Early successional habitats

Mid-Atlantic Coastal Plain

Coastal Plain early successional and scrub-shrub habitats, characterized by low woody vegetation and herbaceous plants, are often found at the transition between agricultural fields and nearby woodlands, created by disturbances like clearcutting, disking or burning. This habitat also includes agricultural hayfields, pastures, and field borders. Early successional habitats can also be mimicked in the understory of very open pine stands. Historically, these habitats were created by catastrophic natural fires, anthropogenic fires, large-scale wind events, insect pests, or pathogens such as fungal diseases. Early successional habitats are found throughout the region.

This habitat category can contain a diverse assemblage of plants, and nearly always features some combination of human activity. That does not mean that environmental factors such as weather events, climate, and natural fires have not played a role in creation and maintenance of some areas. The theoretic role of beavers, historic herbivores, Native American uses and other factors point to additional mechanisms for creation and maintenance of at least some early succession habitats, at least historically; however, in the past century nearly all early successional habitats have been human-created. Natural succession will limit the longevity of many of these habitats, unless they are actively managed.

There are numerous examples and types of communities that provide early successional habitat for an assortment of wildlife species. However, a number of them provide little benefit to a significant array of plant and animal species, especially those patches of small size, and thus could only be considered marginal wildlife habitat at best. These kinds of places generally reflect human use and activity as the primary goals of their management and include a number of places such as large lawns, monoculture hayfields, golf courses, airports, residential development and even urban and suburban development.

High quality early successional wildlife habitats include a variety of pastures, croplands, recent clearcuts, and field borders. Pastures and other grasslands provide year-round habitat for several priority bird species. Croplands such as corn fields and soybean fields provide food (especially where the harvest was poor) for many game species, sparrows, and other wildlife in fall and winter.

In the Coastal Plain, the quantity of early successional habitat is not lacking but the quality is often questionable for most species of wildlife. There are, however, excellent opportunities for quality early sucessional habitat of large patch sizes for wildlife on industrial forestland in the Coastal Plain. Partnerships with timber companies (and other large-scale landowners) featuring external cooperators that focus on creating management plans and strategies that benefit a diverse suite of wildlife species absolutely needs to continue, expand and be refined over time. Table 1 provides a list of priority species for which there is conservation concern.

Table 1. Priority species associated with coastal plain early successional habitat.

Group	Scientific name	Common name	State status* (Federal status)
Birds	*Aimophila aestivalis*	Bachman's Sparrow	SC
	Ammodramus henslowii	Henslow's Sparrow	SR
	Ammodramus savannarum	Grasshopper Sparrow	
	Asio flammeus	Short-eared Owl	
	Caprimulgus carolinensis	Chuck-will's-widow	
	Caprimulgus vociferus	Whip-poor-will	
	Chondestes grammacus	Lark Sparrow	SR
	Chordeiles minor	Common Nighthawk	
	Circus cyaneus	Northern Harrier	SR
	Cistothorus platensis	Sedge Wren	
	Colinus virginianus	Northern Bobwhite	
	Dendroica discolor	Prairie Warbler	
	Falco sparverius	American Kestrel	
	Icterus spurius	Orchard Oriole	
	Lanius ludovicianus	Loggerhead Shrike	SC
	Passerina ciris	Eastern Painted Bunting	
	Scolopax minor	American Woodcock	
	Spizella pusilla	Field Sparrow	
	Sturnella magna	Eastern Meadowlark	
	Tyrannus tyrannus	Eastern Kingbird	
	Tyto alba	Barn Owl	
Mammals	*Condylura cristata*	Star-nosed Mole	SC
	Cryptotis parva	Least Shrew	
	Microtus pennsylvanicus	Meadow Vole	
	Mustela frenata	Long-tailed Weasel	
	Scalopus aquaticus	Eastern Mole	
	Synaptomys cooperi helaletes	Southern Bog Lemming	
Reptiles	*Crotalus adamanteus*	Eastern Diamond-backed Rattlesnake	E
	Lampropeltis calligaster rhombomaculata	Mole Kingsnake	
	Lampropeltis getula getula	Eastern Kingsnake	
	Masticophis flagellum	Eastern Coachwhip	SR
	Ophisaurus attenuatus longicaudus	Eastern Slender Glass Lizard	
	Pituophis melanoleucus melanoleucus	Northern Pinesnake	SC
	Terrapene carolina	Eastern Box Turtle	

*Abbreviations
SC Special Concern
SR Significantly Rare

Location And Condition Of Habitat

Quality early successional habitats have declined considerably over the past half-century, due to reduction of fire, increasing development, and changing agricultural practices. Management of these habitats, especially through fire, is essential for their continued existence and to benefit early successional wildlife. Ephemeral by definition, the distribution and location of early succession habitats across the Coastal Plain can change dramatically within a decade. Currently, most early successional habitats on private lands are located on farmland, recently harvested timberland, powerline right-of-ways and roadsides. Map 1 depicts locations of early successional habitat in the Mid-Atlantic Coastal Plain ecoregion.

Regardless of how it is measured, high quality early successional wildlife habitat in the Coastal Plain of North Carolina is limited (other than industrial timberlands) and may be declining as a percentage of the landscape due to numerous factors.

The declines of grassland bird species, for example, is attributed to not only actual loss of habitat but also degradation of remaining tracts because of improper or inadequate management and encroachment of exotic vegetation, as well as fragmentation of habitat patches into small isolated units (Johnson and Igl 2001). We must determine if agricultural landscapes can support healthy bird populations (Peterjohn 2003) and decide on the future direction of research related to grassland birds (Vickery and Herkert 2001). Many shrub-scrub birds are also declining according to the best information we have (Hunter *et al*. 2001), and further information is badly needed on how they relate to reduced patch size of early successional habitat (Lanham and Guynn, Jr. 1998).

Problems Affecting Species And Habitats

Development and large-scale mono-agricultural operations causing a shortage of quality habitat in large patches (except on industrial forestland) is a major concern, along with fire suppression. Modern agricultural practices (frequent mowing, lack of field borders, pesticide use, and non-native plants like kudzu and fescue) are also a problem for wildlife that use early successional habitat around farmland. Exotic species have caused particular problems in early successional habitats. Fire ants kill newly hatched ground nesting birds and reptiles as well as newly born mammals. Brown-headed cowbirds parasitize bird nests, and many exotic plant species take advantage of the light conditions in early successional habitats.

Human development is causing loss and fragmentation of early successional wildlife habitat, and hinders the use of prescribed fire. Suppression of wildfires and lack of controlled burning eliminates an important source of early succession habitat creation and maintenance. Understanding the way that people perceive, use and value early successional landscapes (human dimensions) needs more attention (Askins 2001 and Gobster 2001).

Some species, such as northern bobwhite, may require large areas of contiguous habitat for long-term population viability. Current restoration efforts often focus on small acreages that have limited value for area-sensitive grassland species such as grasshopper sparrow and eastern meadowlark. Grasslands of >50 acres should be pursued to benefit these species. Some research has suggested that grasslands of at least 500 acres or may be needed to support

a diverse grassland bird fauna or rare species (Vickery *et al*. 1994 and Perkins *et al*. 2003). In addition roads have become a primary mortality factor for many birds, mammals and particularly reptiles and amphibians.

Early succession cover in powerline right-of-ways and roadsides can be adversely affected by too frequent or poorly timed mowing, as well as herbicide treatments (Bramble *et al*. 1992). In addition, many areas of fallow ground near houses or businesses are frequently mowed to maintain a neat appearance, while opportunities exist to convert these areas to suitable wildlife cover.

Most of the understory grass, forb, and shrub layers are lost once a newly planted timber stand "canopies out," which occurs typically 7-15 years after timber clearing and planting. Economic pressures, improvements in equipment and herbicides, and fast-growing genetic strains of trees have all reduced the amount of time to canopy closure, contributing to loss of early succession habitat. In addition, intensive site-prep techniques can reduce the quality and quantity of herbaceous cover during the early phases of timber planting (Morrison and Meslow 1984).

"High grading" of mature timber stands, instead of clearcutting or thinning, also eliminates the potential for early succession habitat creation over the life of stands. Many researchers suggest that silviculture will play an important role in providing habitat for many early successional wildlife species (Askins 1998; Thompson and DeGraaf 2001) so wildlife biologists need to maintain open lines of communication with foresters, and especially with large industrial timber companies. Tremendous opportunities exist on industrial forestland in the Coastal Plain of North Carolina to meet the needs of shrub-scrub birds of high conservation concern.

Powerlines, fields and field borders are usually devoid of any dead and downed logs for herpetofauna. Even clearcuts that supply some dead and downed material don't have near as much as what would have been available under natural conditions created by wildfires or hurricanes.

Economic pressures, improvements in equipment and herbicides, and social factors have all lead to larger, more uniformly shaped rowcrop fields, as well as "cleaner" fields with less weedy edge (Marcus *et al*. 2000). Few rowcrop fields are managed to include a fallow rotation. Some beneficial practices, such as no-till planting, have had mixed success in being adopted. In pastureland, the extensive use of exotic cool-season grasses have reduced habitat quality for wildlife. Cutting hay in mid-summer and overgrazing can adversely affect nesting grassland birds.

Species And Habitat Conservation Actions and Priorities For Implementation

The use of native grasses, shrubs, and herbaceous plantings to support breeding birds, small mammals and herpetofauna should be encouraged. Prescribed burning should be conducted to restore and improve field borders, and the training of certified burners should become a priority. Liability and air quality concerns need to be addressed.

Management of large blocks (50 acres or greater) of shrub-scrub and grassland habitat is needed to restore ample suitable habitat, to serve as breeding sites for area-sensitive shrub-

scrub and grassland species. Patches of early successional habitat should be connected whenever possible to form larger blocks by working with neighboring landowners to cooperate and create large-scale habitat areas. A better understanding of the predator community in early successional sites and their interactions with nesting birds and other wildlife are needed at various habitat patch sizes.

Establishment of field border systems may be an effective way to increase densities of some birds (especially wintering sparrows) on farms at certain times of the year (Marcus *et al*. 2000). Work needs to continue with private landowners to improve hayfield management (e.g., avoid cutting during prime bird nesting season: May- July). Biologists need to continue to work with private landowners to establish no-till agriculture, fallow rotations and hedgerows on agricultural lands. Work is also needed to educate the public on the value of early successional habitats and the benefits of controlled burns (Gobster 2001).

Support is needed to help with implementation of federal Farm Bill programs, North Carolina's Cooperative Upland habitat Restoration and Enhancement program, and other programs that encourage the establishment and management of early succession habitats on private lands. We must also continue efforts to work in cooperation with species-specific initiatives such as the Eastern Painted Bunting Working Group and the Northern Bobwhite Conservation Initiative (Dimmick *et al*. 2002), and to follow prescriptions recommended by those groups.

As nearly all early successional habitats are now created by humans, there is little need for outright acquisition of such habitats. For that matter, there may be increasing public pressure to minimize early successional acreage (e.g., return abandoned farmland to natural systems over time). Thus, it is important for biologists to creatively work to provide the best foraging, nesting, and roosting habitat for priority species in the remaining early successional habitats.

Biologists and researchers need to work with timber companies and private foresters to encourage best management practices that maintain early succession habitat for as long as possible in a timber rotation and reduce the amount of linear edge on some harvest units. Effort needs to be made to encourage early successional areas with dead and downed material present. Retention of snags within clearcuts will help with this effort. Finally, land use planning needs to be encouraged to minimize development within large, unfragmented tracts of farm and forestland that has habitat components that benefit early successional wildlife.

Priority Research, Survey, And Monitoring

Surveys are needed to document the distribution, relative abundance and status of many wildlife species associated with early successional habitats. Priorities for conducting surveys need to focus on species believed to be declining, at risk or mainly dependent on early successional communities.

Secondary priority for surveys should be for species for which current distribution information is already available or for species that are considered common. Monitoring systems need to be expanded and/or targeted to be able to assess current population status and trend information for all wildlife species associated with early successional habitats. Research studies targeting birds need to be long-term and large-scale, replicated studies that have controlled

experimental approaches and focus on population demographics and the response of species to habitat manipulations where appropriate as outlined by the National Partners in Flight Research working group (Donovan *et al*. 2002). Similar research priorities are needed for other early successional taxa including bats, small mammals, amphibians and reptiles.

- **Survey**
  - Determine the status of high priority birds (e.g., Henslow's sparrow, eastern painted bunting, Bachman's sparrow, grasshopper sparow, loggerhead shrike, field sparrow, American woodcock, northern bobwhite, and barn owl) and secondarily for other more widely distributed early successional birds that seem to be declining, such as eastern meadowlark, orchard oriole, eastern kingbird.
  - Determine the status, distribution, and extent of breeding by short-eared owl, northern harrier, and American kestrel.
  - Conduct nocturnal surveys for chuck-will's-widow and whip-poor-will.
  - Determine the status and distribution of hard to detect species such as dickcissel, bobolink and lark sparrow.
  - Determine the status and distribution of small mammals that are rare or difficult to detect (e.g., star-nosed mole, shrews, long-tailed weasel, southern bog lemming) and secondarily for other small mammals using early successional habitats.
  - Survey for bats foraging in early successional habitats.
  - Survey for uncommon and/or hard to detect reptiles (e.g., eastern diamond-backed rattlesnake, mole kingsnake, eastern coachwhip, eastern slender glass lizard and northern pinesnake) in early successional habitats.
- **Monitoring**
  - Many early successional bird species require monitoring attention, due to documented BBS declines, but BBS does not adequately sample irregularly distributed or clumped species. Declines for grassland species (grasshopper sparrow, Henslow's sparrow, eastern meadowlark) have been documented as being especially high, but birds that utilize shrub-scrub such as prairie warbler and common yellowthroat have also seen declines and are in need of additional long-term monitoring.
  - Establish MAPS and migration banding stations, especially in shrublands, grasslands, hay fields, and pastures.
  - Initiate long-term monitoring for Henslow's sparrow (and other grassland breeding and wintering birds) at the Voice of America (VOA) sites in Pitt and Beaufort Counties (Mangun and Kolb 2000).
  - Establish long-term monitoring for declining (according to our best information) early successional bird species in appropriate habitat at all seasons, like Bachman's sparrow (Stober and Krementz 2000).
  - Continue long-term monitoring of early successional birds needed on Game Lands, National and State Forests and National Wildlife Refuges.
  - Initiate long-term monitoring of mammal species of early successional habitats on habitat patches of varying sizes (Yates *et al*. 1997 and Litvaitis 2001).

- Establish long-term monitoring of eastern diamond-backed rattlesnake and northern pinesnake (Woodward and Barthalmus 1996).

- **Research**

  Genetics

  - Conduct genetics studies of the breeding sub-species of American kestrel in the lower Coastal Plain.
  - Conduct genetics studies on Henslow's sparrows at the VOA sites.
  - Conduct genetics studies on Coastal Plain shrew species.

  Habitat use

  - Examine Chuck-will's-widow and whip-poor-will foraging areas on industrial and non-industrial forestland.
  - Study the effects of patch size and vegetative structure on nesting success of early successional birds (Burhans and Thompson 1999; Ricketts and Ritchison 2000).
  - Study the effects of patch size on small mammal populations (Yates *et al*. 1997).
  - Conduct movement studies on northern pinesnake and eastern diamond-backed rattlesnake (using telemetry).

  Population demographics

  - Conduct bird nest search and spot mapping studies on public land and on industrial forestland on various patch sizes.
  - Examine loggerhead shrike productivity, especially near farms and Cooperative Upland habitat Restoration and Enhancement Program cooperatives.
  - Examine nightjar productivity on industrial forestland compared to non-industrial forestland.
  - Examine prairie warbler productivity on industrial forestland compared to non-industrial forestland.
  - Expand bat research on industrial forestland (e.g. Weyerhaeuser and International Paper lands).

  Predator effects

  - Examine predators effects on nest productivity of ground- and shrub- nesting birds (Yahner and Wright 1985 and Davison and Bollinger 2000).
  - Determine the effects of cowbirds on early successional bird productivity
  - Study the impacts of fire ants on bird nests, small mammals and reptiles in disturbed sites (Smith *et al*. 2004).

  Management practices

  - Determine the effects of clearcut stand size on shrubland birds (Krementz and Christie 2000).
  - Examine the responses of bird communities to early successional habitat in a managed landscape (Wilson and Watts 2000, Yahner 2003).

- Determine the effects of silvicultural procedures on breeding, wintering and migrating birds on managed forests (Woodward *et al*. 2001, Easton and Martin 2002)
- Determine the effects of clearcut stand size on small mammals and reptiles (Yates *et al*. 1997).

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