

degree of diversity in its aquatic species, due to the presence of three different river basins (Cape Fear, Neuse, and Roanoke) within its limits. The Cape Fear drainage includes the Haw River, Cane Creek, Morgan Creek, and New Hope Creek. The Neuse Drainage in Orange County is composed of the Little River, the Eno River, and the Eno tributaries Seven-mile Creek and Buckwater Branch. The Roanoke drainage, only a small portion in the northern part of the county, includes Hyco Creek and Lynch Creek.

Two geographic features in Orange County stand out against the background of typical Piedmont formations and both play a significant role in our local biogeography. The first of these are the monadnocks, which are hills capped with rock that is more resistant to erosion than the surrounding countryside. These monadnocks, such as Occonechee Mountain, project above the piedmont peneplain and are rare in the outer piedmont. Their flora and fauna often show distinctly montane affinities. The group of monadnocks nearest to Orange County are in the Uwharrie range, and their summits have a similar montane biota. Our monadnocks are smaller in area. This factor, along with the great distances separating our monadnock communities from their nearest neighbors, has resulted in a reduced diversity of species and a decreased likelihood of their replacement by dispersal if they were to be destroyed. While the habitat on Occonechee Mountain is the most unique and important, Orange County has a significant cluster of these isolated hills, including Blackwood, Bald, Pickards, McCauley, Crawfords, and Mitchells Mountains.

The second large geographic feature that is different from the normal landscape of the County is the Durham Triassic Basin. Located on the southeastern edge of the county, it is a unique part of our landscape with its low elevation and flat, swampy terrain. This is the only part of the county containing Piedmont Swamp Forests, and many of the animals found here are normally distributed in the Coastal Plain.

Other local features of biogeographic interest include restricted soil formations, north-facing slopes, vernal pools, and springs. Each of these possess biotic communities that are equally restricted and often widely separated from related communities by miles of inhospitable terrain.

Steep north-facing slopes occur especially along the margins of the Triassic Basin, due to the sharp drop in elevation and consequent increased stream-cutting. Three of our streams enter the Triassic Basin near the county's eastern border: the Morgan Creek Canyon downstream of US 15-501; New Hope Creek, in the Korstian Division of Duke Forest; and the Eno River in Eno River State Park.

Another feature associated with the Triassic Basin are diabase dikes. These dikes are linear areas of igneous rock that form along fault lines of the Basin. The rock weathers to a circumneutral soil, different in chemistry and texture than the normal acidic Piedmont soils. These diabase areas provide

habitat for a unique natural community. While such geologic formations are found mostly in neighboring Durham and Granville Counties, several exposures of diabase occur near our eastern border. Recent urban development has disturbed most of these habitats.

The presence of several of the more unique communities in Orange County can only be explained by natural climatic events approximately 10,000 years ago, during the Pleistocene glaciation. The Pleistocene created cooler conditions in the Piedmont, and consequently the vegetation of the region was more like that which is today found in the mountains. As the climate warmed, elements of these montane communities remained on the cooler, steep, north-facing slopes, many of which are found along the margin of the Triassic Basin where the streams have cut deeply. These areas now harbor remnant, relictual communities which are quite rare in the Piedmont. Since the glacial events responsible for this phenomenon occur on a time scale of thousands of years, the natural communities generated by these forces should be seen as irreplaceable.

Landscape manipulations by humans have had a tremendous impact on the natural communities of our area. The cutting of much of the eastern deciduous forest and draining of wetlands removed an unknown number of plant species from local areas. Destruction of some of the larger animal species is better documented. The Carolina Parakeet, Passenger Pigeon, and Ivory-billed Woodpecker are now extinct. Extirpation, or local extinction, of large carnivores removed the wolf, mountain lion, and bear from this area. Larger game species such as the woodland bison and elk are no longer found here, though white-tailed deer, turkey and beaver, once extirpated, have now been re-introduced.

Local extirpations are still occurring due to habitat manipulation by humans. Smooth coneflower and wild blue indigo once grew on the diabase soils near the Durham and Orange County line near US 15-501. The Cane Creek Reservoir has inundated the county's only population of atlantic isopyrum. The proposed Sevenmile Creek Reservoir would remove the only population of blue cohosh from the county.

Orange County has a more than two hundred year history of agriculture. In the northern portion of the county, where the topography is more gently rolling, agriculture and associated irrigation impoundments are most extensive. In the southwest quadrant of the county, large numbers of dairy farms add to this agricultural landscape. In the southeast quadrant, many farms were abandoned in the post-Depression era and large portions of that land reverted to woodland. Today, however, this corner of the county is undergoing exceptionally rapid urban and suburban development. Many of the most scenic features here, including hilltops and sites along streams, were relatively little disturbed during the previous era of agriculture, since they are not arable farmland. Today, the hilltop forest, the forests

along streamside slopes, and the upper edges of stream bluffs are highly sought as homesites.

When these sites are developed, the effect on the natural landscape can exceed the boundary of the residential clearing. Openings introduce new light and temperature regimes, and forest interior species face increased competition from species of openings and forest edges. Predation by domestic animals increases pressure on native animal populations, and expanded road networks allow for higher mortality by automobiles.

Such residential development also increases the distribution of exotic species which compete with the native plants and animals. Japanese honeysuckle, periwinkle, and English ivy commonly invade the forest near homesites, and the introduced microstegium grass has replaced native bottomland grasses in many areas of the Piedmont. Introduced animals such as starlings compete with other native birds for nesting cavities, while in our streams, introduced carp compete with native bottom feeders. Increased siltation loads in streams may also result in the elimination of mussel and fish species.

## Animal Life

Compared to plants, there are relatively few animals that exist in highly isolated, numerically small populations. Animals generally need more space than plants and for the most part lack the option to reproduce asexually that allows clonal populations of plants to persist in one spot for decades or even centuries. Moreover, the greater individual mobility of animals permits them to maintain contacts between populations over greater distances than is usual among plants. These differences, however, do not mean that animals are generally less "rare" than plants or that they deserve less attention in conservation efforts. Quite the contrary: these very features of animals often make them more vulnerable to habitat fragmentation or other human-caused disturbance than is true for even some of the rarest plants. Somewhat different criteria must be used, therefore, in evaluating the status of animal populations within the county, as will be discussed in this section; different preservation strategies may also be called for, as will be described in the section on wildlife habitats.

There are, in fact, a few isolated or rare populations of animals comparable to those found among plants; they generally occur among the least mobile or most habitat-specific groups. While there are no species that are confined solely to Orange County and few that are endemic even to the Piedmont, there are several aquatic animals that are found primarily in North Carolina and nowhere else on earth. All these species are state-listed as threatened or of special concern (see Table 3), mainly due to the restricted nature of their distributions.

The Neuse River Waterdog (Necturus lewisi) is probably the most generally restricted animal that occurs within the county. It is found only within the Neuse and Tar river systems of North Carolina and reaches its westernmost limit in the Eno River within Orange County (Braswell and Aston, 1985). Another species with a similar state-distribution and status is the Carolina Madtom (Noturus furiosus), but this fish has yet to be documented upstream from the confluence of the Eno and the Little Rivers, just east of the Orange County line (Lee et al, 1980).

Two other species of fish possessing slightly wider distributions are the Roanoke Bass (Ambloplites cavifrons), which occurs in the Neuse, Tar and Roanoke drainages, and the Carolina Darter (Etheostoma collis), which is found above the Fall Line from the Pee Dee River system north to the Roanoke drainage (Lee et al, 1980). One Orange County population of this darter is especially noteworthy: the only known location for this species in the Cape Fear Basin is at the site of the Cane Creek Reservoir (NC Natural Heritage Program). This species is listed as special concern within the state, but this particular population should be considered threatened or even endangered.

All four of these vertebrate species are adversely affected by the construction of impoundments, reduced stream flow, and

pollution, but perhaps even more threatened by these disturbances are various species of fresh-water mussels. Even though they have less restricted ranges nationally, several of the species occurring in the county are listed as threatened or even endangered within North Carolina. The rarest of these, the ancient floater (Alasmodonta heterodon), may in fact be already extirpated from the entire state. A recent search by Shelley (1987) failed to relocate the Eno population described by Walter (1956) from the vicinity of Hillsborough, the southern limit of this species' distribution along the Atlantic Slope, and we did not have any better luck finding it at our several sites along the Eno. We also failed to locate any of the threatened Atlantic pigtoe (Fusconaia masoni) reported from the Eno, but this species probably still exists within the region (Shelley, 1987).

The other endangered species of mussel occurring within the county, the Savannah shore mussel (Carunculina pulla), seems to be holding its own. A thriving population still exists in University Lake (sites M04 and M05), the only large concentration known for the state, and is likely to persist unless the lake is drained for dam repairs or dredged to increase its capacity. Also seemingly safe for the moment is the notched rainbow (Villosa constricta), a species of special concern for which we added three new sites within the county (E03, E04, and C03). At none of these sites was this species common, however, and two of the populations seem particularly precarious: the site at Sevenmile Creek (E03) has been proposed as a county reservoir and the one at Cane Creek (C03) is located just downstream from the new reservoir and could be affected by both sedimentation during the construction or reduced stream flow following the completion of the project.

While most terrestrial animals in our region are not quite so restricted in terms of their statewide distributions as the aquatic species just mentioned, there are still a number of regionally-rare land animals plus a few state-listed species (again, see Table 3) that have very narrow habitat tolerances and are consequently vulnerable to local extirpation. Again, most of these are small animals with very limited powers of mobility.

As is the case with our rarest plant species, several of our most localized animals appear to be montane or northern disjuncts, existing in our area far from their main areas of distribution. As mentioned in the section on Biogeography, they probably represent relictual populations left over from the cooler times of the Pleistocene when their communities were widespread; they hold out now only in small groups along cool, moist, north-facing bluffs in close association with rhododendrons and other cool-mesic plant species.

Probably the best known of these animals is the red-backed salamander (Plethodon cinereus), one of the widest-ranging of northern salamanders but a species that exists in our area on the very southern edge of its range. In Orange County it has been found only in two widely separated rhododendron communities: along

Morgan Creek (M12 and M14) and along the Eno (E17).

Less well-documented are two invertebrates that appear to share the red-back's habitat preferences. A large and colorful species of velvet mite (Allothrombium sp.), which we are calling the sumo mite due to the wrestling tournaments held among males, is likewise a member of a genus that occurs throughout the northern hemisphere (Moss, 1960) but in our area appears to be restricted to rhododendron or mountain laurel bluffs. A large land snail of the genus Mesomphix also belongs to a group whose main distribution is in cooler regions. This genus is highly diversified in the Southern Appalachians where many endemic species exist, but it generally is absent this far to the east (Hubricht, 1985). Although we are uncertain as to exact identity of this species, it nonetheless is probably the rarest of the montane animal species occurring in the county; we have found it only at one site, the Mason Farm Rhododendron Bluff (M14). Unfortunately, this population is seriously endangered by the proposed Laurel Hill Parkway, which, although missing the rhododendrons found on this bluff, will demolish much of the remaining north-facing slope inhabited by this snail as well as the red-backed salamander and sumo mite.

In addition to these small, slow-moving ground-dwellers, there are several, more motile animals that appear to be disjuncts from the mountains. The brown elfin butterfly (Incisalia augustus) is another animal known from just one site within Orange County, the summit of Occoneechee Mountain (E06). Its main limitation appears to be the distribution of extensive heath thickets, which are food source for its larvae. Although this is another species that has a wide range in the mountains and north, in the Piedmont it is only known from the pine-oak-heath communities found on the tops of monadnocks; in addition to Occoneechee, it has been reported only for the Uwharries (Opler and Krizec, 1984) and the Sauratown Mountains (Jeff Nekola, pers. comm.). Slightly more common -- known from two sites within the county (M16 and E11) -- the pepper-and-salt skipper (Amblyscirtes hegon) has likewise been rarely observed this far to the southeast (Opler and Krizec, 1984). Its habitat requirements here in the Piedmont are unknown.

Other species more typical of the mountains than the Piedmont but which should not be thought of as true disjuncts include such species as the cedar waxwing (Bombycilla cedrorum), worm-eating warbler (Helmitheros vermivorus), broad-winged hawk (Buteo platypterus), and sharp-shinned hawk (Accipiter striatus). All nest sparingly in the Outer Piedmont (all but the worm-eating warbler were recorded in Orange County during the breeding season in 1988), but none can be considered long-term residents at any particular locality as can the true relict species mentioned above. They are good indicators of mature forest habitats, nonetheless.

At the opposite extreme from the montane-like habitats are the swamps and lowlands typical of the Coastal Plain. Within the

Piedmont as a whole, these habitats are possibly even scarcer than cool-mesic sites, but the most numerous group of regionally-rare animals occurring within Orange County occupies just these sorts of environments (see Table 4). Their presence here is due to the low-lying swamplands of the Triassic Basin, cutting across the southeast corner of the county.

Even though many populations of this category of animals are quite large compared to the montane relicts and may, in fact, be continuous with populations in the Coastal Plain (the separation between the Coastal Plain and Triassic Basin is very narrow in Chatham County), Orange County nonetheless appears to possess a more thriving community of these organisms than occurs elsewhere in the Piedmont. Many of these species have indeed been seldom, if ever, recorded above the Fall Line. Like the montane species, they deserve special consideration within the region even if they cannot be considered threatened statewide.

Two other bottomland animals, however, do merit additional attention. The four-toed salamander (Hemidactylium scutatum) and Thorey's grayback dragonfly (Tachopteryx thoreyi) are both state-listed species that require certain kinds of springs or bogs for breeding and have only incompletely known distributions within the Southeast.

The dragonfly, in particular, is considered rare to uncommon throughout its range within the eastern deciduous forest, and is one of the last of a line of dragonflies that was dominant during the times of the dinosaurs (only two species in this family still remain within the United States). Today it holds on only through avoiding competition with more modern dragonflies by occupying a marginal, semi-terrestrial niche at the upper edges of springs, a habitat where the normally aquatic larvae of dragonflies cannot exist (Dunkle, 1981).

The four-toed salamander likewise appears to be marginal, at least within our area; it was first discovered within the state only in the 1940's, at a site within Duke Forest (Gray, 1941). Unlike the dragonfly, however, it is fairly common in the North and its widely scattered populations in the South may represent Pleistocene relicts like those of the red-backed salamander (Means, 1978).

On the other hand, both of these animals are highly inconspicuous and perhaps not as rare as previously thought (see Braswell and Murdoch, 1979, for recent range extensions for Hemidactylium). We ourselves found seven new sites for the salamander in Orange County (two thanks to Jim Petranks) and eight for the dragonfly. Nonetheless, the kinds of habitats these species prefer are quite fragile and easily disrupted by sewer line construction, lowered watertables due to increased well use, or stream channelization for flood control. One site along Bolin Creek (B01) where the salamander was previously known to occur (Stenhouse, 1984) was, in fact, destroyed in 1987 by the construction of a sewer line. These species are definitely not

sufficiently common that we can afford to lose their populations needlessly.

The same is true for a number of species that we take for granted due to their widespread occurrence within the eastern deciduous forest. In addition to the animals that are uncommon due to the narrowness of their habitat requirements, there are a number of other species -- perhaps the majority of our native animals -- that are becoming increasingly scarce due to human-caused disruptions of their habitat or to direct persecution by man. This applies not only to the wolves, bears, mountain lions, and rattlesnakes which we have actively exterminated from the county (and most of the eastern United States), but other carnivores or game species, such as bobcat, otter, mink, or wild turkey, which need large areas of wildlands either for their own hunting or to avoid being overhunted by man. It also includes such species as cooper's and sharp-shinned hawks, shrikes, and kestrels, all of which may have declined in our region due to pesticide poisoning, and even such inoffensive animals as kentucky warblers, ovenbirds or box turtles, which are adversely affected by roads penetrating their forest environments or predation by our domestic cats and dogs.

Table 4 presents a list of species that characteristically inhabit the interiors of forests or require large tracts of undisturbed land for their existence; conversely, this is a list of animals that are most sensitive to forest fragmentation or the inroads of urbanization. Finding healthy populations of bobcat, wild turkeys, or pileated woodpeckers is one of the best indications of the relative lack of disturbance of a "natural" area. On the negative side, the absence of species such as ovenbirds, hooded warblers, or hognose snakes indicates that the site has lost most of its wild qualities, even if large trees or other unusual plant species remain. As mentioned at the outset of this section, for conservation of our natural areas and their animal populations to be effective, we need to be aware of the habitat requirements not only of the species that are rare now, but those that may become so if we simply take our natural heritage for granted.

**Table 3. Significant Animal Species of Orange County**  
 Page 1 of 2.

Endangered:

Accipiter cooperi  
 Alasmodonta heterodon  
 Carunculina pulla

Cooper's Hawk  
 Ancient Floater  
 Savannah Shore mussel

Threatened:

Accipiter striatus  
 Aimophila aestivalis  
 Coragyps atratus  
 Fusconaia masoni  
 Lanius ludovicianus

Sharp-shinned Hawk  
 Bachman's Sparrow  
 Black Vulture  
 Atlantic Pigtoe Mussel  
 Loggerhead Shrike

Special concern:

Ambloplites cavifrons  
 Etheostoma collis  
 Necturus lewisi  
 Tachopteryx thoreyi  
 Villosa constricta

Roanoke Bass  
 Carolina Darter  
 Neuse River Waterdog  
 Thorey's Grayback Dragonfly  
 Notched Rainbow Mussel

Unknown distribution:

Hemidactylium scutatum

Four-toed Salamander

Regionally rare:

Acantharcus pomotis  
 Allothrombium sp.  
 Amblyscirtes hegon  
 Amia calva  
 Ammodramus savannarum  
 Anolis carolinensis  
 Bombycilla cedrorum  
 Buteo lineatus  
 Buteo platypterus  
 Centrarchus macropterus  
 Chlosyne nycteis  
 Chrysemys floridana  
 Chrysemys scripta scripta  
 Crotalus horridus  
 Dendroica petechia  
 Elaphe guttata  
 Enneacanthus gloriosus  
 Enneacanthus obesus  
 Erynnis brizo  
 Etheostoma fusiforme  
 Etheostoma serriferum

Mud Sunfish  
 Sumo Mite  
 Pepper-and-salt Skipper  
 Bowfin  
 Grasshopper Sparrow  
 Carolina Anole  
 Cedar Waxwing  
 Red-shouldered Hawk  
 Broad-winged Hawk  
 Flier Sunfish  
 Silvery Checkerspot  
 Florida Cooter  
 Yellowbellied Slider  
 Timber Rattlesnake  
 Yellow Warbler  
 Corn Snake  
 Blue-spotted Sunfish  
 Banded Sunfish  
 Sleepy Duskywing  
 Swamp Darter  
 Saw-cheeked Darter

**Table 3. Significant Animal Species of Orange County**  
**Page 2 of 2.**

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<i>Eumeces inexpectatus</i>	Southeastern Five-lined Skink
<i>Eumeces laticeps</i>	Broad-headed Skink
<i>Falco sparverius</i>	Sparrow Hawk
<i>Helmitheros vermivorus</i>	Worm-eating Warbler
<i>Ictalurus brunneus</i>	Snail Bullhead
<i>Incisalia augustus</i>	Brown Elfin
<i>Incisalia henrici</i>	Henry's Elfin
<i>Incisalia nippon</i>	Eastern Pine Elfin
<i>Limnodynastes swainsonii</i>	Swainson's Warbler
<i>Lutra canadensis</i>	River Otter
<i>Lynx rufus</i>	Bobcat
<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker
<i>Meleagris gallopavo</i>	Wild Turkey
<i>Mephitis mephitis</i>	Striped Skunk
<i>Mesomphix</i> sp.	(land snail)
<i>Mniotilta varia</i>	Black-and-white Warbler
<i>Mustela frenata</i>	Long-tailed Weasel
<i>Mustela vison</i>	Mink
<i>Necturus punctatus</i>	Dwarf Waterdog
<i>Nerodia erythrogaster</i>	Red-bellied Watersnake
<i>Plethodon cinereus</i>	Red-backed Salamander
<i>Pontia protodice</i>	Checkered White Butterfly
<i>Protonotaria citrea</i>	Prothonotary Warbler
<i>Scaphiopus holbrooki</i>	Eastern Spadefoot Toad
<i>Setophaga ruticilla</i>	American Redstart
<i>Sylvalagus palustris</i>	Marsh Rabbit
<i>Tantilla coronata</i>	Southeastern Crowned Snake
<i>Tyto alba</i>	Barn Owl
<i>Vanessa cardui</i>	Painted Lady Butterfly

**Table 4. Animal Species Indicative of Special Habitats**  
**Page 1 of 2.**

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**I. Species restricted to the Triassic Basin:**

<i>Setophaga ruticilla</i>	American Redstart
<i>Protonotaria citrea</i>	Prothonotary Warbler
<i>Limnothlypis swainsonii</i>	Swainson's Warbler
<i>Sylvalagus palustris</i>	Marsh Rabbit
<i>Chrysemys scripta scripta</i>	Yellow-bellied Slider
<i>Anolis carolinensis</i>	Carolina Anole
<i>Elaphe guttata</i>	Corn Snake
<i>Nerodia erythrogaster</i>	Red-bellied Watersnake
<i>Necturus punctatus</i>	Dwarf Waterdog
<i>Amia calva</i>	Bowfin
<i>Ictalurus brunneus</i>	Snail Bullhead
<i>Acantharcus pomotis</i>	Mud Sunfish
<i>Centrarchus macropterus</i>	Flier Sunfish
<i>Enneacanthus gloriosus</i>	Blue-spotted Sunfish
<i>Enneacanthus obesus</i>	Banded Sunfish
<i>Etheostoma fusiforme</i>	Swamp Darter
<i>Etheostoma serriferum</i>	Saw-cheeked Darter

**II. Species typical of montane habitats:**

<i>Bombycilla cedrorum</i>	Cedar Waxwing
<i>Helmitheros vermivorus</i>	Worm-eating Warbler
<i>Plethodon cinereus</i>	Red-backed Salamander
<i>Incisalia augustus</i>	Brown Elfin
<i>Erynnis brizo</i>	Sleepy Duskywing
<i>Amblyscirtes hegon</i>	Pepper-and-salt Skipper
<i>Allothrombium</i> sp.	Sumo Mite
<i>Mesomphix</i> sp.	Land Snail

**III. Species dwelling in the interior of hardwood forests:**

<i>Coccyzus erythrophthalmus</i>	Yellow-billed Cuckoo
<i>Caprimulgus vociferus</i>	Whip-poor-will
<i>Mniotilta varia</i>	Black-and-white Warbler
<i>Seiurus aurocapillus</i>	Ovenbird
<i>Oporornis formosus</i>	Kentucky Warbler
<i>Wilsonia citrina</i>	Hooded Warbler
<i>Piranga olivacea</i>	Scarlet Tanager
<i>Terrapene carolina</i>	Eastern Box Turtle
<i>Sphodros</i> spp.	Purse-web Spiders

**Table 4. Animal Species Indicative of Special Habitats**  
 Page 2 of 2.

IV. Species characteristic of bottomlands and riparian forests:

Aix sponsa	Wood Duck
Buteo lineatus	Red-shouldered Hawk
Strix varia	Barred Owl
Scolopax minor	Woodcock
Megaceryle alcyon	Kingfisher
Empidonax virescens	Acadian Flycatcher
Parula americana	Northern Parula Warbler
Dendroica dominica	Yellow-throated Warbler
Seiurus motacilla	Louisiana Waterthrush
Sorex longirostris	Southeastern Shrew
Mustela vison	Mink
Lutra canadensis	River Otter
Ambystoma maculatum	Spotted Salamander
Eurytides marcellus	Zebra Swallowtail
Asterocampa celtis	Hackberry Butterfly
Asterocampa clyton	Tawny Emperor
Ummidia audouini	Trap-door Spider
Ummidia carabivorous	Trap-door Spider
Myrmekiaphila fluviatilis	Trap-door Spider

V. Species inhabiting springs and seeps:

Pseudotriton montanus	Mud Salamander
Pseudotriton ruber	Red Salamander
Hemidactylium scutatum	Four-toed Salamander
Tachopteryx thoreyi	Thorey's Grayback Dragonfly

VI. Species requiring large tracts of undeveloped lands:

Buteo platypterus	Broad-winged Hawk
Buteo jamaicensis	Red-tailed Hawk
Accipiter cooperi	Coopers Hawk
Accipiter striatus	Sharp-shinned Hawk
Meleagris gallopavo	Wild Turkey
Strix varia	Barred Owl
Picoides villosus	Hairy Woodpecker
Dryocopus pileatus	Pileated Woodpecker
Sitta carolinensis	White-breasted Nuthatch
Urocyon cinereoargenteus	Gray Fox
Mustela frenata	Long-tailed Weasel
Mustela vison	Mink
Lutra canadensis	River Otter
Lynx rufus	Bobcat
Crotalus horridus	Timber Rattlesnake

## **Discussion of Significance and Ranking**

Each natural area in this report is given a ranking of overall Significance, Integrity, and Threat Status.

A. The **Significance** ranking reflects the presence of an important biological or geomorphic element of the site and the rarity of that element. We have designated five levels of Significance: 1 - State; 2 - Regional; 3 - County High; 4 - County Medium; and 5 - County General.

1. **State significance.** The sites of State significance have been recognized by the North Carolina Natural Heritage Program as natural areas which possess outstanding natural features such as a very rare plant or animal, or one of the best examples of a community type or geomorphic feature in the state. For example, Mason Farm Southern Shagbark Hickory Forest (M16) contains the largest known population of mature southern shagbark hickories in the state. Three sites in Orange County have been given this designation.

2. **Regional significance.** Sites of regional significance possess outstanding natural features or rare plant or animal species, and are one of the best examples of such a site in the eastern Piedmont, but not the best within the entire state. For example, the rhododendron communities are habitat for species that are very rare in the Piedmont region. Fourteen sites in Orange County are regionally significant.

3. **County High significance.** Sites of County High significance are the most significant sites within the county, although similar sites may occur in other counties in the state or region. It may or may not contain a rare plant or animal species, but is considered to be the best of its type in the county, based on uniqueness of the habitat within the county, or species diversity, or overall aesthetic appeal. Twenty-one sites in Orange County have been given this designation.

4. **County Medium significance.** Sites of County Medium significance are those sites which may or may not have a rare plant or animal species, but are an example of a habitat or community that is representative of the overall natural diversity of the county. Generally, but not always, there is a better example of such a natural area elsewhere in the county. Fifteen sites in Orange County have been given this designation.

5. **County General significance.** Sites of County General significance do not have any rare plant or animal species, but are good representatives of the natural diversity of the county. These are generally sites of large aesthetic appeal, or, because of their location near population centers, have extra value because of their natural condition in close proximity to an urban or suburban setting. Eleven sites in Orange County have been

given this designation.

B. The **Integrity** ranking is a measure of the quality of the biological features of the site. It incorporates the size and vigor of populations of the significant elements, the level of present disturbance of the natural area, and the size of the natural area, which is a measure of expected long term viability of biological elements at the site.

We have assigned five numerical categories of Integrity:

- 1 = Prime. The forest or other vegetation at the site is relatively mature. No paved roads transect the natural area (or there is a large distance between such roads).
- 2 = Very Good. The forest or other vegetation at the site is relatively mature. However, the natural area has intrusions such as roads, powerlines, sewerlines, or residential clearings.
- 3 = Good. The forest or other vegetation at this site is relatively mature. However, the size of the natural area is small, and it is surrounded by development.
- 4 = Moderately Good. The forest or other vegetation has been recently disturbed in some places.
- 5 = Fair. The forest or other vegetation has been disturbed but shows evidence of recovery.

C. The **Threat** Status is an assessment of threats to a site which would affect the site's aesthetics or biological viability. Threat status is changing, and some threats are potential while some are immediate. For example, a site on a scenic knoll has a high potential threat for residential development, while a site that has been suggested as the location for a reservoir has a high immediate threat. This is a variable assessment, based on the authors' familiarity with land use patterns in the county. In this survey we did not undertake a rigorous enumeration of threats to these natural areas.

We have assigned five numerical categories of Threat Status:

- 1 = Extreme. The possibility exists for high impact development, clearcutting, flooding, or dense residential development.
- 2 = Strong. There is a possibility for low impact development, such as diffuse residential building.
- 3 = Moderate. The possibility exists for point impact, such as bridges, roads, sewerlines, or powerlines.
- 4 = Slight. The site is undeveloped, but is managed as a

multiple use tract, thus not immune to future threats.

5 = Negligible. The site is presently managed as a natural area.

For state-listed rare species of plants and animals, there are several levels of status that are used in this report. In descending order of rarity they are:

- 1) Endangered; or 2) Threatened: These are legally protected species that may disappear from the state if not protected.
- 3) Primary Proposed; or 4) Significantly Rare: These species are not legally protected, but they may become Endangered or threatened in the future.
- 5) Regionally Rare: These are species that the authors of this report, in conjunction with local biologists, have determined to be rare in the Triangle or Piedmont area because of unique habitat requirements.

**Table 5. List of Sites and their Significance.**

Significance Levels: 1 = State; 2 = Regional;  
3 = County High; 4 = County Medium; 5 = County  
General. See text for discussion of ranking.

\* Three large natural areas, each of which contain several sites described in this report, have been determined to have **State** significance because of their large size and the diversity of Piedmont habitats within their jurisdictional boundaries. These areas are:

- a) Eno River State Park (Sites E11, E12, E13, E14, E15)
- b) Duke Forest Korstian Division along New Hope Creek (Sites N13, N14, N15, N16, N18)
- c) Mason Farm Biological Reserve/NC Botanical Garden lands (Sites M11, M12, M14, M15, M16, M17, M18)

Site #	Site Name	Significance	
		Level	Features
Bolin Creek Sites:			
B01	Bolin Creek	5	Mature hardwood forest
B02	Battle Park	5	Mature hardwood forest, rare plant
C03	Cedar Terrace Bottoms	4	Swamp forest, rare dragonfly
Cane Creek Sites:			
C01	Cane Creek Reservoir	4	Mature hardwood forest, wildlife habitat
C02	Haw River Alluvial Terrace	4	Floodplain levee forest
C03	Lower Cane Creek Slopes and Bottom	3	Mature forest, rare mollusk, otter, nesting black vultures

## Eno River Sites:

E01	Camp Chestnut Ridge	5	Mature chestnut oak forest
E02	Crabtree Creek Monadnock Ridge	5	Upland wildlife reservoir
E03	Sevenmile Creek Sugar Maple Bottoms	2	Mature forest, rare plants
E04	Eno River Duke Forest Mesic Slopes	4	Rich hardwood forest, excellent wildflowers, rare aquatic animals
E05	Occoneechee Mesic Slopes	1	Numerous rare plants
E06	Occoneechee Dry Slopes and Summit	2	Pine-heath-bracken community, rare butterflies, mature chestnut oak forest
E07	Cates Creek Montmorillonite Forest	5	Bottomland forest
E08	Poplar Ridge Slopes and Bottom	3	Rare animals, extensive bottomland forest
E09	Eno River Rich Mesic Slopes	3	Rare plants
E10	Eno River Uplands and Vernal Pools	3	Upland hardwood forest, upland depressions
E11	ERSP Buckwater Branch Hardwood Slope	3	Mature post oak forest, extensive bottomland
E12	ERSP Cox's Mountain	3	Rare plants, rare dragonfly
E13	ERSP Cates Ford	3	Rare aquatic animals

E14	ERSP Mountain Spleenwort & Rhododendron Bluff	2	Rare plants, rare salamander
E15	ERSP Cabellands and Rhododendron Slope	2	Rare plants, rare animals
E16	Stony Creek Four-Toed Salamander Spring	3	Large spring, rare salamander, rare dragonfly

## Hyco Creek Sites:

H01	Allison Road Heartleaf Ravine	4	Rare plant
H02	Pentecost Road Nestronia Flat	3	Rare plants

## Little River Sites:

L01	South Fork Little River Marsh	3	Beaver pond and marsh
L02	Forrest Creek Beaver Pond	5	Beaver pond and marsh
L03	Jimmy Ed Road Heartleaf Flat	3	Rare plant
L04	Breeze Road Heartleaf Ravine	4	Rare plant

## Morgan Creek Sites:

M01	Pickards Mountain	3	Excellent chestnut oak forest
M02	Calvander Laurel Bluff and Bottom	4	Rare salamander
M03	McCauley Mountain	4	Mature upland forest
M04	University Lake Slopes	4	Rare plants, rare mollusk, mature forest

M05	University Lake Marsh	5	Marsh, good birdlife
M06	Berryhill Rhododendron Bluff	2	Rare plants, rhododendron bluff
M07	Stillhouse Bottom	3	Mature hardwood forest, excellent birdlife
M08	Stillhouse Bend Rhododendron Slope	2	Rhododendron slope
M09	Stillhouse Bend Glade	4	Rare fern
M10	Morgan Creek Anemone Glade	2	Rare plants
M11	Hunt Arboretum Rhododendron Bluff	2	Rhododendron bluff
M12	King's Mill Rhododendron Slope	2	Rhododendrons, rare salamander
M13	Laurel Hill Ridge and Vernal Pool	4	Large upland forest, rare plant
M14	Mason Farm Pond Rhododendron Bluff	2	Rhododendrons, rare plant, rare animal
M15	Mason Farm Hackberry Bottom	4	Large hackberry stand
M16	Mason Farm Southern Shagbark Hickory Forest	1	Rare forest type on diabase rock
M17	Big Oak Woods	1	Old growth swamp forest
M18	Morgan Creek Swamp	2	Swamp forest, rare animals

## New Hope Creek Sites:

N01	Bald Mountain Hardwood Slopes	4	Mature chestnut oak forest, nesting turkey vultures
N02	Bald Mountain Hardwood Depression	4	Upland depression
N03	Meadow Flats	2	Upland depression
N04	Eubanks Road Montmorillonite Forest	3	Montmorillonite Forest
N05	Blackwood Mountain	4	Mature upland forest
N06	Steepbottom Branch	5	Mature forest
N07	Currie Hill	3	Basic Forest on diabase rock
N08	Camp Pipsissewa	5	Mature bottomland forest
N09	New Hope Church Road Basic Forest	4	Forest on basic rock
N10	New Hope Chestnut Oak Forest	5	Chestnut oak forest
N11	Oosting Natural Area	3	Mature hardwood forest, rare animals
N12	Gate 24 Purseweb Spider Ravine	5	Mature forest, rare animals
N13	Wooden Bridge Bluffs	3	Rich hardwood forest, rare plant