BIOLOGICAL ASSESSMENT

Activities Related to

Wildlife Habitat, Utilities, and Overlooks

Forest Openings Maintenance

Environmental Assessment

USDA-Forest Service
Cherokee National Forest

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1.0 INTRODUCTION

The purpose of this biological assessment (BA) is to document any potential effects of the project on Proposed, Endangered, and Threatened species (PETS) or their habitats, and to ensure land management decisions are made with the benefit of such knowledge. The objectives of this assessment are to:

1) Comply with the requirements of the Endangered Species Act that actions by federal agencies not jeopardize or adversely modify critical habitat of federally listed species.

2) Provide a process and a standard by which PETS receive full consideration in the decision-making process.

1.1 ACTION AREA AND SCOPE OF ANALYSIS

The action area (Figure 1) for available habitat, direct effects, and indirect effects on Proposed, Threatened and Endangered species includes managed wildlife spot and linear openings, utility corridors and overlooks across the Cherokee National Forest. The CNF covers approximately 656,070 acres and is located in ten east Tennessee counties along the border with North Carolina. The CNF generally lies within the Hot Continental Division of the Humid Temperate domain. Within this division, all but westernmost fringe of the south end of the CNF is in the Central Blue Ridge Mountain Section of the Central Appalachian Broadleaf Forest - Coniferous Forest – Meadow Province. The westernmost fringe of the south end of the CNF is located in the Sandstone hills Subsection of the Central Ridge and Valley Section, Eastern Broadleaf Forest Province.

This project proposes alternative methods to manage existing openings on the forest. Openings considered include corridors for electrical utility lines comprising approximately 1,576 acres, linear wildlife openings comprising approximately 859 acres, spot wildlife openings (including managed openings such as mountain balds) comprising approximately 2,205 acres, and scenic overlooks comprising approximately 14 acres.

These existing openings comprise a total of approximately 4,654 acres, which is less than one percent of the total 656,070 acres of the Cherokee National Forest. A summary of the proposed activities is provided below.

Unless otherwise described in the sections below, analysis of direct and indirect effects for resources is primarily focused within the boundaries of the individual project areas. The timeframe for short-term effects is within the first year after treatment, and long-term effects up to 10-15 years from treatment. Analysis of cumulative effects also includes past, present and reasonably foreseeable activities on the forest, and may extend beyond the limits of the defined project areas to include the range of a species or habitat type. Time frames for cumulative effects analysis for terrestrial elements generally include 10 years prior to 10-15 years post treatment. A list of past, present and reasonably foreseeable activities to be considered is included in the project environmental assessment.
No surveys were conducted specifically for this project. All the potentially affected sites have been previously managed as open areas (many for decades), thus species occurring within those sites are typically those adapted to open conditions and the associated disturbance that creates and maintains them. Existing data on locations of rare or uncommon species was overlaid with maps of all of the existing openings to see what known sites for species may be coincident or proximal to the openings included in the proposed action.

**FIGURE 1. FOREST OPENINGS PROJECT AREA MAP**

The environmental baseline includes past/present impacts of all Federal, State, and private actions in the action area and future Federal actions with existing section 7 consultations. The timeframe considered for past actions is the last five years, based on timeframe of potential impacts and guidance from the US Fish and Wildlife Service (FWS). Past and present impacts are restricted to effects of the actual mechanical maintenance of the openings themselves which has been ongoing. Herbicides have also been used in openings for the elimination and control of non-native invasive species.

**1.2 PROPOSED ACTIONS IN PREFERRED ALTERNATIVE**

*Alternative B*
The Cherokee National Forest proposes to manage grassy, herbaceous and shrubby openings using a combination of manual, cultural, and chemical control treatment methods across the
National Forest. While treatments are currently ongoing, new treatment methods are expected to begin in the fall of 2015 and are estimated to occur until conditions change requiring new analysis. Openings include those managed by the National Forest as openings benefiting wildlife species and utility corridors under special use permit by utility agencies, cooperatives and companies. The overlooks are developed scenic overlooks along the Ocoee Scenic Byway in Polk County and the Cherohala Skyway in Monroe County. They would be maintained only within their existing footprint.

In this proposal, appropriate vegetation would continue to be established by mechanical means. In addition, chemical methods would be used to establish the desired vegetation. Openings would be treated with an appropriate rate of herbicide, using a backpack or portable low-pressure sprayer to promote native grasses and forbs during manipulation and establishment of grasses. Some areas may be planted using the no-till method. At that time, one of two seed mixtures could be used 1) a cool season mixture including annual rye grass and clover or 2) a native mixture including Indian grass, little bluestem, switchgrass, Illinois bundleflower, partridge pea, and big bluestem. Mixture selection would be based on site characteristics and species composition may vary. Plugs of native species that benefit pollinators may be planted as appropriate. Mechanical and chemical methods would also be used to maintain the preferred vegetation by selectively treating the woody sprouts that develop after planting.

The treatments proposed for maintaining early successional habitat in openings are:

• Chainsaw Work—use chainsaws to remove woody vegetation. The intent is to maintain conditions suitable for the growth of grasses, forbs, and shrubs. This will include dropping trees to increase feathering of the edges. Include daylighting with heavy equipment such as bulldozers to remove vegetation.

• Mowing—use equipment such as tractor-powered mowers to cut grass, brush, and tree seedlings at ground level.

• Non-native Invasive Species (non-natives) and Woody Encroachment Treatment—use hand, mechanical, and chemical treatments to remove or limit non-natives and to help reduce excess woody vegetation. This may include spot application of herbicides to prevent resprouting and occasional use of herbicides instead of cutting woody vegetation. Existing permits allow several maintenance activities in the utility corridors. The Forest proposes to add herbicide use to the treatments allowed for maintenance of utility corridor segments, plus treatments such as seed drilling to establish native warm season grasses. This analysis does not commit a utility company to complete work beyond that required by its existing permit.

• Prescribed Fire—increase vegetative diversity and quality through management-ignited fire.

• Road Maintenance—maintain existing access roads to these locations through blading, mowing, or ditching if needed, but build no new roads. Access is available on public roads to most of the proposed treatment areas.

• Root Raking—use dozers with raking attachments to remove woody encroachment.

• Planting—to enhance vegetative diversity, if needed, plant a native seed mixture or desired non-native that includes shrubs, grasses, and herbaceous plants; broadcast seed or use no-till drills.
• Strip Disking—drag equipment to rip the soil, loosening thick mats of grass and providing aeration and opportunity for new plants to grow.

Openings maintained by the Forest would be treated as funding and logistical constraints allow. Most would be maintained by mechanical means each year, however, chemical treatments would occur on fewer areas. Utilities would be required to submit annual operating plans with areas of maintenance identified. Buffers of untreated vegetation would remain near streams and other areas not appropriate for manipulation. Stream buffers would meet or exceed Revised Plan direction.

Specific herbicides that could be used in the project area are listed below. Detailed descriptions of these chemicals including comprehensive risk assessments for each can be found at: http://www.fs.fed.us/foresthealth/pesticide/risk.shtml

• Aminopyralid has been registered by the U.S. EPA for the control of invasive weeds. Uses of aminopyralid involve applications to forest and rangelands, rights-of-way, and developed recreational areas such as campgrounds, picnic areas and trails. Application methods include backpack (selective foliar). Two formulations of aminopyralid are specifically considered: Milestone and Milestone VM.

• 2,4-D, the common name for 2,4-dichlorophenoxyacetic acid, is a selective systemic herbicide used to control broadleaf weeds. In Forest Service programs, herbicide formulations containing 2,4-D are most commonly used in wildlife opening, rights-of-way maintenance, and noxious weed control.

• Clopyralid is a selective herbicide that controls broadleaf herbs, primarily composites, legumes, and smartweeds. This chemical acts as a growth regulator and is typically applied as a direct foliar application. With selectivity to legumes, this chemical is particularly useful in the control of kudzu, mimosa, and lespedeza. It may be used for wildlife opening maintenance, planting site preparation, and release of tree seedlings. Commercial brand-names include, but are not limited to Transline™.

• Dicamba is a somewhat selective herbicide that controls most annual and perennial broadleaf herbs and some woody species. This chemical acts as a growth regulator and is typically applied as a direct foliar application. It is known to be effective on autumn olive. Commercial brand-names include, but are not limited to Vanquish™ and Overdrive™.

• Fluazifop-P-butyl is an effective herbicide for the control of many annual and perennial grass weeds. It is used in forestry related applications including the control of grasses in tree farms, conifer nurseries, and conifer plantations as well as applications to rights-of-way, utility lines, fence lines, and several other non-crop sites.

• Fluroxypyr is a selective post-emergent systemic herbicide registered for the control of broadleaf weeds in rangeland, non-crop areas, and grazed areas as well as for the control of woody brush. Uses of fluroxypyr involve applications to forest and rangelands, rights-of-way, and developed recreational areas such as campgrounds, picnic areas, and trails.

• Glyphosate is a non-selective, broad spectrum herbicide that can be used to control many grasses, forbs, vines, shrubs, and tree species. Specific formulations of Glyphosate have been
labeled for aquatic application. Formulations labeled for aquatic sites can be effective on both emergent aquatics and shoreline vegetation. This chemical is a growth inhibitor that can be applied through direct foliar application, stem injection, and cut-surface application. It has been proven effective on a wide variety of non-native invasive plant species. Commercial brand-names include, but are not limited to Accord™, Roundup™, and Rodeo™.

• Imazapic is a selective herbicide that is used primarily in and around populations of native, warm season grasses. Warm season grasses, many wildflower species, and legumes are resistant, while many cool season grasses (including non-native species of Fescue) and broadleaf weeds are susceptible. It is often used for restoration of native plants in pastures and fields. Commercial brand-names include, but are not limited to Plateau™.

• Imazapyr is a selective herbicide that is used primarily in the control of hardwood trees and some species of grasses. This chemical is a plant protein production inhibitor that can be absorbed either through roots or foliage, or injected directly into the stem, and works systemically throughout the target plant. It has been proven effective in the control of tree of heaven, princess tree, mimosa, autumn olive, privet, and multiflora rose. Used in combination with Triclopyr or Glyphosate can increase target specificity. Commercial brand-names include, but are not limited to Arsenal™ and Chopper™.

• Metsulfuron methyl is a systemic herbicide that is selective to woody species, broadleaf weed species, and many annual grasses. It has been proven to be effective in the control of lespedeza, Japanese honeysuckle, kudzu, and multiflora rose. Commercial brand-names include, but are not limited to Escort™.

• Picloram is a systemic herbicide that is registered for the post-emergent control of broadleaf weeds and woody plants. Picloram is used in Forest Service programs primarily for the control of noxious weeds. Rights-of-way management is a minor use for picloram. The formulations of picloram used most often by the Forest Service are Tordon K and Tordon 35 22K.

• Triclopyr is a selective herbicide that controls many species of herbaceous and woody broadleaf weeds, but has little to no effect on grasses. This chemical acts as a growth regulator and can be applied as a direct foliar application, stem injection, or cut-surface treatments. Specific formulations of Triclopyr have been labeled for aquatic application. Formulations labeled for aquatic sites can be effective on both emergent aquatics and shoreline vegetation. It has been proven effective on a wide variety of non-native invasive plant species. Commercial brand-names include, but are not limited to Garlon 3ATM, Garlon 4TM, and Pathfinder IITM.

Methods of application would be:

• Foliar, where the foliage of the individual plant to be controlled is sprayed;

• Basal (streamline), where the herbicide is sprayed onto the individual stem of the plant to be controlled;

• Cut surface, where the herbicide is applied to an axe-chop in the stem (hack and squirt), or to the freshly sawn stump.
Aerial spraying will not be considered in this analysis as it is not allowed in utility corridors according to the Forest Plan.

**Design Criteria**
Specific actions will be incorporated into the project design and implementation; only those relating to potential effects of PETS are listed.

1. Use broad-based dips or water bars on all access ways on non-level slopes.

2. Implement Tennessee Best Management Practices (BMPs) as a minimum to achieve soil and water quality objectives. When Forest Plan (RLRMP) Standards exceed BMPs, the standards shall take precedence over Tennessee BMPs.

3. Streamside management zones (riparian corridors and filter zones) would be established, as specified in the RLRMP.

4. Any new threatened, endangered, and/or sensitive species locations discovered within a project area may result in all actions being delayed or interrupted within the area. The appropriate district wildlife/fisheries biologist or botanist would be consulted to determine effects of the action on the species.

5. Trees known to have been used as roosts by Indiana bats are protected from cutting and/or modification until they are no longer suitable as roost trees unless necessary for public safety. Consultation with the US Fish and Wildlife Service (FWS) must occur before cutting or modification.

6. To avoid injury to young Indiana bats, prescribed burning of potential maternity roosting habitat between May 1 and August 15 is prohibited, unless otherwise determined by consultation with the FWS.

7. Snags with exfoliating bark are not intentionally felled unless necessary for public safety. Exceptions may be made for small-scale projects such as insect/disease control, salvage harvesting, and facility construction.

8. During all silvicultural treatments in hardwood forest types, retention priority is given to the largest available trees that exhibit characteristics favored by roosting Indiana bats.

9. Mixing-water for herbicide use would be brought to the site by work crews and not obtained from streams or other bodies of water.
10. No herbicide would be applied within 30 feet of open water except for selective treatments that use herbicides labeled for aquatic use.

11. Skid trails and temporary roads for the purpose of timber harvest would not be constructed for sustained distances over 200 feet in areas with slopes of 40% or greater (“steep area”). The 200-foot length can be exceeded however where the skid trail and/or temporary road is needed to traverse a steep area in order to access the remaining harvest unit(s). Trees within the traversed steep area would not be harvested, except where possible through cable winching to equipment placed outside the steep area.

2.0 CONSULTATION HISTORY

On February 26, 2013, Mary Jennings (FWS) sent a letter to the Cherokee National Forest (CNF) pertaining to project-specific Indiana bat surveys and proposed habitat use study on the north end of the CNF. The letter states that “During the period of the O’Keefe study, a substantial amount of time will be devoted to acoustic and netting surveys. Given this effort, I believe additional, project-specific bat surveys will not be necessary during the duration of this study to address the potential impacts of CNF projects on the north end of the CNF. Therefore, my staff will no longer be providing recommendations to conduct site-specific bat surveys in conjunction with individual projects…” This project falls under the period of the O’Keefe study, and site-specific bat surveys have not been conducted.


The U.S. Fish and Wildlife Service, Atlanta Regional Office issued a final Biological Opinion addressing the effects to the northern long-eared bat resulting from continued implementation of U.S. Department of Agriculture, Forest Service, Forest Land and Resource Management Plans and their associated projects on 15 National Forests and 1 National Recreation Area in the FS Southern Region. This was released on July 24, 2015.

3.0 SPECIES EVALUATED AND METHODS USED

This BA addresses Proposed, Threatened and Endangered species that are considered to occur or have habitat on the CNF in maintained openings. Analysis of the project was conducted using the best available science, including references from science-based websites, books, papers, reports, state and federal databases, and field surveys. The Proposed, Threatened and Endangered List on the CNF (Jennings 2014) was reviewed to determine species to consider. Information from field surveys and database maps identified Proposed, Threatened and Endangered species known to occur in the project area. Project area habitat and species habitat requirements, distributions and limiting factors were used to determine if additional PETS were likely to occur in the project area.
No surveys were specifically conducted to identify Proposed, Threatened and Endangered species associated with the Openings Project. No surveys were conducted specifically for this project. All the potentially affected sites have been previously managed as open areas (many for decades), thus species occurring within those sites are typically those adapted to open conditions and the associated disturbance that creates and maintains them. Existing data on locations of rare or uncommon species was overlaid with maps of all of the existing openings to see what known sites for species may be coincident or proximal to the openings included in the proposed action.

4.0 HABITAT RELATIONSHIPS, EFFECTS ANALYSIS, AND DETERMINATIONS OF EFFECTS

Based on absence of habitat in the action area or the project occurring outside of the species range, the Openings Project would have “no effect” on the following CNF Proposed, Threatened and Endangered species (Table 1). They are not further analyzed in this document.

Table 1. Proposed, Threatened and Endangered species of the CNF with a “No Effect” Determination for the Openings Maintenance Environmental Assessment

<table>
<thead>
<tr>
<th>Group</th>
<th>Scientific Name</th>
<th>Common Name</th>
<th>Status</th>
<th>Habitat in Project Area</th>
<th>Determination of Effect</th>
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<tbody>
<tr>
<td>Arachnid</td>
<td>Microhexura montivaga</td>
<td>Spruce-fir moss spider</td>
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<td>No Effect</td>
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<tr>
<td>Fish</td>
<td>Percina antesella</td>
<td>Amber darter</td>
<td>E</td>
<td>None</td>
<td>No Effect</td>
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<tr>
<td>Mammal</td>
<td>Glaucomys sabrinus coloratus</td>
<td>Carolina northern flying squirrel</td>
<td>E</td>
<td>None</td>
<td>No Effect</td>
</tr>
<tr>
<td>Mollusk</td>
<td>Ptychobranchus greenii</td>
<td>Triangular kidneyshell</td>
<td>E</td>
<td>None</td>
<td>No Effect</td>
</tr>
<tr>
<td>Nonvasc. Plant</td>
<td>Gymnoderma lineareae</td>
<td>Rock gnome lichen</td>
<td>E</td>
<td>None</td>
<td>No Effect</td>
</tr>
<tr>
<td>Vascular Plant</td>
<td>Geum radiatum</td>
<td>Spreading avens</td>
<td>E</td>
<td>None</td>
<td>No Effect</td>
</tr>
<tr>
<td>Vascular Plant</td>
<td>Isotria medeoloides</td>
<td>Small whorled pogonia</td>
<td>T</td>
<td>None</td>
<td>No Effect</td>
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<tr>
<td>Vascular Plant</td>
<td>Pityopsis ruthii</td>
<td>Ruth’s golden aster</td>
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<td>None</td>
<td>No Effect</td>
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<tr>
<td>Vascular Plant</td>
<td>Solidago spithamaea</td>
<td>Blue Ridge goldenrod</td>
<td>T</td>
<td>None</td>
<td>No Effect</td>
</tr>
<tr>
<td>Vascular Plant</td>
<td>Spiraea virginiana</td>
<td>Virginia spirea</td>
<td>T</td>
<td>None</td>
<td>No Effect</td>
</tr>
</tbody>
</table>

Table 2 lists the species analyzed in this Biological Assessment.

Table 2. Proposed, Threatened and Endangered species of the CNF analyzed in the Openings Maintenance Environmental Assessment

<table>
<thead>
<tr>
<th>Group</th>
<th>Scientific Name</th>
<th>Common Name</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fish</td>
<td>Cyprinella caerulea</td>
<td>Blue shiner</td>
<td>T</td>
</tr>
<tr>
<td>Fish</td>
<td>Erimonax monachus</td>
<td>Spotfin chub</td>
<td>T</td>
</tr>
<tr>
<td>Fish</td>
<td>Etheostoma stitkaense</td>
<td>Critico darter</td>
<td>E</td>
</tr>
<tr>
<td>Fish</td>
<td>Noturus baileyi</td>
<td>Smoky madtom</td>
<td>E</td>
</tr>
<tr>
<td>Fish</td>
<td>Noturus flavipinnis</td>
<td>Yellowfin madtom</td>
<td>T</td>
</tr>
<tr>
<td>Fish</td>
<td>Percina jenkinsi</td>
<td>Conasanga logperch</td>
<td>E</td>
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<tr>
<td>Fish</td>
<td>Percina tanasi</td>
<td>Snail darter</td>
<td>T</td>
</tr>
<tr>
<td>Mammal</td>
<td>Corynorhinus townsendii virginianus</td>
<td>Virginia big-eared bat</td>
<td>E</td>
</tr>
<tr>
<td>Mammal</td>
<td>Myotis griseescens</td>
<td>Gray bat</td>
<td>E</td>
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<tr>
<td>Mammal</td>
<td>Myotis septentrionalis</td>
<td>Northern long-eared bat</td>
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<tr>
<td>Group</td>
<td>Scientific Name</td>
<td>Common Name</td>
<td>Status</td>
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<td>-----------------</td>
<td>--------------------------------------</td>
<td>----------------------</td>
<td>--------</td>
</tr>
<tr>
<td>Mammal</td>
<td>Myotis sodalis</td>
<td>Indiana bat</td>
<td>E</td>
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<tr>
<td>Mollusk</td>
<td>Alasmidonta raveneliana</td>
<td>Appalachian elktoe</td>
<td>E</td>
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<td>Mollusk</td>
<td>Epioblasma florentina walkeri</td>
<td>Tan riffleshell</td>
<td>E</td>
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<td>Mollusk</td>
<td>Epioblasma metastriata</td>
<td>Upland combshell</td>
<td>E</td>
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<tr>
<td>Mollusk</td>
<td>Epioblasma othcaloogensis</td>
<td>Southern acornshell</td>
<td>E</td>
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<td>Mollusk</td>
<td>Hamiota altilis</td>
<td>Fine-lined pocketbook</td>
<td>T</td>
</tr>
<tr>
<td>Mollusk</td>
<td>Medionidus acutissimus</td>
<td>Alabama moccasinshell</td>
<td>T</td>
</tr>
<tr>
<td>Mollusk</td>
<td>Medionidus parvalus</td>
<td>Coosa moccasinshell</td>
<td>E</td>
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<tr>
<td>Mollusk</td>
<td>Pleurobema decisum</td>
<td>Southern clubshell</td>
<td>E</td>
</tr>
<tr>
<td>Mollusk</td>
<td>Pleurobema georgianum</td>
<td>Southern pigtoe</td>
<td>E</td>
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<td>Pleurobema hanleyianum</td>
<td>Georgia pigtoe</td>
<td>E</td>
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<td>Mollusk</td>
<td>Pleurobema perovatum</td>
<td>Ovate clubshell</td>
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<td>Mollusk</td>
<td>Pleuronaia dolabelloides</td>
<td>Slabside pearlymussel</td>
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<td>Mollusk</td>
<td>Ptychobranchus foraminatus</td>
<td>Rayed kidneyshell</td>
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<td>Mollusk</td>
<td>Ptychobranchus subtentum</td>
<td>Fluted kidneyshell</td>
<td>E</td>
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<td>Mollusk</td>
<td>Villosa trabalis</td>
<td>Cumberland bean pearly mussel</td>
<td>E</td>
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<tr>
<td>Reptiles</td>
<td>Glyptemys muhlenbergii</td>
<td>Bog turtle</td>
<td>T</td>
</tr>
<tr>
<td>Vascular Plant</td>
<td>Houstonia montana</td>
<td>Roan Mountain bluet</td>
<td>E</td>
</tr>
</tbody>
</table>

### 4.1 BLUE SHINER

**Habitat Relationships**
The blue shiner is endemic to the upper Mobile Basin drainage ranging from Tennessee down to central Alabama. On the Cherokee NF, it occurs only in the Conasauga River watershed where it is known from the Conasauga River, Jacks River, Sawmill Branch and Mooneyham Branch. Habitat includes small streams to large rivers with low gradients at low elevation; firm substrates in pools and areas of moderate current. Feeding is surface or mid water column where terrestrial and immature aquatic insects are taken. Spawning is from spring into summer.

Threats include water quality degradation associated with urbanization, sewage pollution, and strip mining; introduced biota; and impoundments.

**Environmental Baseline**
Openings across the Forest have been maintained in the past by mechanical means and chemically for non-native invasive weeds. None of these treatments have negatively affected the aquatic species.

**Effects**
The fish species all have similar effects determinations and thus will be analyzed together below.

### 4.2 SPOTFIN CHUB
**Habitat Relationships**

This chub inhabits cool and warm, typically clear, large creeks or medium-sized rivers of moderate gradient, in upland and montane areas, generally in or near moderate and swift currents over gravel to bedrock, rarely over sand or silt. The spotfin chub is a rock crevasse spawner; males guard cracks in bedrock in swift flows. Spotfin chubs forage on drifting insects in the water column and seek escape by moving to other swift flowing areas. They are endemic to the Tennessee River in Tennessee, Virginia, North Carolina and Georgia. On the Cherokee NF, it has been re-introduced into Tellico River as a non-essential experimental population. No other occurrences are likely on the Forest. Threats include fragmentation and loss of habitat from reservoirs and siltation.

Spotfin chubs were first introduced into the Tellico River in 2002. Approximately 1700 have been introduced every year since. They were found to be successfully reproducing in 2006.

**Environmental Baseline**

Openings across the Forest have been maintained in the past by mechanical means and chemically for non-native invasive weeds. None of these treatments have negatively affected the aquatic species.

**Effects**

The fish species all have similar effects determinations and thus will be analyzed together below.

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**4.3 CITICO DARTER**

**Habitat Relationships**

This fish inhabits large streams with low gradients at low elevations. Citico darters are usually found in the transitional zone between riffles and pools. They were never observed in pool habitats even when suitable slab rocks were present (Shute, Rakes and Shute, 1997). Flat rocks for spawning and hiding cover are essential (Shute, Rakes and Shute, 1997). Excess sediment may be detrimental to its survival. Male Citico darters excavate nest cavities under flat rocks where they guard their eggs and young. These darters use the interstitial spaces between rocks for escape cover and for foraging on aquatic insects. Formerly known as the duskytail darter, this species is endemic to tributaries of the Little Tennessee River system and occurs naturally only in Citico Creek on the Cherokee National Forest. Two non-essential, experimental, populations have been established: one in Abrams Creek and the other in the Tellico River.

Citico darters were first introduced into the Tellico River in 2003. Approximately 430 have been introduced every year since. They were found to be successfully reproducing in 2004.

**Environmental Baseline**

Openings across the Forest have been maintained in the past by mechanical means and chemically for non-native invasive weeds. None of these treatments have negatively affected the aquatic species.

**Effects**
The aquatic species all have similar effects determinations and thus will be analyzed together below.

### 4.4 SMOKY MADTOM

**Habitat Relationships**

This catfish inhabits large streams with low gradients at low elevations. It prefers transitional areas between pools and riffles (Etnier and Starnes 1993); shallow riffles containing flat, palm sized slab rocks, pea sized gravel; and deep pools (during colder months) (Dinkins 1984) with silty/sandy bottoms with large boulders (Biggins 1985). Excess sediment may be detrimental to their survival. This species is nocturnal. Male madtoms excavate nest cavities under flat rocks where they guard their eggs and young. Madtoms use the interstitial spaces between rocks for escape cover and for foraging on aquatic insects. This species is endemic to the Little Tennessee River system and occurs naturally only in Citico Creek on the Cherokee National Forest. Critical Habitat for the smoky madtom was designated at the time of listing (Biggins 1985) for Citico Creek from the upper Mountain Settlement Bridge upstream to the confluence with Barkcamp Branch. Smoky madtoms have documented both above and below the Critical Habitat (USDA Forest Service 2014). Two non-essential, experimental, populations have been established: one in Abrams Creek and the other in the Tellico River.

Smoky madtoms were first introduced into the Tellico River in 2003. Approximately 270 have been introduced every year since. They were found to be successfully reproducing in 2005.

**Environmental Baseline**

Openings across the Forest have been maintained in the past by mechanical means and chemically for non-native invasive weeds. None of these treatments have negatively affected the aquatic species.

**Effects**

The fish species all have similar effects determinations and thus will be analyzed together below.

### 4.5 YELLOWFIN MADTOM

**Habitat Relationships**

This catfish inhabits large streams to large rivers with low gradients at low elevations. It occurs in pools associated with cover such as flat rocks for spawning and leaf packs for shelter (USDI FWS 1983). This species is nocturnal. Excess sediment may be detrimental to its survival (Shute, 1984). Male madtoms excavate nest cavities under flat rocks where they guard their eggs and young. Madtoms use the interstitial spaces between rocks for escape cover and for foraging on aquatic insects. Yellowfin madtoms are endemic to the upper Tennessee River and occur on the Cherokee National Forest in 2 miles of Citico Creek, in the Powell River in northern Tennessee, and in Copper Creek in Virginia. Two non-essential, experimental, populations have been established: one in Abrams Creek and the other in the Tellico River.
Yellowfin madtoms were first introduced into the Tellico River in 2003. Approximately 230 have been introduced every year since. They were found to be successfully reproducing in 2008.

**Environmental Baseline**

Openings across the Forest have been maintained in the past by mechanical means and chemically for non-native invasive weeds. None of these treatments have negatively affected the aquatic species.

**Effects**

The fish species all have similar effects determinations and thus will be analyzed together below.

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4.6 **CONASAUGA LOGPERCH**

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**Habitat Relationships**

The Conasauga logperch is endemic to the Conasauga River. On the Cherokee NF it occurs for the entire length of the Conasauga and Jack's Rivers within the Forest Boundary. Critical habitat is defined on the Cherokee NF in the Conasauga River from Halfway Branch downstream to Georgia State Hwy 2, Murray Co., Ga. Habitat is typically large streams with low gradients at low elevations; deep gravel runs or pools with small stones and sandy bottoms. Conasauga logperch feed on aquatic invertebrates which are obtained by flipping over stones with its snout. Spawning occurs in the spring over shallow gravel with fast current. Threats include sedimentation, channelization, and impoundment.

**Environmental Baseline**

Openings across the Forest have been maintained in the past by mechanical means and chemically for non-native invasive weeds. None of these treatments have negatively affected the aquatic species.

**Effects**

The fish species all have similar effects determinations and thus will be analyzed together below.

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4.7 **SNAIL DARTER**

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**Habitat Relationships**

The snail darter is endemic to larger tributaries of the Tennessee River from the Sequatchie River to the confluence of the French Broad and Holton Rivers. Seven extant populations exist. On the Cherokee NF it occurs in the Hiwassee River from the downstream Forest boundary upstream to Reliance. A single individual was collected in Citico Creek in 2007; its origin is unknown. Preferred habitat is small rivers with low gradient at low elevation with sand and gravel shoals to deep pools with some current. Snail darters feed primarily on snails with some insects also taken. Spawning occurs in late winter to early spring. Eggs are deposited in gravel areas; larva drift
downstream. Juveniles migrate upstream after 3 to 4 months. Threats are primarily from impoundments.

Snail darters are present on the Forest in the Hiwassee River. It occurs downstream of the Forest in the Ocoee River below Parksville Lake. Historically the snail darter was present in the Little Tennessee River upstream of the confluence with Citico Creek (Starnes 1977).

**Environmental Baseline**

Openings across the Forest have been maintained in the past by mechanical means and chemically for non-native invasive weeds. None of these treatments have negatively affected the aquatic species.

**Direct Effects to Fish**

Direct effects to aquatic habitats and organisms happen only when an activity occurs within the stream channel. There will be no direct impacts to T&E Species or their Critical Habitats from alternative B because no activities will occur in stream channels.

**Indirect and Cumulative Effects to Fish**

Indirect effects to aquatic organisms arise from activities authorized outside the stream channel that allow sediments or herbicides to enter and alter aquatic habitats. When the sediments or herbicides generated by these indirect effects are added to the sediment or herbicide generated by ongoing activities, the combination is referred to as Cumulative Effects.

Indirect and cumulative effects from these alternatives are not likely to adversely affect any of these aquatic T&E species or their Critical Habitats because these species are restricted to large and medium sized rivers which would dilute sediment and herbicides. Reddington (2015) analyzed the proposed actions and determined the ground disturbances and herbicide treatments associated with a combination of manual, cultural, and chemical control treatment methods across the National Forest would follow Forest Plan standards and limit impacts to soil and water resources to acceptable levels. Forest Plan Standards (USDA Forest Service 2004a) were designed to protect the most susceptible aquatic species (trout) (USDA Forest Service 2004b pp 285-288) from harmful levels of sediments or herbicides.

**Determination of Effect for Fish**

Implementation of the proposed action may affect, not likely to adversely affect the threatened and endangered fish species listed in this document.

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**4.8 VIRGINIA BIG-EARED BAT**

**Habitat Relationships**

This bat is found in the Appalachian Mountains in Virginia, West Virginia, North Carolina, and eastern Kentucky. It was recently found in northeast Tennessee. Presently it occurs in decreased numbers throughout much of the historic range. The largest colonies are in several caves in Pendleton County, West Virginia; some caves serve as both hibernation and maternity sites,
others are primarily maternity caves. Colonies occur also in Lee County and surrounding counties, Kentucky (the best known site being Stillhouse Cave); in Bath, Highland, Rockingham, Bland, and Tazewell counties, Virginia; and in Avery and Watauga counties, North Carolina (NatureServe 2015). It was documented in northeast Tennessee in 2013.

It inhabits caves typically in limestone karst regions dominated by mature hardwood forests of hickory, beech, maple, and hemlock and prefers cool, well-ventilated caves for hibernation. Roost sites are often near cave entrances or in places where there is considerable air movement. Males and females hibernate together. In summer, males occur singly or in groups in caves (NatureServe 2015).

Maternity colonies settle deep within caves, far from entrance as these caves are warmer than those used for hibernation. The bat feeds principally on moths and forages over fields and woods, with individuals routinely traveling 3-5 miles from roost cave to foraging area. In eastern West Virginia, Lepidoptera was the most important insect order in the diet, followed by Coleoptera, Diptera, and Hymenoptera; compared to availability, selectively consumed Lepidoptera and avoided Coleoptera; forest insect comprised a substantial part of the diet (NatureServe 2015).

On the Cherokee National Forest, individuals were found in 2013 in a natural rock roost along the Elk River in Carter County. In 2014, individual bats were found in a natural rock roost along the Watauga River. They were also found in 3 barns and a pine tree in Johnson County. None of these locations were on the Cherokee National Forest, but were nearby.

Environmental Baseline
The closest caves to any openings that would be treated where Virginia big-eared could potentially be found are approximately one mile away, in the French Broad River watershed. None have been found there in the past. Foraging habitat for the bat is present near openings.

Direct, Indirect and Cumulative Effects
As effects to Virginia big-eared bat are similar to other bat species, these will be analyzed together below.

Habitat Relationships
This bat is found throughout the limestone region of southern middle-western and southeastern United States (Whitaker 1998). It has been documented at 11 locations on the CNF, most on the north end of the Forest. Gray bats use caves year-round for hibernating, maternity colonies, and roosting. They forage for insects over water along riparian areas and shorelines with forest cover (USFWS 1982). They feed primarily on flying insects such as mayflies, moths, flies, and beetles (LaVal 1977).

Gray bats are threatened by the destruction of hibernacula (USFWS 1982) and white nose syndrome, a fungus that attacks hibernating bats. White nose syndrome has now been found in
Tennessee. Large-scale population declines may occur in the future as the disease continues to spread.

**Environmental Baseline**

The closest caves to any openings that would be treated where gray bats have been found are approximately one mile away, in the French Broad River watershed. Foraging habitat for gray bat is present near openings.

**Direct, Indirect and Cumulative Effects**

As effects to gray bat are similar to other bat species, these will be analyzed together below.

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### 4.10 NORTHERN LONG-EARED BAT

**Habitat Relationships**

Northern long-eared bat (NLEB) is found throughout the eastern United States and Canada (Caceres 2000). This bat uses caves and man-made structures for hibernation. They leave their hibernacula in March and April and return in August and September (USFWS 2013).

In summer roost singly or in small colonies, mainly in trees but occasionally in caves. NLEB typically use large, tall trees (either live or dead) and roost under loose bark or in cavities or crevices. NLEB are somewhat opportunistic when selecting roost trees, not depending on a particular tree species. Structural complexity of roosting habitat may be more important. Forest canopy cover has been found to range from 56 to 84%, with some studies finding roosts in stand with lower canopy cover than the surrounding forest, particularly females (USFWS 2013).

NLEB forage for insects by hawking and gleaning on forested ridges and hillsides. Gleaning behavior suggests that these bats have the ability to maneuver and forage in a cluttered environment (USFWS 2013).

The single greatest threat to NLEB is white nose syndrome, a disease caused by a fungus that attacks hibernating bats (USFWS 2013). Large-scale population declines may occur in the future as the disease continues to spread.

**Environmental Baseline**

On the CNF, this bat has been documented in many locations. Mist net and ANABAT surveys have been conducted since 1998, with nearly 1,100 captures. Foraging, roosting, and potential maternity habitats are available in the action areas. No hibernacula occur in or near the action areas. None of the openings are within 0.25 mile of a known roost tree or hibernacula.

**Direct, Indirect and Cumulative Effects**

As effects to Northern long-eared bat are similar to other bat species, these will be analyzed together below.

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### 4.11 INDIANA BAT

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**Habitat Relationships**
Indiana bat occurs from Vermont to Michigan, south to South Carolina, west to Alabama, Indiana to Arkansas, and Oklahoma. Only nine hibernacula in three states (KY, IN, MO) harbor 75% of the remaining population (NatureServe 2012). No hibernacula are known from the CNF, but one is located in the Great Smoky Mountains National Park, where several maternity roosts have been located. Four additional hibernacula are located within 40-70 miles of the CNF.

In the Southern Appalachian region, females currently establish primary maternity roosts under the sloughing bark of dead yellow and white pines and eastern hemlock (O’Keefe 2012). Single bats may use a variety of tree species for roosts, as long as there is available sloughing bark or crevices on those trees. The majority of roosts are on mid and upper slopes in mixed pine-hardwood stands, but some roosts have been found near streams. Caves are used for hibernacula. The Indiana bat returns to hibernacula beginning in late August. The species forages for flying insects along waterways, floodplains, and over upland waterholes (NatureServe 2012).

Indiana bats are threatened by white nose syndrome, a fungus that attacks hibernating bats. White nose syndrome has now been found in Tennessee. Large-scale population declines are expected over the next several years as the disease continues to spread.

**Environmental Baseline**
On the CNF, this bat has only been documented on the southern districts. Indiana bat surveys have been conducted on the northern districts of the CNF every year since 1998 with no captures.

On February 26, 2013, Mary Jennings (FWS) sent a letter to the CNF pertaining to project-specific Indiana bat surveys and proposed habitat use study on the north end of the CNF. The letter states that “During the period of the O’Keefe study, a substantial amount of time will be devoted to acoustic and netting surveys. Given this effort, I believe additional, project-specific bat surveys will not be necessary during the duration of this study to address the potential impacts of CNF projects on the north end of the CNF. Therefore, my staff will no longer be providing recommendations to conduct site-specific bat surveys in conjunction with individual projects…” This project falls under the period of the O’Keefe study, and site-specific bat surveys have not been conducted specifically for this project. Foraging, roosting, and potential maternity habitats are available in and near openings.

**Direct and Indirect Effects to Bat Species**
With the proposed action, the Cherokee National Forest proposes to manage grassy, herbaceous and shrubby openings using a combination of manual, cultural, and chemical control treatment methods across the National Forest. No direct effects are expected for the gray bat or Virginia big-eared bat. Habitat associated with caves would not be impacted because no caves are located within the action areas. Hibernacula and maternity colony habitat would not be affected. Proposed activities would occur during the day while bats are roosting in caves and are absent from the project area.

Effects to northern long-eared bats and Indiana bats are unlikely. There are no known hibernacula on the Forest, no caves are near any openings, and no Indiana bats have been found.
on the northern districts of the CNF. Indiana bats have been found on the southern districts of the Forest. Trees very near wildlife openings have been documented as roost trees in the past. Should an Indiana bat roost site be discovered prior to and/or during project implementation, project activities would stop, and the CNF would again consult with the FWS. The southern districts have incidental take for Indiana bats. This project tiers to that document.

Riparian zone restrictions (no harvest within 100 feet of perennial streams) and streamside buffer zones (no ground disturbance) would protect foraging habitat downstream from changes to vegetation and water quality.

If individual northern long-eared or Indiana bats are present in areas where openings are being maintained by tree removal, disturbance may disrupt individuals or cause inadvertent loss of individual bats or small groups roosting in trees that are cut or pushed over. The RLRMP requires the largest trees with favorable conditions for roosting bats to be left. It also requires retention of all shagbark hickory trees (>6 inch diameter) and snags with exfoliating bark. This would protect most roosting bats from harm. If harvest disturbs roost trees it could cause the bats to increase roost dispersal, leading to fewer shared roost trees. These lower group numbers could decrease the spread of disease (USFWS 2013).

Removal of trees would contribute to the loss of future roosting habitat. However, northern long-eared bats and Indiana bats are opportunistic and flexible in roost tree selection. Indiana bats have adapted to these types of situations as roost trees are temporary in nature (O’Keefe 2011). This flexibility in roosting may allow bats to be adaptable in managed forests and avoid competition for roosting habitat with more specialized species (USFWS 2013).

The overall effect of these activities would provide open patches of forest with standing snags for roosting. The open condition of these areas would make roosting habitat more suitable by providing more sunlight to maintain warmer conditions in the roost. Female NLEB have been found to prefer roosts with lower canopy cover most likely for increased solar radiation for pup development and for greater ease for pups learning to fly (USFWS 2013).

Maintenance of these open areas would increase herbaceous plant diversity. These activities would increase insect production and improve forage conditions for bats. Less than one percent of the potential roosting habitat would be impacted on the Forest.

Dormant season burning to maintain native plants in the openings would have no direct effects on bats because burning would take place when bats are not present. However, foraging, roosting, and maternity colony habitat may be altered. Since roost trees are ephemeral, bats are adapted to finding new roost trees should historic roosts be lost during the fire. Burns would have indirect beneficial impacts to bats by maintaining open habitat which in turn increases insect production (Lacki et. al 2009). The increase in insect production would provide better foraging opportunities for bats in general.

Herbicides would be used to control woody vegetation and treat non-native invasive species. The herbicides used for treatments would not contact bats directly, but may be present in trace amounts on an occasional insect ingested by bats, although the likelihood of this occurrence is small. The following factors would further minimize the risk of contamination: 1) herbicide
applied in small amounts; 2) application methods targeting woody stems; and 3) design criteria for herbicide use such as timing to avoid rainfall and 30-foot buffer zones. Timing of application and quantities applied would ensure that no measurable effects to water quality would occur even in aquatic scenarios. Effects of the individual herbicides can be found below.

Herbicide toxicity data is presented below for mammals, birds and terrestrial invertebrates. The data suggest that the herbicides proposed for use in terrestrial and aquatic settings are generally safe to wildlife if used in accordance with the manufacturer label. Research suggests there is low risk of bioaccumulation in the environment and food chain from use of the herbicides (SERA 2004a, 2004b, 2004c, 2004d, 2006, 2007, 2009, 2011a, 2011b, 2011c, 2011d, 2014).

**Aminopyralid (SERA 2007)** Adverse effects are not likely in mammals that consume contaminated vegetation or insects at typical and maximum application rates of 0.003 lb a.e./acre to 0.11 lbs. a.e./acre. Over the range of application rates and over the range of the estimated exposures, the hazard quotients for mammals range from 0.00001 (the lower bound for direct spray of a small mammal assuming first-order absorption at an application rate of 0.03 lb a.e./acre) to 0.07 (the consumption of contaminated insects by a small mammal after an application of 0.11 lb a.e./acre).

**2,4-D (SERA 2006)** Adverse effects are plausible in mammals that consume contaminated vegetation or insects at typical and maximum application rates of 0.5 lb a.e./acre to 4 lbs. a.e./acre, but not at the lowest rate. However, there is no indication that substantial numbers of mammals would be subject to lethal exposure. Canines and other sensitive carnivorous mammals are more sensitive than other mammals. Birds appear to be much more tolerant than mammals and long-term exposure is unlikely to cause adverse effects. Adverse effects are a concern after acute exposure for birds. Adverse effects on terrestrial invertebrates may occur at the highest application rate of 4 lb a.e./acre.

**Clopyralid (SERA 2004a)** No adverse effects are anticipated in terrestrial animals from the use of clopyralid in Forest Service programs at the typical application rate of 0.35 lb a.e./acre. The same holds for the maximum application rate of 0.5 lb a.e./acre, except for large birds or mammals feeding exclusively on contaminated vegetation over a long period of time (i.e., 90 days). The scenarios assume that the vegetation is treated and that the animal stays in the treated area consuming nothing but the contaminated vegetation. Given that most forms of vegetation would likely die or at least be substantially damaged, this exposure scenario is implausible. It is, however, routinely used in Forest Service risk assessments as a very conservative upper estimate of potential exposures and risks. The longer term consumption of vegetation contaminated by drift or the longer term consumption of contaminated water or fish – yield hazard quotients that are in the range of 0.00005 to 0.02, far below a level of concern.

**Dicamba (SERA 2004b)** No adverse effects are anticipated in terrestrial animals from the use of dicamba in Forest Service programs at the typical application rate of 0.3 lb a.e./acre. The same holds for the maximum application rate of 2 lb a.e./acre except that reproductive effects is plausible for birds or mammals feeding on contaminated vegetation or insects at this application rate. However, even this scenario yields hazard quotients that are below the level of concern by factors of 5 to over 16,000. Small animals seem to be less sensitive to dicamba than larger animals.
Fluazifop (SERA 2014) For exposure scenarios involving the consumption of contaminated vegetation following one or two applications, the hazards are lower than with more applications, but some scenarios exceed the level of concern. Longer-term exposures to mammals and birds are a concern. The hazards for mammals are of greater concern because of a possible association between exposure levels and endpoints involving reproductive capacity (i.e., decreased testes weight). There are no data to suggest that levels of long-term exposure to fluazifop-P-butyl will cause adverse effects in birds. Furthermore, acute exposures associated with the consumption of contaminated vegetation by birds do not appear to pose a hazard. For mammals, some of the acute hazard quotients associated with the consumption of contaminated vegetation exceed the level of concern. The highest levels of exposure are associated with the consumption of contaminated short grasses, which enhances the level of concern for acute exposures, because fluazifop-P-butyl is applied to grasses. For chronic exposures, the consumption of treated contaminated grasses is less plausible, because fluazifop-P-butyl will kill most treated grasses with the exception of resistant grasses. Exposure scenarios for mammals and birds involving contaminated water are of much less concern than those associated with contaminated vegetation. Some scenarios for the consumption of contaminated fish by a canid, large mammalian carnivore, and piscivorous bird result in hazard quotients that exceed the level of concern at the upper bounds of estimated exposures.

Based on these data, no risks to terrestrial insects would be anticipated. Based on the results of one bioassay on a predatory mite (Typhlodromus pyri), risks to sensitive species of terrestrial arthropods could be substantial. Based on another bioassay in this species as well as toxicity data on other terrestrial arthropods, risks are apparent but could be much lower. Many of the most relevant studies are summarized only briefly in a review by the European Food Safety Authority (EFSA 2012). Published field studies indicate that applications of fluazifop-P-butyl used to enhance the growth of wildflowers can be beneficial to both bees and butterflies. These field studies, however, do not exclude the possibility of direct adverse effects in sensitive species of terrestrial arthropods.

Fluroxypyr (SERA 2009) Fluroxypyr is practically non-toxic to honey bees and birds on an acute and dietary basis. It is slightly toxic to small mammals. This herbicide does not bioaccumulate in mammals or bioconcentrate through the food chain. At typical application rates and considering the small amount of area to be treated, there is an insignificant risk to mammals and birds and no adverse effects are anticipated.

Glyphosate (SERA 2011a) Based on pesticide use reports from the Forest Service, typical application rates for glyphosate in Forest Service programs are in the range of 0.5 to 4 lbs a.e./acre. Applications of more toxic formulations of glyphosate at rates of up to 2.5-3 lb a.e./acre do not appear to present any apparent risks to terrestrial animals, based on upper bound estimates of exposures. At application rates above 2.5 lb a.e./acre, risks to mammals cannot be ruled out based on upper bound estimates of exposure, but no risks are apparent based on central estimates of exposure. At application rates above about 3.3 lb a.e./acre, the hazard quotients for birds modestly exceed the level of concern, but there is no basis for asserting that overt toxic effects in birds are likely. Risks to terrestrial insects are a greater concern in dietary exposures than direct spray. Based on upper bound estimates of dietary exposure at the maximum
application rate of 8 lb a.e./acre, the hazard quotients for terrestrial insects can reach a value of 10. Concern for terrestrial invertebrates is enhanced by two toxicity studies using South American formulations of glyphosate which noted adverse effects on reproduction and development. While most field studies suggest that effects on terrestrial invertebrates are due to secondary effects on vegetation, the field studies do not directly contradict the South American toxicity studies. The less toxic formulations of glyphosate do not appear to present any risks to terrestrial organisms other than terrestrial plants.

**Imazapic** (SERA 2004c) In acute exposure scenarios, the highest exposures for small terrestrial vertebrates would occur after a direct spray and could reach up to about 2.4 mg/kg at an application rate of 0.1 lb a.e./acre. There is a wide range of exposures anticipated from the consumption of contaminated vegetation by terrestrial animals: central estimates range from 0.125 mg/kg for a small mammal to 2.69 mg/kg for a large bird with upper ranges of about 0.27 mg/kg for a small mammal and 7.6 mg/kg for a large bird. The consumption of contaminated water leads to much lower levels of exposure. A similar pattern is seen for chronic exposures. Estimated daily doses for a small mammal from the consumption of contaminated vegetation at the application site are in the range of about 0.0001 mg/kg to 0.01 mg/kg. The upper ranges of exposure from contaminated vegetation far exceed doses that are anticipated from the consumption of contaminated water, which range from 0.0000001 mg/kg/day to 0.00000044 mg/kg/day for a small mammal. Based on general relationships of body size to body volume, larger vertebrates would be exposed to lower doses and smaller animals, such as insects, to much higher doses than small vertebrates under comparable exposure conditions. Because of the apparently low toxicity of imazapic to animals, the rather substantial variations in the different exposure assessments have little impact on the assessment of risk to terrestrial animals.

**Imazapyr** (SERA 2011b) Although the current risk assessments are based on the unit application rate of 1 lb a.e./acre, other applications are considered in the risk characterization up to the maximum labeled rate of 1.5 lbs a.e./acre.

The U.S. EPA/OPP classifies imazapyr as practically non-toxic to mammals, birds, honeybees, fish, and aquatic invertebrates. This classification is clearly justified. None of the expected (non-accidental) exposures to these groups of animals raise substantial concern; indeed, most accidental exposures raise only minimal concern. The major uncertainties regarding potential toxic effects in animals are associated with the lack of toxicity data on reptiles and amphibians.

No hazards associated with the direct toxic action of imazapyr can be identified for either terrestrial or aquatic animals. Chronic studies in three mammalian species and several reproduction studies in two mammalian species indicate that imazapyr is not likely to be associated with adverse effects at relatively high-dose levels.

Like the acute and chronic studies in mammals, the available avian studies on imazapyr, all of which were conducted up to limit doses, do not report any signs of toxicity. The direct spray scenarios lead to hazard quotients far below the level of concern,

**Metsulfuron methyl** (SERA 2004d) There is no clear basis for suggesting that effects on terrestrial or aquatic animals are likely or would be substantial. Adverse effects in mammals, birds, terrestrial insects, and microorganisms are not likely using typical or worst-case exposure assumptions at the typical application rate of 0.03 lb a.e./acre or the maximum application rate of 0.15 lb a.e./acre. Metsulfuron-methyl has been tested in only a limited number of species and
under conditions that may not well-represent populations of free-ranging non-target species. Notwithstanding this limitation, the available data are sufficient to assert that no adverse effects are anticipated in terrestrial animals.

**Picloram (SERA 2011c)** Exposures of terrestrial animals to contaminated water do not lead to apparent risks even in the case of an accidental spill. For contaminated vegetation or prey, none of the central estimates of exposure (i.e., the most likely events) result in hazard quotients that exceed the level of concern. At the maximum anticipated application rate of 1 lb a.e./acre, upper bound hazards that exceed the level of concern are associated with the consumption of contaminated grasses (i.e., food items which contain the highest concentrations of picloram) by a small mammal. For longer-term scenarios, the consumption of contaminated grasses leads to upper bound hazards that exceed the level of concern for a small mammal, a large mammal, and a small bird. At the typical application rate of 0.25 lb a.e./acre, all of these upper bound hazard quotients would be at or below the level of concern except for the small mammal and the small bird. Direct toxic effects on terrestrial invertebrates as well as terrestrial microorganisms cannot be ruled out but do not appear to be substantial. Because of effects on terrestrial vegetation, secondary effects on terrestrial animals may occur due to changes in habitat quality and/or food availability. These secondary effects could be beneficial to some species and detrimental to other species.

**Triclopyr (SERA 2011d)** Contaminated vegetation is primary concern in the use of triclopyr and high application rates will exceed the level of concern for both birds and mammals in longer term exposure scenarios.

At an application rate of 1 lb a.e./acre, hazards exceed the level of concern for exposures involving the consumption of contaminated vegetation by mammals and birds. Hazard quotients are greatest for large mammals. The high hazards suggest the potential for adverse effects, but not overt toxic effects, in large mammals. Based on a very cursory probabilistic assessment, exposures of mammalian wildlife that would be associated with upper bound hazards are probably rare occurrences.

The highest exposures are associated with the consumption of contaminated grasses, and the lowest exposures are associated with the consumption of contaminated water. This is a common pattern for pesticides applied to vegetation. The exposure assessment for mammals is somewhat more detailed to encompass more diverse body weights. This approach is taken because the toxicity data (Section 4.3.2) indicate that larger mammals are more sensitive than smaller mammals to triclopyr.

The direct spray scenarios lead to hazard quotients far below the level of concern, and an elaboration for body size would have no impact on the risk assessment.

**Cumulative Effects**
Private land within the analysis area is predominantly in forested condition and no known future activities are expected to occur. Therefore, no cumulative effects to bats would occur.

**Determination of Effect**
Due to the limited nature of foraging habitat in the action area and timing of activities, effects of the action alternative would be discountable. Some effects may be slightly beneficial. No
known Northern long-eared bat roosts or hibernacula are within 0.25 mile of any openings. The proposed project may affect, not likely to adversely affect Virginia big-eared bat and gray bat.

This project is likely to adversely affect the northern long-eared bat; however, there are no effects beyond those previously disclosed in the programmatic biological opinion dated August 5, 2015 (FWS Log #04E00000-2015-F-0003). Any taking that may occur incidental to this project is excepted from the prohibitions for taking threatened species under 50 CFR 17.31 and 17.32. This project is consistent with the forest plan, the description of the proposed action in the programmatic biological opinion, and activities excepted from taking prohibitions under the ESA section 4(d) rule applicable to the northern long-eared bat; therefore, the programmatic biological opinion satisfies the Forest Service’s responsibilities under ESA section 7(a)(2) relative to the northern long-eared bat for this project.

The proposed project may affect, not likely to adversely affect Indiana bat on the Northern districts because none have been found on those districts, adverse effects would be discountable and some effects would be beneficial if the bats were using the area. The proposed project may affect, likely to adversely affect the Indiana bat on the southern districts due to the presence of the bat in the area and the potential for removal of roost trees. This document tiers to the Biological Opinion for Indiana bat on the southern districts (USFWS 2015) where the bats have been found.

4.12 APPALACHIAN ELKTOE

Habitat Relationships

The Appalachian elktoe is endemic to the Tennessee River in East Tennessee and western North Carolina. Only 2 extant populations remain. It occurs in the Nolichucky River on the Cherokee NF. Preferred habitat is small to large rivers with low gradient at high and low elevations; among cobbles and boulders with some sand and gravel. Fish host is the banded sculpin. Threats include siltation from logging, mining, agriculture and construction; organic and inorganic pollutants from industrial, agricultural, and other point and non-point sources; habitat loss due to impoundments, channelization and dredging.

Environmental Baseline

Openings across the Forest have been maintained in the past by mechanical means and chemically for non-native invasive weeds. None of these treatments have negatively affected the aquatic species.

Effects

The aquatic species all have similar effects determinations and thus will be analyzed together below.

4.13 TAN RIFFLE SHELL

22
**Habitat Relationships**

The tan riffleshell mussel is endemic to major tributaries of the Tennessee and Cumberland Rivers. Only two extant populations remain. It is known from two sites in the Hiwassee River on the Cherokee NF and the other population is in the Clinch River. The upper site, on the Hiwassee River, was augmented in 1999 with juveniles raised by Dr. Dick Neves, Va. Tech. but none of these have been seen since. The last observation of a live tan riffleshell mussel in the Hiwassee River was in 1993. Preferred habitat is large streams and small rivers with low gradient at low elevation in shallow riffles (less than 3 feet deep) with coarse sand, gravel, and some silt. Fish hosts include sculpins, greenside darter, fantail darter, and redline darter. Threats are from impoundments that flood habitat or alter flow regime; siltation from strip mining, coal washing, dredging, farming, logging and road construction; and pollution from municipal, agricultural, and industrial waste discharges.

**Environmental Baseline**

Openings across the Forest have been maintained in the past by mechanical means and chemically for non-native invasive weeds. None of these treatments have negatively affected the aquatic species.

**Effects**

The aquatic species all have similar effects determinations and thus will be analyzed together below.

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**4.14 UPLAND COMBSHELL**

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**Habitat Relationships**

The upland combshell is endemic to the Mobile River system. It has not been documented on the Cherokee NF but is known from the Conasauga River five miles below the Forest boundary. Critical Habitat includes all of the Conasauga River on the Forest. Preferred habitat is medium size rivers with moderate gradient in riffle areas. Fish host is unknown. Threats include dams, dredging, mines, point source pollution, and non-point source pollution.

**Environmental Baseline**

Openings across the Forest have been maintained in the past by mechanical means and chemically for non-native invasive weeds. None of these treatments have negatively affected the aquatic species.

**Effects**

The aquatic species all have similar effects determinations and thus will be analyzed together below.

---

**4.15 SOUTHERN ACORNSHELL**

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**Habitat Relationships**

The southern acornshell is endemic to the Mobile River system. It has not been documented on the Cherokee NF but is known from the Conasauga River eight miles below the Forest boundary. Critical habitat includes all of the Conasauga River on the Forest. Preferred habitat is medium size rivers with moderate gradient in riffle areas. Fish host is unknown. Threats include dams, dredging, mines, point source pollution, and non-point source pollution.

**Environmental Baseline**

Openings across the Forest have been maintained in the past by mechanical means and chemically for non-native invasive weeds. None of these treatments have negatively affected the aquatic species.

**Effects**

The aquatic species all have similar effects determinations and thus will be analyzed together below.

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4.16 FINELINED POCKETBOOK

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**Habitat Relationships**

The finelined pocketbook is endemic to the Alabama River system; three extant populations are known; one is the Conasauga River within the Forest Boundary. Critical habitat includes all of the Conasauga River on the Forest. Preferred habitat is large streams to large rivers with low gradient at low elevation; in moderate current less than 3 feet deep with a substrate composed of sand and mud with some gravel. Fish hosts include redeye and largemouth bass. Threats include habitat modification, impoundments, sedimentation, eutrophication, urban and agricultural runoff, and sand and gravel mining.

**Environmental Baseline**

Openings across the Forest have been maintained in the past by mechanical means and chemically for non-native invasive weeds. None of these treatments have negatively affected the aquatic species.

**Effects**

The aquatic species all have similar effects determinations and thus will be analyzed together below.

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4.17 ALABAMA MOCCASINSHELL

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**Habitat Relationships**

The Alabama moccasinshell is endemic to the Mobile River system. It has not been documented on the Cherokee NF but is known from the Conasauga River four miles below the Forest boundary. Critical habitat includes all of the Conasauga River on the Forest. The preferred
habitat is on the margins of streams with a sand and gravel substrate in clear water of moderate flow in small to large rivers. Fish hosts include several darters and a topminnow. Threats include habitat modification, sedimentation, and water quality degradation.

**Environmental Baseline**

Openings across the Forest have been maintained in the past by mechanical means and chemically for non-native invasive weeds. None of these treatments have negatively affected the aquatic species.

**Effects**

The aquatic species all have similar effects determinations and thus will be analyzed together below.

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**4.18 COOSA MOCCASINSHELL**

**Habitat Relationships**

The Coosa moccasinshell is endemic to the Mobile River system. It has not been documented on the Cherokee NF but the only extant population is in the Conasauga River where it has been found five miles downstream of the Forest Boundary. Critical habitat includes all of the Conasauga River on the Forest. Preferred habitat is usually sand and gravel in highly oxygenated, clear streams with moderate to strong flows in streams and small rivers. Threats include dams, dredging, mines, point source pollution, and non-point source pollution.

**Environmental Baseline**

Openings across the Forest have been maintained in the past by mechanical means and chemically for non-native invasive weeds. None of these treatments have negatively affected the aquatic species.

**Effects**

The aquatic species all have similar effects determinations and thus will be analyzed together below.

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**4.19 SOUTHERN CLUBSHELL**

**Habitat Relationships**

The southern clubshell was known from Mississippi, Alabama, Georgia and Tennessee. It has not been documented on the Cherokee NF but is known from the Conasauga River five miles below the Forest boundary. Critical habitat includes all of the Conasauga River on the Forest. The preferred habitat is highly oxygenated streams with sand and gravel substrate in shoals of large rivers to small streams; it may be found in sand and gravel in the center of the stream or in sand along the margins of the stream. Threats include habitat modification, sedimentation, and water quality degradation.
Environmental Baseline

Openings across the Forest have been maintained in the past by mechanical means and chemically for non-native invasive weeds. None of these treatments have negatively affected the aquatic species.

Effects

The aquatic species all have similar effects determinations and thus will be analyzed together below.

4.20 SOUTHERN PIGTOE

Habitat Relationships

The southern pigtoe is endemic to the Alabama River system with four extant populations. On the Cherokee NF it occurs in the main channel of the Conasauga River where it was last collected in 2011. Critical Habitat includes all of the Conasauga River on the Forest. Preferred habitat is large streams with low gradient at low elevation; sand, gravel, and cobble shoals and runs. Fish host is unknown. Threats include habitat modification, impoundments, sedimentation, eutrophication, household and agricultural runoff, recreational activities.

Environmental Baseline

Openings across the Forest have been maintained in the past by mechanical means and chemically for non-native invasive weeds. None of these treatments have negatively affected the aquatic species.

Effects

The aquatic species all have similar effects determinations and thus will be analyzed together below.

4.21 GEORGIA PIGTOE

Habitat Relationships

The Georgia pigtoe is endemic to the Alabama River system. On the Cherokee NF it occurs in the Conasauga River which may be the only extant population. Critical Habitat includes all of the Conasauga River on the Forest. Preferred habitat is large streams and small rivers with low gradient at low elevation; moderate current over sand and gravel substrate. Fish host is unknown. Threats include sedimentation.

Environmental Baseline

Openings across the Forest have been maintained in the past by mechanical means and chemically for non-native invasive weeds. None of these treatments have negatively affected the aquatic species.

Effects
The aquatic species all have similar effects determinations and thus will be analyzed together below.

4.22 OVATE CLUBSHELL

**Habitat Relationships**

The ovate clubshell is endemic to the Mobile River system. It has not been documented on the Cherokee NF but is known from the Conasauga River five miles below the Forest boundary. Critical habitat includes all of the Conasauga River on the Forest. The preferred habitat is sand/gravel shoals and runs of small rivers and large streams. Fish host is unknown. Threats include dams, dredging, mines, point source pollution, and non-point source pollution.

**Environmental Baseline**

Openings across the Forest have been maintained in the past by mechanical means and chemically for non-native invasive weeds. None of these treatments have negatively affected the aquatic species.

**Effects**

The aquatic species all have similar effects determinations and thus will be analyzed together below.

4.23 SLABSIDE PEARLYMUSSEL

**Habitat Relationships**

This mussel is endemic to the Tennessee River system; few extant populations are left range wide. It is found at two sites on the Cherokee NF in the Hiwassee River. Critical habitat includes all of the Hiwassee River from Hwy 411 to Hwy 68. Preferred habitat is large streams with low gradient at low elevation with moderately strong currents in sand, fine gravel, and cobble substrate. Fish hosts include: popeye, rosyface, saffron, silver, telescope, and Tennessee shiners. Threats include pollution, siltation, habitat perturbation, inundation, over-collecting, and loss of glochidial hosts.

**Environmental Baseline**

Openings across the Forest have been maintained in the past by mechanical means and chemically for non-native invasive weeds. None of these treatments have negatively affected the aquatic species.

**Effects**

The aquatic species all have similar effects determinations and thus will be analyzed together below.

4.24 RAYED KIDNEYSHELL
**Habitat Relationships**

The rayed kidneyshell is endemic to Alabama River system. On the Forest it is known to occur in the Conasauga River above Jacks River but is likely to occur all the way down stream. Critical habitat includes all of the Conasauga River on the Forest. The preferred habitat is in medium to large rivers with a mixture of sand and gravel in moderate to swift current. Fish hosts are darters and sculpins. Threats include genetic isolation.

**Environmental Baseline**

Openings across the Forest have been maintained in the past by mechanical means and chemically for non-native invasive weeds. None of these treatments have negatively affected the aquatic species.

**Effects**

The aquatic species all have similar effects determinations and thus will be analyzed together below.

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4.25 FLUTED KIDNEYSHELL

**Habitat Relationships**

The fluted kidneyshell is found in the Cumberland and Tennessee River systems. It has not been documented on the Cherokee NF but individuals were introduced into the Hiwassee River approximately five miles downstream of the Forest boundary. Critical habitat has been designated for the Hiwassee River from Hwy 411 to Hwy 68. Preferred habitat is small to medium rivers in areas with swift current or riffles. Fish hosts are darters and sculpins. Threats include impoundments, stream channel alterations, water pollution, and sedimentation.

**Environmental Baseline**

Openings across the Forest have been maintained in the past by mechanical means and chemically for non-native invasive weeds. None of these treatments have negatively affected the aquatic species.

**Effects**

The aquatic species all have similar effects determinations and thus will be analyzed together below.

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4.26 CUMBERLAND BEAN PEARLY MUSSEL

**Habitat Relationships**

The Cumberland bean pearly mussel is endemic to the Tennessee and Cumberland River systems; four extant populations exist. It is known from two sites in the Hiwassee River on the
Cherokee NF and was last collected here in 2010. Two collections were downstream of the powerhouse in the Hiwassee River – Athern in 1970 and Ortmann in 1915. Both of these are considered to be from historical populations that no longer have suitable habitat in the river. Preferred habitat for this mussel is found in large streams and small rivers with low gradient at low elevation. Current is usually fast with gravel or sand and gravel substrate. Fish host is unknown. Threats are from impoundments that flood habitat, alter flow regime, or decrease water temperature; siltation from strip mining, coal washing, dredging, farming, logging and road construction; and pollution from municipal, agricultural, and industrial waste discharges.

**Environmental Baseline**

Openings across the Forest have been maintained in the past by mechanical means and chemically for non-native invasive weeds. None of these treatments have negatively affected the aquatic species.

**Effects**

The aquatic species all have similar effects determinations and thus will be analyzed together below.

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### 4.27 BOG TURTLE

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**Habitat Relationships**

The bog turtle is known from New York to Georgia along the Appalachian Mountains. Populations are disjunctive. They occur near the Cherokee NF in the South Holton watershed. Preferred habitat is low, shallow, muck-bottomed rivulets of sphagnum bogs, calcareous fens, marshy/sedge-tussock meadows, spring seeps, wet cow pastures, and shrub swamps; habitat usually contains an abundance of grassy or mossy cover. Threats include loss, degradation, and fragmentation of habitat and excessive (and illegal) collecting for the pet trade.

**Environmental Baseline**

Openings across the Forest have been maintained in the past by mechanical means and chemically for non-native invasive weeds. None of these treatments have negatively affected the aquatic species.

**Direct Effects to Mollusks and Bog Turtle**

Direct effects to aquatic habitats and organisms happen only when an activity occurs within the stream channel. There will be no direct impacts to T&E Species or their Critical Habitats from alternative B because no activities will occur in stream channels.

**Indirect and Cumulative Effects to Mollusks and Bog Turtle**

Indirect effects to aquatic organisms arise from activities authorized outside the stream channel that allow sediments or herbicides to enter and alter aquatic habitats. When the sediments or herbicides generated by these indirect effects are added to the sediment or herbicide generated by ongoing activities, the combination is referred to as Cumulative Effects.
Indirect and cumulative effects from these alternatives are not likely to adversely affect any of these aquatic T&E species or their Critical Habitats because these species are restricted to large and medium sized rivers which would dilute sediment and herbicides. Reddington (2015) analyzed the proposed actions and determined the ground disturbances and herbicide treatments associated with a combination of manual, cultural, and chemical control treatment methods across the National Forest would follow Forest Plan standards and limit impacts to soil and water resources to acceptable levels. Forest Plan Standards (USDA Forest Service 2004a) were designed to protect the most susceptible aquatic species (trout) (USDA Forest Service 2004b pp 285-288) from harmful levels of sediments or herbicides.

**Determination of Effect to Mollusks and Bog Turtle**

Implementation of the proposed action may affect, not likely to adversely affect the Threatened and Endangered aquatic species listed in this document.

4.28 ROAN MOUNTAIN BLUET

**Habitat Relationships**

Roan mountain bluet is a federally endangered species with a very limited range. The species is endemic to the high Blue Ridge of northwestern North Carolina and northeastern Tennessee, most notably occurring on Roan Mountain, Grandfather Mountain, Bluff Mountain, and Three Top Mountain (Weakley 2012). Habitat is described as crevices of rock outcrops at the summits of high elevation peaks of the Southern Blue Ridge, also in thin, frost-heaved, gravelly soils of grassy balds near summit outcrops, from 1250-1950 m in elevation (Weakley 2012).

**Environmental Baseline**

No federally listed proposed, endangered, or threatened plant species are known to occur, nor would be expected to occur, within any of the typical openings included in his project. The proposal does include the high mountain balds of Roan Mountain, however, which is a very unique area of high botanical diversity. One federally endangered species, Roan Mountain bluet (*Houstonia montana*) is known to occur within portions of the bald habitat on Roan Mountain. Potential effects to *Houstonia montana* are described below.

**Direct and Indirect Effects**

*Houstonia montana* is known to occur at a few sites within the grassy bald habitat of Roan Mountain. The proposed action would add the potential use of herbicides and/or prescribed fire to the mix of management tools available for vegetation management within the balds. Current vegetation management that is carried out at Roan Mountain is based on recommendations from the Environmental Assessment for Vegetation Management of the Roan Mountain Grassy Balds (USDA Forest Service 1991) and standards from the Roan Mountain management prescription in the Cherokee National Forest Revised Land and Resource Management Plan (USDA Forest Service 2004a). All vegetation management on the Roan Mountain balds is coordinated through a working group of federal, state and private agencies and individuals, and is designed to maintain and enhance existing plant communities and associated rare species. No specific management for *Houstonia montana* is proposed as a part of this project, however any management activities within the vicinity of *Houstonia montana* sites would be carefully planned.
and implemented to ensure only neutral or beneficial effects to the species. Implementation of this alternative would have no known direct or indirect effects on *Houstonia montana*.

**Cumulative Effects**

Under the action alternatives there are no anticipated direct or indirect effects, and thus there would be no incremental contribution to cumulative effects to the species from this alternative.

**Determination of Effect**

Implementation of this alternative would have no effect on *Houstonia montana*.

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### 5.0 SUMMARY OF EFFECTS DETERMINATIONS

Table 3 summarizes the determinations of effect for each species.

<table>
<thead>
<tr>
<th>Group</th>
<th>Scientific Name</th>
<th>Common Name</th>
<th>Status</th>
<th>Determination of Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fish</td>
<td><em>Cyprinella caerulea</em></td>
<td>Blue shiner</td>
<td>T</td>
<td>May affect, not likely to adversely affect</td>
</tr>
<tr>
<td>Fish</td>
<td><em>Erimonax monachus</em></td>
<td>Spotfin chub</td>
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<tr>
<td>Fish</td>
<td><em>Etheostoma siikauense</em></td>
<td>Citico darter</td>
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<td>Fish</td>
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<td>Smoky madtom</td>
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</tr>
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<td>Yellowfin madtom</td>
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<td>Conasauga logperch</td>
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<tr>
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<td>Mammal</td>
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<tr>
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<td></td>
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<td>Common Name</td>
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<td>Reptiles</td>
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<td>Roan Mountain bluet</td>
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</tr>
</tbody>
</table>

6.0 SIGNATURE(S) OF PREPARER(S)

Forest Wildlife Biologist
August 20, 2015
7.0 REFERENCES AND DATA SOURCES


Jennings, 2013. Project-specific Indiana bat surveys, and proposed habitat use study, north section of the Cherokee National Forest, Tennessee. Correspondence between Cherokee National Forest and US FWS. Cookeville TN.


USDI Fish and Wildlife Service. 2013. 12-Month Finding on a Petition To List the Eastern Small-Footed Bat and the Northern Long- Eared Bat as Endangered or Threatened Species; Listing the Northern Long-Eared Bat as an Endangered Species. Federal Register 78: 61046-61080.


