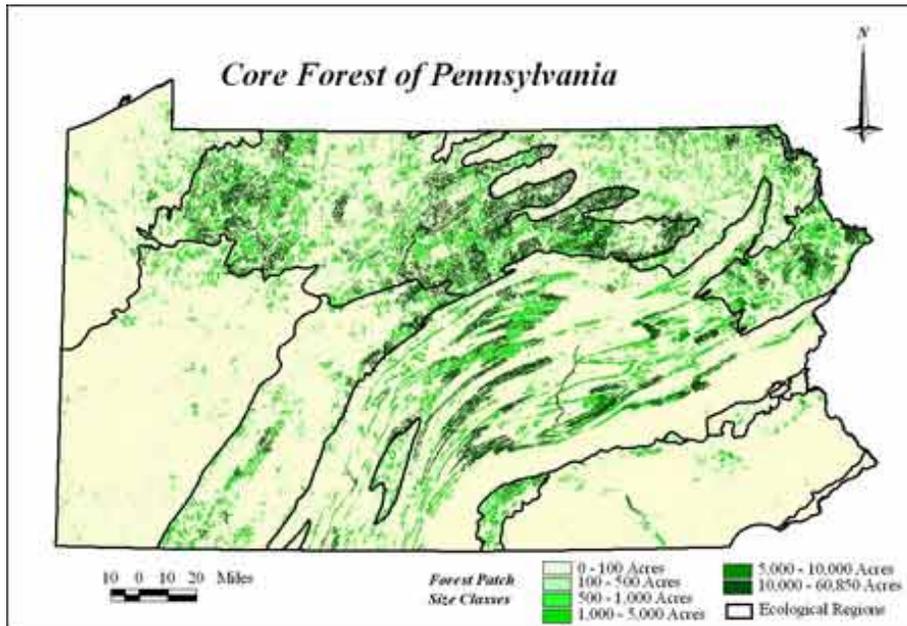




## Forest Wildlife Trends

Pennsylvania's forests fill a keystone role in conservation of forest wildlife within the northeastern United States (Rosenburg et al. 1995). Species that depend on large continuous forests can still find a place in Pennsylvania, although the quality of forest has declined in recent years (Figure 24). Forests are beset with challenges such as fragmentation, invasive non-native species, and lack of regeneration. Forest-interior nesting birds (e.g., worm-eating warbler, wood thrush, northern goshawk, barred owl) and large mammals such as the fisher, eastern wood rat, black bear and bobcat depend on large forest blocks for their prime habitat (Figure 24).



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**Figure 24. Core Forest of Pennsylvania showing the locations of contiguous blocks.**

Fragmentation of forests can occur in two manners. Forests that are cut into small patches by development or agriculture are one method of fragmentation. Another aspect of fragmentation is the cutting of roads, pipelines, or developments into large forested areas. Even timber cutting or food plots for wildlife can be a form of fragmenting the forest. The degree of fragmentation varies among these processes or activities (Yahner 1998). Most researchers suggest that the overall proportion of forest cover in a local region is a key wildlife habitat component (e.g., percent forest cover in one square mile). The size of an opening in the forest and the proportion of opening or forest edges to contiguous forest is critical in how this habitat change impacts wildlife. Although further research is needed to determine how different species respond to different levels of forest removal or development.

Of the forest mammals, Allegheny wood-rats have reduced their range in the state since the 1970s', however black bear and bobcat populations appear to have increased in recent years (PGC data). Wild turkey

Edward G. Rendell, Governor  
Michael DiBerardinis,  
Secretary

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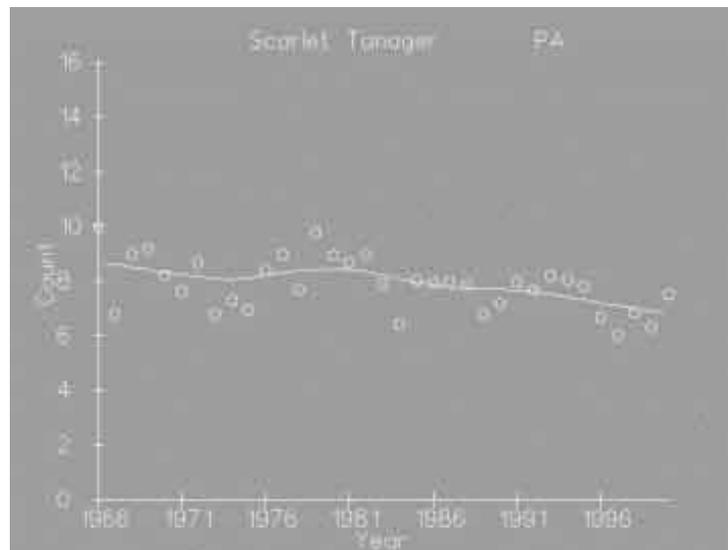
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populations have increased since 1990 from 6.8 per 1000 km surveyed to 18.2 per 1000 km in Turkey Management Areas (PGC unpubl. data; Figure 19).

Although forest area has increased in the past century, recent incursions of human development into Pennsylvania's forest are decreasing the potential area for area-sensitive species, such as the wood thrush. And, even when the species are present their reproductive success may be significantly reduced leading to population decline. Some forest species that are sensitive to fragmentation continue to decline across the state. The wood thrush and eastern wood peewee were both estimated to decline on the BBS from 1990 to 2000 at rate of 3% per year. The scarlet tanager is declining across the state at a rate of 1% per year. The cause of these declines is unclear, but perhaps the diminished forest quality is impacting these species more than others.

The majority of Pennsylvania's forests are privately owned. Parcelization, the process of large forested land holdings being segmented into smaller parcels owned by more and more people, has been occurring throughout Pennsylvania. A forest tract changes ownership every seven years on average, presenting a challenge for long-term forest planning (Palone, pers. comm.).

**Figure 25. Trends in Pennsylvania scarlet tanager and wood thrush populations (BBS data; Sauer et al. 2000).**



Forest age distribution is limited because most of Pennsylvania's forest has regenerated from being cut at nearly the same time a century ago. Older forest and younger (less than 40 years) forest are not as widely distributed and consequently the wildlife relying on these habitats are less abundant. Range contraction has been observed for northern flying squirrel, a species of older conifer forests (Mahan et al 1999). Decline in species needing young forest habitats or shrub thickets and orchards such as golden-winged warbler, eastern towhee, and woodcock have been documented regionally, in part due to habitat succession, however woodcock mostly suffer from loss of brushy thickets in open or wetland areas. Ruffed grouse populations do not appear to be declining across the state, although their local abundance

increases in younger forest (Figure 17b).

For forest birds, Pennsylvania is one of the most important states in the northeastern region in supporting large populations of forest species, including some that are undergoing region-wide declines (Rosenberg et al. 1995). Eleven percent of PA woodland nesting birds show significant declines since 1980 while 34% are increasing. Six forest species that show significant declines in Pennsylvania since 1980 according to USFWS Breeding Bird Survey data include some common forest species such as the wood thrush, scarlet tanager, black-billed cuckoo, yellow-billed cuckoo, eastern wood pewee, and great crested flycatcher (Sauer et al. 2000) (Figure 25). All are forest-interior species that tend to reach highest abundance and nest most successfully away from openings and in larger forest patches.

One example of a declining species is the scarlet tanager. It ranges throughout much of the eastern United States in mature hardwood and mixed deciduous forests. However, biologists estimate that 17% of all scarlet tanagers that exist today nest within Pennsylvania (Rosenberg et al. 1995) giving Pennsylvania a high responsibility for conserving this woodland nester. Tanagers are declining at a rate of 1 % per year on Pennsylvania Breeding Bird Survey routes, 1966 to 2000 (Figure 25, Sauer et al. 2000).

Continuous forest cover or a cluster of large forest patches near each other is key to conservation of scarlet tanagers. Connectivity among forest blocks can be important in maintaining nesting forest birds. A 100 acre patch located over 10 miles from a large continuous forest is only 20% likely to have nesting tanagers. If we could isolate trends by region, we might discover that tanagers and other forest interior species are declining more severely in the southern half of the state where forest is highly fragmented and patchy in distribution (Figure 24, 26). Forest patches exceeding 1,000 acres are scarce in the southeast.

The wood thrush, another common Pennsylvania forest bird, also has its highest nesting success in forest patches over 100 acres in size (Hoover et al. 1995). Wood thrushes are declining at a rate of 1.8% per year in Pennsylvania since 1980. Because Pennsylvania harbors 8.5 percent of all wood thrushes, these declines are particularly unsettling (Figure 25) (Rosenberg et al. 1995). A species that relies on large forested blocks for successful breeding and reaches highest populations in large forested blocks is called a "forest-interior" species. Forest-interior birds have reduced nest success in small patches of forest and are found in lower abundance than would be predicted, e.g., they avoid small forests. Forest-interior species reach their highest diversity in areas of the state with abundant forest cover, including the north-central and northeastern regions (Figure 26). Where large blocks of forest occur, the Breeding Bird Atlas surveys showed high numbers of forest-interior species. In contrast, areas where core forest is lacking, such as the southeast, forest-interior species are found in lower numbers and smaller areas (Figure 24, 26).

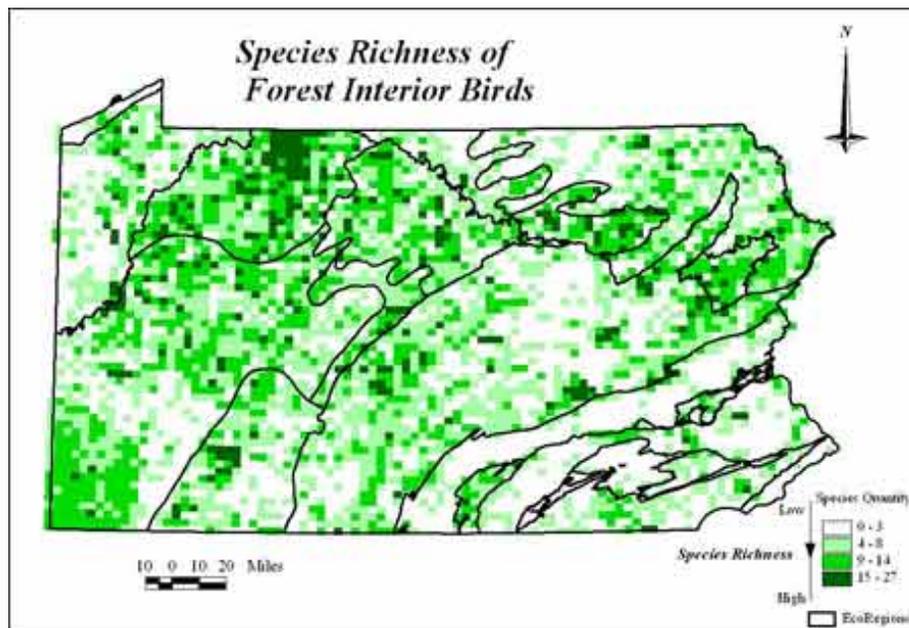
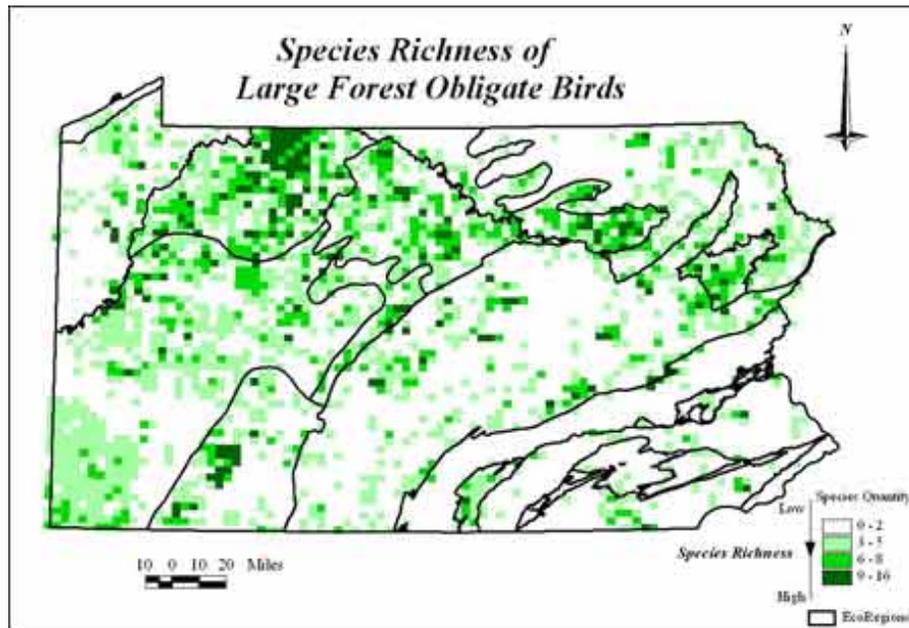


Figure 26. Distribution of forest-interior species state-wide, note concentrations in northern contiguous forests (cluster in southwest is artifact of special efforts)(from 1980s Breeding Bird Atlas) (Brauning 1992).

The bobcat is an example of a mammal that relies on large forest blocks or areas with a high proportion of forest cover (Whitaker and Hamilton 1998, Nielsen and Woolf 2002). Models of habitat suitability based on radio-collared bobcat in Illinois show core use areas were comprised of 61% forest cover and bobcat occurrence was best predicted by average patch size of forested areas (Nielsen and Woolf 2002). Fisher is also associated with a high proportion of forest cover (Serfass et al. 1994).

Using Breeding Bird Atlas data (Brauning 1992) we plotted the distribution of 20 species of birds that rely on large forested areas for nesting or 'large forest obligates' (e.g., northern goshawk, winter wren, black-and-white warbler, cerulean warbler) (Figure 27; list derived in part from Bishop 2000). Forest bird concentrations are apparent where core forest is in highest proportion (Figure 24) suggesting the association with habitat area is strong. Large forest obligate birds were generally lacking from the southeast and south-central regions of Pennsylvania, reflecting the overall severity of forest fragmentation through most of the southern part of the state.

Wood thrush nest in the under-story or shrub layer and as a result may be negatively impacted by the over-browsing by white-tailed deer or other factors that reduce regeneration in larger forests (deCalestra 1994; Hoover et al. 1995). Because they seek out thick shrubs for nesting, they may be enticed into nesting in suburban woodlots or in small forest patches generally, where nest success is very low (e.g., Hoover et al. 1995). These factors may be contributing to overall declines, particularly in the fragmented forests of southern Pennsylvania where habitat is already limited.



**Figure 27. Distribution of birds needing large forested blocks (from Breeding Bird Atlas, Brauning 1992). Cluster in southwest is partly due to enhanced effort in this area.)**

Pennsylvania also harbors a critical population of worm-eating warblers with 10% of their populations occurring in the state (Rosenberg et al 1995). Worm-eating warblers nest in large forests away from forest edges, reaching peak densities in forests exceeding 3000 acres, with healthy populations found only in forests over 1000 acres (Robbins et al 1989). Worm-eating warblers seek out thick under-story in a mature forest and may also be negatively affected by the reduced shrub or under-story layer observed today, although populations appear stable in Pennsylvania according to Breeding Bird Survey data (Sauer et al. 2000).



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