Early Successional Habitats

Piedmont Ecoregion

Piedmont early succession and scrub-shrub habitats, characterized by low woody vegetation and herbaceous plants, are often found associated with agricultural or forestry activities. This habitat includes grasslands, shrublands, clearcuts and regenerating forests, large canopy gaps, hayfields, pasture, row crops and field borders. For the purposes of this Strategy, this habitat category will also include open savannas, or any habitat where dense understory vegetation is maintained through periodic disturbance. These habitats are created and maintained by disturbances like discing, clearcutting, or burning. To a lesser extent, extreme weather events or tree pests (insects and diseases) can also create early succession habitats. Historically, large herbivores and Native American land uses likely contributed to the creation and maintenance of these habitats.

By their nature, early succession habitats are ephemeral and will have a limited longevity without repeated disturbance. The habitat structure changes as succession progresses, and many wildlife and plant species are adapted to different stages within the early succession continuum, from bare earth through pole-stage woodland. Managing for species dependent upon early succession habitats presents several management challenges, including the need to identify which successional stage is most appropriate for the species or assemblage of interest and the need for repeated management actions to maintain suitable habitat.

Early succession habitats can contain a diverse assemblage of plants, with Piedmont prairies being a notable example of this (Davis *et al*. 2002). However, intensively managed habitats such as large lawns, golf courses, high production agricultural fields, monoculture hayfields, and intensively managed commercial timber stands often have low species and structural diversity, and thus have limited habitat value for wildlife. They may, however, play a role in the overall landscape scale habitat selection process of certain early successional species, provide transitional habitats, or provide habitat for a limited number of other species. Therefore, in a general sense or at a large scale, they can be included as part of the overall early successional habitat matrix, though most of the priority early successional species require a more diverse plant community than is often provided at these kinds of sites.

The landscape context can be critical for success of maintaining populations of early succession species, as many of these species depend on the ability to rapidly colonize new areas as succession renders other areas unsuitable, and many of the species in this group are “area sensitive,” requiring a minimum contiguous habitat patch size before they will colonize an area or successfully reproduce. Many early succession habitats with otherwise suitable habitat structure may have limited wildlife value if the habitat patch is too small or isolated from other similar habitats.

Historically, the Piedmont contained some prairie-type habitats (Barden 1997) with high plant and, presumably, insect diversity. Around the time of colonization, these Piedmont prairies were maintained through fire and herbivore grazing. Today, remnant tracts of prairie are found

primarily along powerline rights-of-way and sites managed specifically for prairie restoration and maintenance. Table 1 provides a list of priority species associated with this habitat for which there are conservation concerns.

Table 1. Priority species associated with piedmont early successional habitats.

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	
	Caprimulgus carolinensis	Chuck-will's-widow	
	Caprimulgus vociferus	Whip-poor-will	
	Chordeiles minor	Common Nighthawk	
	Colinus virginianus	Northern Bobwhite	
	Dendroica discolor	Prairie Warbler	
	Dolichonyx oryzivorus	Bobolink	
	Empidonax traillii	Willow Flycatcher	
	Falco sparverius	American Kestrel	
	Icterus spurius	Orchard Oriole	
	Lanius ludovicianus	Loggerhead Shrike	SC
	Scolopax minor	American Woodcock	
	Spiza americana	Dickcissel	
	Spizella pusilla	Field Sparrow	
	Sturnella magna	Eastern Meadowlark	
	Tyrannus tyrannus	Eastern Kingbird	
	Tyto alba	Barn Owl	
Mammals	*Cryptotis parva*	Least Shrew	
	Microtus pennsylvanicus	Meadow Vole	
	Mustela frenata	Long-tailed Weasel	
	Peromyscus polionotus	Old-field Mouse	SR
	Scalopus aquaticus	Eastern Mole	
	Zapus hudsonius	Meadow Jumping Mouse	
Reptiles	*Lampropeltis calligaster rhombomaculata*	Mole Kingsnake	
	Lampropeltis getula getula	Eastern Kingsnake	
	Ophisaurus attenuatus longicaudus	Eastern Slender Glass Lizard	
	Terrapene carolina	Eastern Box Turtle	

*Abbreviations
SC Special Concern
SR Significantly Rare

Location And Condition Of Habitat

Ephemeral by definition, the distribution and location of early succession habitats across the Piedmont can change dramatically within a decade. Currently, most early succession habitats are found on private lands in farmland, recently harvested timberland, powerline rights-of-way, roadsides, and managed Piedmont prairies. The extent and quality of early succession habitats has been greatly dependent upon human land use patterns. While there is some uncertainty of the extent of early succession habitats prior to European settlement, it is likely that many early succession species' populations peaked in the early 1900s with extensive clearing of forests and low-intensity agricultural operations. In the second half of the 20th century, the quantity and quality of early succession habitats have diminished due to reduction of the use of fire, increasing development, encroachment of exotic vegetation, changing agricultural and forestry practices, and fragmentation of habitat patches into small isolated units (Cobb *et al*. 2002, Johnson and Igl 2001, Thompson and DeGraaf 2001, Warner 1994). Populations of many species that depend on these habitats have also declined during this time period (e.g. Hunter *et al*. 2001, Litvaitis 2001). Map 1 depicts locations of early successional habitats in the Piedmont ecoregion.

Problems Affecting Species And Habitats

The routine land disturbance by agricultural operations provides the best opportunities for early succession habitat creation and maintenance in North Carolina. However, the value of modern farmland for early succession wildlife has been reduced as economic pressures, improvements in equipment and herbicides, and social factors have all led to larger, more uniformly shaped rowcrop fields, as well as "cleaner" fields with fewer weeds in the fields and less weedy edge. 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 has reduced habitat quality for wildlife. Cutting hay in mid-summer and overgrazing can adversely affect nesting grassland birds.

Commercial forestry operations create much of the early succession habitat available in the Piedmont. In 2002, about 1.1 million acres (10% of the total land area in the Piedmont) were classified as timber stands <10 years old (Brown and Sheffield 2003). Clear-cutting timber typically results in the creation of early succession habitat for a short period of time. Most of the understory grass, forb, and shrub layers are typically reduced or lost once a newly planted commercial timber stand "canopies out", which occurs typically 7-15 years after timber clearing and planting. Heavily stocked, even-aged pine monocultures typically retain very little understory structure after canopy closure. 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 stand establishment. Conversion of longleaf to loblolly pine hampers the ability of foresters to conduct controlled burns during the early years of tree growth. Thinning of mature trees creates another opportunity for understory habitat development, but most commercial operations leave too high a basal area after thinning for much benefit to be realized. "High

grading" of mature timber stands, instead of clear-cutting, reduces the potential for early succession habitat creation.

Suppression of wildfires and lack of controlled burning eliminates an important source of early succession habitat creation and maintenance within many forested habitats. Concerns about uncontrolled fire, liability, air quality, social acceptance, and smoke management, and lack of landowners with the experience and equipment to conduct controlled burns have limited the use of fire on private lands.

Grass/shrub habitat is lost through the natural process of succession and also through conversion to other land uses. Human development in rural areas of the Piedmont is causing loss and fragmentation of agriculture and forest lands (U.S. Department of Commerce 1992), and hinders the use of prescribed fire. While some early succession species, such as northern mockingbird, song sparrow and black rat snake, have adapted well to human development, most of the priority species for this habitat are harmed by the encroachment of development. While most birds can rapidly find and colonize early succession habitat patches, some bird species (and grassland birds in particular) are area sensitive and will not use small patches of habitat surrounded by forest or developed areas. Bobwhite quail may require large (>5,000 acres) areas of contiguous habitat for long-term population viability (based on Guthery *et al*. 2000). The isolation of suitable early succession habitats may be most problematic for mammals and herptiles which have limited dispersal ability and may suffer high mortality when traveling through unsuitable habitats. Forest managers can increase connectivity of early succession habitats by planning forestry operations in adjacent stands or creating corridors between timber harvests.

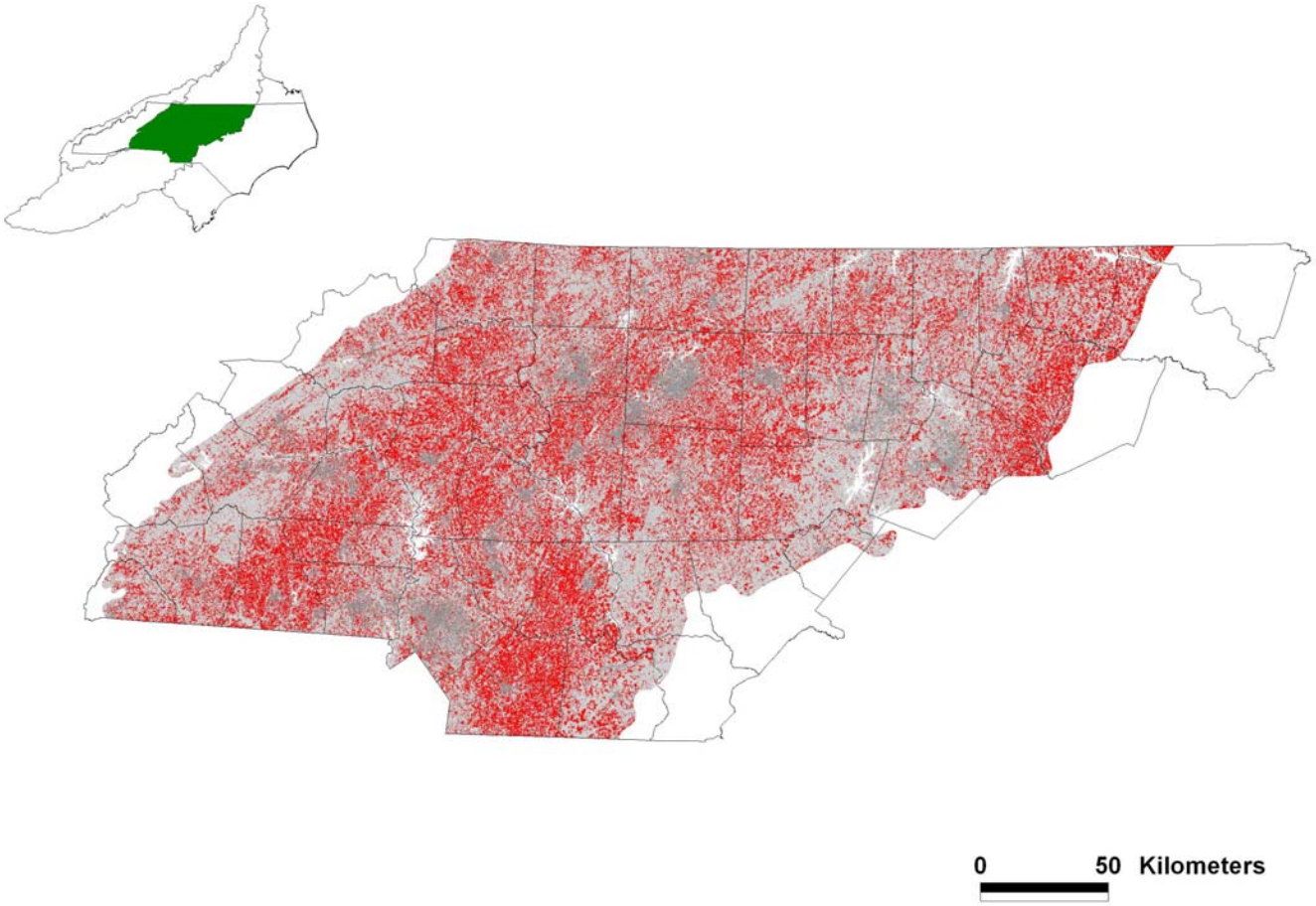
Early succession cover in powerline rights-of-way and roadsides is often adversely affected by too frequent or poorly timed mowing. In addition, many areas of fallow ground near houses or businesses are frequently mowed to maintain a neat appearance, while opportunities exist to convert some of these areas to suitable wildlife cover. Fallow or un-mowed areas are seen by many as "messy" and "weedy", and an indicator of a lack of caring or effort by a landowner. This widespread public perception is partially responsible for fallow habitats being reduced in habitat quality or eliminated.

Piedmont prairies contain highly diverse and specialized plant and insect communities. Currently, only small remnant tracts remain. Fire and/or low intensity agricultural operations are necessary to maintain prairie communities. Current restoration efforts are focused on plant conservation and have been implemented on small acreages that have limited value for area-sensitive grassland species such as grasshopper sparrow and eastern meadowlark. Grasslands of >20 acres should be pursued to benefit these species.

The effects of exotic plants, insects, and animals on early succession habitat and native wildlife populations are poorly understood. Impacts are likely to vary widely depending on the species involved, environmental conditions, and management activities. Fire ants are a species of particular concern, especially regarding their potential impact on herpetofauna, small

mammals, and ground nesting birds. The impacts of commercial collecting of box turtles on local populations are unknown.

Map 1. Early successional habitats (including agricultural areas) in the Piedmont ecoregion of North Carolina (in red).



Data source: NC GAP, 1992

Species And Habitat Conservation Actions and Priorities For Implementation

With a convergence of interest in the conservation of early succession habitats by both game and non-game communities, there is a great opportunity to bring a lot of resources to bear on problems facing this habitat. Both the Northern Bobwhite Conservation Initiative (Dimmick *et al*. 2002) and the Partners in Flight Southern Piedmont Bird Conservation Plan (Cooper and Demarest 1999) call for similar actions to promote early succession habitat, and both game and

non-game objectives have been incorporated into the Commission's early succession habitat initiative, the Cooperative Upland habitat Restoration and Enhancement (CURE) program.

Since the greatest opportunities for creating and maintaining early succession habitat in the Piedmont exists on private "working" lands, the highest priority for conservation actions should be to forge and expand partnerships and programs to promote early succession habitat management on agriculture and forestry lands. Many financial incentive programs are currently in place to facilitate management of private lands (particularly through the Farm Bill), including the Wildlife Habitat Incentives Program, the "bobwhite buffers" (CP-33) program, and CURE, which are designed explicitly to enhance early succession wildlife populations. The most limiting factor for implementation of these programs seems to be technical guidance manpower to solicit and work with private landowners. Potential partners for implementing conservation practices on private lands include but are not limited to the Natural Resources Conservation Service, Farm Services Agency, Soil and Water Conservation districts, Cooperative Extension, consulting foresters, land trusts, sportsman groups (like Quail Unlimited), US Fish and Wildlife Service Partners program, and the Commission.

The Commission has identified "focal areas" for early succession habitat work within the Piedmont and upper coastal plain for the CURE program (see Howell *et al*. 2002). These focal areas contain landscapes that are considered to provide the greatest potential for early succession habitat management on private lands. These focal areas should be used to prioritize and focus other early succession habitat initiatives. Furthermore, conservation efforts should be geographically clustered, to the extent possible, to create larger areas of contiguous early succession habitat.

Habitat management and restoration actions

- The greatest need and opportunity within private agricultural lands in the Piedmont is to increase the habitat value of pasture and hayfields. Conservation programs should promote the integration of native warm season grasses into livestock operations, and discourage haying or overgrazing during the nesting season.
- On row crop farms conservation actions should focus on using technical guidance and outreach to help promote establishment of field borders, no-till agriculture, fallow rotations, hedgerows, and native herbaceous and shrub plantings. We should proactively encourage the establishment of large blocks of habitat and increasing the connectivity of existing habitats by encourage neighboring landowners to work together to create larger-scale habitat areas. The Commission's CURE program provides one example of how such an effort could be implemented.
- Cooperative agreements and incentive programs should be forged with industrial timber companies to promote best management practices to enhance early succession habitat structure, maintenance and connectivity. An example of such an agreement is the Upper Tar River Memorandum of Understanding signed between International Paper and several North Carolina conservation organizations in 2004. While this agreement focused primarily on riparian habitats, it provides a framework and precedent for the type of voluntary conservation agreement that can be reached with timber companies. Successful promotion of early succession habitat enhancement on industrial timberlands will require an understanding of the financial costs of implementing those practices. The Wildlife and

Industry Together (WAIT) program may help with this endeavor. Timber companies, Partners in Flight, Partners in Amphibian and Reptile Conservation, the NC Forest Service, and the Commission will all be important players.

- An effort should be made to encourage the use of controlled burning, including promoting the training of certified burners and addressing liability concerns and air quality concerns. A critical partner in this endeavor will be the NC Forest Service.
- An effort should be made to promote best management practices among non-industrial private timber managers. Practices that should be promoted include pre-commercial thinning, thinning to lower basal areas, controlled burning, minimizing the linear edge of harvest units, and planting longleaf pine where appropriate. Practices that should be discouraged include "high-grade" timber thinnings. Critical partners in this effort include private consulting foresters and the NC Forest Service.
- Sites with potential for restoration of Piedmont prairies should be identified and beneficial management should be proactively promoted. Sources of local-ecotype native seed should be developed for use in restoration projects. The Piedmont Prairie Partnership is providing a framework for those interested in prairie restoration.

Policy-based actions

- The current NC Use Value Assessment Program for assigning land taxes charges higher land taxes for land managed exclusively for wildlife than for land in agricultural or forestry production. This creates a financial disincentive for landowners to convert working lands into permanent wildlife cover. This tax code [including N.C.G.S. 105-160A-49(fl), 105-277.2 through 105-277.7, 105-289(a)(5) and (6), 105-296(j), and 106A-37(fl)] should be amended to include managed wildlife habitat in the same land valuation category as agriculture and forestry (Cobb *et al*. 2002).
- Land use planning should be promoted to minimize development within large, unfragmented tracts of farm and forestland, particularly within the CURE focal areas and in regions that are not yet experiencing heavy development pressure. Critical partners in this endeavor include county commissions and zoning boards, developers, the NC Department of Transportation, land trusts, and the American Farmland Trust.

Protection actions

- Conservation organizations should consider acquisition of upland agricultural habitats, which could be subsequently leased to tenant farmers with stipulations for favorable early succession habitat management practices. A high priority should be placed on acquiring sites with potential for restoration of Piedmont prairies.
- Easement programs that protect farm and forestland from development should be promoted, particularly within the CURE focal areas. Land trusts and the Natural Resources Conservation Service will be important partners.
- Educate the public on the value of early succession habitats and on the beneficial role of controlled burning. Teachers, nature centers, Cooperative Extension agents, foresters, and the Commission's Division of Conservation Education are among the educators who can help in this endeavor.

Priority Research, Survey, And Monitoring

Priorities for conducting surveys, monitoring, and research need to focus on species believed to be declining, at risk or mainly dependent on early successional communities, with highest priority given to habitat specialists. Secondary priority should be for species for which current information is already available or for species that are considered common.

We are aware of few long-term monitoring programs in the Piedmont that are focused on early succession habitats. The best information currently exists for birds (primarily through the Breeding Bird Survey and Christmas Bird Count, though also through Commission and Mecklenburg County Department of Parks and Recreation monitoring programs), while very little population status and trend information is available for mammals and herptiles. High priority should be given to developing monitoring systems for these taxa.

The identification of "surrogate species" (those species who may be representative of the habitat needs of a particular guild of species and are widespread enough to allow population monitoring) will facilitate monitoring efforts. Surrogate species should be identified for bird, mammal, amphibian, and reptile communities. For birds we suggest the following surrogate species:

- Grasslands: eastern meadowlark, northern bobwhite and grasshopper sparrow;
- Shrublands: field sparrow, indigo bunting, blue grosbeak, prairie warbler, and yellow-breasted chat;
- Open Woodlands: red-headed woodpecker and brown-headed nuthatch.

Research priorities should include understanding the factors that limit populations of at-risk species, and the development and refinement of habitat and population management strategies. Particular effort should be made to find habitat management strategies that are easy and cost-effective to implement on "working" lands. N.C. State University and other research colleges and universities in the state will be important partners in accomplishing some of these research goals.

- **Surveys**
  - Surveys are needed to document the distribution, relative abundance and status of many wildlife species associated with early successional habitats. This need is particularly acute for mammals and reptiles.
  - Survey small mammals to determine the composition of the early succession mammal community in the Piedmont.
  - Determine the distribution of the least shrew, meadow jumping mouse and old-field mouse surveys (especially in Rutherford Co.).
  - Document the status and distribution of mole kingsnake, eastern kingsnake and eastern slender glass lizard and survey for more common amphibians and reptiles using early succesional habitats.
  - Determine the importance of early succession habitats for foraging bats.

- Implement winter surveys for birds (and other taxa) to measure populations at the time of the year when early succession habitat may be most limiting.
- Survey for grassland birds that are considered to be steeply declining, are not tracked well by typical survey methods, or have poorly understood distribution and status in the region (e.g., barn owl, grasshopper sparrow, Bachman's sparrow, eastern meadowlark and eastern kingbird).
- Conduct nocturnal surveys for Chuck-will's-widow and whip-poor-wills, concentrating on foraging areas.
- Determine vesper sparrow breeding status and loggerhead shrike status and distribution.
- Conduct migration surveys to determine the extent of use of early succession habitats by post-breeding and migratory birds.

- **Monitoring**
  - Develop monitoring systems to determine population trend information for grassland-dependent small mammals.
  - Establish MAPS, winter, and migration bird banding stations - especially in grasslands and hay fields.
  - Continue and expand long-term monitoring of grassland and scrub-shrub birds on Piedmont Game Lands and other public lands.
- **Research**

  Habitat use
  - Examine the habitat requirements of habitat specialists and ways to integrate management for these species into commercial agriculture and forestry operations.
  - Examine the minimum habitat patch and habitat complex size required to sustain populations of shrub-scrub and grassland birds and mammals. Some studies suggest that patch size may be an important factor affecting both birds (Lanham and Guynn 1998) and mammals (Yates *et al*. 1997).
  - Evaluate the landscape context (amount of suitable habitat in surrounding landscape) for sites where rare species are found.
  - Study the responses of bird communities to early successional habitat in managed landscapes and unmanaged landscapes.
  - Evaluate the habitat requirements and management needs of grassland-dependent herpetofauna.
  - Identify factors limiting populations of loggerhead shrike.

  Populations and communities
  - Examine impacts of cowbird parasitism and predation on neotropical migrant nesting productivity (e.g., hooded warbler, Kentucky warbler, eastern wood-pewee and worm-eating warbler).

Predator effects

- Identify predators of field sparrow nests, and other species with high nest depredation rates.
- Determine if cowbirds are negatively impacting bird productivity in portions of the western Piedmont with higher densities of livestock and cowbirds.
- Examine the impacts of fire ants on herpetofauna, small mammals, and ground nesting birds, in addition to large scale management actions that could be used to control fire ants.

Other

- Conduct economics and human dimensions research to determine how to make early succession habitat creation and maintenance more financially and socially acceptable for private landowners.

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