

**Ecosystem Description**

Longleaf pine communities are scattered throughout the Coastal Plain and extend into the southern Piedmont. Dry longleaf pine communities range from moist sites to excessively drained coarse sands which produce near desert conditions for plants. They were once the most abundant communities in the Coastal Plain, occupying most of the land that was not swamp or pocosin and now occur as scattered remnants. With frequent fire, longleaf pine strongly dominates the canopy, which may range from sparse to fairly dense but is seldom completely closed.

A number of variants are recognized within the community types, determined by variation in moisture, soil, and location: Sandhill Coastal Fringe, Xeric Scrub, and Pine/Scrub Oak types, Mesic Pine Flatwoods, and Piedmont Longleaf Pine Forest. These communities have in common a regime of frequent natural fires which once crept across vast areas of the landscape. The ground cover is dominated by wiregrass and has a variety of other herbs and low shrubs. The structure and composition of these communities at present strongly depends on the extent to which these fires have continued or have been replaced by prescribed fire.

In the three sandhill community types a sparse midstory of scrub oaks is present, with the species varying with the types and variants. In the Mesic Pine Flatwoods type, oaks are absent and the community has a distinctly two-layered structure of trees and grass. The herb layer is often very diverse. With removal of fire, scrub oaks in the sandhills community types and shrubs and hardwood trees in the flatwoods community types become dense and out-compete the herbs. Piedmont Longleaf Pine Forests are more poorly known. Most existing examples have a mixed canopy of longleaf, loblolly, and shortleaf pine, often mixed with southern red oak and post oak. These communities probably once also had a grassy understory, but it is not known if wiregrass was once dominant.

The best remaining examples of the dry longleaf pine habitat in the Coastal Plain are on the military bases of Fort Bragg, Camp Lejeune, Sonny Point, and Cherry Point, the Croatan National Forest, Holly Shelter Game Land, Goose Creek Game Land, and Sandhills Game Land. Most of the acreages on the above sites are in fair to good condition, due to regular prescribed burning. There are many other sites on both public and private lands where little to no burning has depleted the value of the habitat; these sites would thus be considered to be in poor condition (NCWRC 2005). Priority habitats identified in the 2005 Wildlife Action Plan that may be a component of this community include Piedmont Dry Coniferous Woodlands, Dry Coniferous Woodlands (Loblolly/ Slash Pine Forest), and Dry Longleaf Pine (see Chapter 5A) (NCWRC 2005).

Table 1 at the end of this report provides of summary of expected climate change impacts to these natural communities.

## **Predicted Effects to Wildlife Species**

Tables 2 through 6 at the end of this report identify the species of greatest conservation need (priority species) that use habitats in this ecosystem.

Habitat loss and lack of fire affects bird species that rely on a grass-dominant understory and open pine ecosystems (red-cockaded woodpecker, Bachman's sparrow, brown-headed nuthatch, Henslow's sparrow, and northern bobwhite). Old growth characteristics (canopy gaps, red-heart fungus, cavities, snags, hollow trees) are lacking throughout, except where red-cockaded woodpeckers are managed, impacting both primary (e.g., woodpeckers) and secondary (e.g., rodents, bats and other birds) cavity users. High grading of stands, lack of gap management, and overstocked stands are leading to a lack of structural diversity for many species. Roads cause particularly high mortality to reptiles and amphibians (NCWRC 2005).

Microhabitat features such as large woody debris have been lost, impacting reptiles and small mammals (Loeb 1999). Localized and non-lethal infestations can be beneficial for wildlife by creating snags, a food source, and habitat diversity. Extensive lethal outbreaks of native and exotic pests can dramatically shift the composition of the tree community, with implications for conifer-specialists like brown-headed nuthatch (NCWRC 2005).

Wild fires in drought may be more likely to be too intense or too extensive, and may harm some species. In small, isolated sites, an increase in wildfires may have catastrophic impacts on insects and other animals that depend on a metapopulation strategy for coping with environmental disturbances. For such species, lack of landscape connectivity can prevent restoration of populations through re-colonization from unburned refuges. As a result, there may be a significant increase in local extirpations that may eventually lead to region-wide extirpations or even extinction of certain species. To protect sensitive insect populations, prescribed burns should include setting aside unburned refugia in every burn and preferably following a three year burn rotation among three different burn units.

Mild winters, with decreased cold damage, are likely to allow species from the south to move into North Carolina. In recent years, several longleaf-pine associated insects once thought to be restricted to Florida or the Gulf Coast have been found to be established in North Carolina. Although we lack the historic data to know for sure that these represent recent colonizations, this trend will undoubtedly accelerate with decreasingly cold winters. Fire ant impacts are also a growing threat.

## **Climate Change Compared to Other Threats**

The greatest threats to this system do not come from climate change. With their adaptation to dry conditions, fire, wind, and their range well to the south, these may be the most resilient systems to warming climate. Currently, the greatest threat comes from development pressure. Historically, conversion and exploitation destroyed most of this once extensive system, and these forces continue to consume the remnants.

Table 7 compares climate change with other existing threats.

<b>Table 7. Comparison Of Climate Change With Other Threats</b>		
<b>Threat</b>	<b>Rank Order</b>	<b>Comments</b>
Development	1	Development of slopes within this habitat can lead to fragmentation that disrupts connectivity between patches for most wildlife except birds. Road crossings can lead to mortalities, especially for reptiles and amphibians. These systems occur on some of the highest lands in the outer Coastal Plain, where development may become even more concentrated as sea level rises.
Logging/ Exploitation	2	Intensive pine straw raking impacts understory habitat by removing understory grasses and forbs, preventing their growth, and sometimes creating an almost bare sandy forest floor (NCWRC 2005). Slow reproductive rates may limit regrowth once longleaf pines have been removed.
Conversion to agriculture/ silviculture	2	The threat of agricultural conversion has reduced in recent years (having greatly reduced habitat historically), but pine plantation conversion continues. Genetic improvements to planting stock have resulted in getting longleaf to gain height growth quickly, with most trees coming out of the grass stage within 3 years. However, these trees clearly have a less developed root system and are more susceptible to wind throw.
Biofuel Production	2	Industrial timber operations will be likely candidates for conversion to biomass production. It will be important to consider competing resource needs as alternative energy production increases the demand for biofuel products (DeWan et al. 2010).
Fire	3	Prescribed burning is crucial for retaining these systems in both the present and the expected climate. Inadequate fire is an ongoing threat at many sites. For small, isolated habitat remnants, wildfires can cause permanent extirpation of insect and other animal populations. This is a problem at most unprotected examples and is the greatest threat to protected examples. Much of the plant diversity in these habitats is found in the transition zones between the longleaf communities and other adjacent wetter sites. Traditional use of plowed fire lines in these transition zones has resulted in the eventual deterioration of these transition zones
Invasive Species	3	Fire ants are a threat to many terrestrial animals, especially amphibians. There are numerous native and exotic pests that can impact coniferous trees in this habitat (e.g., southern pine beetle, red-headed pine sawfly, tip moths, pine webworm, Schweinitzii root and bud disease, red heart of pine disease) (NCWRC 2005). Early detection and control of invasive exotic species (such as cogon grass) will reduce the ecological damage caused by invasives and the cost of controlling them. Preventative measures such as forbidding sale and transport of invasive species will help reduce the risks and cost

**Table 7. Comparison Of Climate Change With Other Threats**

Threat	Rank Order	Comments
Climate Change	4	Climate change will likely exacerbate some of these problems.

## **Summary and Recommendations**

Because so few examples remain, protecting and expanding remaining examples is crucial with or without climate change. Because these systems are likely to withstand the stresses of changing climate well, restoring more of them in the near future would produce more resilient natural landscapes. Protecting and restoring landscape connections is important to allow movements of mobile species and to improve the viability of small populations. The need for this is particularly important for disturbance maintained habitats such as longleaf pine ecosystems and will increase with the stresses of a changing climate.

### **Recommended Actions**

- |                      |   |
|----------------------|---|
| Surveys              | <ul style="list-style-type: none"> <li>• Surveys are needed to document the distribution, relative abundance, and status of priority wildlife species associated with dry longleaf pine habitats.</li> <li>• Conduct surveys for species for which current distribution information is already available or for species that are considered common.</li> </ul>  |
| Monitoring           | <ul style="list-style-type: none"> <li>• Monitoring systems need to be expanded and/or targeted to be able to assess current population status and trend information for all wildlife species associated with dry longleaf pine habitats.</li> <li>• Many North Carolina dry longleaf pine bird species require specialized monitoring attention, since neither BBS nor standard point counts adequately sample for many species like Bachman's sparrow, nightjars, American kestrel, Henslow's sparrow and red-headed woodpecker.</li> </ul>   |
| Management Practices | <ul style="list-style-type: none"> <li>• Conservation actions should include management and protection of non-longleaf pine woodlands with easements, acquisitions, and the re-introduction of fire to control excess fuel loads.</li> <li>• Where possible, fire should be allowed to burn through transition zones to maintain these sites instead of plowing fire lines through them.</li> <li>• Suppression of fire ants is an urgent priority within protected examples of longleaf pine ecosystems.</li> <li>• Work cooperatively with other agencies to define sustainable forestry criteria for biomass production.</li> <li>• Restoration of landscape integrity is a high priority for protecting insect populations associated with longleaf pine habitats.</li> </ul> |

- Suppression of fire ant colonies -- particularly where multi-queen colonies have developed -- should be a high priority for all protected natural areas.
- Evaluate sustainable forestry criteria established by European countries that use woody biomass for fuel to generate preliminary guidelines for biomass production in North Carolina (Buford and Neary 2010 in DeWan *et al.* 2010).
- Develop strategies for pine straw raking that minimizes impacts to understory habitat structure.
- Landowners should have the option to purchase longleaf seedlings that stay in the grass stage longer. This will allow the trees to better establish their root systems in the hurricane zone, and will also provide a longer period of high quality early successional habitat.

#### Land Protection

- Because so few examples remain, protecting and expanding remaining examples is crucial with or without climate change. Because these systems are likely to withstand the stresses of changing climate well, restoring more of them in the near future would produce more resilient natural landscapes.
- Protecting and restoring landscape connections is important to allow movements of mobile species and to improve the viability of small populations.

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**Table 1. Predicted Impacts of Climate Change**

<b>Climate Change Factor</b>	<b>Comments</b>
Drought	The most extreme Xeric Sandhill Scrub, the Sand Barrens, are dry enough that vegetation density is limited. Increase drought may possibly cause plant mortality and reduce vegetation density further. It may also cause Sand Barrens to develop in slightly less dry soils.
Fire	Severe wild fires in droughts, burning in excessive fuel loads, may cause ecological damage. For particular species, especially insects, too frequent or too extensive burning (whether by wildfire or prescribed burns) can have major effects when coupled with loss of landscape integrity resulting from habitat loss.
Storm Events	General forecasts suggest an increase in severe storms. Increased drought conditions and increased thunderstorm intensity are likely to produce more wild fires. Increased wind storm damage could affect canopy structure. Longleaf pines are among the least susceptible trees to wind destruction, and it is unclear how significant increased wind will be to them. Some young planted coastal longleaf stands have shown significant damage from hurricanes and other strong winds. This usually occurs within a few years after the longleaf have emerged from the grass stage. Because of their slow reproductive rate and long life span, increased wind mortality would reduce average age and might reduce natural canopy density. This would be detrimental to red-cockaded woodpeckers and other species that depend on older longleaf pine trees. Increased plant productivity with a longer growing season may partly offset the effect of reduced tree age on structure.
Temperature	These systems and their component species are well adapted to warm temperatures. Increased temperatures might increase the range of these systems in the northern Coastal Plain and in Virginia. However, the widespread conversion of uplands in this region, the fragmented distribution and lack of seed source for them, and their dependence on fire, make natural expansion very unlikely. Warmer temperatures may allow some species of longleaf pine systems farther south to move into North Carolina. The limited tendency of most plants in these systems to invade new areas suggests that any such process would naturally be slow and limited.
Invasive Species	Warmer temperatures may allow the invasion of Cogon grass ( <i>Imperata cylindrica</i> ) and armadillos ( <i>Dasypus novemcinctus</i> ). Once established, they are likely to expand more rapidly with a warming climate. Fire ants ( <i>Solenopsis invicta</i> ) are already a serious invader in these systems.
Mild Winters	May include some positive (longer growing season) and some negative (pest insect survival) effects.
Compositional Change	Could be some positive effects of adding native species but negative if exotics increase. Some of the insects most highly tied to dry longleaf habitats may be eliminated by increases in wildfires.

**Table 2. Bird Species Utilizing Coastal Plain/Piedmont Dry Longleaf Pine Communities**

Species	Common Name	Element Rank	Endemic	Major Disjunct	Extinction/Extirpation Prone	US/NC/WAP*	Comments
<b>BIRDS</b>							
<i>Accipiter cooperii</i>	Cooper's Hawk					/SC/P	
<i>Accipiter striatus</i>	Sharp-shinned Hawk					/SR/P	
<i>Aimophila aestivalis</i>	Bachman's sparrow	G3/ S3B, S2N				FSC/ SC/ P	
<i>Ammodramus henslowii</i>	Henslow's Sparrow					/SR/P	
<i>Caprimulgus carolinensis</i>	Chuck-will's-widow	G5/S5B				/ /P	
<i>Caprimulgus vociferus</i>	Whip-poor-will					/ /P	
<i>Chordeiles minor</i>	Common Nighthawk					/ /P	
<i>Colaptes auratus</i>	Northern Flicker					/ /P	
<i>Colinus virginianus</i>	Northern Bobwhite					/ /P	
<i>Contopus virens</i>	Eastern Wood-pewee					/ /P	
<i>Dendroica discolor</i>	Prairie Warbler					/ /P	
<i>Falco sparverius</i>	American Kestrel					/ /P	
<i>Helmitheros vermivorous</i>	Worm-eating Warbler					/ /P	
<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker					/ /P	
<i>Picoides borealis</i>	Red-cockaded woodpecker	G3/S2				LE/E/P	
<i>Picoides villosus</i>	Hairy Woodpecker					/ /P	
<i>Sitta pusilla</i>	Brown-headed Nuthatch					/ /P	



**Table 3. Mammal Species Utilizing Coastal Plain/Piedmont Dry Longleaf Pine Communities**

Species	Common Name	Element Rank:	Endemic	Major Disjunct	Extinction/Extirpation Prone	US/NC/WAP*	Comments
<b>MAMMALS</b>							
<i>Lasiurus seminolus</i>	Seminole Bat					/ /P	
<i>Sciurus niger</i>	Eastern Fox Squirrel					/SR/P	

**Table 4. Reptile Species Utilizing Coastal Plain/Piedmont Dry Longleaf Pine Communities**

Species	Common Name	Element Rank	Endemic	Major Disjunct	Extinction/Extirpation Prone	US/NC/WAP*	Comments
<b>REPTILES</b>							
<i>Cemophora coccinea</i>	Scarlet snake	G5/S3				/W1, W5/P	
<i>Cemophora coccinea copei</i>	Northern Scarletsnake						
<i>Crotalus adamanteus</i>	Eastern Diamondback Rattlesnake					/E/P	
<i>Crotalus horridus</i>	Timber (Canebrake) Rattlesnake					/SC/P	
<i>Elaphe guttata</i>	Corn Snake					/ /P	
<i>Heterodon platirhinos</i>	Eastern Hog-nosed Snake					/ /P	
<i>Heterodon simus</i>	Southern hognose snake	G2/S2				FSC/SC/P	Recorded from only a few sites in the NC Coastal Plain.
<i>Lampropeltis calligaster rhombomaculata</i>	Mole Kingsnake					/ /P	
<i>Lampropeltis triangulum elapsoides</i>	Scarlet Kingsnake					/ /P	
<i>Masticophis flagellum</i>	Coachwhip	G5/S3				/SR/P	
<i>Micrurus fulvius</i>	Eastern coral snake	G5/S1				/E/P	
<i>Ophisaurus attenuatus longicaudus</i>	Eastern Slender Glass Lizard					/ /P	
<i>Pituophis melanoleucus melanoleucus</i>	Northern Pinesnake					/SC/P	
<i>Sistrurus miliarius</i>	Pigmy Rattlesnake					/SC/P	
<i>Tantilla coronata</i>	Southeastern crowned snake	G5/S3S4				/ /P	

**Table 5. Amphibian Species Utilizing Coastal Plain/Piedmont Dry Longleaf Pine Communities**

Species	Common Name	Element Rank:	Endemic	Major Disjunct	Extinction/ Extirpation Prone	US/ NC/ WAP *	Comments
<b>AMPHIBIANS</b>							
<i>Ambystoma tigrinum</i>	Eastern Tiger Salamander					/T/P	
<i>Bufo quercicus</i>	Oak toad	G5/S3				/SR/P	Thought to be declining due to invasion of fire ants. Decreases in cold winters may lead to higher densities of fire ants, with consequent decreases in oak toads and many other species of ground-dwelling animals.
<i>Hyla andersonii</i>	Pine Barrens Treefrog					/ /P	
<i>Hyla gratiosa</i>	Barking Treefrog					/ /P	
<i>Plethodon glutinosus sensu stricto</i>	Northern Slimy Salamander					/ /P	
<i>Pseudacris ornata</i>	Ornate Chorus Frog					/SR/P	
<i>Rana capito</i>	Carolina Gopher Frog					/T/P	
<i>Scaphiopus holbrookii</i>	Eastern Spadefoot					/ /P	

**Table 6. Invertebrate Species Utilizing Coastal Plain/Piedmont Dry Longleaf Pine Communities units**

Species	Common Name	Element Rank	Endemic	Major Disjunct	Extinction/ Extirpation Prone	US/ NC/ WAP*	Comments
<b>INVERTEBRATES</b>							
<i>Acronicta albarufa</i>	Barrens daggermoth	G3G4/ S1S2		YES		/SR/	Apart from one historic record from the Piedmont, all NC records are from the Fall-line Sandhills.
<i>Agrotis carolina</i>	A dart moth	G2G3/ S2S3	YES			FSC/SR/	May benefit from increases in fire – has a subterranean larva that appears to survive fires on site better than most other longleaf insect species.
<i>Anicla lubricans</i>	Slippery dart moth	G4G5/ S3?				/W3/	
<i>Apoda rectilinea</i>	A slug moth	GNR/ S1S3				/W3/	
<i>Bleptina sangamonica</i>	A noctuid moth	GU/S1S2		YES		/SR/	Very few occurrences are known for this species rangewide. May represent a species complex.
<i>Callophrys augustinus</i>	A hairstreak	G5/S4		YES		/ /	While fairly widely distributed in the mountains, it occurs in only a few scattered locations in the Fall-line Sandhills and Piedmont.
<i>Callophrys irus</i>	Frosted elfin	G3/S2		YES		/SR/	Occurs in NC only as widely scattered populations. The largest may be the one in the

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Species	Common Name	Element Rank	Endemic	Major Disjunct	Extinction/Extirpation Prone	US/ NC/ WAP*	Comments
<b>INVERTEBRATES</b>							
							Fall-line Sandhills.
<i>Catocala amestris</i>	Three-staff underwing	G4/S1S2		YES		/SR/	
<i>Catocala grisatra</i>	Grisatra underwing	G1G3/S1S2		YES		/SR/	The Bladen County population -- if it still exists -- is the only one known north of Florida and extreme south GA. Given the extremely patchy distribution of the hawthorn habitats that it is associated with, this species is likely to be highly vulnerable to the effects of wildfires and other environmental disturbances.
<i>Catocala jair</i>	Jair underwing	G4/S1S3				/SR/	
<i>Catocala louiseae</i>	Louise's underwing	G4/S1S3		YES		/SR/	The Bladen County population is the only one known north of FL.
<i>Catocala messalina</i>	Messalina underwing	G4/S2?		YES		/SR/	Appears to be primarily associated with maritime forests but an apparently disjunct population was found at Fort Bragg.

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Species	Common Name	Element Rank	Endemic	Major Disjunct	Extinction/Extirpation Prone	US/ NC/ WAP*	Comments
<b>INVERTEBRATES</b>							
<i>Chaetagnaea fergusoni</i>	A noctuid moth	G4/SU				/SR/	Habitats and range are poorly known. Recorded at Weymouth Woods in the Sandhills.
<i>Chytonix sensilis</i>	An owlet moth	G4/S3?				/W3/	A fire follower that is likely to benefit from increased fire frequency
<i>Cryphia cyanympha</i>	An owlet moth	G4/SU				/W3/	
<i>Dasychira leucophaea</i>	A tussock moth	G4/SU				/W3/	
<i>Digrammia eremiata</i>	Three-lined angle (moth)	G4/S3?				/W3/	
<i>Doryodes n. sp. 1</i>	A moth	G3G4/S3S4	YES			/W3/	A grass-feeding species thought to be strongly associated with northern wiregrass. Not found in habitats lacking that grass.
<i>Erastria coloraria</i>	Broad-lined catopyrrha (moth)	G4/SU		YES		/W3/	Feeds on New Jersey tea, but the only known population in NC is located at Fort Bragg.
<i>Erynnis martialis</i>	Mottled duskywing	G3G4/ S3				/SR/	
<i>Eucrotopcnemis dapsilis</i>	An owlet moth	G4/S2S3				/W3/	
<i>Faronta rubripennis</i>	Pink streak	G3G4/S2S3				/W3/	

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Species	Common Name	Element Rank	Endemic	Major Disjunct	Extinction/Extirpation Prone	US/ NC/ WAP*	Comments
<b>INVERTEBRATES</b>							
<i>Feltia manifesta</i>	A moth	G4/S2S3		YES		/SR/	Most NC records are from the Fall-line Sandhills and from similar sandhill habitats in the Outer Coastal Plain. However, there are also records from the mountains although none yet from the Piedmont.
<i>Gabara pulverosalis</i>	An owlet moth	G4/S3?				/W3/	
<i>Grammia phyllira</i>	Phyllira tiger moth	G4/S2S3				/SR/	
<i>Heliomata infulata</i>	Rare spring moth	G2G4/S2S3		YES		/SR/	The population in the Sandhills is widely disjunct from those in the western Piedmont and Mountains.
<i>Hemeroplanis n. sp.</i>	A noctuid moth	GNR/S2S3				/SR/	The population in the Sandhills is widely disjunct from those in the western Piedmont and mountains. The overall range of this species is not yet known.
<i>Hesperia attalus slossonae</i>	Dotted skipper	G2G4 T2T3/ S2				/SR/	Vulnerable to local extirpation following a fire. Needs high landscape integrity to persist within the region.

**Table 6. Invertebrate Species Utilizing Coastal Plain/Piedmont Dry Longleaf Pine Communities units**

Species	Common Name	Element Rank	Endemic	Major Disjunct	Extinction/Extirpation Prone	US/ NC/ WAP*	Comments
<b>INVERTEBRATES</b>							
<i>Hesperia meskei</i>	Meske's skipper	G3G4/S3				/SR/	Vulnerable to local extirpation following a fire. Needs high landscape integrity to persist within the region.
<i>Heterocampa varia</i>	A prominent moth	G3G4/S1S2		YES			
<i>Hyperstrotia aetheria</i>	A noctuid moth	GNR/S1S2		YES		/SR/	Previously not recorded north of FL. Belongs to a species complex that has yet to be sorted out taxonomically.
<i>Hypomecis buchholzaria</i>	Buchholz's gray (moth)	G3G4/S1S2		YES		/SR/	Recorded from only a few sites in NC.
<i>Idaea eremiata</i>	A wave (moth)	G4/S3S4				/W3/	
<i>Idaea ostentaria</i>	A wave (moth)	GNR/S3?				/W3/	
<i>Lobocleta peralbata</i>	An inchworm moth	GNR/SU				/W3/	
<i>Megathymus yuccae</i>	Yucca giant skipper	G5/S3S4				/W2/	
<i>Melanoplus strumosus</i>	Swollen spur-throat grasshopper	G4G5/SU				/W3/	
<i>Nemoria bifilata</i>	An emerald moth	G4/S3?				/W3/	
<i>Ptichodis bistrigata</i>	Southern ptichodis (moth)	G3/S2S3				/SR/	
<i>Pygarctia abdominalis</i>	Yellow-edged pygarctia (moth)	G3/S2S3				/SR/	



**Table 6. Invertebrate Species Utilizing Coastal Plain/Piedmont Dry Longleaf Pine Communities unities**

Species	Common Name	Element Rank	Endemic	Major Disjunct	Extinction/ Extirpation Prone	US/ NC/ WAP*	Comments
<b>INVERTEBRATES</b>							
<i>Satyrium edwardsii</i>	Edwards' hairstreak	G4/S2?		YES		/SR/	The population in the Fall-line Sandhills appears to be widely separated from those in the mountains.
<i>Schinia bina</i>	Bina flower moth	G4/S2S3				/W3/	
<i>Schinia jaguarina</i>	Jaguar flower moth	G4/S1S3				/SR/	
<i>Schinia siren</i>	A flower moth	GNR/SU				/W3/	
<i>Ulolonche modesta</i>	Modest Quaker moth	G5/SU				/W3/	

**\* US/ NC/ WAP Abbreviations (species are subject to reclassification by USFWS, NHP, or WRC).**

E	Endangered	SC	Special Concern	P	WAP Priority Species
T	Threatened	SR	Significantly Rare		
FSC	Federal Species of Concern	W	Watch Category		
T(S/A)	Threatened due to Similarity of Appearance				

NatureServe Element Rank: <http://www.natureserve.org/explorer/ranking.htm>

USFWS Endangered Species Listing Status: [http://www.fws.gov/raleigh/es\\_tes.html](http://www.fws.gov/raleigh/es_tes.html)

NC Natural Heritage Program Status:  
<http://www.ncnhp.org/Images/2010%20Rare%20Animal%20List.pdf>

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