Integrating Management of Forest Interior Migratory Birds With Game in the Northeast

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Abstract — State wildlife agencies in the northeastern United States, and throughout the country, are funded primarily through hunting license revenues. As such, most efforts by state agencies are game oriented. To more effectively influence Neotropical migratory bird management within state wildlife agencies, integration of habitat management with that for game species is strongly recommended. In recent years there has been growing concern for Neotropical migratory birds that are forest interior breeders. Forest interior breeding birds are those species that need relatively large contiguous tracts of forest to support viable breeding populations. They are generally adversely effected by edge conditions. Habitat management for forest game species, particularity wild turkey, ruffed grouse, and American woodcock, is practiced by many northeastern state wildlife agencies. This paper discusses habitat management practices for turkey, grouse, and woodcock and its implications for forest interior breeding birds. Recommendations are given for integrating Neotropical migratory bird needs with management of these game species. Regional planning to accommodate both game and forest interior birds is recommended. Research on direct effects of game management on these Neotropical migrants is warranted.

There has been a prevailing dogma throughout the traditional wildlife profession that good game habitat management is good for nongame as well. Though this may be true for certain nongame species, it is not appropriate as a general rule. Temple (1986) noted out this philosophy is demonstrably naive and incorrect. In his land ethic essay, Leopold (1949) noted we are getting closer to having a land ethic when we admit that songbirds should continue as a matter of biotic right, regardless of presence or absence of economic advantages to us. He stressed the importance of managing the total wildlife community. Game and nongame managers should strive for this approach.

Community or ecosystem management, in lieu of featured species management, is increasing in application and should continue. However, featured species management, particularly of game species, is still widely practiced throughout the country. This approach, in some form or another, is the norm for most state wildlife agencies.

Though state wildlife agencies are usually legally responsible for all wildlife species, their funding base is primarily through hunting revenues. As a result, many habitat management practices employed by state wildlife agencies are game oriented. Appropriateness of this orientation can be argued a number of ways, but the reality is game management is a very high priority by state agencies and accounts for a significant amount of their efforts. In the northeastern U.S., which is the focus of this paper, the percentage of state wildlife agencies' budgets dedicated to nongame management ranges from 1 to 10%. This probably is representative of all state wildlife agencies nationwide.

To more effectively manage nongame species, such as Neotropical migratory birds, it is essential for state agencies to integrate this management with game management. I suggest

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ways of integrating management of forest interior breeding Neotropical migratory birds with game species in the Northeast as an example of this strategy.

Little research on direct effects of various game habitat management techniques on Neotropical migratory birds are available to aid in developing an integrated approach. In the Northeast, studies on effects of ruffed grouse (*Bonasa umbellus*) habitat management on songbirds (Euler and Thompson 1978; Yahner 1984, 1986, 1991; Yahner and Scott 1988; Yahner and Voytko 1989; Yahner et al. 1989) are the only published papers available reporting direct effects of forest game management. More research in this area is needed.

Though effects of game habitat management on songbirds has not been well documented, impacts of these practices relative to the overall problems facing Neotropical migrant populations is small. Game management is not the major environmental factor effecting these birds, but modifications to game habitat practices that can benefit Neotropical migratory birds will help the cause.

In this paper I discuss general requirements for forest interior breeding Neotropical migrants, predominately used habitat management practices for select forest game in the Northeast, and provide recommendations for integrating habitat management for both groups. Most of my recommendations are based on biological interpretation of the literature and not the result of direct research on this topic. This paper is intended to alert land managers to conflicts and possible resolutions of integrating forest interior breeding bird and game habitat management using the best information available today.

FOREST INTERIOR BREEDING BIRDS

In the Northeast, there is growing concern for Neotropical migratory birds that are forest breeders. Population declines of forest breeding Neotropical migrants have been well documented (e.g. Hall 1984, Johnston and Winings 1987, Holmes and Sherry 1988, Leck et al. 1988, Sauer and Droege 1992), with an accelerated decline noted in recent years (Robbins et al. 1989b).

Many of these species require large (>150 ha) contiguous tracts of forest for breeding. They are generally characterized as being (1) area sensitive, (2) ground nesters or nesting near the ground, (3) open cup nesters, and (4) single brooded with small clutch sizes (Robbins 1979, Whitcomb et al. 1981). Bushman and Therres (1988) summarized these species habitat requirements as needing large contiguous forest with a closed or partially opened canopy, moderate to dense understory, relatively mature trees, and a low level of disturbance during the breeding season. Of course, each species has its own unique habitat needs so the above generalizations must be viewed with this in mind. For example, some species nest in the canopy and not on the ground. Table 1 lists Neotropical migratory birds considered forest interior breeders in the Northeast. Though these species are considered forest interior specialists, they will breed in less than optimum conditions and will be found in other than forest interior. The important factor to keep in mind is that these species are area sensitive and that their population viability depends on large forested ecosystems.

Table 1. — Species of Neotropical migratory birds considered forest interior breeders in the northeastern United States. (Sources: DeGraaf and Rudis 1986, Brittingham 1989, Robbins et al. 1989a).

Species	Scientific Name
Whip-poor-will[1]	*Caprimulgus vociferus*
Yellow-bellied flycatcher[2]	*Empidonax flaviventris*
Acadian flycatcher	*Empidonax virescens*
Blue-gray gnatcatcher	*Polioptila caerulea*
Veery	*Catharus fuscescens*
Swainson's thrush[1]	*Catharus ustulatus*
Wood thrush[1]	*Hylocichla mustelina*
Yellow-throated vireo	*Vireo flavifrons*
Red-eyed vireo	*Vireo olivaceus*
Northern parula	*Parula americana*
Black-throated blue warbler	*Dendroica caerulescens*
Black-throated green warbler	*Dendroica virens*
Blackburnian warbler	*Dendroica fusca*
Yellow-throated warbler	*Dendroica dominica*
Cerulean warbler[1,3]	*Dendroica cerulea*
Black-and-white warbler[1]	*Mniotilta varia*
American redstart	*Setophaga ruticilla*
Prothonotary warbler	*Protonotaria citrea*
Worm-eating warbler	*Helmitheros vermivorus*
Swainson's warbler	*Limnothlypis swainsonii*
Ovenbird	*Seiurus aurocapillus*
Northern waterthrush	*Seiurus noveboracensis*
Louisiana waterthrush[2]	*Seiurus motacilla*
Kentucky warbler	*Oporornis formosus*
Hooded warbler	*Wilsonia citrina*
Canada warbler[2]	*Wilsonia canadensis*
Scarlet tanager	*Piranga olivacea*

[1] *Significant negative BBS trend for 1966-1991.*
[2] *Significant negative BBS trend for 1982-1991.*
[3] *Listed as migratory nongame bird of management concern by USFWS.*

The two major habitat management considerations that influence forest interior breeding birds are amount of contiguous forest habitat and amount and juxtaposition of edge.

Robbins et al. (1989a) demonstrated that forest area influences breeding abundance of forest interior species. They found the highest probability of breeding by most forest interior species in forests > 3,000 ha in size. Estimated minimum areas needed to support breeding populations ranged from 1 ha for wood thrush to 1,000 ha for black-throated blue warbler, with half the species needing 150 ha or more. There were few forest interior species for which forests < 10 ha appeared to provide adequate habitat for breeding. In small forested tracts nest success may be significantly reduced by nest predation (Wilcove 1985). The issue of forest area is complicated by forest vegetation characteristics and the distance between forest stands (Lynch and Whigham 1984, Blake and Karr 1987).

Forest interior breeding birds generally avoid edge conditions (Kroodsma 1984). Chasko and Gates (1982) found the mean nesting distance from transmission corridor edges in western Maryland of 11 forest interior species was 40.7 m, with species differences ranging from 21 m for scarlet tanager to 65 m for worm-eating warbler. Numerous studies (e.g. Wilcove 1985, Andren and Angelstam 1988, Yahner and Scott 1988) have demonstrated higher predation rates of nests along forest edges. Martin (1992) reported predation as the primary cause of nest mortality of Neotropical migrants and suggested against managing for habitat features that decrease reproductive output, such as edge creation. Brood parasitism by brown-headed cowbirds (*Molothrus ater*) is also much higher along edges as compared to forest interior (Brittingham and Temple 1983). This combination of higher predation and parasitism rates can result in reduced reproductive success and possibly lower populations. For a more comprehensive discussion of edge effects refer to Reese and Ratti (1988) and Yahner (1988).

The issue of edge effect is the major conflict between forest interior bird and game species management. In reference to Neotropical migrants, Temple (1986:19) stated "intentional ecosystem modifications undertaken by game managers, with the specific goal of creating additional ecological edges in an area, are likely to have a negative impact on a segment of the local wildlife community that is already suffering population decline." Herein lies the need for integration.

FOREST GAME MANAGEMENT

In the Northeast, the primary forest game species are wild turkey (*Meleagris gallopavo*), ruffed grouse, American woodcock (*Scolopax minor*), squirrels, white-tailed deer (*Odocoileus virginianus*), and black bear (*Ursus americanus*). Standard forest silvicultural practices, such as even-aged management, are generally used to manage forests for these game species. Most states in the Northeast implement limited habitat management practices for squirrels, deer, and bears, but many do specifically manage habitat for turkey, grouse, and to a lesser degree woodcock.

Following is a brief description of habitat management techniques used for each of these gamebirds by state agencies in the Northeast. Impacts of these practices on Neotropical migrants are discussed, and suggestions for integrating management are presented.

Ruffed Grouse

Grouse habitat management is focused on successional forest conditions. Aspens are the forest type most often managed for grouse, though oak-hickory forests are also manipulated. Standard recommendations are to manage by creating small (2.5-4 ha) even-aged blocks of varying age classes. Usually ¼ of each management unit (i.e combination of four blocks of varying age classes) is clearcut, followed by rotating the clearcut of each ¼ block over a 40-year rotation for aspens or 80 years for oak-hickories. This management technique follows that detailed by Gullion (1972), who described a patchwork or checkerboard system of these management units. This patchwork system applied over a large area creates a tremendous amount of edge.

In Pennsylvania, this intensive grouse management strategy was employed on a 583 ha area beginning in 1976-1977. Breeding bird surveys conducted 4 years after the initial ¼ blocks were clearcut found only 1 of 7 forest interior species at a lower abundance on the managed tract than on a forested control area immediately adjacent to the site (G. Therres, unpub. data). Yahner (1984) reported 2 of 5 forest interior species at lower densities on the same managed tract the year following clearcutting of the second ¼ block. This technique resulted in increased populations of 4 Neotropical migrants which breed in early successional habitats. Brown-headed cowbird populations were similar between managed and control sites. In a similar study in Minnesota, Fouchi and Gullion (1984) found breeding densities for 6 of 9 forest interior birds greater in the unmanaged forest than on the grouse management area. This grouse area had been under management for over a decade longer then the Pennsylvania site.

Studies with artificial nests on the Pennsylvania grouse management area found greater predation rates in areas with 50% clearcuts compared to an unmanaged control (Yahner and Scott 1988), greater predation in forested ¼ blocks as compared to clearcuts (Yahner and Wright 1985), and that predation may have a greater effect on birds nesting above rather than on the ground (Yahner et al. 1989). Corvids were the major nest predators.

Grouse management techniques used on a smaller scale include planting small patches (< 0.5 ha) of evergreens for winter cover, planting fruit producing shrubs, daylighting roads, seeding logging roads and landings with grasses and legumes, and controlled burning. These practices increase edge and may negatively impact forest interior birds.

Habitat Management Recommendations

Following are management recommendations for integrating ruffed grouse and forest interior breeding bird habitat management:

1. Timber harvesting should be designed to minimize edge creation. A square or circular design provides the least amount of edge.
2. Avoid creating grouse management units in forest interior.
3. Locate habitat management practices in existing successional forest types or near existing permanent edges.
4. Limit grouse management units to 20 ha and avoid large patchwork management systems.

5. Avoid daylighting roads. If necessary, daylight only one side < 25 m.
6. Seed logging roads and landings with shade tolerant grasses and legumes suitable for grouse, so that a closed forest canopy can be allowed to develop or be maintained for forest interior birds.

Wild Turkey

Turkey habitat management primarily encourages forests of mast producing trees, particularly oaks and hickories. An optimum balance of age and size classes would include 40% sawtimber, 30% pole stands, 20% saplings, and 10% recently regenerated stands (Dellinger 1973). Distribution and juxtaposition of these age and size classes will effect forest interior breeding birds in varying ways. Thompson et al. (1992) studied several forest tracts, approximately 200 ha each, with similar age and size class distributions for optimum turkey habitat and found 2 forest interior species with lower breeding densities, 3 with greater densities, and 3 with no differences between these areas and areas of 100% pole-sawtimber. In a 15,700-ha forest ecosystem in western Maryland, considered prime turkey habitat, 16 forest interior breeding birds were documented (J.E. Gates, unpub. data). Of the top ten species by breeding density, eight were forest interior species. Brown-headed cowbird was also one of the top ten. The age and size class distribution in this system was 67% sawtimber, 26% pole stands, and < 10% seedling/saplings.

In the Northeast, small (0.2-2 ha) permanent openings dispersed throughout the forest at 0.4-0.8 km intervals are often recommended to provide turkey brood foraging habitat. Long, narrow openings are often recommended. Robbins et al. (1989a) defined contiguous forest as forested tracts separated by < 100 m of non-forested habitat. Using this as a guide to define the maximum size of an opening and still maintaining contiguous forest, openings should not exceed 2.5 ha. However, since Chasko and Gates (1982) found avoidance of edges by forest interior birds of transmission corridors 50 m wide, a more conservative opening is recommended. Research is needed to determine the maximum forest opening dimensions compatible with forest interior breeding bird needs.

Other habitat management techniques used to enhance forest for brood rearing include daylighting roads and seeding logging roads and landings with grasses and legumes. These techniques increase edge.

Habitat Management Recommendations

Following are management recommendations for integrating turkey and forest interior breeding bird habitat management:

1. Timber harvesting should be designed to minimize edge creation. A square or circular design provides the least amount of edge.
2. Utilize selective harvest techniques when feasible.
3. Avoid creating permanent openings in forest interior. Locate openings near existing permanent edge.
4. Minimize size and number of permanent openings. Restrict size to < 1 ha with a maximum width < 50 m. Shape should be circular or square.
5. Avoid daylighting roads. If necessary, daylight only one side < 25 m.
6. Seed logging roads and landings with shade tolerant grasses and legumes suitable for turkey use, so that a closed forest canopy can be allowed to develop or be maintained for forest interior birds.
7. Manage transmission corridors as brood habitat for turkeys in lieu of creating permanent openings.

American Woodcock

Woodcock management is usually conducted in bottomlands or lowlands adjacent to streams, near bogs and swamps, and in early successional forests. Alder stands, young aspen forests, and moist shrub thickets are particularly desired habitats. Habitat management techniques include maintaining alder stands, maintaining young (30-yr old) aspen stands by clearcutting, and enhancing or creating shrub thickets, especially hawthorn thickets. Release cuttings through removal of overstory trees > 15 cm d.b.h. is also recommended to rejuvenate remnant stands of shrubs (Liscinsky 1972). Sepik et al. (1981) provided a number of management plans utilizing small patch and strip clearcuts to maintain young second growth conditions. These cuts are usually < 1 ha in size.

As with turkeys, small permanent openings are often recommended for use as woodcock singing grounds. Sepik and Dwyer (1982) suggested numerous clearings are necessary to realize the full courting-male potential of an area since not all openings will be utilized due to unknown selection preferences. These areas should be at least 0.1 ha in size and maintained in grasses, weeds, or other short vegetation (Liscinsky 1972). Gutzwiller and Wakeley (1982) concluded that opening size does not appear to be important in determining the quality of singing sites, so smaller openings would have less impact on forest interior birds with no impact on woodcock.

While sharing common concerns with grouse and turkey management, woodcock habitat management adds the concern that it is often associated with riparian forests. These forests usually support higher densities of forest interior breeders. Several forest interior species are directly dependent on streams and bottomland forests for breeding (DeGraaf and Rudis 1986). Conversely, several Neotropical migrants depend on forested wetlands, bogs, alder swamps, and early successional habitats needed by woodcock.

Habitat Management Recommendations

Following are management recommendations for integrating woodcock and forest interior breeding bird habitat management:

1. Concentrate woodcock habitat management near edges of alder swamps, bogs, and shrub dominated wetlands.
2. Avoid intensive woodcock management in forested wetlands or in mature riparian or bottomland forests. Management in these areas should be located adjacent to permanent edges.
3. Maintain early successional habitat only in areas of existing successional forests or along permanent edges.
4. Avoid creating woodcock singing grounds in forest interior.
5. Limit size of permanent openings to < 0.5 ha with a maximum width < 50 m.
6. Manage transmission corridors in appropriate conditions suitable for singing woodcock and roosting cover in lieu of creating permanent openings.

FINAL CONSIDERATIONS

Management of forest interior breeding birds and forest game does not have to be mutually exclusive. Since forest interior birds and forest game share a common need, for forests, objectives for managing both are achievable. Managing exclusively for one group over the other is irresponsible and unnecessary. Applying the integration recommendations provided can feature both groups and is more conducive to the total wildlife community. However, it must be recognized that maximum production for game or forest interior species cannot be achieved in this process. A true conflict arises when habitat management for non-forested game species is applied in forested habitats.

Integration is effective when applied as a regional management strategy (Brittingham 1989). With this strategy all land uses, on both public and private lands, should be taken into consideration. Through this approach core forest interior areas can be managed primarily for forest interior birds and peripheral areas managed primarily for forest game. Robbins (1979) and Harris (1984) present various strategies that could be used to accomplish this regional approach.

Habitat management decisions of a local scale should take into consideration present habitat conditions and the wildlife community it supports. Priorities should be given to those communities or species that are rare, threatened, endangered, or in serious decline. In the Northeast, turkey populations have significantly increased while ruffed grouse and woodcock populations have declined according to BBS trends for 1982-1991. Table 1 lists forest interior species with declining populations regionally. These trends may differ by state.

Research specifically designed to determine effects of game habitat management practices on forest interior birds is needed. Determining size and frequency of permanent openings compatible with forest interior birds is one such need.

Finally, it is imperative that game and nongame biologists and managers communicate and work cooperatively, in integrating management of forest interior breeding Neotropical migratory birds and game species. Without this cooperation state wildlife agencies and other land management agencies will be ineffective at managing our wildlife communities.

ACKNOWLEDGMENTS

Thanks are extended to those wildlife biologists from the northeastern states' wildlife agencies who provided information useful in preparing this paper. D.W. Brauning, E.J. Golden, S.A. Smith, and T.P. Mathews reviewed the manuscript and provided helpful comments.

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