

Mesic Forest
Piedmont Ecoregion

Piedmont mesic forests occur on moist portions of upland habitat, steep north-facing slopes, lower slopes, along ravines, high sections of outer floodplains and stream bottoms. The most common subtypes in the Piedmont are Mesic Mixed Hardwood Forest and Basic Mesic Forest (Schafale and Weakley 1990). These habitats have well-developed understory and shrub layers and are characterized by canopy species such as American beech, tulip poplar and red oak, and in the western Piedmont, eastern hemlock.

Under natural conditions these forests are uneven-aged and often have some old, large trees present. Reproduction occurs mainly in canopy gaps (Schafale and Weakley 1990) and disturbed areas have increased amounts of pines, tulip poplar and sweetgum. Fires most likely occurred periodically but because of the moist and sheltered nature of the sites, they likely did not burn often or with great intensity. Mesic Mixed Hardwood Forests grade into alluvial or bottomland forest or into various upland forest types and can be distinguished from Basic Mesic Forest by more acidic soils, an absence of base-loving plants and lower vegetative diversity in the understory.

In general, Mesic Mixed Hardwood Forests are quite common and their occurrence on steeper topography has allowed some to escape extensive disturbance until recently. Due to a scarcity of basic rocks in the piedmont, the Basic Mesic Forest subtype is rare. Mesic forests can be distinguished from upland hardwood forests by the canopy composition and from floodplain forests by the lack of bottomland tree species and presence of flood-intolerant trees (Schafale and Weakley 1990). Table 1 provides a list of priority species associated with this habitat for which there are conservation concerns.

Table 1. Priority species associated with piedmont mesic forest.

Group	Scientific name	Common name	State status* (Federal status)
Birds	<i>Accipiter cooperii</i>	Cooper's Hawk	SC
	<i>Accipiter striatus</i>	Sharp-shinned Hawk	SR
	<i>Coccyzus americanus</i>	Yellow-billed Cuckoo	
	<i>Colaptes auratus</i>	Northern Flicker	
	<i>Contopus virens</i>	Eastern Wood-pewee	
	<i>Helmitheros vermivorus</i>	Worm-eating Warbler	
	<i>Hylocichla mustelina</i>	Wood Thrush	
	<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker	
	<i>Oporornis formosus</i>	Kentucky Warbler	
	<i>Picoides villosus</i>	Hairy Woodpecker	
	<i>Wilsonia citrina</i>	Hooded Warbler	
	Mammals	<i>Lasionycteris noctivagans</i>	Silver-haired Bat
<i>Mustela frenata</i>		Long-tailed Weasel	
<i>Scalopus aquaticus</i>		Eastern Mole	

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Group	Scientific name	Common name	State status* (Federal status)
Amphibians	<i>Ambystoma maculatum</i>	Spotted Salamander	
	<i>Ambystoma opacum</i>	Marbled Salamander	
	<i>Ambystoma talpoideum</i>	Mole Salamander	SC
	<i>Hemidactylium scutatum</i>	Four-toed Salamander	SC
	<i>Hyla gratiosa</i>	Barking Treefrog	
	<i>Hyla versicolor</i>	Northern Gray Treefrog	SR
	<i>Plethodon glutinosus sensu stricto</i>	Northern Slimy Salamander	
Reptiles	<i>Clemmys guttata</i>	Spotted Turtle	
	<i>Crotalus horridus</i>	Timber Rattlesnake	SC
	<i>Elaphe guttata</i>	Corn Snake	
	<i>Eumeces laticeps</i>	Broadhead Skink	
	<i>Lampropeltis calligaster rhombomaculata</i>	Mole Kingsnake	
	<i>Terrapene carolina</i>	Eastern Box Turtle	
	<i>Virginia valeriae valeriae</i>	Eastern Smooth Earthsnake	
*Abbreviations SC Special Concern SR Significantly Rare			

Location And Condition Of Habitat

Mesic habitats in the Piedmont have experienced less direct habitat destruction and fragmentation as compared to other upland habitats, but more recent logging has reduced the extent of old growth canopy in most places. Also, the extent of intact natural landscapes with a mesic forest component (often amidst other upland forest types and bottomland communities) has been reduced by development and forest clearing for agriculture, especially in oak forest types immediately above the mesic forest slopes. Map 1 depicts locations of mesic forest communities in the Piedmont ecoregion.

There are still good examples of this mesic forest in the piedmont at Umstead State Park, Duke Forest, Hill Demonstration Forest, Raven Rock State Park and at Eno River State Park in the central piedmont, and also examples in parts of Uwharrie National Forest. The Basic Mesic Forest subtype often has rare and disjunct plant species.

Problems Affecting Species And Habitats

Housing subdivisions are often built adjacent to mesic slopes and floodplain forests in central North Carolina. As with all Piedmont forested habitats, fragmentation of mesic forests into smaller or narrower contiguous blocks is a concern for forest interior birds (like wood thrush, Cooper's hawk, and worm-eating warbler), which may occur in lower densities or suffer lower

productivity or survival in small habitat patches. Fragmentation by roads and development can be particularly problematic for reptiles (particularly timber rattlesnake and box turtle), amphibians, and small mammals (particularly eastern mole) that suffer high mortality on roads when traveling between forest patches or between mesic forest and other habitats.

After logging, some mesic forest habitats are replanted to even-aged loblolly pine plantations, reducing species and structural diversity. When forests are cut for timber as soon as they are economically viable, they are not able to develop old-growth structural characteristics such as canopy gaps and standing and fallen snags. A lack of canopy gaps in this habitat type has probably lead to a reduced number of some avifauna such as the eastern wood-pewee, red-headed woodpecker, northern flicker, hooded warbler and Kentucky warbler. This reduction in canopy gaps has also caused a decline in midstory and understory vegetation, which has impacted species such as the Swainson's warbler, Kentucky warbler, hooded warbler and wood thrush. The reduction in standing snags negatively impacts primary and secondary cavity nesting species, and the lack of dead wood on the forest floor impacts herpetofauna and small mammals.

Plants such as autumn olive, Japanese grass, Japanese honeysuckle, and privet have taken resources from native vegetation and altered habitat structure and species composition. The extent of negative (and positive) impacts of exotic species on populations of native fauna is largely unknown.

Species And Habitat Conservation Actions and Priorities For Implementation

Within Piedmont mesic forest there are three major conservation needs. The highest priority is land use planning to minimize development within large, unfragmented tracts of mesic forest. This would be most appropriate and effective in the regions that are, as yet, not heavily developed, including Anson, Montgomery, Stanly, Randolph and Richmond counties in the southern Piedmont, and the northern tier counties of Surry, Stokes, Rockingham, Caswell, Person, and Granville. Planning for future infrastructure (roads, water lines, etc.) should be concentrated closer to existing development and should avoid dissecting larger tracts of unfragmented forest.

The next highest priority for this habitat is direct land protection through easements and land acquisition. Attempts should be made to connect mesic stands to adjacent patches of upland hardwoods or floodplain forests to establish larger core areas for wildlife. State and county parks departments, the Commission, the Ecosystem Enhancement Program, The Nature Conservancy, the Piedmont Land Conservancy, the Land Trust for Central North Carolina, and other regional land trusts are all important players in land protection. The Nature Conservancy's Piedmont Ecoregional Plan (when completed) and the One NC *Naturally* Initiative will help to prioritize land protection efforts in the Piedmont.

The third major conservation need is habitat management and forestry practices that will encourage structural and species diversity. Possibly the greatest habitat management need is an increased focus on allowing longer forestry rotations and the development of older-growth forest characteristics. After timber harvest, landowners could consider establishing multi-tree

species or multi-age stands. Also, allowing or encouraging periodic habitat disturbance will help to create tree-fall gaps and snags that will promote understory development and increase vegetative and structural diversity. The Forest Landbird Legacy Program can help provide technical guidance and cost share for management practices that promote late succession forest bird habitat.

Priority Research, Survey, And Monitoring

Initial efforts need to be directed towards surveys to determine the current baseline distribution and status of species mainly associated with mesic forests (especially those that are state-listed or believed to be declining) for which that information is lacking. Since we lack baseline information about even common species and their distribution and status in this habitat type, we need to direct secondary efforts to conduct surveys to understand current status from which we can then measure future population changes over time. Protocols and procedures developed from baseline surveys should then provide a means to convert from a baseline survey mode to a long-term population monitoring mode.

- **Surveys**

- Determine the breeding distribution and status of Cooper's and sharp-shinned hawks. Because of their secretive nature, traditional bird surveys do not adequately track these populations. Targeted tape "play-back" surveys will be needed.
- Conduct nest-searching and spot-mapping bird surveys to determine limiting factors in productivity.
- Determine the distribution and population status of mole salamander, four-toed salamander, northern two-lined salamander.
- Determine the status and distribution of timber rattlesnake.
- Determine the status and distribution of spotted and box turtles, particularly in more urbanized and rapidly urbanizing counties.
- Determine the status and distribution of small mammals and bats in Piedmont mesic forest.

- **Monitoring**

- Current monitoring systems and protocols (e.g., MAPS and BBS) may need to be enhanced to better cover species not well covered by current monitoring efforts.
- Establish MAPS and migration banding stations.
- Conduct herpetofauna monitoring to track population trends for species of concern. Particular attention should be paid to mole salamanders and four-toed salamanders.
- Establish monitoring systems and protocols for small mammals, bats and reptiles and amphibians to follow population trends.

- **Research**

Population demographics

- Conduct life history studies on priority bat species, as well as investigations into specific habitat needs, particularly for silver-haired bats.
- Conduct research on the effects of the loss of old-growth characteristics on herpetofauna populations.

Predator effects

- Examine impacts of cowbird parasitism and predation on neotropical migrant nesting productivity (e.g., hooded warbler, Kentucky warbler, eastern wood-pewee and worm-eating warbler).

Habitat use

- Study the impacts of habitat fragmentation and roads on reptile and amphibian survival and productivity.

Other

- Conduct economic and human dimensions research to determine how to encourage commercial forestry practices that promote multi-age stands with structural diversity.

Supporting References

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