

Oak Forest (Including Mixed Hardwoods And Pine)
Mid-Atlantic Coastal Plain

This habitat includes the traditional ‘oak-hickory’ forest type, but may also contain large concentrations of tulip poplar, red maple, sweet gum and/or pine species in disturbed sites. In very dry settings, post oak and blackjack oak may dominate. This habitat category also includes sites that may have been longleaf pine stands at one time, but without fire have regenerated into closed canopy mixed hardwood/ pine stands with crowded midstory development and low understory species diversity.

In the Coastal Plain, two examples of oak dominated natural communities include Dry Oak-Hickory Forest and Dry-Mesic Oak-Hickory Forest (Schafale and Weakley 1990). Dry Oak-Hickory Forest is typically a more upland community and was once one of the predominant community types in the Piedmont, and although not as common in the Coastal Plain it was clearly widespread before European settlement and land clearing (Schafale and Weakley 1990). Dry-Mesic Oak-Hickory Forest was historically found throughout the Piedmont and Coastal Plain but much of this area in the Coastal Plain is now in agriculture or pine plantations (Schafale and Weakley 1990). Table 1 provides a list of priority species for which there is conservation concern.

Table 1. Priority species associated with coastal plain oak forest (and mixed hardwoods/pine).

| Group | Scientific name | Common name | State status* (Federal status) |
|--------------|---|---------------------------|---|
| Birds | <i>Accipiter cooperii</i> | Cooper's Hawk | SC |
| | <i>Caprimulgus carolinensis</i> | Chuck-will's-widow | |
| | <i>Caprimulgus vociferus</i> | Whip-poor-will | |
| | <i>Coccyzus americanus</i> | Yellow-billed Cuckoo | |
| | <i>Colaptes auratus</i> | Northern Flicker | |
| | <i>Contopus virens</i> | Eastern Wood-pewee | |
| | <i>Hylocichla mustelina</i> | Wood Thrush | |
| | <i>Melanerpes erythrocephalus</i> | Red-headed Woodpecker | |
| | <i>Picoides villosus</i> | Hairy Woodpecker | |
| Mammals | <i>Wilsonia citrina</i> | Hooded Warbler | |
| | <i>Mustela frenata</i> | Long-tailed Weasel | |
| | <i>Scalopus aquaticus</i> | Eastern Mole | |
| Amphibians | <i>Sciurus niger</i> | Eastern Fox Squirrel | SR |
| | <i>Ambystoma maculatum</i> | Spotted Salamander | |
| | <i>Ambystoma opacum</i> | Marbled Salamander | |
| | <i>Hemidactylium scutatum</i> | Four-toed Salamander | SC |
| | <i>Plethodon glutinosus sensu stricto</i> | Northern Slimy Salamander | |
| | <i>Scaphiopus holbrookii</i> | Eastern Spadefoot | |

Table 1. Priority species associated with coastal plain oak forest (and mixed hardwoods/pine).

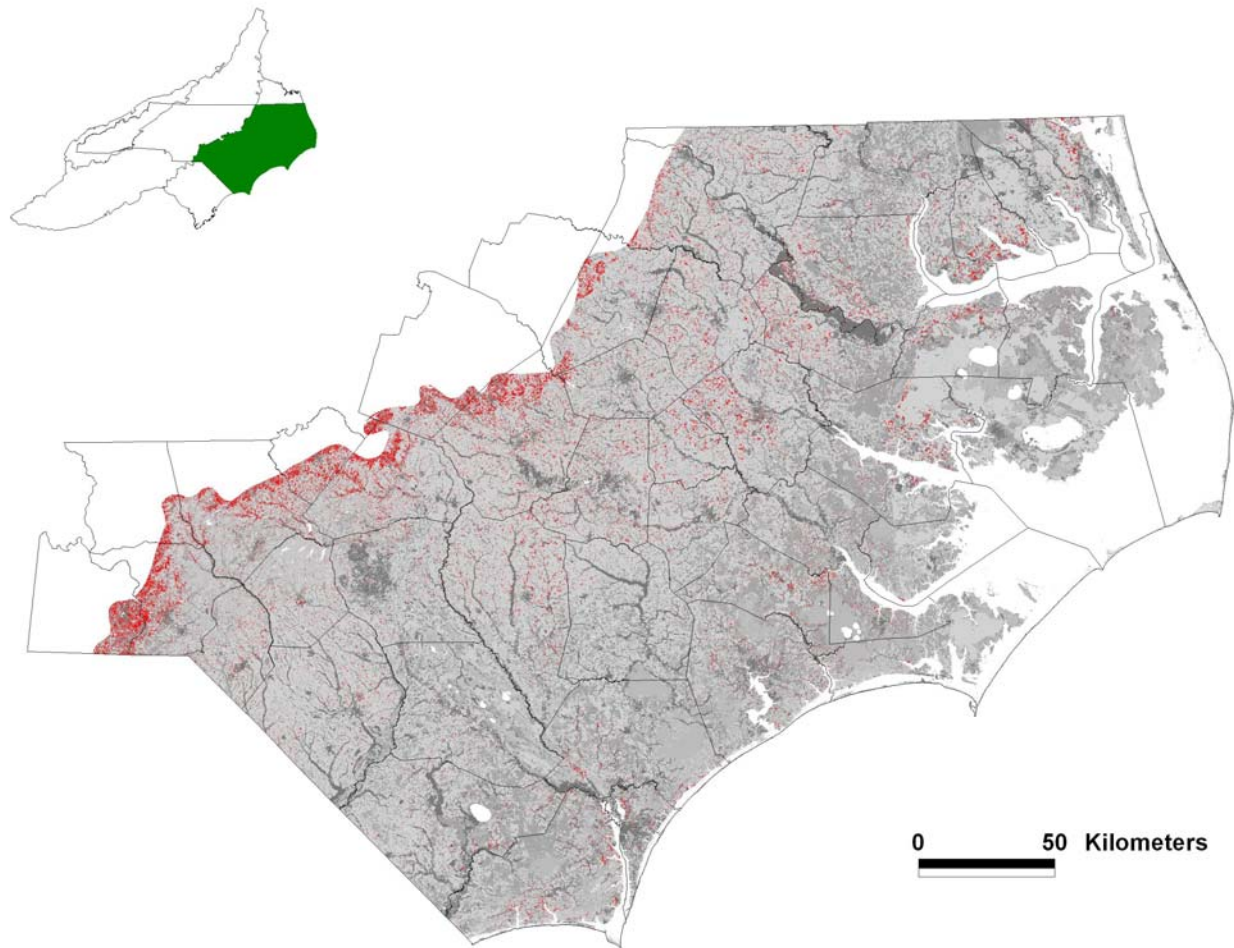
| Group | Scientific name | Common name | State status* (Federal status) |
|-----------------------|--|-----------------------------------|-----------------------------------|
| Reptiles | <i>Cemophora coccinea copei</i> | Northern Scarletsnake | |
| | <i>Crotalus horridus</i> | Timber (Canebrake) Rattlesnake | SC |
| | <i>Elaphe guttata</i> | Corn Snake | |
| | <i>Eumeces laticeps</i> | Broad-headed Skink | |
| | <i>Heterodon platirhinos</i> | Eastern Hog-nosed Snake | |
| | <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

Oak dominated forest communities are located throughout the Coastal Plain but are no longer common except in small patches. Most of these forests have been logged or cleared at least once within the past 300 years, and many have been cleared multiple times. The quality of remaining tracts ranges widely across the Coastal Plain and depends primarily upon the age of the canopy trees, management history, and degree of fragmentation of the tract. The condition of many oak forests and mixed hardwood/pine stands in the Coastal Plain has degraded over the last century due to development, habitat fragmentation, fire suppression, high-grading of stands, and the resultant lack of understory and crowded midstory development, although the quality of some stands has improved with age. Map 1 depicts locations of oak forest and mixed hardwood/pine stands in the Mid-Atlantic Coastal Plain ecoregion.

Disturbed areas in Dry Oak-Hickory and Dry Mesic Oak-Hickory Forests have varying amounts of pines, red maple, tulip poplar and sweetgum depending on the degree of canopy opening and disturbance history. Heavily logged areas or high-graded sites have a mixture of pines and hardwoods. Usually these forests are uneven-aged with old trees occasionally present. Disturbance of many types, exotic plants and fire suppression has undoubtedly changed the species composition and structure of the Coastal Plain natural oak dominated forests. In turn, due to less frequent fires many areas once dominated by longleaf pine have been invaded oaks, hickories and other hardwoods. However, many of these areas have a high percentage of the total habitat patches dominated by weedy hardwood species such as sweetgum, tulip poplar and red maple if the areas are disturbed frequently.

Map 1. Oak forest and mixed hardwoods habitats in the Mid-Atlantic Coastal Plain ecoregion of North Carolina (in red).



Data source: NC GAP, 1992.

Problems Affecting Species And Habitats

Microhabitat loss, lack of woody debris, and roads have impacted amphibians, reptiles and small mammals in oak/mixed hardwood stands in the Coastal Plain. Acquisition can be problematic in upland habitats since fewer options are available for grants. Conversion to single-aged loblolly pine stands is a threat; stands have also been high-graded, leaving the trees' form and functions altered. A lack of canopy gaps, affecting bird species that rely on those gaps for foraging areas (e.g., nightjars, eastern wood-pewee, northern flicker, red-headed woodpecker) is also a problem. Development and roads have caused habitat fragmentation,

and amphibian species have been impacted by a loss of ephemeral habitats found within the matrix habitat of oak/mixed hardwoods. Lastly, the potential and realized impacts by gypsy moths and other non-native plants and animals are becoming a growing concern throughout hardwood dominated communities. Examples of large size and good quality oak dominated communities are now lacking in the Coastal Plain and habitat fragmentation presents a major problem for many wildlife species.

Species And Habitat Conservation Actions and Priorities For Implementation

Acquisition whenever possible and proper management of these areas is key. Conservation of existing oak forest patches is imperative. As oak forests typically occur in small stands, it may be difficult to specifically target these stands for acquisition. However, acquisitions of large tracts (>500 acres) is recommended where some stands of oak forest are present.

Use of infrequent prescribed fire and canopy gap management may be needed to improve forest structural heterogeneity (frequent fire will limit shrub and understory development necessary to breeding bird species). Management and protection of mixed hardwoods/pine to promote future large, unfragmented tracts is especially important for amphibians, reptiles, small mammals and bats. Landowner incentives to promote extending rotation lengths may be another management option.

A portion of these lands should be dedicated to old growth habitat. Within the oak-mixed hardwoods/pine habitat, we must attempt to retain as many of the embedded habitats (e.g., seasonal wetlands) as possible. Some mixed hardwood stands should be considered for conversion back to longleaf pine habitat where appropriate. Long-term studies focusing on the habitat-use needs of many species in oak and hardwood/pine forests, as well as the response of wildlife species to habitat fragmentation, patch size and habitat management are needed.

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 oak and mixed hardwood/pine 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. Current monitoring systems and protocols (e.g., MAPS and BBS) may need to be enhanced to better cover certain species not well covered by current monitoring efforts.

- **Surveys**

- Document the status and distribution of neotropical migrant birds not adequately sampled by BBS (e.g., hooded warbler, Kentucky warbler, yellow-billed cuckoo, red-headed woodpecker, northern flicker, hairy woodpecker).
- Conduct nocturnal surveys for chuck-will's-widow and whip-poor-will to determine status and distribution, especially in areas with open patches of habitat mixed with mature trees.
- Determine the status and distribution of all bats using hardwood and hardwood/pine forests.
- Determine the status and distribution of long-tailed weasel and other small mammals using the habitat.
- Determine the status and distribution of eastern spadefoot and four-toed salamander.
- Determine the status of amphibians (mainly salamanders such as marbled, spotted, redback and slimy salamander) that key on woody debris for part or all of their life cycle.
- Determine the status and distribution of secretive, hard to survey reptiles (e.g., canebrake rattlesnake, mole kingsnake, northern scarletsnake and eastern smooth earthsnake) (in conjunction with surveys for more common reptiles).

- **Monitoring**

- Establish MAPS and migration banding stations and migration monitoring surveys.
- Initiate long-term monitoring for breeding neotropical migrants (especially ground-nesters and cavity nesters).
- Initiate long-term monitoring for bats and small mammals (e.g. moles, shrews, rodents) following initial survey efforts.
- Initiate long-term monitoring for amphibians that use woody debris as a microhabitat following initial survey efforts.
- Initiate long-term monitoring needed for canebrake rattlesnakes and other secretive reptiles following initial survey efforts.

- **Research**

- Research studies targeting birds need to be long-term and large-scale, replicated studies that have controlled experimental approaches and focus on population demographics and the response of species to habitat manipulations where appropriate as outlined by the National Partners in Flight Research working group (Donovan *et al.* 2002).
- Similar research priorities are needed for other oak/mixed hardwoods forest taxa including bats, small mammals, amphibians and reptiles.

Population demographics

- Conduct long-term life history studies for many birds, bats, small mammals, amphibians and reptiles, starting with those of highest conservation priority (Yates *et al.* 1997, Holmes and Sherry 2001, Ellis *et al.* 2002, Osbourne and Anderson 2002, Taylor and Jones 2002).

Predator effects

- Study predator effects on nest productivity (especially for shrub and ground nesters) via nest search and spot mapping studies.
- Examine productivity of canopy and cavity nesting birds.

Habitat use

- Examine habitat use patterns on raptors and nightjars using telemetry (Mills 1986 and Lake *et al.* 2002).
- Determine how large scale floods affect reptile and amphibian populations.

Management practices

- Determine the effects of management to improve vegetative structure (canopy gaps, prescribed fire, etc.) on habitat use patterns of birds, small mammals, bats, amphibians and reptiles (Blake and Hoppes 1986, Lanham and Guynn 1998, Osbourne and Anderson 2002).

Supporting References

Bailey, M. A., J. N. Holmes, and K. A. Buhlmann. 2004. Habitat management guidelines for amphibians and reptiles of the southeastern United States (DRAFT). Partners in Amphibian and Reptile Conservation.

Blake, J.G. and W.G. Hoppes. 1986. Influence of resource abundance on use of tree-fall gaps by birds in an isolated woodlot. *The Auk* 103: 328-340.

Donovan, T.M., C.J. Beardmore, D.N. Bonter, J.D. Brawn, R.J. Cooper, J.A. Fitzgerald, R. Ford, S.A. Gauthreaux, T. L. George, W.C. Hunter, T.E. Martin, J. Price, K.V. Rosenberg, P.D. Vickery and T.B. Wigley. 2002. Priority research needs for the conservation of neotropical migrant landbirds. *Journal of Field Ornithology* 73(4): 329-339.

Ellis, A.M., L.L. Patton and S.B. Castleberry. 2002. Bat activity in upland and riparian habitats in the Georgia Piedmont. *Proc. Annu. Conf. Southeast. Assoc. Fish and Wildl. Agencies* 56: 210-218.

- Holmes, R.T. and T.W. Sherry. 2001. Thirty-year bird population trends in an unfragmented temperate deciduous forest: Importance of habitat change. *The Auk* 118(3): 589-609.
- Hunter, W. C., L. Peoples, and J. Collazo. 2001. Partners in Flight bird conservation plan for the South Atlantic Coastal Plain. American Bird Conservancy.
- Johns, M.E. 2004. North Carolina Bird Species Assessment. N.C. Partners in Flight.
- Lake, L.A., D.A. Buehler and A.E. Houston. 2002. Cooper's hawk non-breeding habitat use and home range in southwestern Tennessee. *Proc. Annu. Conf. Southeast. Fish and Wildl. Agencies*: 56: 229-238.
- Lanham, J.D. and Gwynn, Jr. D.C. 1998. Habitat-use relationships of shrub-scrub birds in South Carolina. *Proc. Annu. Conf. Southeast. Fish and Wildl. Agencies* 52:222-231.
- Mills, A.M. 1986. The influence of moonlight on the behavior of goatsuckers (Caprimulgidae). *The Auk* 103: 370-378.
- Osbourne, J.D. and J.T. Anderson. 2002. Small mammal response to coarse woody debris in the central Appalachians. *Proc. Annu. Conf. Southeast. Assoc. Fish and Wildl. Agencies* 56: 198-209.
- Pashley, D.N., C.J. Beardmore, J.A. Fitzgerald, R.P. Ford, W.C. Hunter, M.S. Morrison, K.V. Rosenberg. 2000. Partners in Flight: Conservation of the land birds of the United States. American Bird Conservancy, The Plains, VA.
- Rich, T.D., C.J. Beardmore, H. Berlanga, P.J. Blancher, M.S.W. Bradstreet, G.S. Butcher, D.W. Demarest, E.H. Dunn, W.C. Hunter, E.E. Inigo-Elias, J.A. Kennedy, A.M. Martell, A.O. Panajabi, D.N. Pashley, K.V. Rosenberg, C.M. Rustay, J.S. Wendt, T.C. Will. 2004. Partners in Flight North American landbird conservation plan. Cornell Lab of Ornithology. Ithaca, NY.
- Schafale, M. P., and A. S. Weakley. 1990. Classification of the natural communities of North Carolina, third approximation. N.C. Department of Environment and Natural Resources, Natural Heritage Program, Raleigh, NC.
- Taylor, J.D. and J.C. Jones. 2002. Quantifying amphibian richness in southeastern forests. *Proc. Annu. Conf. Southeast. Fish and Wildl. Agencies* 56:301-311.
- Yates, M.D., S.C. Loeb and D.C. Gwynn, Jr. 1997. The effect of habitat patch size on small mammal populations. *Proc. Annu. Conf. Southeast. Assoc. Fish and Wildl. Agencies* 51:501-510.