Chapter 2. Looking Beyond Property Boundaries – Landscape and Regional Considerations for Managing Early-Successional Habitats

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Wildlife biologists realize that any management activity should start with a substantial amount of "front-end time". That is, developing an understanding of what needs to be done before taking any action. Among the first steps are completing a comprehensive inventory of the property and developing an understanding of the landowner's desires and goals for the property. But it's also important to look beyond the immediate management area. Because most landowners don't control thousands of acres, it is essential to determine what habitats surround the parcel and give some consideration to a "landscape approach" when managing wildlife habitats. But what is actually meant by a *landscape*? And what is a *landscape approach*?

A landscape usually refers to a tract of land that has a recognizable pattern (e.g., forest-field or forest-field-riparian zone), and supports at least several individuals of a species under consideration. Like the term habitat, landscape is used to describe the environment of a particular animal. It is different from the term *home range,* which refers to the area an individual animal occupies while it feeds and reproduces. For the sake of our discussion, a landscape will refer to an area of at least several square miles that contains several home ranges of most animals we manage habitat for.

Taking a landscape approach to habitat management means having a good understanding of the food and cover resources that are available for wildlife (or in short supply) on your own land and the land of your neighbors. As a result, a landscape approach should provide an opportunity for neighboring landowners to consider joint efforts where their cooperation yields greater habitat rewards than would be possible by working individually. This can be especially important in areas where individual ownerships are relatively small and where the objective is to enhance the habitat for wide-ranging species, such as turkeys and black bears. Like most birds and mammals in the Northeast, turkeys and bears utilize a variety of habitats and forest age classes. Both of these species utilize early-successional habitat during specific seasons. For example, turkey hens and their poults feed on insects in hayfields during summer. After hibernation ends, black bears often feed on grasses and forbs in clearings because these are the first foods available. Several months later, they feed on raspberries in young clearcuts. As a result, the landscape occupied by these two species should contain an early-successional component if all their habitats needs are to be meet.

In this chapter, I'll provide some background information and explain why placing habitat management activities in a context beyond the boundaries of a landowner is so important. As many of the authors of this manual indicate, it's important to know how present-day habitats differ from historic conditions and how these differences should be considered as we manage early-successional habitats. So let's start there.

Historic versus present-day landscapes

In chapter 1, Darrel Covell reviewed the available information on the abundance of early-successional habitats in the Northeast prior to the arrival of European settlers. As he indicated, simple comparisons between historic and current abundance of early-successional habitats don't provide a good assessment of how well these habitats function in present-day circumstances. Historically, the abundance of early-successional habitats was probably less than 10% of land area in much of the Northeast. Among inland forests, small openings were created by frequent windstorms or beaver impoundments. On the other hand, coastal areas were much more susceptible to large disturbances, like wild fires and hurricanes. As a result, patches of early-successional

forests, barrens, and grasslands represented at least 20% of coastal New England, Long Island, New Jersey, Maryland, and Delaware. Now, let's look at these same regions 400 years later.

According to the most recent census in 2000, the 11 states that represent the Northeast are occupied by almost 60 million people. As we know, the consequences of that many people includes dense road networks and a variety of land uses that range from sparsely settled agricultural areas to densely populated urban centers. On a state-by-state basis, the average population density in New Jersey is 1,100 people per square mile whereas in Maine it is only 40 people per square mile. Regardless of the state, much of our human population is clustered within 50 miles of the Atlantic coast. Because of these differences in human distributions, opportunities to manage wildlife habitats will likely differ among states and even within states depending on the degree of development.

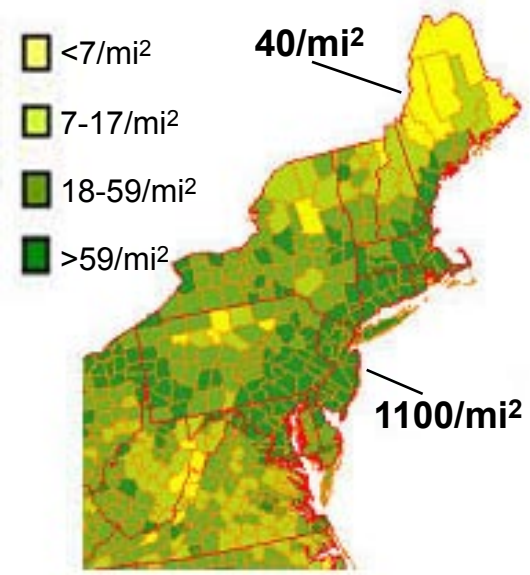

Figure 1. Human population density varies substantially in the northeastern United States, ranging from 40 residents per square mile in Maine to approximately 1100 per square mile in New Jersey. Managing wildlife habitats will likely vary in response to population density and associated land uses.

Historically, the Northeast was dominated by continuous forests. Our relatively recent changes to these forests either through clearing for farms or shopping malls have had profound effects on wildlife populations. In many landscapes, the most obvious influence is that wide-ranging animals can no longer move without encountering a road or other man-made obstacle. Remaining patches of habitat, including early-successional forests and native shrublands, are broken up or fragmented into disjunct patches. Animals that have relatively large home ranges, like bobcats that hunt these habitats for rabbits and hares, may find the remaining patches of habitat too small to fulfill their needs. In more developed landscapes, this results in frequent road crossings that make bobcats vulnerable to vehicle collisions. Other species with small home ranges (such as gray catbirds, towhees, or New England cottontails) may be able to occupy the scattered fragments. However, even these animals may be hampered by the consequences of human land uses that surround small patches of habitat. For instance, populations of generalist predators including foxes, raccoons, skunks, and crows often thrive in developed landscapes because of their ability to take advantage of resources associated with humans. Large populations of these predators result in predation rates that can reduce or even eliminate small populations of prey species like New England cottontails and some songbirds. Over time, these small patches may contain fewer species than similarly-sized patches that are surrounded by extensive forests.

Although the ramifications of contemporary forest fragmentation are real, it is important to remember that they too are affected by landscape properties. There is increasing evidence that many of the current concerns of fragmentation are dependent on habitat features that are described at large spatial scales. The general trend is that the effects of fragmentation are minor or even absent in rural areas where forests are essentially continuous. As you move into more developed landscapes, where agriculture or suburban developments replace forests, populations of generalist predators and nest parasites (especially brown-headed cowbirds) become more abundant and exert a greater influence on the local wildlife community. A couple of examples will illustrate this.

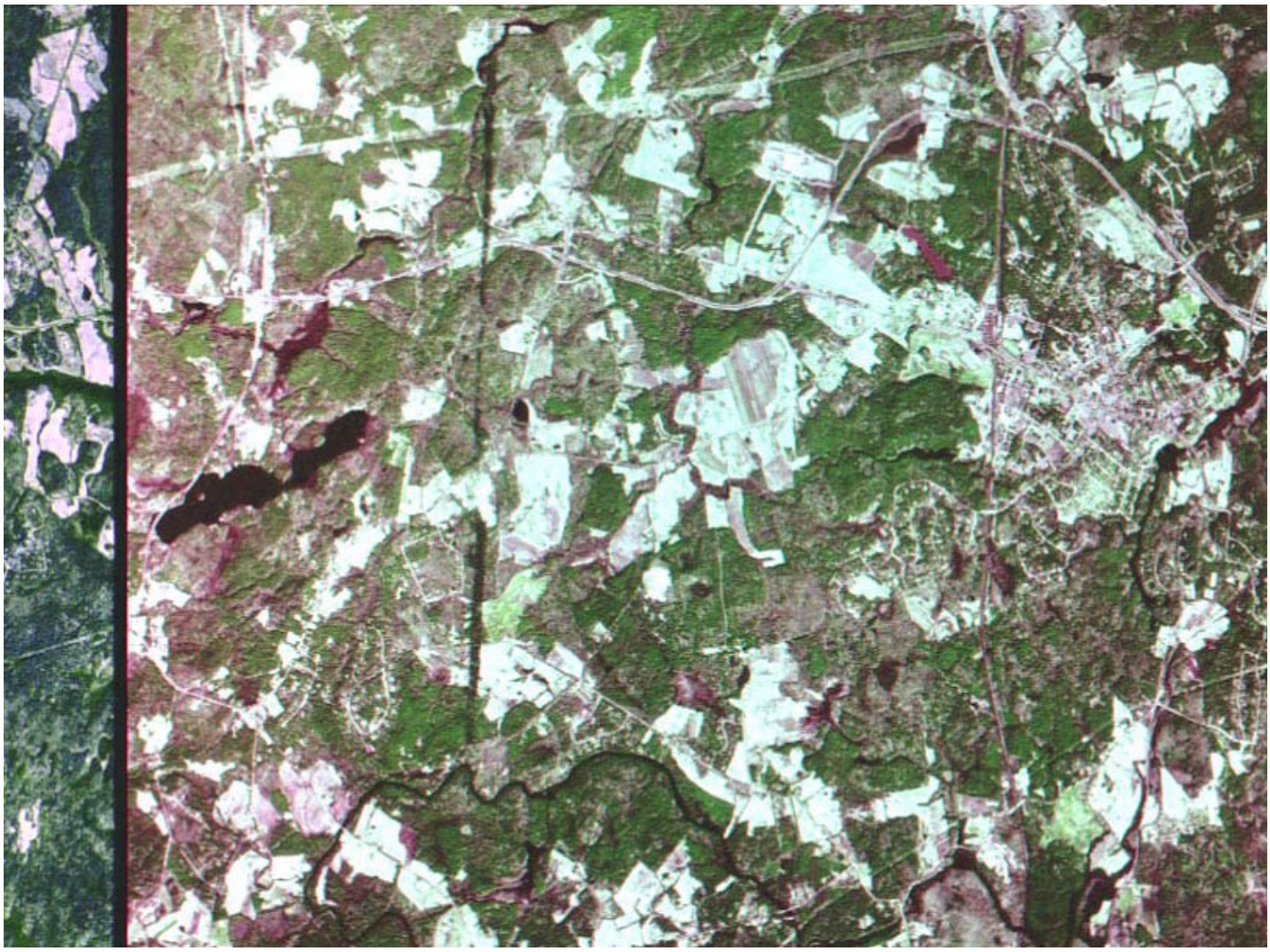

Figure 2. Much of the Northeast can be characterized by a mix of agricultural fields, forests, and suburban develops like this aerial view of southeastern New Hampshire. In these diverse landscapes, populations of such generalist predators as raccoons, coyotes, and red foxes reach higher densities than in less developed. As a result, larger patches of early-successional habitat may be more effective in sustaining species associated with these habitats that are vulnerable to predation (e.g., New England cottontails).

Researchers in New Hampshire examined the abundance of raccoons, foxes, and coyotes in three study areas (each was approximately 20 square miles). Forest coverage, agricultural land, suburban development, and human density were measured in each study area and compared to the relative abundance of generalist predators (based on systematic track counts). Looking at the most different study areas, the rural area was dominated by continuous forest (81% coverage, 3% in agricultural fields, and 3% in development) and a sparse human population (4 people per square mile). In comparison, the most developed landscape had less continuous forest (58% forest, 8% agricultural fields, and 17% in residential or commercial developments) and a human density of over 100 people per square mile. In the developed area, the abundance of generalist predators was twice that encountered in the rural area. As a result, generalist predators probably had a greater influence on local wildlife populations than in the rural area.

In addition to predation, avian brood parasites are another consequence of habitat fragmentation. Brood parasites reduce the ability of other birds to successfully rear young by laying their eggs in the nest of a host species. Brood parasitism is now acknowledged as a major factor causing the regional decline of several forest birds. Because cowbirds are the only brood parasite that regularly occurs in forests of the Northeast, understanding how land use may affect their abundance is important. Among the preferred breeding habitats of cowbirds are clearcuts. So efforts to increase the abundance of early-successional habitat with timber harvests

may potentially attract cowbirds. Research in the Green Mountains of Vermont has provided some insight into a more complex relation than that observed for generalist predators. In that study, extensive forests (over 90% of the study area) would suggest that cowbirds would not be a concern. However, cowbirds are known to "commute" more than four miles between their preferred feeding habitats (agricultural fields and livestock pens) and breeding habitats (riparian zones, clearcuts, and forest edges). The presence of cowbirds in recently logged areas in the Green Mountains was dependent on several landscape features, including the distance to a permanent opening (such as mowed pasture or residential lawns) and the number of farms that supported livestock within four miles. Even in extensive forests, cowbirds were detected if livestock operations were nearby with rather small amounts of residential or recreational development. On the other hand, cowbirds were rarely found in areas that were isolated from livestock operations or permanent openings.

Responding to shortfalls in early-successional habitats in contemporary landscapes

It is now apparent that early-successional habitats in some portions of the Northeast have become scarce and that active management of these habitats is essential. In the past decade or so, wildlife biologists have been developing a framework for managing early-successional habitats. From these deliberations, there seems to be increasing interest toward using natural disturbance regimes as a guide for management of early-successional habitats. By adopting such an approach, habitat managers would attempt to create patches of early-successional habitat in a pattern similar to wind throw, beaver flowages, wildfires, and other events that historically opened up patches of forest. Using natural disturbance as a guide usually means generating patch cuts or mowing small clearings that are a few acres or less in size. In many respects, creating scattered patches of young forest would result in a landscape that is similar to the conditions most animals in the Northeast are adapted to. In landscapes where forests are still mostly intact, the effects of fragmentation may not be an issue. So landowners can consider a range of management activities. It may be appropriate to mimic small-scale natural disturbances if early-successional habitats are well represented in the area; larger cuts may be appropriate if early-successional habitats are scarce in the area. Regardless of the size of the timber harvest, it is still important to avoid conflicts with important habitat components. Early-successional habitats should not be increased at the expense of mature stands that may contain groups of large mast-producing oaks, hickories, or beeches. Additionally, mature stands may contain large roost or den trees that are essential to many species.

In more developed regions of the Northeast, forests are quite different from the forests that existed before settlement. In the previous section, I summarized some of the effects of habitat fragmentation. It's important to consider the extent of these effects when managing distinct patches of habitat. Creating small patches of early-successional habitats in diverse landscapes may not be an effective approach toward addressing the habitat needs of animals that occupy these habitats. Recall that predation pressure is often quite intense on these small patches of habitat. As a result, small patches of habitat will not be able to offset the effects of predation. Also, surrounding land uses may effectively isolate small patches making it difficult for animals to reach them. Therefore, the notion of using natural disturbance as a guide to management may not be appropriate in many portions of the Northeast. In areas that contain a diversity of land uses (e.g., some combination of forest, agriculture fields, development, etc.), landowners may want to consider an approach that differs from natural disturbance patterns. Here, efforts may include positioning managed habitats in close proximity to existing patches of shrubland, wetland, or a beaver flowage. Such an approach would create patches of habitat that would likely be much larger than natural openings. The establishment and maintenance of some moderate (>10 acres) to large-size (>25 acres) patches of early-successional habitat can serve as core habitats within these modified landscapes. As a core habitat, species that are dependent on these habitats will likely produce sufficient offspring to offset local losses to predation and surplus young that can disperse to other patches of habitat within the landscape. An added advantage of this approach is that it may help alleviate some of the concerns of fragmentation and edge habitats that are associated with scattered patches of early-successional habitat.

Combining management efforts with existing land uses may offer some additional opportunities. Powerline corridors, for example, are often kept in an early-successional state. Recent research in southern New York has shown that powerline corridors can be very productive habitat for a number of songbirds that nest in thicket habitats. However, these linear habitats may not be suitable for other species affiliated with early-successional habitats. New England cottontails, for example, are not found along corridors, possibly because raptors perched on utility poles are very efficient predators. Therefore, positioning several acres of managed early-successional habitat immediately adjacent to a powerline corridor could substantially improve the suitability of corridors for cottontails and other species that may be vulnerable to predation. Placing managed habitats near utility corridors may also increase the ability of animals to move across a landscape by using the utility corridor as a dispersal route.

From these examples, it should be clear that approaches to managing wildlife habitats are often dependent on the surrounding landscape. But some of the factors that influence management are best described at a spatial scale even larger than a landscape.

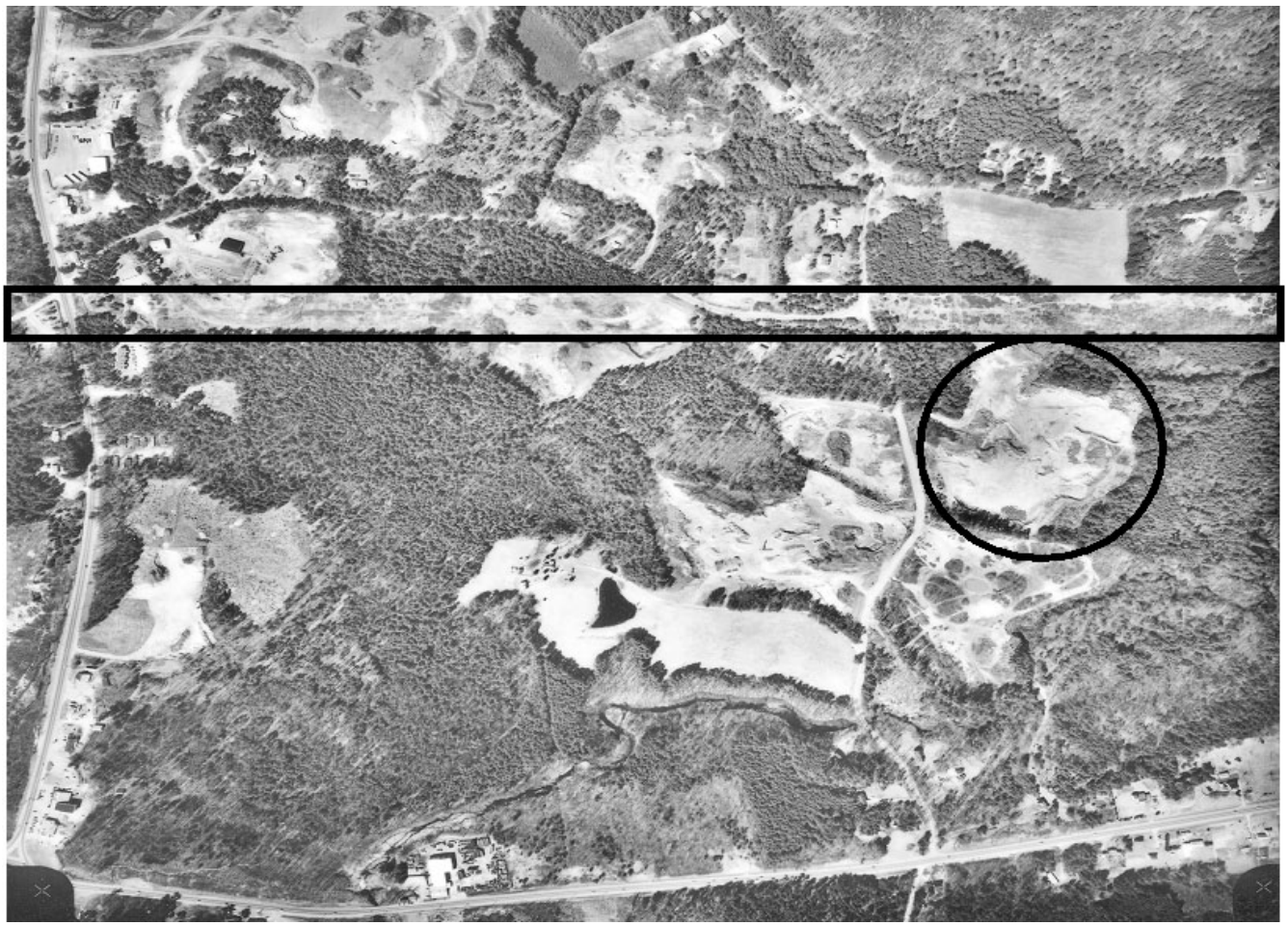

Figure 3. Positioning managed parcels of early-successional habitats in close proximity to existing land uses like powerline-rights-of-way can maximize the benefits of contemporary land uses. In this aerial photograph, an aerial successional habitat (outlined by the circle) is next to a powerline that may serve as additional habitat and a dispersal corridor.

Early-successional habitats in a regional context

I'll now introduce the concept of *regional* concerns in habitat management. For our discussion, a *region* is much larger than a landscape, probably measured in hundreds of square miles. Regional divisions may be based on natural properties, such as forest type. For example, the oak-pine forests of central New England and the yellow pine forests of southern New Jersey and portions of Delaware have a number of plants and animals that differ. As a result, management prescriptions for the two regions also differ. Regions also may be described by major land use patterns, such as rural, agricultural, or suburban. Recall from our previous descriptions of historic habitats that the distribution of early-successional habitats was greater along the Atlantic coast than among interior forests. However, human populations also are most abundant near the coast, limiting our ability to manage habitats. As we move inland and away from major river drainages, human populations become less dense and the intensity of development is lessened. Our ability to manage wildlife habitats often increases in these regions than in more densely settled regions.

Recognize that we are building on the concept of spatial scale. We now have three terms that represent a continuum. At one end is the land controlled by a single landowner. This may be represented by a single woodlot or a portion of a larger forest. At the landscape level, we are considering what surrounds a single ownership. Finally, at the regional level, we are acknowledging the importance of major natural properties like forest type but also how humans have affected wildlife habitats with road networks and developments.

A new challenge - ownership fragmentation

From the discussion above, it should be clear that habitat fragmentation can have a substantial influence on the ability of wildlife populations to persist. In addition to habitat fragmentation, ownership fragmentation or *parcelization* can have a substantial influence on our ability to maintain wildlife habitats in the Northeast. For a variety of reasons, the size of a tract of land owned by someone has an influence on ownership tenure and the likelihood that the owner will develop a habitat management plan. In general, as parcel size decreases, ownership turns over more frequently, and landowner involvement is less likely. Even if the landowner is motivated, management of small parcels can often be too expensive for a single owner to justify. Let's consider how parcelization is affecting wildlife habitats and what can be done to counter this influence.

In the Northeast, the overwhelming majority of forestland is privately owned; public lands represent only 11% of the timberland of this region. Although the amount of forestland in private, non-industrial ownership has remained relatively constant since the 1950s, the number of individual owners has changed substantially, increasing to almost 2 million by the mid 1990s. Ownerships have become most fragmented in southern New England (e.g., Massachusetts, Connecticut, and Rhode Island) and among coastal middle Atlantic states (e.g., New Jersey, Maryland, and Delaware). Individually, 60% of non-industrial owners own less than ten acres but their total ownership represents only 5% of all non-industrial timberland.

Even in rural states such as New Hampshire, parcelization is becoming a significant factor influencing land management. In rapidly developing southeastern New Hampshire (e.g., township of Exeter), almost 60% of the land area is in parcels less than 50 acres; whereas in Tamworth (a township that borders the White Mountain National Forest in central New Hampshire), approximately 65% of the parcels are at least 50 acres, and over 10% are in parcels more than 500 acres.

Although there is no distinct woodlot size where management is not considered, 50 acres is the approximate threshold where ownership tenure, landowner motivation, and cost efficiency seem to coalesce into a reduction in sustained management activity. In areas where suburban development is expanding rapidly, owners of the remaining large parcels may have a real influence on wildlife populations if they become the only land available for management. Yet in many areas, the reliance on large landowners may not be a practical option for achieving a diversity of wildlife habitats. In such regions it also may be useful to form a *management cooperative*. Management cooperatives have been established in states like Massachusetts where development pressures are great. In chapter 11, Paul Catanzaro summarizes how the Massachusetts Woodlands Cooperative

is developing a comprehensive structure within which landowners in western Massachusetts can more effectively address the management of private lands and marketing of forest products. Although cooperatives aren't a complete solution to offsetting the effects of expanding human populations, they have the potential of having a very important influence in some areas.

Conclusions

If our efforts to enhance early-successional habitats are to be successful, we now know that we need to consider the consequences of human land uses. Regardless of the specific management technique that is applied, it should now be clear that taking landscape and regional characteristics into consideration can greatly increase the intended benefits that landowners are hoping to provide wildlife. Think beyond your property line! Many species occupy areas much larger than most private landowners control. Considering how your land is affected by surrounding lands and how your management efforts will complement surrounding lands will likely yield the greatest returns for wildlife.

Suggested reading

See a special issue of Forest Ecology and Management (2003, Volume 185) that includes a series of papers on early-successional habitats in the Northeast. These are available in pdf format at: http://www.unh.edu/natural-resources/livaitis-papers.html or contact John Litvaitis. Also, a developing web site (www.unh.edu/ncssf) will provide substantial information on managing forest in the Northeast.