these dragonflies (or habitat for them), but they may not be afforded the same level of protection. This makes their presence on the forest even more important.

Determination and Rationale

Overall, plan implementation is expected to have no impacts on this aquatic insect because: 1) protection of the stream and riparian areas buffering the stream zones will provide maintenance of high quality habitat occupied by this species, and 2) opportunities exist for the riparian prescription to actually improve existing conditions in some streams.

Cherokee clubtail (*Gomphus consanguis*)

Distribution, Status and Trend

This dragonfly occurs in the southern Appalachians. This insect has potential to occur in 17 HUCs with Forest Service ownership. Most populations are apparently quite small, and it may be under sampled due to its use of small streams. There are probably many more populations to be discovered elsewhere within the current known range. It has recently been found on Forest in Floyd County and off Forest in Walker and Chattooga counties. It has been listed as critically imperiled in Georgia

(NatureServe 2003). On the Chattahoochee National Forest, it may be found in 39 different HUCs (Appendix F of the FEIS).

Habitat Relationships and Limiting Factors

This aquatic insect is linked to high to moderate gradient creeks and small, spring-fed streams (usually first or second order streams) with sand, gravel and fine detritus in partially shaded to open areas. Both adults and larvae stages are often concentrated in mud-bottomed sections of these streams. It requires high water quality, usually spring-fed water. It is probably declining due to habitat loss and degradation, but it is reported to be fairly tolerant of some organic pollution, such as light livestock grazing near streams where it occurs (NatureServe 2003).

Potential Management Effects

Management actions that most likely create adverse effects to this species are those that disturb the soil or bank and cause sediment loading and temperature increases. The revised plan has a riparian prescription that provides direction designed to maintain and enhance water quality and associated beneficial uses. Therefore, implementing the plan should have little potential for adverse impacts to these individuals. Cumulatively, some of the habitat occupied by this dragonfly may be found on private lands that are not as well protected, making the presence of quality habitat on the forest increasingly important.

Determination and Rationale

Implementation of the revised forest plan is expected to have no impacts on this aquatic insect because: 1) stream and riparian protection measures are in place that will provide maintenance of high quality site that are occupied by this species, and 2) opportunities exits that might even improve existing watershed areas where this species might occur in the future.

Bluestripe shiner (*Cyprinella callitaenia*)

Distribution, Status, and Trend

The bluestripe shiner is endemic to the Apalachicola River system, where it occurs in the Chattahoochee and Flint River drainages (Mettee et al. 1996, NatureServe 2003). Bluestripe shiner populations are highly localized and generally uncommon. Populations are rare in the Blue Ridge, but they have been collected in the upper Chattahoochee River and its tributary, Mossy Creek in White County. They have also been collected in the Chestatee River southeast of Dahlonega. The most recent collection (1994) of bluestripe shiners is from the Chattahoochee River at Georgia Highway 74, roughly 2-3 miles downstream of the Chattahoochee National Forest. All other records of bluestripe shiners in the upper Chattahoochee River are from the 1950's and 1960's, their population status is unknown. It occurs in HUCs: 313000101, 313000102, 313000105 and 313000106.

Habitat Relationships and Limiting Factors

Bluestripe shiners are found in sandy and rocky runs with flowing water and no aquatic vegetation in small to medium rivers (NatureServe 2003). Good populations have also been collected in Lake Walter F. George, an impoundment on the Chattahoochee River. Their feeding habits are unstudied, but presumably their diet is composed primarily of aquatic macroinvertebrates. Members of the genus *Cyprinella* are "crevice spawners" that deposit their eggs in cracks in submerged logs, cobbles, bedrock, and boulders (Wallace and Ramsey 1981). The viability evaluation indicates that the HUCs where this species occurs are in excellent condition for three watersheds. One watershed is listed as average. Plan implementation is not expected to change this condition. The elimination of suitable habitat due to impoundment, pollution, and siltation is believed to be the limiting factor (NatureServe 2003).

Potential Management Effects

Management actions most likely to create adverse effects to aquatic species are those that disturb soil or litter, potentially leading to sedimentation, and those that reduce vegetative cover over streams, potentially leading to increased water temperature. The riparian prescription included in the revised plan provides direction designed to maintain or enhance water quality and associated beneficial uses. Therefore, plan implementation should have little potential for adverse impacts to individuals of this species. Implementation of the riparian prescription is expected to improve stream conditions at local sites. Cumulatively, many of these habitats on private lands are currently in a degraded state, making presence of quality habitats on national forest land increasingly important to this species.

Determination and Rationale

Implementation of the plan is expected to have no impacts on this species because: 1) protection measures for streams and riparian zones will provide maintenance of high quality sites occupied by this species, and 2) opportunities exist for the riparian prescription to improve existing conditions.

Coldwater darter (*Etheostoma ditrema*)

Distribution, Status, and Trend

The coldwater darter's range is restricted to a small number of isolated springs in the Coosa-Conasauga River systems in northeastern Alabama, northwestern Georgia, and southeastern Tennessee (Mettee et al. 1996). The species has been collected within five miles of the Chattahoochee National Forest in Estelle Spring (Whitfield County, GA), Colvard Spring and a nearby spring run (Murray County, GA), and the Conasauga River in Tennessee (HUCs 315010101, 315010102, 315010103 and 315010504). Listed as threatened by the state of Georgia, the coldwater darter is believed to be declining in numbers and vulnerable due to its isolated springs habitat (NatureServe 2003).

Habitat Relationships and Limiting Factors

Coldwater darters occur almost exclusively in springs and spring runs (Mettee et al. 1996). These are strongly associated with aquatic vegetation such as mosses (*Fontinalis*), watercress, and milfoil. Coldwater darters use this vegetation for cover, feeding, and spawning. They have an extended spawning season lasting from March through September. Eggs are adhesive and are broadcast into vegetation during spawning. No parental care is provided. The diet of coldwater darters is comprised mainly of crustaceans such as amphipods, isopods, and copepods that are commonly associated with spring habitats.

Populations of coldwater darter are particularly sensitive to human impacts because each population is relatively isolated. Loss of occupied habitat for coldwater darter may be attributed to siltation or filling of springs and spring runs from agriculture, logging, and associated road building. In addition, water abstraction for agriculture or damage to springs and spring vegetation by livestock can negatively impact coldwater darter populations. All watersheds where it occurs, are ranked as excellent condition with low risk for potential impairment.

Potential Management Effects

Management actions most likely to create adverse effects to aquatic species are those that disturb soil or litter, potentially leading to sedimentation, and those that reduce vegetative cover over streams, potentially leading to increased water temperature. The riparian prescription included in the revised plan provides direction designed to maintain or enhance water quality and associated beneficial uses. Therefore, plan implementation should have little potential for adverse impacts to individuals of this species. In addition, implementation of the riparian prescription is expected to improve stream conditions at local sites. Cumulatively, many of these habitats on private lands are currently in a degraded state, making presence of quality habitats on national forest land increasingly important to this species.

Determination and Rationale

Implementation of the plan is expected to have no impacts on this species because: 1) protection measures for streams and riparian zones will provide maintenance of high quality sites occupied by this species, and 2) opportunities exist for the riparian prescription to improve existing conditions.

Holiday darter (*Etheostoma brevirostrum*)

Distribution, Status, and Trend

The holiday darter is endemic to the upper Coosa River system. Disjunct populations occur in the upper reaches of the Conasauga, Coosawattee, and Etowah Rivers in Georgia and Shoal Creek in Alabama (Mettee et al. 1996). Currently, these populations are all described as a single species. It is listed as threatened in the State of Georgia (Georgia Heritage Program 2003). On and near the Chattahoochee National Forest, the holiday darter is found in the upper Conasauga River, the lower

Jacks River, in Mill Creek in Murray County, in Dawson County, Georgia. Populations also exist in Amicalola Creek, Little Amicalola Creek, Cochrans Creek, Etowah River in northern Lumpkin County in the Coosawattee drainage, and in Mountaintown, Cherrylog, and Turniptown Creeks (Mettee et al. 1996, Walters 1997, NatureServe 2003). It is reported in HUCs: 315010101, 315010102, 315010202, 315010203, 315010401 and 315010402. The species is uncommon and possibly extirpated and/or declining in portions of its range; it is apparently stable in the Conasauga River area.

Habitat Relationships and Limiting Factors

Holiday darters prefer medium to large, clear streams with moderate to fast current and rocky and sandy substrates (NatureServe 2003). They typically occur in streams that are cool enough to support trout populations, but they are tolerant of warmer conditions. Diet consists of macro-crustaceans and aquatic insect larvae (Mettee et al. 1996). The viability evaluation indicates that the species is sensitive to sedimentation. Two watersheds where this species occurs are in excellent condition and four are ranked as average. Plan implementation is not expected to alter these conditions.

Potential Management Effects

Management actions most likely to create adverse effects to aquatic species are those that disturb soil or litter, potentially leading to sedimentation, and those that reduce vegetative cover over streams, potentially leading to increased water temperature. The riparian prescription included in the revised plan provides direction designed to maintain or enhance water quality and associated beneficial uses. Therefore, plan implementation should have little potential for adverse impacts to individuals of this species. Implementation of the riparian prescription is expected to improve stream conditions at local sites. Cumulatively, many of these habitats on private lands are currently in a degraded state, making presence of quality habitats on national forest land increasingly important to this species.

Determination and Rationale

Implementation of the plan is expected to have no impacts on this species because: 1) protection measures for streams and riparian zones will provide maintenance of high quality sites occupied by this species, and 2) opportunities exist for the riparian prescription to improve existing conditions.

Lined chub (*Hybopsis lineapunctata*)

Distribution, Status, and Trend

The lined chub is endemic to the highland streams in the Coosa and Tallapoosa River drainages (Etnier and Starnes 1993, Mettee et al. 1996). Collection records indicate that its range is shrinking. Lined chubs have been collected only once since the 1970s in the Conasauga River basin (1996, North Prong Sumac Creek, Murray County, Georgia). Other Conasauga River system populations existed in Tar, Drowning

Bear, Swamp, Little Swamp, Mills, and Old Fort Creeks, but these are extirpated. Lined chubs were also presumed extirpated from the entire Etowah River system until they were recently rediscovered in Pumpkinvine Creek, Bartow County, Georgia (Walters, personal communication, 2003). The state of Georgia lists the lined chub as a species of special concern (Georgia Natural Heritage Program Data 2003, NatureServe 2003). It is found in 10 different HUCs (Appendix F of the FEIS).

Habitat Relationships and Limiting Factors

The lined chub is found in small to medium creeks in rocky or sandy pools (Etnier and Starnes 1993). They are often collected near riffles or submerged vegetation. The breeding season is from mid May to early June, but nothing is known about their spawning behavior. Lined chubs are benthic feeders that primarily feed on chironomid larvae and pupae. Causes of the decline of lined chubs likely include sedimentation from deforestation and agriculture as well as habitat loss and fragmentation due to dam building. Chicken, Tar, Swamp, Drowning Bear, and Little Swamp creeks in the Conasauga system formerly maintained populations of lined chubs but have been severely impacted by urban runoff and industrial pollution. Limiting factors include habitat quality and the potential for impoundment (NatureServe 2003). The viability evaluation indicates that the species is somewhat sensitive to sedimentation. However, 8 of the HUCs where it occurs are ranked as excellent and two are ranked as average .

Potential Management Effects

Management actions most likely to create adverse effects to aquatic species are those that disturb soil or litter, potentially leading to sedimentation, and those that reduce vegetative cover over streams, potentially leading to increased water temperature. The riparian prescription included in the revised plan provides direction designed to maintain or enhance water quality and associated beneficial uses. Therefore, plan implementation should have little potential for adverse impacts to individuals of this species. The implementation of the riparian prescription is expected to improve streamconditions at local sites. Cumulatively, many of these habitats on private lands are currently in a degraded state, making presence of quality habitats on national forest land increasingly important to this species.

Determination and Rationale

Implementation of the plan is expected to have no impacts on this species because: 1) protection measures for streams and riparian zones will provide maintenance of high quality sites occupied by this species, and 2) opportunities exist for the riparian prescription to improve existing conditions.

Trispot darter (*Etheostoma trisella*)

Distribution, Status, and Trend

The trispot darter is endemic to the upper Coosa River system in Georgia, Tennessee and Alabama. It was originally described from a single specimen collected in Cowens Creek in Alabama in 1947. The type locality was inundated by Lake Weiss in 1960,

and the species was presumed extirpated until a second specimen was discovered in a collection from 1954 in Swamp Creek, a tributary of the Conasauga River (Mettee et al. 1996, NatureServe 2003). The extant range of trispot darters was presumably limited to the Conasauga River basin until 1998, when three populations were found in the Coosawattee River system downstream of Carters Reservoir (Murray and Gordon counties, Georgia). Populations occur on or off of the Chattahoochee National Forest boundary in the Conasauga River, Coahulla Creek, Swamp Creek, Little Swamp Creek, Mill Creek (Whitfield County), Rock Creek., and Holly Creek. The state of Georgia lists the trispot darter as threatened due to its small range and its dependence on spring and spring seepages. It is reasonably secure in Georgia according to NatureServe (2003). It is known to occur in 5 HUCs.

Habitat Relationships and Limiting Factors

The trispot darter is found in medium to large creeks and small rivers. It is associated with slack water areas (e.g., channel margins, margins of mid-channel and lateral bars) usually in the vicinity of woody debris and/or water willow (*Justicia americana*). Diet consists primarily of midge and mayfly larvae but also includes stonefly and caddisfly larvae as well as some copepods. Trispot darters have distinctive habitat requirements for spawning. Beginning in the fall, many trispot darters migrate from the Conasauga River and larger streams to small tributaries. They spawn in seepage areas adjacent to these small streams. One known spawning locale is a seepage adjacent to the Conasauga River in north Georgia (Murray and Whitfield counties), suggesting that not all trispot darters migrate into small tributaries. Spawning generally occurs from December to April when low-lying wetland habitats are flooded. Eggs are broadcast and adhere onto aquatic and terrestrial vegetation. Males guard nesting sites (Ryon 1986).

In-stream loss of occupied habitat for trispot darter may be attributed to siltation from agriculture, logging, and associated road building. Additional losses of spawning habitat include filling of wetlands adjacent to streams for construction as well as ditching and draining of wetlands for agriculture.

Of the watersheds where it occurs, four are ranked as excellent. HUC 315010104 is listed as average. However, the forest has opportunities to improve this watershed condition under the revised forest plan direction.

Potential Management Effects

Management actions most likely to create adverse effects to aquatic species are those that disturb soil or litter, potentially leading to sedimentation, and those that reduce vegetative cover over streams, potentially leading to increased water temperature. The riparian prescription included in the revised plan provides direction designed to maintain or enhance water quality and associated beneficial uses. Therefore, plan implementation should have little potential for adverse impacts to individuals of this species. The implementation of the riparian prescription is expected to improve sedimentation and streamconditions at local sites. Cumulatively, many of these habitats on private lands are currently in a degraded state, making

presence of quality habitats on national forest land increasingly important to this species.

Determination and Rationale

Implementation of the plan is expected to have no impacts on this species because: 1) protection measures for streams and riparian zones will provide maintenance of high quality sites occupied by this species, and 2) opportunities exist for the riparian prescription to improve existing conditions.

Wounded darter (*Etheostoma vulneratum*)

Distribution, Status, and Trend

The wounded darter is endemic to the upper Tennessee River system (Etnier and Starnes 1993); however, several collections have been made in the Toccoa River system. U.S. Forest Service personnel made the most recent collection (2001) in the Toccoa River on the Chattahoochee National Forest. The population in the Toccoa River is disjunct from other populations of wounded darter and may represent a taxonomically distinct form of the species. The known range of wounded darters in the Toccoa River system extends from the Benton McKay trail downstream to reaches below Lake Blue Ridge (Cole, personal communication 2003). The state of Georgia has classified the wounded darter as endangered because of the small, isolated nature of the Toccoa population and its vulnerability to extirpation (Georgia Natural Heritage Program 2003). It is listed in 6 HUCs (Appendix F of the FEIS).

Habitat Relationships and Limiting Factors

The wounded darter occurs in large streams and rivers. They are found in deeper water (> 50 cm depth) with boulder and cobble substrates. In the Toccoa River, they are associated with bedrock outcrops, plunge pools and chutes. Wounded darters are uncommon, but population estimates are difficult because their habitat is difficult to sample. Little is known about wounded darter life history but presumably they feed on aquatic macro-invertebrates. Wounded darters belong to the subgenus *Nothonotus*, which bury themselves in gravel during spawning. Eggs are laid directly in the gravel and no parental care is provided (NatureServe 2003, Etnier and Starnes 1993).

Wounded darter populations have been lost throughout much of their range due to river impoundment. Additional losses of instream habitat may be attributed to siltation from agriculture, logging, and associated road building. The viability evaluation indicates that the species is sensitive to sedimentation and five HUCs where it occurs are listed as average. One of these watersheds ranked as below average.

Potential Management Effects

Management actions most likely to create adverse effects to aquatic species are those that disturb soil or litter, potentially leading to sedimentation, and those that reduce vegetative cover over streams, potentially leading to increased water

temperature. The riparian prescription included in the revised plan provides direction designed to maintain or enhance water quality and associated beneficial uses. Therefore, plan implementation should have little potential for adverse impacts to individuals of this species. The implementation of the riparian prescription is expected to improve stream conditions at local sites. Cumulatively, many of these habitats on private lands are currently in a degraded state, making presence of quality habitats on national forest land increasingly important to this species.

Determination and Rationale

Implementation of the plan is expected to have no impacts on this species because: 1) protection measures for streams and riparian zones will provide maintenance of high quality sites occupied by this species, and 2) opportunities exist for the riparian prescription to improve existing conditions.

Fatlips minnow (*Phenacobius crassilabrum*)

Distribution, Status, and Trend

The fatlips minnow is endemic to the upper Tennessee River system from the South Fork Holston River through the Little Tennessee River system (Etnier and Starnes 1993). It is an upland species restricted to the Blue Ridge physiographic province. In Georgia it is limited to the Little Tennessee River system on or near the Chattahoochee National Forest. Populations occur at one site in the Little Tennessee River near Dillard (HUC 601020201) and in several locales in Betty Creek, a tributary of the Little Tennessee River (Walters, personal communication 2002). The state of Georgia lists the fatlips minnow as endangered because of its limited and isolated range and vulnerability to extirpation (Georgia Natural Heritage Program data 2003, NatureServe 2003).

Habitat Relationships and Limiting Factors

Fatlips minnows are found in riffles of medium creeks and small rivers. They are benthic feeders and consume a variety of aquatic insects including midge and cranefly larvae. Little is known about the spawning behavior of fatlips minnows. Presumably, they are benthic nest associates that deposit their eggs on gravel nests constructed by other cyprinid species (Etnier and Starnes 1993). Threats to the species include habitat degradation from siltation from unrestricted agriculture, logging, and the associated road building. Privately held lands along the Little Tennessee River in Georgia are utilized for grazing and row crops. Erosion is severe in places and livestock in many places have direct access to much of the river between Dillard, Georgia and the Tennessee state line (Cole, personal communication 2003, NatureServe 2003). The viability evaluation indicates that the species is sensitive to sedimentation. The overall watershed condition ranking is average.

Potential Management Effects

Management actions most likely to create adverse effects to aquatic species are those that disturb soil or litter, potentially leading to sedimentation, and those that

reduce vegetative cover over streams, potentially leading to increased water temperature. The riparian prescription included in the revised plan provides direction designed to maintain or enhance water quality and associated beneficial uses. Therefore, plan implementation should have little potential for adverse impacts to individuals of this species. The implementation of the riparian prescription is expected to improve sedimentation conditions at local sites. Cumulatively, many of these habitats on private lands are currently in a degraded state, making presence of quality habitats on National Forest land increasingly important to this species.

Determination and Rationale

Implementation of the plan is expected to have no impacts on this species, because: 1) protection measures for streams and riparian zones will provide maintenance of high quality sites occupied by this species, and 2) opportunities exist for the riparian prescription to improve existing conditions.

Frecklebelly madtom (*Noturus munitus*)

Distribution, Status, and Trend

The frecklebelly madtom occurs in widely scattered populations in the Pearl and Mobile River drainages (Etnier and Starnes 1993). In the upper Coosa River system, frecklebelly madtoms occur primarily in the Conasauga and Etowah Rivers. They are distributed along roughly 90 km in the Etowah River from Canton, Georgia, north to the Dawson Forest Wildlife Management Area. The farthest upstream collections are in the Etowah River, 0.6 miles upstream of the confluence with the Amicalola River and in the Amicalola River, 0.7 miles upstream of its mouth. Historical collections in the Conasauga River range from Dalton north to the Tennessee state line, a reach of roughly 80 km. However, recent intensive collections in this reach indicated that frecklebelly madtoms are presently restricted to one site (Mitchell Bridge Road Crossing, Murray County Road 132) in this river. None of the collections in the Etowah and Conasauga Rivers are within 5 miles of the Chattahoochee National Forest (Walters, personal communication, 2002). These populations are isolated from the other Mobile drainage populations, which are in significant decline overall (NatureServe 2003). The state of Georgia classifies this species as endangered. It occurs in HUCs 315010101, 315010102, 315010401 and 315010402.

Habitat Relationships and Limiting Factors

The frecklebelly madtom is found in small to large rivers and is virtually unknown from small streams. They occur in swift water in bedrock shoals and gravel/cobble riffles and are frequently associated with dense growths of riverweed (*Podostemum ceratophylum*). Their diet is comprised mainly of aquatic insect larvae, particularly hydropsychid caddisflies, mayflies, midges, and blackflies. Their spawning behavior is unstudied, but other madtoms typically deposit eggs in cavities beneath rocks, coarse woody debris, or other structures. Males guard nest sites (Etnier and Starnes 1993).

Causes of the recent decline of frecklebelly madtoms in the Conasauga River are unknown. This reach of river maintains high quality habitat and populations of other sensitive species.

The viability evaluation indicates that the species occurs in 3 HUCs, all are in excellent condition with a low risk of potential impacts to the aquatic fauna. In HUC 315010402, it is ranked as average in overall watershed condition there. There is only a limited opportunity for the forest to help improve the overall status, mainly because of the amount of private lands affecting that watershed.

Potential Management Effects

Management actions most likely to create adverse effects to aquatic species are those that disturb soil or litter, potentially leading to sedimentation, and those that reduce vegetative cover over streams, potentially leading to increased water temperature. The riparian prescription included in the revised plan provides direction designed to maintain or enhance water quality and associated beneficial uses. Therefore, plan implementation should have little potential for adverse impacts to individuals of this species. The implementation of the riparian prescription is expected to improve stream conditions at local sites. Cumulatively, many of these habitats on private lands are currently in a degraded state, making presence of quality habitats on National Forest land increasingly important to this species.

Determination and Rationale

Implementation of the plan is expected to have no impacts on this species because: 1) protection measures for streams and riparian zones will provide maintenance of high quality sites potentially occupied by this species, and 2) opportunities exist for the riparian prescription to improve existing conditions.

Freckled darter (*Percina lenticula*)

Distribution, Status, and Trend

The freckled darter is endemic to the Mobile River drainage (Mettee et al. 1996), and uncommon throughout its range (Freeman unpublished, NatureServe 2003). In the upper Coosa River system they occur in scattered localities in the Etowah and Conasauga Rivers. Freckled darters have been collected at three sites in the lower Conasauga, several miles downstream of National Forest land, but none since 1986 (Walters, personal communication, 2002). Populations in the Etowah River range from Canton (Cherokee County, Georgia) upstream to the Dawson Forest Wildlife Management Area north of Dawson, Georgia; these appear to be stable (Walters, personal communication, 2002). None of these populations are within five miles of the Chattahoochee National Forest. The state of Georgia classifies the freckled darter as endangered due to extremely low population levels (Georgia Natural Heritage Program Data 2003). This fish occurs in HUCs: 315010102, 315010105, 315010301 and 315010401.

Habitat Relationships and Limiting Factors

The freckled darter is usually found in deep runs, chutes, and riffles in swift current of large streams and rivers (Mettee et al. 1996). These habitats are often dominated by boulder, bedrock, and large cobble substrates. Juveniles have been collected in water willow (*Justicia americana)* beds in shallow riffles. Little is known about their life history, but presumably freckled darters consume aquatic macro-invertebrates and spawn in gravel, as do other members of the genus *Percina.* Limiting factors include habitat quality and the potential for stream alteration (NatureServe 2003). There is limited opportunity to affect these watersheds since so much of them are not on the forest.

Potential Management Effects

Management actions most likely to create adverse effects to aquatic species are those that disturb soil or litter, potentially leading to sedimentation, and those that reduce vegetative cover over streams, potentially leading to increased water temperature. The riparian prescription included in the revised plan provides direction designed to maintain or enhance water quality and associated beneficial uses. Therefore, plan implementation should have little potential for adverse impacts to individuals of this species. Within these watersheds, implementation of the riparian prescription is expected to improve stream conditions at local sites. Cumulatively, many of these habitats on private lands are currently in a degraded state, making presence of quality habitats on National Forest land increasingly important to this species.

Determination and Rationale

Implementation of the plan is expected to have no impacts on this species because: 1) protection measures for streams and riparian zones will provide maintenance of high quality sites occupied by this species, and 2) opportunities exist for the riparian prescription to improve existing conditions.

Highscale shiner (*Notropis hypsilepsis*)

Distribution, Status, and Trend

The highscale shiner is native to the Chattahoochee and Savannah river systems in Alabama and Georgia (Mettee et al. 1996). Current occurrences on or near the Chattahoochee National Forest are in Tallulah River watershed. Historically, the species also occurred in the Chattahoochee River watershed. The status of these populations is unknown (Walters, personal communication, 2002). The state of Georgia lists the species as threatened (Georgia Natural Heritage Program database 2003). It is known to occur in HUCs 306010207, 306010206 and 313000106.

Habitat Relationships and Limiting Factors

Highscale shiners are found in runs and pools of medium creeks and small rivers. They have been collected over sand, gravel, and bedrock substrates. Their life history is unstudied (Mettee et al. 1996, NatureServe 2003).

Potential Management Effects

Management actions most likely to create adverse effects to aquatic species are those that disturb soil or litter, potentially leading to sedimentation, and those that reduce vegetative cover over streams, potentially leading to increased water temperature. The riparian prescription included in the revised plan provides direction designed to maintain or enhance water quality and associated beneficial uses. Therefore, plan implementation should have little potential for adverse impacts to individuals of this species. The implementation of the riparian prescription is expected to sedimentation conditions at local sites. Cumulatively, many of these habitats on private lands are currently in a degraded state, making presence of quality habitats on National Forest land increasingly important to this species.

Determination and Rationale

Implementation of the plan is expected to have no impacts on this species because: 1) protection measures for streams and riparian zones will provide maintenance of high quality sites occupied by this species, and 2) opportunities exist for the riparian prescription to improve existing conditions.

Mountain brook lamprey (*Ichthyomyzon greeleyi*)

Distribution, Status, and Trend

The mountain brook lamprey is native to upland streams in the Ohio and Tennessee River drainages (Etnier and Starnes 1993). In Georgia, it occurs on or near Chattahoochee National Forest at the following locales (Freeman, unpublished; Cole, personal communication):

1) Hiawassee River system: Hiawassee River, Brasstown Creek, Soapstone Creek, unnamed tributaries
2) Toccoa River system: Toccoa River, Mulky Creek, Coopers Creek, Hemptown Creek, unnamed tributaries
3) Little Tennessee River system: Little Tennessee River, Blacks Creek, Betty Creek, unnamed tributaries
4) Nottely River system: Nottely River, Coosa Creek, unnamed tributaries.
5) South Chickamauga Creek system

The state of Georgia classifies the mountain brook lamprey as a species of special concern; there are less than five known occurrences of unknown condition in the state. (NatureServe 2003, Georgia Natural Heritage Program Data 2003). It occurs in 7 different HUCs (Appendix F of the FEIS).

Habitat Relationships and Limiting Factors

Mountain brook lampreys inhabit small to medium, high gradient, upland streams (Etnier and Starnes 1993, Mettee et al. 1996). These lampreys are non-parasitic. They exist in larval form (ammocoetes) for 5-7 years. During this time, they burrow into fines sand and silt and feed on microorganisms and detritus filtered from the water column. Ammocoetes metamorphose into adults during the winter, and adults aggregate in riffles in May and June to spawn. Mountain brook lampreys are

communal spawners that broadcast their eggs over gravel and provide no parental care.

The species is threatened by habitat degradation. Of the watersheds where it occurs, five are ranked as average, one is ranked below average. Sedimentation is the main potential threat to the watershed. The forest has limited opportunity for overall watershed improvement efforts due the amount of private land included within these watersheds.

Potential Management Effects

Management actions most likely to create adverse effects to aquatic species are those that disturb soil or litter, potentially leading to sedimentation, and those that reduce vegetative cover over streams, potentially leading to increased water temperature. The riparian prescription included in the revised plan provides direction designed to maintain or enhance water quality and associated beneficial uses. Therefore, plan implementation should have little potential for adverse impacts to individuals of this species. For the most part, implementation of the riparian prescription is expected to improve water conditions at local sites. Cumulatively, many of these habitats on private lands are currently in a degraded state, making presence of quality habitats on National Forest land increasingly important to this species.

Determination and Rationale

Implementation of the plan is expected to have no impacts on this species because: 1) protection measures for streams and riparian zones will provide maintenance of high quality sites occupied by this species, and 2) opportunities exist for the riparian prescription to improve existing conditions.

Olive darter (*Percina squamata*)

Distribution, Status and Trend

The olive darter is endemic to headwaters of the Cumberland and upper Tennessee River systems in Tennessee, Kentucky, North Carolina, and Georgia (Etnier and Starnes 1993, NatureServe 2003). The range of olive darters has been considerably reduced and fragmented by dam building in the above drainages. This darter occurs on or near the Chattahoochee National Forest within the Toccoa Rive watershed (Cole, personal communication, 2003). Populations within the Toccoa River are found between the mouths of Cooper and Rock Creeks. This population is isolated from other Tennessee River populations by Blue Ridge Lake near the town of Blue Ridge. The range of olive darters in Georgia may be larger than suggested by current museum records due to difficult-to-sample habitat (Walters, personal communication 2002). The state of Georgia ranks the species as threatened due to its geographic isolation and potential for extirpation (Georgia Natural Heritage Program Data 2003, Freeman unpublished). It occurs in 6 HUCs (Appendix F of the FEIS).

Habitat Relationships and Limiting Factors

Olive darters are found in high gradient upland rivers and large creeks (Etnier and Starnes 1993). They are collected in bedrock shoals, plunge pools, and deep runs. They are commonly associated with bedrock and boulder substrates in swift to torrential currents. Spawning occurs from mid-May through July, but spawning behavior is undocumented. Presumably, olive darters spawn like other species of *Percina* by burying eggs in loose gravel. Diet is composed mainly of hydropsychid caddisfly and heptageniid mayfly larvae (Etnier and Starnes 1993, NatureServe 2003). Limiting factors include habitat quality and the potential for impoundments. The viability evaluation indicates that the species is sensitive to sedimentation and stream alteration. Five watersheds have an average ranking and one is ranked as below average.

Potential Management Effects

Management actions most likely to create adverse effects to aquatic species are those that disturb soil or litter, potentially leading to sedimentation, and those that reduce vegetative cover over streams, potentially leading to increased water temperature. The riparian prescription included in the revised plan provides direction designed to maintain or enhance water quality and associated beneficial uses. Therefore, plan implementation should have little potential for adverse impacts to individuals of this species. Within the watersheds where this species occurs, implementation of the riparian prescription is expected to improve water quality conditions at local sites. Cumulatively, many of these habitats on private lands are currently in a degraded state, making presence of quality habitats on National Forest land increasingly important to this species.

Determination and Rationale

Implementation of the plan is expected to have no impacts on this species because: 1) protection measures for streams and riparian zones will provide maintenance of high quality sites occupied by this species, and 2) opportunities exist for the riparian prescription to improve existing conditions.

Popeye shiner (*Notropis ariommus*)

Distribution, Status, and Trend

The popeye shiner is widespread but not consistent in distribution throughout its range in the Ohio and Tennessee River systems (Etnier and Starnes 1993). It is rare in the southern portion of its range, with only being documented in Brasstown Creek and several locales in Chickamauga Creek, all within HUC 602000109. Populations are greater than one mile downstream from the National Forest. A Brasstown Creek population is possibly extirpated. The species is thought to be declining throughout most of its range (NatureServe 2003). The state of Georgia ranks it as threatened (Georgia Natural Heritage Program Data 2003).

Habitat Relationships and Limiting Factors

Popeye shiners occur in large streams and small rivers. They are habitat specialists found only in flowing pools at least one meter deep with small gravel substrates. This type of habitat is locally rare, but popeye shiners are rarely collected in other environs (Etnier and Starnes 1993, NatureServe 2003). They feed primarily on adult and immature aquatic insects. Their spawning behavior is unstudied, but are thought to spawn in late spring.

Habitat for this fish has been greatly reduced by impoundment; they are also very sensitive to suspended sediment and high turbidity (Cole, personal communication). The watershed where this species occurs is ranked as excellent. Sedimentation potential is a risk, but there are only limited opportunities for the forest to affect the watershed because it occurs mainly on private lands.

Potential Management Effects

Management actions most likely to create adverse effects to aquatic species are those that disturb soil or litter, potentially leading to sedimentation, and those that reduce vegetative cover over streams, potentially leading to increased water temperature. The riparian prescription included in the revised plan provides direction designed to maintain or enhance water quality and associated beneficial uses. Therefore, plan implementation should have little potential for adverse impacts to individuals of this species. In HUC 602000109, implementation of the riparian prescription is expected to improve water conditions at local sites. Cumulatively, many of these habitats on private lands are currently in a degraded state, making presence of quality habitats on National Forest land increasingly important to this species.

Determination and Rationale

Implementation of the plan is expected to have no impacts on this species because: 1) protection measures for streams and riparian zones will provide maintenance of high quality sites occupied by this species, and 2) opportunities exist for the riparian prescription to improve existing conditions.

Brook floater (*Alasmidonta varicosa*)

Distribution, Status, and Trend

The brook floater is an Atlantic slope species that ranges from Nova Scotia and New Brunswick, south to South Carolina (NatureServe 2003). It is known to occur in the Chattooga River in Rabun County, Georgia (Savannah River drainage, HUC 306010201 watershed); this location on Forest is thought to be the best in the southeast is extremely significant for the conservation of the species (Alderman, personal communication, 2003). The state of Georgia classifies the brook floater as a species of concern (Georgia Natural Heritage Program Data 2003).

Habitat Relationships and Limiting Factors

The brook floater is often found in and near riffles due to its preference for strong currents. Habitat usually consists of small, upland, rapidly flowing streams that are rich in oxygen, and sand or gravel substrates (Adkins 1995). Overall watershed condition rating is ranked as average. Forest Service management may influence these watershed conditions to improve overall water quality in the watershed.

Potential Management Effects

Management actions most likely to create adverse effects to aquatic species are those that disturb soil or litter, potentially leading to sedimentation, and those that reduce vegetative cover over streams, potentially leading to increased water temperature. The riparian prescription included in the revised plan provides direction designed to maintain or enhance water quality and associated beneficial uses. Therefore, plan implementation should have little potential for adverse impacts to individuals of this species. In HUC 306010201 watershed, implementation of the riparian prescription is expected to improve stream conditions at local sites. Cumulatively, many of these habitats on private lands are currently in a degraded state, making presence of quality habitats on National Forest land increasingly important to this species.

Determination and Rationale

Implementation of the plan is expected to have no impacts on this species because: 1) protection measures for streams and riparian zones will provide maintenance of high quality sites potentially occupied by this species, and 2) opportunities exist for the riparian prescription to improve existing conditions.

Ridged mapleleaf (*Quadrula rumphiana*)

Distribution, Status, and Trend

The ridged mapleleaf is a Coosa drainage species; it is currently found in the Oostanaula River and its tributaries Armuchee Creek, Johns Creek, and the Conasauga River; also the lower Coosawattee River (Paul Johnson, personal communication, NatureServe 2003). The species is thought to be stable; about 100 occurrences are known at this time (NatureServe 2003). It is known in HUCs 315010102, 315010101 and 315010105. The state of Georgia does not list the species as one of special concern (Georgia Natural Heritage Program 2003).

Habitat Relationships and Limiting Factors

The ridged mapleleaf exists in large streams, rivers and reservoirs over sand or gravel substrates with moderately silty water. Threats to the species include impoundment and siltation, although it is fairly tolerant of nondestructive intrusion (NatureServe 2003). All three watersheds are ranked as excellent. This mussel was collected historically in HUC 315010104.

Potential Management Effects

Management actions most likely to create adverse effects to aquatic species are those that disturb soil or litter, potentially leading to sedimentation, and those that reduce vegetative cover over streams, potentially leading to increased water temperature. The riparian prescription included in the revised plan provides direction designed to maintain or enhance water quality and associated beneficial uses. Therefore, plan implementation should have little potential for adverse impacts to individuals of this species. The implementation of the riparian prescription is expected to improve stream conditions at local sites. Cumulatively, many of these habitats on private lands are currently in a degraded state, making presence of quality habitats on National Forest land increasingly important to this species.

Determination and Rationale

Implementation of the plan is expected to have no impacts on this species because: 1) protection measures for streams and riparian zones will provide maintenance of high quality sites potentially occupied by this species, and 2) opportunities exist for the riparian prescription to improve existing conditions.

Alabama creekmussel (*Strophitus connasaugensis*)

Distribution, Status, and Trend

The Alabama creekmussel is an Alabama River drainage species (Parmalee and Bogan 1998). In the Coosa drainage, the species occurs in the middle and upper Conasauga River and in its tributary, Holly Creek but below National Forest land (Paul Johnson, personal communication, Evans 2001). It now appears to be uncommon to rare (Parmalee and Bogan 1998). The state of Georgia classifies it as a species of special concern (Georgia Natural Heritage Program Data 2003). It is found in HUCs 315010101, 315010102 and 315010105.

Habitat Relationships and Limiting Factors

The Alabama creekmussel is found in small to medium-sized rivers, or shallow areas in larger rivers, over sand, silt, or fine gravel substrate (Parmalee and Bogan 1998). It typically occurs in stretches with some current in less than two feet of water. Fish hosts for its glochidia are unknown. Limiting factors include habitat quality and the potential for stream alteration (NatureServe 2003).

Most of the watersheds where this species occur are in excellent condition, and there are only limited opportunities for improvement of these watersheds on the forest.

Potential Management Effects

Management actions most likely to create adverse effects to aquatic species are those that disturb soil or litter, potentially leading to sedimentation, and those that reduce vegetative cover over streams, potentially leading to increased water temperature. The riparian prescription included in the revised plan provides direction designed to maintain or enhance water quality and associated beneficial uses. Therefore, plan implementation should have little potential for adverse impacts to

individuals of this species. The implementation of the riparian prescription is expected to improve streamconditions at local sites. Cumulatively, many of these habitats on private lands are currently in a degraded state, making presence of quality habitats on National Forest land increasingly important to this species.

Determination and Rationale

Implementation of the plan is expected to have no impacts on this species because: 1) protection measures for streams and riparian zones will provide maintenance of high quality sites occupied by this species, and 2) opportunities exist for the riparian prescription to improve existing conditions.

Alabama rainbow (*Villosa nebulosa*)

Distribution, Status, and Trend

The Alabama rainbow is found throughout the Mobile Bay basin (Parmalee and Bogan 1998). In Georgia, it occurs throughout the Coosa watershed. Occurring in the following watersheds with Forest Service ownership: 315010101, 315010102, 315010103, 315010104, 315010303 and 315010305 (Appendix F of the FEIS). It is only known from historical records in HUC 315010103 (Evans, 2001). Although the species is thought to be currently stable (Parmalee and Bogan 1998), the state of Georgia has listed it as a species of special concern (Georgia Natural Heritage Program Data 2003).

Habitat Relationships and Limiting Factors

This mussel lives in riffles and along the edges of emerging vegetation, such as *Justicia* beds, in gravel and sand in moderate to strong current (Parmalee and Bogan 1998). It prefers clean, well-oxygenated stretches at depths less than three feet. Hosts for its glochidia include various bass species (*Micropterus* sp.). Overall watershed condition rating is excellent in five HUCs and average within one HUC.

Potential Management Effects

Management actions most likely to create adverse effects to aquatic species are those that disturb soil or litter, potentially leading to sedimentation, and those that reduce vegetative cover over streams, potentially leading to increased water temperature. The riparian prescription included in the revised plan provides direction designed to maintain or enhance water quality and associated beneficial uses. Therefore, plan implementation should have little potential for adverse impacts to individuals of this species. The implementation of the riparian prescription is expected to improve water quality conditions at local sites. Cumulatively, many of these habitats on private lands are currently in a degraded state, making presence of quality habitats on National Forest land increasingly important to this species.

Determination and Rationale

Implementation of the plan is expected to have no impacts on this species because: 1) protection measures for streams and riparian zones will provide maintenance of

high quality sites potentially occupied by this species, and 2) opportunities exist for the riparian prescription to improve existing conditions.

Tennessee heelsplitter (*Lasmigona holstonia*)

Distribution, Status, and Trend

The range of the Tennessee heelsplitter (*Lasmigona holstonia*) is limited to small creeks and rivers in the upper Tennessee and upper Coosa river system (Johnson and Evans, 2000, Parmalee and Bogan 1998). Formerly widespread throughout the Coosa River drainage, recent surveys resulted in the following locations: Chattooga River tributaries Teloga, Rough, and Cane Creeks; West Armuchee Creek; scattered populations in the Conasauga River watershed; Coosawattee River tributaries; and Etowah River tributaries (Johnson, personal communication, Evans 2001). Distribution has been reduced and continues to decline (NatureServe 2003). The state of Georgia classifies the Tennessee heelsplitter as a species of concern (Georgia Natural Heritage Program Data 2003). It can be found in HUCs: 315010102, 315010103, 315010104, 315010305 and 315010105.

Habitat Relationships and Limiting Factors

This species is associated with spring-influenced tributaries in sand/mud substrate in moderate current (Parmalee and Bogan 1998). Host fish for its glochidia are possibly banded sculpin and rockbass (NatureServe 2003). Habitat degradation due to agricultural practices (especially uncontrolled cattle grazing) is a major threat to the species; reservoir construction initially reduced and fragmented the species' range (NatureServe 2003).

Potential Management Effects

Management actions most likely to create adverse effects to aquatic species are those that disturb soil or litter, potentially leading to sedimentation, and those that reduce vegetative cover over streams, potentially leading to increased water temperature. The riparian prescription included in the revised plan provides direction designed to maintain or enhance water quality and associated beneficial uses. Therefore, plan implementation should have little potential for adverse impacts to individuals of this species. The implementation of the riparian prescription is expected to improve water quality conditions at local sites. Cumulatively, many of these habitats on private lands are currently in a degraded state, making presence of quality habitats on National Forest land increasingly important to this species.

Determination and Rationale

Implementation of the plan is expected to have no impacts on this species because: 1) protection measures for streams and riparian zones will provide maintenance of high quality sites occupied by this species, and 2) opportunities exist for the riparian prescription to improve existing conditions.

Georgia Pigtoe (*Pleurobema hanleyanum*)

Distribution, Status and Trend

The Georgia pigtoe's distribution is currently limited to the Conasauga River (Polk and Bradley Counties, Tennessee, and two occurrences near the Mill Creek (Murray County) confluence (Evans 2001, Johnson personal communication). The species is endemic to the Alabama River system, and prior to 1997, it was thought to be extinct (NatureServe 2003). The state of Georgia classifies the Georgia pigtoe as a species of special concern (Georgia Natural Heritage Program data 2003). It occurs in HUCs 315010102 and 315010101.

Habitat Relationships and Limiting Factors

This species is found in areas with good current flowing over coarse sand and gravel substrate in small rivers. In the Conasauga River, it was encountered at depths of less than two feet (Parmalee and Bogan 1998). The fish host for the glochidia is unknown. Freshwater mussels are filter feeders taking organic detritus, diatoms, phytoplankton, and zooplankton from the water column (Parmalee and Bogan 1998). The decline and extirpation of most populations of Georgia pigtoe mussels is not well documented but sedimentation is given as the most likely threat (NatureServe 2003). The viability analysis lists both watersheds where this mussel occurs as being in excellent condition with a low risk of potential degradation.

Potential Management Effects

Management actions most likely to create adverse effects to aquatic species are those that disturb soil or litter, potentially leading to sedimentation, and those that reduce vegetative cover over streams, potentially leading to increased water temperature. The riparian prescription included in the revised plan provides direction designed to maintain or enhance water quality and associated beneficial uses. Therefore, plan implementation should have little potential for adverse impacts to individuals of this species. The implementation of the riparian prescription is expected to improve water quality conditions at local sites. Cumulatively, many of these habitats on private lands are currently in a degraded state, making presence of quality habitats on National Forest land increasingly important to this species.

Determination and Rationale

Implementation of the plan is expected to have no impacts on this species because: 1) protection measures for streams and riparian zones will provide maintenance of high quality sites occupied by this species, and 2) opportunities exist for the riparian prescription to improve existing conditions.

Attachment B.

HUC = 5th Order Hydrologic Unit Code

% = Percent of the watershed under National Forest management

Watershed Condition for forest plan on the Chattahoochee-Oconee National Forest. Ownership is the percentage of the watershed managed by the Forest Service. WCR is the watershed condition ranking score. Watershed Condition for viability has three categories: Low Risk; Risk 1 indicates watershed concerns but Forest Service may influence conditions to improve the condition of the watershed; and Risk 2 also indicates watershed concerns; however, Forest Service opportunity to measurably affect the watershed is limited. Sources of impairment: S = sediment; P = point-source pollution; T = temperature; F = Altered Flow.

Watershed Condition Ranking

Watershed	Ownership	Current	Watershed Condition			Alt-I
HUC	%	WCR	Low Risk	Risk 1	Risk 2	WCR
306010201	42.84	A		S		A
306010207	55	A		S		A
306010206	25.59	E	X			E
306010401	12.10	E	X			E
307010106	4.09	E	X			E
307010107	19.73	E	X			E
307010109	4.25	A			S	A
307010111	0.59	A			S	A
307010110	0.01	A			S	A
307010114	0.74	A			S	A
307010115	28.03	E	X			E
307010116	11.15	E			S	A
307010117	15.79	E	X			E
307010310	11.78	E	X			E
307010313	12.79	E	X			E
313000101	40.11	E	X			E
313000102	17.22	E	X			E
313000105	31.64	E	X			E
313000106	19.20	A			S	A
315010101	40.98	E	X			E
315010102	19.57	E			T	E
315010103	1.66	E	X			E
315010104	26.65	A		S		A
315010105	7.51	E			P	E
315010201	17.86	A			S	A
315010202	21.98	A			S	A
315010203	29.04	A			S	A
315010204	2.42	A			S	A
315010301	10.83	E			P	E
315010303	37.73	E	X			E
315010304	15.44	E	X			E
315010305	24.23	E	X			E
315010401	23.37	E	X			E
315010402	7.05	A			S	A
315010504	1.47	E	X			E
315010505	3.37	E	X			E
601020201	21.34	A		S		A
602000109	3.96	E	X			E
602000201	39.63	A			S	A
602000204	18.93	A			S	A
602000208	35.75	A			S	A
602000301	68.41	A		S		A
602000302	18	B/A			S	B/A

6. CONSULTATION WITH OTHERS

CATT, Center for Aquatic Technology Team, U.S. Forest Service Research

Mitzi Cole, Forest Fisheries Biologist for the Chattahoochee-Oconee National Forest

Bud Freeman, Fisheries Consultant at the University of Georgia in Athens

Paul Johnson, Aquatic Specialist, pers. comm. with Ruth Stokes

Nathan Klaus, Georgia DNR Ornithologist, pers. comm. with Elizabeth Caldwell

Dr. Susan Loeb, Research Scientist at Clemson University, Bat Research Specialist

Cindy Wentworth, Forest Ecologist and Botanist for the Chattahoochee-Oconee National Forest

John Alderman, Malacologist.

Chris Skelton, Professor at Georgia College and State University.

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Approximate Conversions

When the unit of measure you know is in the second column, multiply by the factor shown to find the equivalent in the unit of measure shown in the fourth column.

English to Metric

Length				
in	inches	2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km

Area				
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha

Mass (weight)				
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	metric ton	t

Volume				
tsp	teaspoons	5	milliliters	mL
Tbsp	tablespoons	15	milliliters	mL
in^3	cubic inches	16	milliliters	mL
fl oz	fluid ounces	30	milliliters	mL
c	cups	0.24	liters	L
pt	pints	0.47	liters	L
qt	quarts	0.95	liters	L
gal	gallons	3.8	liters	L
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3

Metric to English

Length				
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi

Area				
cm^2	square centimeters	0.16	square inches	in^2
m^2	Square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	square miles	mi^2
ha	hectares	2.5	acres	(10,000 m^2)

Mass (weight)				
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
	metric ton	1.1	short tons	(1,000 kg)

Volume				
mL	milliliters	0.03	fluid ounces	fl oz
mL	milliliters	0.06	cubic inches	in^3
L	liters	2.1	pints	pt
L	liters	1.06	quarts	qt
L	liters	0.26	gallons	gal
m^3	cubic meters	35	cubic feet	ft^3
m^3	cubic meters	1.3	cubic yards	yd^3

Source: National Institute of Standards and Technology website at "http://ts.nist.gov/ts/htdocs/200/202/conv.htm