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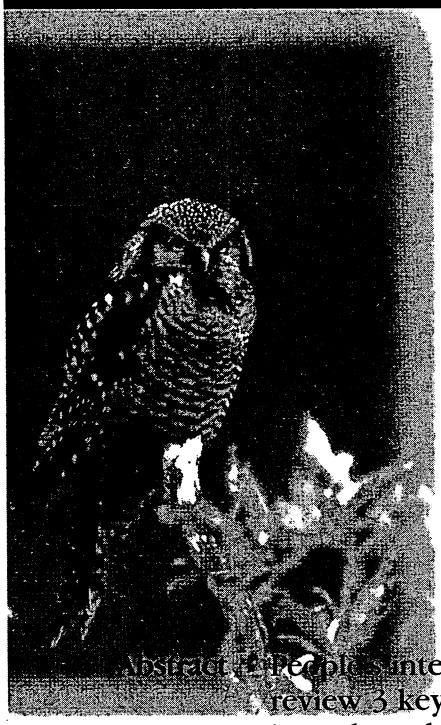

Human dimensions of early successional landscapes in the eastern United States

by Paul H. Gobster

Abstract People's interactions with early successional landscapes are varied and diverse. I review 3 key ways that people perceive, use, and value forest landscapes, emphasizing selected types of early successional landscapes in the eastern United States (U.S.): production and consumption of timber and nontimber forest products, visual and aesthetic perceptions, and recreational uses and choices. Site- and regional-scale forest planning and design efforts can be improved by better understanding the human dimensions of early successional landscapes, such as siting facilities for recreation and planting native vegetation for aesthetics. Various types of communication, such as signs, brochures, and opportunities for on-the-ground experience, can help interpret the significance of these landscapes to the public for wildlife and human values. I suggest some research directions to increase knowledge about the human dimensions of early successional landscapes.

Key Words aesthetics, early succession, forest products, perceptions, recreation

In this paper I discuss the human dimensions of early successional landscapes in the eastern U.S. Human dimensions is a commonly used term to describe the range of perceptions, attitudes, values, uses, and other interactions that people have toward something such as wildlife (e.g., Gray 1995). In the natural resources field this term often centers on questions about management. I use the term landscape rather than habitat because the former conveys more clearly how people perceive and relate to the land (but see my discussion of "recreation habitats" later). Etymologically, landscape is the land that is scoped by a person, that which surrounds and is comprehended (Rolston, in press). Landscapes such as prairies thus might be comprehended as habitats or ecosystems but might also be understood as places defined by their aesthetic characteristics or cultural–historic meanings (Naveh 1995). Early successional refers to landscapes that exist through periodic natural or human-caused disturbance to favor young stages of forest growth such as aspen (*Populus* spp.) saplings; grasses, forbs, or shrubs such as a tallgrass prairie or alder (*Alnus* spp.) thicket; and those with scattered overstory trees such as an oak (*Quercus* spp.) savanna or pine (*Pinus* spp.) barrens (Curtis 1971).

Early successional landscapes in the eastern U.S. are diverse in their structure, function, and composition of plant and animal species. Consequently, it is difficult to characterize generally how such places and their wildlife might be perceived and used by humans. Research is especially sparse on the human dimensions of any particular

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early successional landscape; most studies examining people's production and consumption of forest products, visual and aesthetic perceptions, recreational uses and choices, and other human dimensions usually deal only with broad categories of land use and land cover. Despite these important limitations, it is useful to review what we do know about the human dimensions of early successional landscapes in order to draw conclusions about their relevance to and role in wildlife habitat management and research. My objectives here are to: 1) characterize the key human dimensions of forest landscapes, 2) identify actual and probable relationships between people and early successional landscapes in the eastern U.S., and 3) discuss implications of managing early successional landscapes for wildlife and people.

[P]eople's recreational backgrounds can affect how they aesthetically perceive early successional landscapes and the ways in which those landscapes are managed.

The human dimensions of forest landscapes

The ways in which people relate to and interact with forest landscapes are as varied and diverse as the landscapes themselves. Some key categories of human interactions are: timber and nontimber forest products, visual and aesthetic perceptions, and recreational uses and choices. For each category I briefly summarize some of the major findings from existing research, then apply this knowledge to selected types and structural characteristics of early successional landscapes in the eastern U.S.

Timber and nontimber forest products

Statistics compiled for the 1992 Resources Planning Act (RPA) national assessment of forest resources show that 94% (144.5 million ha) of forest land cover in the eastern U.S. is classified as timberland that is potentially available for harvesting (Powell et al. 1994). Where timber production is an important goal, forest managers tend to favor a greater proportion of early successional tree species than might occur naturally. For example, aspen–birch (e.g., *Populus tremuloides*, *Betula papyrifera*)-dominated forests currently account for 16% of all timberlands in the north-central region, whereas in pre-European settlement times their occurrence was uncommon (Kotar 1997). Along with preferences for early successional species types, timber harvesting along with other human and natural disturbances keeps about 23% of all eastern U.S. timberlands in an early successional, seedling–sapling stage (Powell et al. 1994), though this percentage can vary greatly with location within the region (see Trani et al. 2001).

The contribution of timber resources to the economy of the eastern U.S. also varies considerably within the region. In the Northeast, only about 6% of the workforce is engaged in forest-related industries, whereas in the Southeast it is more than double that (Haynes 1990). Despite these differences, all of the eastern U.S. depends on important early successional species such as aspen (*Populus tremuloides* and *Populus grandidentata*) and southern pine (e.g., *Pinus palustris, Pinus echninata)* to provide significant portions of raw material upon which the region's timber industries depend. In the eastern U.S., early successional species are particularly important to high-value forest industries such as pulp and paper manufacturing. These industries, prominent in the northern and southern parts of the region, generally pay the highest wages of all timber-related industries and in 1982 employed nearly 200,000 individuals and generated shipments valued at more than $28 billion (Haynes 1990).

In addition to the timber resource, there is an increasing awareness of the importance of nontimber forest products and the need to manage forests to provide these products for commercial, subsistence, recreation, and other purposes. Nontimber forest products (NTFPs) generally include all wildlife and nontimber vegetation in forest and other natural landscapes and can be used for food, wildcraft, medicinal, cosmetic, religious, and other purposes. A multiyear national assessment of NTFPs in the U.S. is

Early successional landscapes provide diverse wildlife-related recreational opportunities, such as birding, that appeal to a wide range of people.

Table 1. Examples of early successional nontimber forest products found in the Upper Peninsula of Michigan, USA (adapted from Emery 1998).

	Functional uses				Livelihood uses			
Common name	M	C	E	F	PC	BG	SR	SP[a]
balsam, boughs				X	X		X	X
balsam, cones				X			X	
balsam, needles	X				X	X		
balsam, pitch	X				X			
berries, blackberry			X		X	X	X	X
berries, blueberry			X		X	X	X	X
berries, raspberry			X		X	X	X	X
berries, thimbleberry			X		X		X	X
birch, bark	X	X		X	X	X		X
birch, root				X				
birch, sections				X				X
birch, twigs		X		X			X	X
sweet fern		X	X	X	X	X		
sweet grass		X		X	X	X		X
wild rose hips			X	X				X
wild rose petals	X				X			
willow, twigs				X	X	X		X

[a] M = medicinal, C = ceremonial–cultural, E = edibles, F = floral–nursery–craft, PC = personal consumption, BG = barter–gift, SR = sale raw form, SP = sale processed form

almost complete (Jones et al., in press), and regional and local studies have highlighted the importance of early successional forests in providing a significant portion of these products. For example, research by Emery (1998) in the Upper Peninsula of Michigan documented that 138 products from more than 80 species of plants played important roles in the livelihoods of the households studied. Early successional species identified by Emery (1998) include trees such as birch (*Betula papyrifera* and *Betula nigra*; bark, twigs, roots) and balsam fir (*Abies balsamea*, boughs and cones) used in various wildcrafts, shrubs with edible berries (e.g., blueberry [*Vaccinium angustifolium*], blackberry [*Rubus fruticosus*]), and ground-cover plants such as sweet fern (*Comptonia peregrina*), and sweet grass (*Hierochloe odorata*) that have cultural and ceremonial uses (Table 1).

Given the importance of early successional species to the timber and NTFP communities of the eastern U.S., there are important reasons to consider efforts to maintain or increase their extent and availability. But with only 16% of timberlands held by private industry (Powell et al. 1994) and likely much less held by NTFP gatherers, this is an increasingly difficult task. Moreover, public lands, accounting for 14% of all eastern U.S. timberlands, are increasingly being managed to provide a more diverse array of benefits and values that the public demands. This includes management for recreation and aesthetics (to be discussed in more detail later) that often favors a more mature forest condition as opposed to early successional stages. The same trend may be occurring with nonindustrial private forestlands, which account for 70% of eastern U.S. timberlands. In many parts of the region, these lands are being subdivided and sold as smaller forest parcels and there are concerns that the new owners may be less concerned about timber values of the land than aesthetic and recreational ones (Gobster et al. 2000).

A major consequence of the trends described above, along with other factors, is that the land area of important early successional forest types is declining in the eastern U.S. This includes a 31% decrease in the area of aspen–birch, a 15% decrease in loblolly–shortleaf pine (*Pinus taeda* and *Pinus echinata*), and a 46% decrease in the area of longleaf–slash pine (*Pinus palustris* and *Pinus elliotti*) timberlands between 1963 and 1992. Along with changing forest types, the timberlands of the eastern U.S. are getting older, especially in the northern half of the region. There, the area of sawtimber has increased by 53% between 1963 and 1992, whereas the area in seedlings or saplings has decreased by 22% (Flather et al. 1999, see also Trani et al. 2001).

Visual and aesthetic perceptions

Sight is by far the most important sensory perception of humans, and thus the appearance of a landscape plays a major role in how it is appreciated and used by people (e.g., Bell 2000). Various theories of landscape preference have been developed and applied to forest and other natural environments over the last 3 decades, and they have implications for how different types or structures of early successional landscapes might be evaluated by people. Bioevolutionary theories of Appleton (1984) and others maintain that our preferences are at least in part geared genetically to favor landscapes that provide a prospect and a refuge—that is, allow people to see without being seen. Informational theories of Kaplan and Kaplan (1989) and others coincide with bioevolutionary theory, adding that humans prefer some degree of complexity and mystery in the landscape, but not so much that these landscapes lack coherence and legibility. In other words, we like landscapes that pique our interest and invite exploration, but we also need to be able to understand those landscapes so we can avoid danger or the risk of getting lost.

Oak-savanna landscapes of the eastern U.S. are good examples of early successional landscapes that might be preferred in the context of these theories. Reminiscent of our species' origin on the African savanna, these landscapes are high in prospect and refuge; they have a smooth ground plane that provides mobility, an open

midstory that affords a view, and a spatial arrangement of trees that gives the landscape visual interest (Gobster 1994). In contrast, many of the eastern U.S.'s other early successional landscapes might fare less well in preference assessments according to these theories. For example, large prairies and pine barrens may be too open and monotonous, whereas shrub carrs and alder thickets may be too closed and monotonous. The little empirical research that is available on perceptions of these landscapes tends to bear this out. Raffetto (1993) and Ryan (2000) each found that people preferred scenes of oak savanna restorations over those of prairies, whereas Kaplan (1979) and Herzog (1984) found that scenes with a well-defined spatial structure of trees were preferred over those with wide, open views or narrow, blocked views.

A large number of landscape perception studies have examined forest environments in the context of timber-harvesting alternatives (for a comprehensive review, see Ribe 1989). Findings for eastern U.S. forests generally indicate a preference for large, mature overstory trees with a lush herbaceous understory and an open midstory providing good visual penetration (see, for example, Vodak et al. 1985, Rudis et al. 1988, Ribe 1990, Pings and Hollenhorst 1993). Of the different forest-harvesting alternatives, clearcutting has generally been found to have the greatest negative visual impact on forest aesthetics, especially if large amounts of slash are visible. Aesthetic recovery from the clearcutting of eastern U.S. forests varies with site quality, initial stand density, species, and treatment (natural regeneration, planting, thinning). Generally, ratings of aesthetic preference follow a typical logarithmic growth curve, rising quickly in the first 2 decades after cutting, then increasing at a slower rate as stands begin to look more like mature forests (Hull and Buhyoff 1986, Palmer 1990, Ribe 1991).

Berries are one of many important nontimber forest products for which early successional landscapes are managed.

Oak-savanna landscapes of the eastern U.S. are good examples of early successional landscapes that are highly preferred by people for their visual and aesthetic qualities.

Preferences also can vary depending on knowledge of the respondent about the landscape, the purpose behind its management, as well as the primary activity the respondent engages in as he or she perceives the landscape. While studies generally show a strong consensus among different people and groups as to which types of forest environments and management alternatives are beautiful and which are ugly, there is a tendency for forestry professionals and forest land owners to be more aesthetically accepting than the lay public of fresh clearcuts and other treatments that set forests back to an early successional stage (e.g., McCool et al. 1986, Vodak et al. 1988). However, knowledge provided to lay people about the purposes of forest management practices can help increase their tolerance of such practices. For example, brochures given to Tucson, Arizona, residents describing the effects of prescribed and severe fire on ponderosa pine (*Pinus ponderosa*) ecosystems resulted in respondents having a more tolerant view of the use of prescribed fire as compared to a control group who were given only general information about the forests without mention of prescribed fire (Taylor and Daniel 1984). Finally, the recreational orientation of the user can sometimes affect how forest management practices are perceived and evaluated (e.g., Brunson and Shelby 1992, Ribe 1994). In one study of northern Michigan residents, Langenau et al. (1980) found that archery deer hunters and small-game hunters had the most favorable attitude toward clearcutting, whereas campers and canoeists had the least.

Recreational uses and choices

As we have just seen, people's recreational backgrounds can affect how they aesthetically perceive early successional landscapes and the ways in which those

landscapes are managed. We also can look more directly at how early successional landscapes are used for recreation by examining the activities recreationists engage in and the environments in which those activities occur. The disciplines of human ecology, environmental psychology, leisure studies, and recreational geography have all examined people's outdoor recreational behavior as a function of their environmental context. The Forest Service's (1982) Recreation Opportunity Spectrum system for planning and managing outdoor recreation in the national forests is premised on the idea that people seek environments and activities that provide the kinds of personal and social benefits they desire. Additionally, Field et al. (1985), Greer (1990), and others have used the concept of "recreation habitats" to identify and study the attributes of sites that facilitate particular recreation activities.

Within this context, researchers have studied the landscape preferences and choices of different forest recreation users and have found that early successional landscapes play a varied role in terms of their importance. For example, campers tend to prefer more mature forests over early successional ones; they prefer shady sites to those that are more open and do not rate the screening that might be afforded by early successional vegetation as being as important as other characteristics such as flat ground or proximity to a water body (Bumgardner et al. 1988, Brunson and Shelby 1990). Trail users, on the other hand, tend to prefer a more heterogeneous landscape that might include some early successional landscapes and early successional stages of forest along with more mature forest conditions (e.g., Axelsson-Lindgren and Sorte 1987).

Wildlife-related recreation perhaps bears the closest correspondence to the type and structural characteristics of forest landscapes of all recreational activities; wildlife-oriented recreation is often where recreation habitat is synonymous with wildlife habitat. Hunters, wildlife photographers, birders, and other wildlife-oriented recreationists derive a great deal of satisfaction by "bagging" their prey (Bryan 1979), and whether that means a kill, a photograph, or a checkmark on a life list, those engaged in wildlife-oriented recreation are quick to learn the importance of being in or near the right habitat. These habitat–wildlife relationships are learned through experience, passed on from expert to novice, or studied with the help of field guides and other materials. Habitat-oriented wildlife guides can be invaluable in this respect. For example, Benyus's (1989) *Northwoods Wildlife: A Watcher's Guide to Habitats* begins with a habitat key and describes the constellation of plants and animals one is likely to find in 18 different habitat types in northern Minnesota, Wisconsin, and Michigan. Early successional habitat types form an important part of the book and include several kinds of forested and nonforested habitats such as small openings and edges, large fields, and young broadleaf upland forests.

Habitat types and wildlife species can be used as indicators to gauge the importance of early successional landscapes for wildlife-oriented recreation, and the United States Fish and Wildlife Service and United States Bureau of Census's *National Survey of Fishing, Hunting, and Wildlife-associated Recreation* provides statistics on activity participation using habitat and species groupings. The most recently available data are from surveys conducted in 1995–1996, and previous surveys (conducted every 5 years since 1955) can be used to help understand trends in participation. Statistics for 1996 show that 7% of the U.S. population aged 16 and older, nearly 14 million Americans, hunted in the previous 4 months, whereas 16% or 23.7 million watched wildlife away from home. Trend data (Figure 1) for 1980–1995 for the U.S.

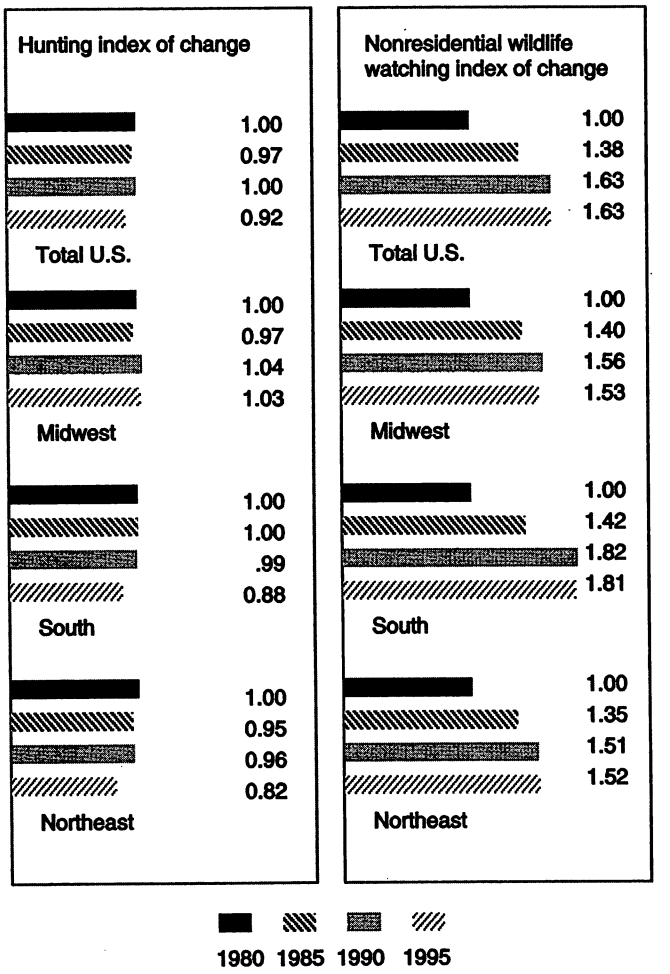

Figure 1. Index of change (1980 base year = 1.00) in percentage of U.S. residents 6 years and older participating in selected wildlife-related recreation activities 1980–1995 for total U.S. and eastern U.S. subregions (adapted from Aiken 1999).

Table 2. Participation in early successional wildlife-related recreation, U.S. population age 16 and older, 1980–1996.

	Hunting				Nonresidential wildlife watching			
Year	Deer	Grouse	All Hunting	% U.S. pop.	Brush	Open field	All sites	% U.S. pop.
1980	11,400,000	2,309,000	17,444,000	10	12,710,000	12,595,000	28,822,000	17
1985	11,987,000	2,190,000	16,684,000	9	10,355,000	11,384,000	29,347,000	16
1991	10,277,000	1,375,000	14,063,000	7	16,791,000	16,240,000	29,999,000	16
1996	10,722,000	1,220,000	13,975,000	7	14,065,000	14,849,000	23,652,000	12

Sources: United States Fish and Wildlife Service and United States Census Bureau (1982, 1988, 1993, 1997).

show that hunting in general is dropping in popularity, whereas nonresidential (away from home) wildlife watching is increasing (Aiken 1999). The greatest regional drop in participation was for hunting in the Northeast, which experienced an 18% decrease in the number of residents ages 6 years and up who hunted, whereas the greatest rise in participation was for nonresidential wildlife watching in the South, which saw an 81% increase from 1980 to 1995.

Statistics for species and habitat type are not published at the regional level, but nationwide data I compiled from the individual pentennial surveys give a reasonable picture of the importance of early successional communities (United States Fish and Wildlife Service and United States Bureau of Census 1982, 1988, 1993, 1997; Table 2). Deer (*Odocoileus* spp.) and grouse–prairie chicken (e.g., *Bonasa umbellus*, *Tympanuchus* spp.) are 2 species categories that depend on early successional communities. Deer hunting is by far the most popular type of hunting, engaged in by 77% of all hunters (16+ yrs) in 1996; by contrast, grouse–prairie-chicken hunting was confined to only about 9% of hunters. Both activities saw a drop in participation during 1980–1996, with deer hunting decreasing by 6% and grouse–prairie-chicken by nearly half (48%). For nonresidential wildlife watching, brush areas and open fields are 2 types of sites identified in the survey that are clearly early successional in nature. Both types were visited by more than 60% of nonresidential wildlife watchers aged 16 years and older in 1996. Visitation to these 2 types of sites has risen from 1980 to 1996 by more than 8%, though it is down from highs in 1991.

Implications

Information compiled on timber and nontimber forest products, visual and aesthetic perceptions, and recreational uses and choices all show that early successional landscapes play important roles in people's lives. It is impossible to calculate, however, whether this means there should be more or less in the way of early successional landscapes in the eastern U.S. than is currently present. Grouse hunters, for example, may desire mature trees so that they may hear owls, and those who weave baskets from willow (*Salix* spp.) shrubs found at the forest edge may use those baskets to collect mushrooms found deeper in the forest. Instead of arguing whose interests should be better served, forest managers and stakeholders should work together to help ensure that the forests of the eastern U.S. provide a spectrum of opportunities and experiences for people that in turn encompass a spectrum of early successional and other landscape and habitat types. What follows are some general recommendations for forest planning and design, communications to stakeholder groups, and research directions for advancing our understanding of the human dimensions of early successional landscapes with respect to wildlife and wildlife habitat.

Forest planning and design

Early successional landscapes supply important products to people, not only in terms of timber but increasingly for a variety of nontimber forest products used for commercial, subsistence, and cultural purposes. We are only beginning to realize the diversity of these products and how we might better provide them. As our knowledge of NTFPs increases with work such as the national assessment mentioned earlier, such information should be integrated into forest planning and design efforts to provide for these uses along with wildlife and other benefits and uses.

Early successional landscapes also supply important aesthetic and recreational benefits to people. Forest planners and landscape architects should look closely at the characteristics of early successional landscapes to understand the spectrum of recreation habitats they provide for site- and regional-scale planning and design. Using site-scale design guidelines by Ryan (2000) and others, forest landscape architects may be able to make some early successional landscapes more visually interesting and comfortable for people, yet still maintain the importance and integrity of those landscapes for the wildlife and plant species that depend on them. This might include such things as planting some showy native plants along trails

in a visually homogeneous area to provide aesthetic diversity, planting native food-producing plants for wildlife near observation points to increase the chances for people to see wildlife, and locating trails in large, open ecosystems such as prairies near available canopy trees to provide occasional shade for people during their outings.

At the regional scale, design and planning systems for recreation and aesthetics also might be improved with better integration of information on ecology and wildlife habitat requirements. For the United States Forest Service, the primary developer of such systems in the U.S., some of this has happened in recent years since revision of its principal system for landscape aesthetics, the Scenery Management System or SMS (United States Forest Service 1995). SMS is built on a foundation of ecosystem management and uses ecological factors to describe key aspects of aesthetic quality. The Forest Service's companion system for recreation, the Recreation Opportunity System (United States Forest Service 1982), could benefit from a similar type of ecosystem integration. For early successional wildlife in particular, more detailed information about visual and recreational considerations could be provided with a handbook dedicated to landscape design and planning for wildlife. Similar detailed handbooks exist for timber, fire, utilities, and other topics, but the *Wildlife Habitat Management* handbook, which has existed in draft form since the mid-1980s, has yet to be published. As these topical handbooks are revised to conform to the Scenery Management System, publication of a wildlife handbook should be reconsidered.

Communications

Along with planning and design, communication with forest stakeholders can go far to describe benefits of early successional landscapes for wildlife and related concerns. Elsewhere (e.g., Gobster 1999) I have described how the idea of an "ecological aesthetic" might help to expand people's appreciation for some types of landscapes, such as prairies, which are not thought of as scenic in the conventional sense. Communication plays an important role in cultivating this more ecologically oriented appreciation for landscapes. For example, information can be a key tool in conveying knowledge about the intent and purpose behind early successional landscapes, especially for some management activities such as prescribed burning, where it is difficult to use design to increase public acceptance of the activity. On-site information such as signs, interpretive nature trails, stewardship programs, and the like can help communicate messages to the public. Habitat guides and brochures can be particularly useful for off-site communication.

Site design, such as trails and right-of-way mowing, and on-site information, such as signage, can often enhance the recreational and aesthetic benefits of early successional landscapes for people, especially in urban settings.

Along with such communications, on-the-ground experience and involvement can go far in helping people better understand and appreciate early successional landscapes. This experience can be gained in many ways, such as through self-guided nature tours and nature-oriented recreation such as birding, plant identification, hunting, and nature photography. Directed activities, such as participation in ecosystem restoration, are particularly valuable ways through which forest users can gain experience and appreciation of early successional systems and processes. This type of participation is less easy to accomplish on a large scale but can be extremely effective on a smaller, single-project basis. People who participate in such activities on a continuing basis often find that what began as an uncommon leisure activity has evolved into a relationship with the land that has deep aesthetic, symbolic, and spiritual implications.

Research needs

Finally, more social science research needs to be conducted to better understand the human dimensions of early successional landscapes. This includes studies that contribute to our knowledge about the benefits and uses of products from these landscapes, as well as a more refined understanding of how different kinds of landscapes and landscape management alternatives affect people's aesthetic perceptions and recreational uses. The need for further research is particularly true for nontimber-oriented studies, as there is little information on how people respond to different types of early successional landscapes as well as natural disturbances that create and maintain them (Gobster 1999). Early successional habitat could be built into these studies, for example, to gauge how the public perceives efforts to restore and

manage landscapes for grassland birds. Research information related to wildlife-oriented recreation use such as hunting and wildlife watching also would be welcome, particularly by managers and groups concerned about the decline in hunting and hunting opportunities in the eastern U.S. (e.g., Flather et al. 1999).

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