Qualifying Native Warm-Season Grasses and Early Succession Habitat

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Abstract: Tall fescue and other non-native perennial cool-season grasses (such as orchardgrass, timothy, bromegrasses, and bluegrass) provide poor wildlife habitat. Native warm-season grasses (nwsg), especially big and little bluestem, indiangrass, and switchgrass, have been promoted to replace non-native cool-season grasses and enhance quality early succession habitat. Initially, problems associated with establishing nwsg and landowner misperceptions slowed the progress of early succession habitat enhancement on private lands. More recently, improvements in planting equipment, herbicides, and seed quality have increased establishment success. Wildlife response to native grass plantings generally has been positive, especially when an abundance of wildlife-friendly forbs and scattered shrubs occur with the grasses. Landowners, however, still have misperceptions about native grass plantings. Specifically, there is considerable confusion as to the appearance of quality early succession habitat. A persistent "farming mentality" finds fields with a diverse composition and structure unappealing. Instead, landowners typically wish to see fields of planted native grass appear like a tall fescue field–thick, clean and even, visually pleasing, with no "weeds." Unfortunately, many wildlife managers have the same misconception that "clean" native grass fields should be the goal when managing for grassland species. Prime early succession cover often is created simply by killing the non-native grass carpet and then stimulating the native seedbank with fire or disking. Further, there is no need to even plant nwsg where broomsedge and a variety of forbs, brambles, and sumac await release. We suggest an integrative approach, using extension pamphlets, professional development workshops, landowner meetings, and field demonstrations, to teach wildlife managers and landowners the appropriate composition and structure of nwsg plantings and other early succession habitats.

Key Words: Extension education, fire, habitat, native grasses, seeding, vegetation management, warm-season grasses, wildlife habitat improvement

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Historical Perspective

Land-use patterns have changed dramatically across the South in the past 50 years (Heard et al. 2000). The biggest change is human encroachment into rural areas (Graham 2002). Thousands of acres of potential wildlife habitat are lost each year to a growing suburbia. Moreover, land that isn't lost to urban development has changed greatly. The small family farms of yesteryear have disappeared along with the small rowcrop fields that were fallow for much of the year, the weedy field borders and fencerows, and brushy creek banks. Today, remnant farmland is stressed to produce high yields on larger fields that are double- or triple-cropped each year and cleaned with herbicides, leaving no fallow growth for wildlife habitat. Many fields that were in rowcrop production through the 1960s were planted to pasture or hay through the 1970s, and 80s, often just to keep the fields from "growing up" rather than for financial gain. The vast majority of these pastures and hayfields were planted to non-native perennial grasses, such as tall fescue and bermudagrass, which provide little wildlife benefit and displace potential quality early succession cover (Barnes et al. 1995).

Through this period, many wildlife species dependent upon and/or associated with early succession habitats experienced significant population declines. Northern bobwhite, loggerhead shrike, Henslow's sparrow, field sparrow, grasshopper sparrow, eastern meadowlark, indigo bunting, cottontail rabbit, and others have decreased to a fraction of their population 30 years ago (Peterjohn and Sauer 1999). Although there are many factors associated with these declines, an overriding factor is habitat loss and or conversion to unsuitable cover (Dimmick et al. 2002).

The population decline for many early succession species was so slow that it was not perceived by most wildlife managers until fairly recently. Initially, many factors were blamed for population declines. For example, predation, diseases, and inadequate food supply all were suspected and investigated to some degree as the cause for northern bobwhite declines. More recently, however, intensive habitat investigations

and population modeling have identified broad deficiencies in habitat quality on a landscape scale for most species strongly associated with early succession habitats (Burger 2002). Managers now realize the importance of habitat connectivity and landscape-scale conservation, and that many early succession species cannot be managed on a field-by-field basis (Guthery 1997). Nonetheless, habitat improvement begins at the individual field level and there is a strong push from the conservation community for landowners to improve early succession habitat. This effort includes a wide variety of programs that provide cost-share assistance and sign-up incentives designed to persuade landowners to change many current land-use habits (Heard et al. 2000).

Problems Associated with Habitat Improvement

Habitat improvement efforts include eradication of non-native perennial grasses and establishment of native warm-season grasses. Switchgrass, big and little bluestem, and indiangrass have been the primary species recommended by state wildlife agencies, the Natural Resources Conservation Service (NRCS), and non-profit organizations. As private lands management initiatives have been developed, 3 main problems associated with these habitat improvement recommendations have become evident.

Lack of Non-Native Grass Control

Non-native perennial grasses, such as tall fescue and bermudagrass, lack desirable cover and provide poor structure for many birds and other small wildlife (Barnes et al. 1995, Bond et al. 2005). Thick growth at ground level makes travel through fields dominated by these non-native species difficult. Seed availability also is reduced by the sod and thatch produced. Forb coverage is limited because of the literal "carpet" of grass that blankets the seedbank and limits germination. Before any habitat improvements can be made, it is imperative that these grasses be eradicated.

Many fields have been planted to native warm-season grasses (nwsg) without first spraying and effectively killing the existing non-native grass cover with the appropriate herbicide. The practices of plowing and disking do not kill these undesirable grasses. Even if nwsg are established successfully, non-native grasses grow amongst the nwsg within 2 years if they are not eradicated beforehand. Thus, even though nwsg are growing on the site, field conditions for wildlife remain suboptimal. Nwsg planted in fields with bermudagrass pose an especially unique problem. Although herbicide advancements in the last 10 years have made nwsg establishment much easier, there is no herbicide that will kill bermudagrass growing in association with nwsg. Thus, the entire field must be killed to eradicate bermudagrass.

Lack of Establishment Success

Early attempts (1980s through the mid-1990s) at habitat restoration with nwsg were set back severely because of establishment problems. Establishment success has improved dramatically with recent advancements in planting equipment (e.g., no-till drills specifically designed for nwsg seed with long awns) and herbicides (Harper et al. 2004). Despite these advancements, however, difficulties establishing nwsg still occur. Most notably, planting seed too deep or too late in the growing season, and competition with non-desirable plants, make many establishment efforts futile. As a result, many managers become discouraged and recommend against planting nwsg because they don't germinate quickly (if at all), don't grow quickly during the year of establishment, and/or don't compete well with "weeds."

Improper Species Mixtures, High Seeding Rates, and Lack of Management

Prior to development of the appropriate drill attachments, it was difficult to sow the fluffy seed of bluestems and indiangrass. As a result, most managers planted switchgrass. The seed was small and smooth (much like millet) and it was easily top-sown or drilled. There were problems with plant competitors, especially with non-native warm-season grasses (such as crabgrasses and johnsongrass), but the patient manager could usually establish a stand of switchgrass within a couple of years. Thus, for many, establishing nwsg meant sowing a pure stand of switchgrass. Moreover, expectations as to what the field

should look like undoubtedly were influenced by past experiences with non-native cool-season grasses. Managers planted *thick* stands of switchgrass, often using 8-10 pounds of pure live seed (PLS) per acre. As a result, wildlife response was mixed. Some thick stands of pure switchgrass did not present much better habitat than a cool-season grass field. Indeed, a pure stand of switchgrass was about as unnatural as a field of tall fescue.

As cost-share assistance programs began to enroll considerable acreage into nwsg and equipment improvements were made (late 1990s), more bluestems and indiangrass were planted. However, problems associated with field image continued. Mixed stands of nwsg were planted at 6-10 pounds PLS per acre, resulting in a *thick mixed stand* with few forbs present in the field. Landowners began to think this was what "early succession habitat" should look like because that's what the biologists prescribed! Again, wildlife response was mixed, and it was common to see reduced wildlife activity in those fields with dense grass that were not burned or disked (Dykes 2005). Grass density generally became excessively dense 4-5 years after planting.

Thick stands of grass limit forb coverage, which reduces habitat quality for most wildlife species that use early succession habitats. Forbs provide structural diversity, more openness at ground level, and an important seed source and quality forage. Forbs also attract higher numbers of pollinators and other invertebrates, which are an important food source for many birds. Shrubs represent yet another critical component for a number of wildlife species. Scattered shrubs provide additional cover and diverse structure needed by northern bobwhites and several songbirds. Certain shrubs (such as wild plum, sumac, and elderberry) also provide soft mast for birds and mammals.

Until 2004, many fields enrolled into conservation programs were never "set back" or managed. Mid-management practices were prescribed by the NRCS to invigorate fresh growth and improve the structure and composition of enrolled fields. Unfortunately, a "reluctance to burn" attitude prevents many landowners and some wildlife managers from using fire to manage early succession fields, leaving only mowing and disking as viable management options. Because it is impossible to disk the thick, tall mixtures that have been recommended and planted, most landowners use mowing as a management practice (Dykes 2005). This only makes field conditions worse. Mowing is most often accomplished during the summer, killing young wildlife and destroying habitat necessary for reproductive success. Mowing also accumulates thatch and other debris, reducing openness at ground level and limiting germination and growth from the seedbank (McCoy et al. 2001). A more proactive, aggressive management strategy is needed.

New Vision

Recent research has shown burning and/or disking are necessary to reduce grass density and improve the structure and composition of early succession habitat (Gruchy and Harper 2006, Gruchy et al. In Press). Further, managers have begun to realize a 3-4-pound PLS per acre seeding rate is most appropriate for wildlife habitat. Coverage of nwsg should not exceed 60 percent. This allows an *early succession community* to develop, replete with a variety of forbs and grasses and scattered shrubs. This composition and structure is absolutely crucial when trying to replicate the quality habitat with which our native wildlife evolved. Ironically, ideal early succession habitat conditions are often created simply by eradicating the non-native cover and allowing the seedbank to respond. Indeed, it is amazing how long seed can remain viable in the seedbank, just waiting for a chance to germinate. Recent research has shown dramatic increases in wildlife populations when naturally occurring forbs and grasses are allowed to develop in place of non-native cover (Palmer et al. 2005).

Is There a Need to Plant?

If quality early succession habitat can be created by stimulating the seedbank, is it necessary to plant? We don't think so. However, there are a couple of risks when direct planting is not used.

An obvious risk is trying to manipulate a seedbank that is depleted of native seed or one that contains a disproportionate amount of non-native seed. Seedbanks vary greatly from site to site, but there are some

generalities that hold true. Forested areas at least 60-70 years old usually contain extremely rich seedbanks with few non-native early successional species. Within 2 years after clearing, a diverse early succession community is usually established without planting. Old pastures, however, are always full of non-native grasses and forbs. Techniques used to eradicate these species can deplete existing native plant populations, thus lowering habitat quality. Fields that have been in agricultural production for many years often have a severely depleted seedbank, especially fields with a history of continued herbicide use. Planting is generally necessary when establishing quality early succession habitat on these sites.

Another problem when promoting quality early succession habitat for wildlife is landowner perception. The specific plants and habitat conditions being promoted are what the landowner has fought against for years– "weeds." Creating desirable vegetation composition and structure for wildlife is not visually pleasing for most people. These fields look unkempt. To most onlookers, it reflects laziness of the owner, an unwilling attitude to "tend their property properly." Concern over what others might think is a real issue in persuading people to more appropriately manage for quality early succession habitat.

Extending the Message

We feel one of the most important steps to change landowner attitudes is to develop demonstration areas, especially on private landowners' property. Once a landowner sees what is possible, the news will spread. Establishing demonstration areas on public lands is also important. Interpretive signs should be used to describe what the onlooker is viewing. This will help improve perceptions of those who may not own land and persuade them to be less critical of a private landowner who is managing a "field of weeds."

Another need is to work closely with the agricultural community. Fallow ground is generally disdained by producers. Fallow field borders and buffer strips can actually save producers money, while improving wildlife habitat and helping increase wildlife populations (Barbour 2006). Helping producers, as well as others involved in agricultural production, understand the importance of early succession habitat is critical to sound land stewardship. Educational programs through Extension, state wildlife agencies, and the NRCS should stress proactive land management and highlight cost-share opportunities for landowner assistance.

Literature Cited

Barbour, P. J. 2006. Ecological and economic effects of field borders in row crop agriculture production systems in Mississippi. Dissertation. Mississippi State University, Mississippi State, MS.

Barnes, T. G., L.A. Madison, J. D. Sole, and M. J. Lacki. 1995. An assessment of habitat quality for northern bobwhite in tall fescue-dominated fields. Wildlife Society Bulletin 23(2):231-237.

Bond, B. T., C. D. Baumann, M. W. Lane II, R. E. Thackston, and J. L. Bowman. 2005. Efficacy of herbicides to control bermudagrass for enhancement of northern bobwhite habitat. Proceedings of the Southeastern Association of Fish and Wildlife Agencies 59:191-199.

Burger, L. W. Jr. 2002. Quail management: Issues, concerns, and solutions for public and private lands–a Southeastern perspective. Proceedings of the National Quail Symposium 5:20-34.

Dimmick, R. W., M. J. Gudlin, and D. F. McKenzie. 2002. The northern bobwhite conservation initiative. Miscellaneous publications of the Southeastern Association of Fish and Wildlife Agencies, South Carolina.

Dykes, S. A. 2005. Effectiveness of native grassland restoration in restoring grassland bird communities in Tennessee. M.S. Thesis. The University of Tennessee, Knoxville, TN. 131 pp.

Graham, K. L. 2002. Human influences on forest wildlife habitat. Pp. 63-90 (Ch. 3) *in*: D. N. Wear and J. G. Greis (Eds.), Southern Forest Resource Assessment. Gen. Tech. Rep. SRS-53, U.S. D. A., Forest Service, Southern Research Station, Asheville, NC.

Gruchy J. P., and C. A. Harper. 2006. When is the best time to disk native warm-season grasses for wildlife? *In*: M. A. Sanderson (Ed.), Proceedings Eastern Native Grass Symposium 5:296-302.

Gruchy, J. P., C. A. Harper, and M. J. Gray. *In Press*. Methods for controlling woody invasion into CRP fields in Tennessee. Proceedings National Quail Symposium (J. Carroll, Ed.), Vol. 6.

Guthery, F. S. 1997. A philosophy of habitat management for northern bobwhites. Journal of Wildlife Management 61:291-301.

Harper, C. A., G. D. Morgan, and C. E. Dixon. 2004. Establishing native warm-season grasses using conventional and no-till technology with various applications of Plateau herbicide. *In*: J. Randall and J. C. Burns (Eds.), Proceedings Eastern Native Grass Symposium 3:63-70.

Heard, L. P., A. W. Allen, L. B. Best, S. J. Brady, L. W. Burger, A. J. Esser, E. Hackett, D. H. Johnson, R. L. Pederson, R. E. Reynolds, C. Rewa, M. R. Ryan, R. T. Molleur, and P. Buck. 2000. A comprehensive review of Farm Bill contributions to wildlife conservation, 1985 - 2000. *In*: W. L. Holman and D. J. Halloum (Eds.), US Department of Agriculture, Natural Resources Conservation Service, Wildlife Habitat Management Institute, Technical Report, USDA/NRCS/WHMI-2000.

McCoy, T. D., E. W. Kurzejeski, L. W. Burger, Jr., and M. R. Ryan. 2001. Effects of conservation practice, mowing, and temporal changes on vegetation structure on CRP fields in northern Missouri. Wildlife Society Bulletin 29:979-987.

Palmer, W. E., S. D. Wellendorf, J. R. Gillis, and P. T. Bromley. 2005. Effect of field borders and nest-predator reduction on abundance of northern bobwhites. Wildlife Society Bulletin 33:1398-1405.

Peterjohn, B. G., and J. R. Sauer. 1999. Population status of North American grassland birds from the North American Breeding Bird Survey, 1966 - 1996. Studies in Avian Biology 19:27-44.