

# CONSERVATION PRACTICES TO PROMOTE QUALITY EARLY SUCCESSIONAL WILDLIFE HABITAT

## INVESTIGATOR INFORMATION

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## INTRODUCTION

The loss of quality early successional habitat has had a negative impact on several wildlife species in Tennessee. Northern bobwhite (*Colinus virginianus*) populations have declined approximately 70 percent since 1980 as a result of habitat loss. To address this problem, the USDA-NRCS has promoted native warm-season grasses (NWSG) on lands enrolled in the Conservation Reserve Program. However, if left unmanaged, NWSG grow dense over time and habitat benefits are reduced. The renovation of tall fescue (*Festuca arundinaceae*) is a priority of the Northern Bobwhite Conservation initiative (NBCI), but there are questions regarding the most effective methods to eliminate tall fescue and stimulate desirable native plants. Additionally, many old-field habitats in the South have been invaded by undesirable woody species.

## OBJECTIVES

- 1) Determine effects of management practices on vegetation structure and composition of previously unmanaged NWSG fields.
- 2) Determine effective methods for renovating tall fescue fields using herbicide applications and disking.
- 3) Determine effective management practices for reducing undesirable woody encroachment in old-field habitats.

## PROGRESS TO DATE

**Objective 1, Managing native warm season grasses**—To address the decline of northern bobwhite, nwsgr are commonly recommended instead of non-native perennial cool-season grasses. If not managed, however, nwsgr can become dense and rank over time and habitat benefits are reduced.

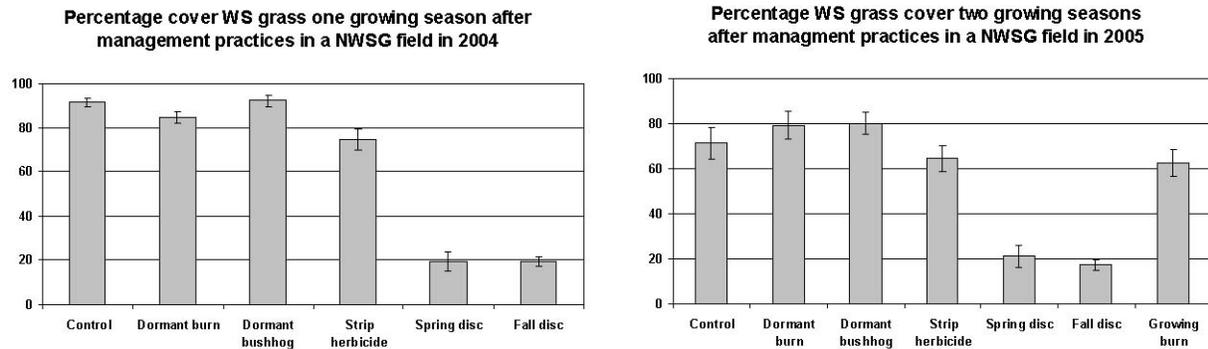
### Study design and methods

We tested 6 management practices. Fall disking (November), dormant-season mowing (March), dormant-season burning (March), spring disking (March), growing-season burning (September),

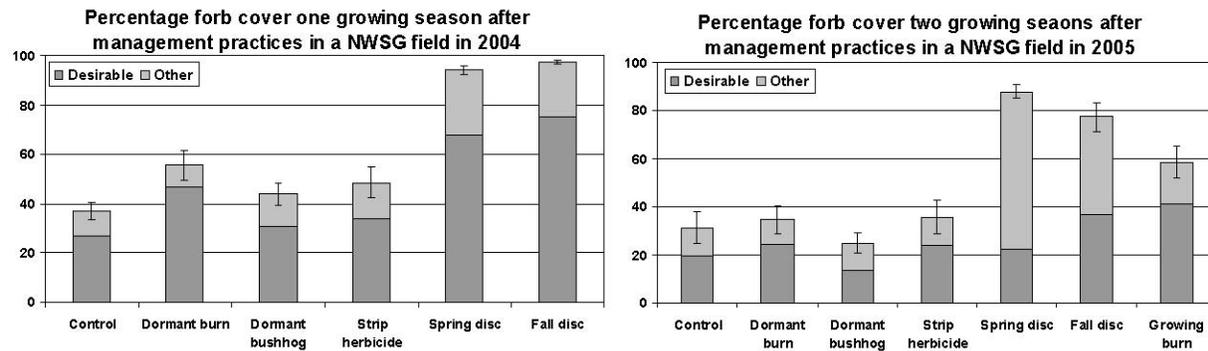
and alternate-tip application (May) of clethodim (Select<sup>®</sup> 10 oz/ac) with control areas were replicated within each of 3 previously unmanaged nwsG fields across Tennessee, 2003-2004. Vegetation structure and composition were measured throughout the growing-season and fall of 2004, and in the winter, spring, and throughout the 2005growing-season.

## Results

First-year results for the nwsG field in McMinn County, TN are presented. Percentage cover of planted nwsG was reduced in discing treatments, but remained similar to control in all other treatments.



Spring and fall discing had greater percentage forb cover and openness at ground level than all other treatments. Discing and burning treatments increased percentage bare ground and decreased percentage litter and litter depth. In the first growing season after treatment application, disced plots contained desirable forbs such as ragweed, goldenrod, and beggar's-lice (*Desmodium spp.*) with few undesirable forbs. In the second growing season after treatment application, disced plots contained undesirable forbs (primarily thistle) released from the seedbank.



## Discussion

Bushhogging provided no bobwhite habitat benefits. Dormant-season fire increased nwsG vigor, which increased vertical structure and overhead cover during the wintering period one growing season after burning. Additionally, dormant-season burning reduced coverage of undesirable species, such as nimblewill. Strip applications of a grass-selective herbicide decreased canopy coverage of planted nwsG. Desirable forb response was low after strip-herbicide application, likely from a lack of seedbank stimulation associated with fire or discing. Residual tall fescue, orchardgrass, and smooth brome existing prior to nwsG establishment was released after nwsG canopy was reduced.

Despite the presence of undesirable forbs in the second growing season, discing treatments improved brood-rearing conditions for bobwhites greater than any other treatment. It is important to understand our plots were **disked** (>4 passes). “Light discing” (2 passes) will **not** yield the same desirable effects as discing. Past studies have shown habitat benefits increasing in the first year after light discing, but were reduced by the second growing season. We believe habitat benefits from soil disturbance (discing and burning) far out-weigh the possible negative effects of stimulating unwanted plants from the seedbank. If unwanted weeds, such as thistle, bermudagrass, sericea lespedeza, sicklepod, marehail, or plantain, are present in the seedbank, managers should be prepared to deal with these plants using appropriate control methods, both chemical and mechanical. Further, this only **accentuates the importance of getting rid of unwanted species prior to planting!** The only way to achieve a desirable, *long-term* plant community is to deal with undesirable species head-on and manage the site as needed. **This may take several years on some sites!** But, if ignored, undesirable plants **will** eventually colonize the site and habitat conditions will decline. If you choose not to disturb the site because of fear of releasing non-desirable species, habitat quality for most early succession obligates will suffer.

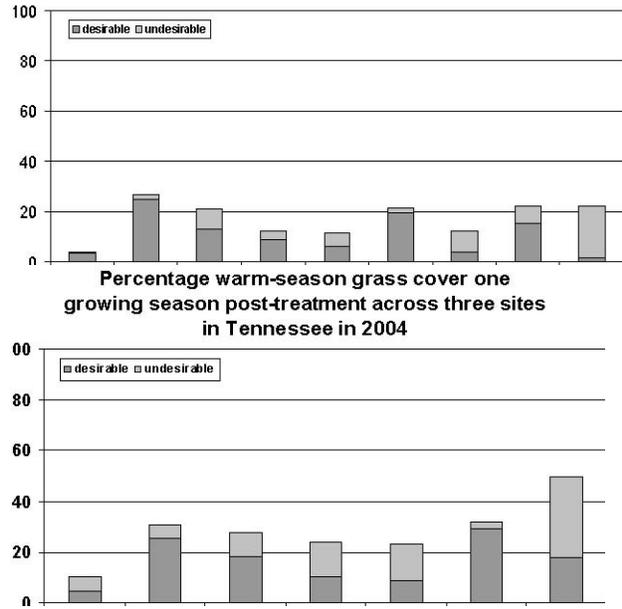
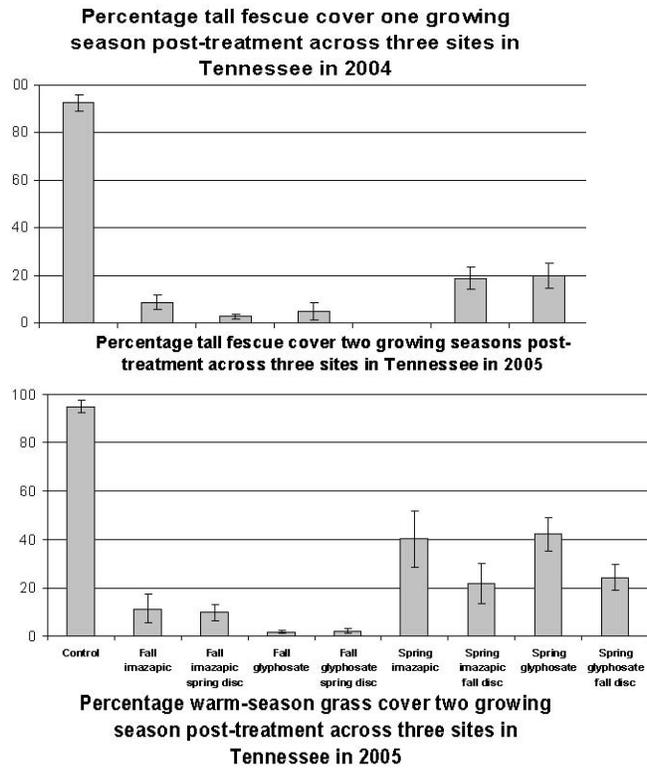
**Objective 2, Renovating tall fescue fields**—Eradicating tall fescue is a priority of the Northern Bobwhite Conservation Initiative (NBCI), but there are questions regarding the most effective methods to eliminate tall fescue and stimulate desirable native plants. Currently, there are approximately 170,000 acres of CRP sown to cool-season perennial grasses (CP-1) in Tennessee, which receive government subsidy and provide little or no benefit to wildlife.

### Study design and methods

Eight treatments with control areas were replicated within each of 3 tall fescue fields across Tennessee, 2003-2004. Treatments included fall application of glyphosate (Gly-4 Plus<sup>®</sup> 2qts/acre) and fall application of imazapic (Plateau<sup>®</sup> 12 oz/acre) (both with and without discing the following spring) and spring application of glyphosate (2qts/acre) and spring application of imazapic (12 oz/acre) (both with and without discing the following fall). Vegetation structure and composition were measured throughout the growing season and fall of 2004 and in the winter, spring and throughout the 2005 growing season.

### Results

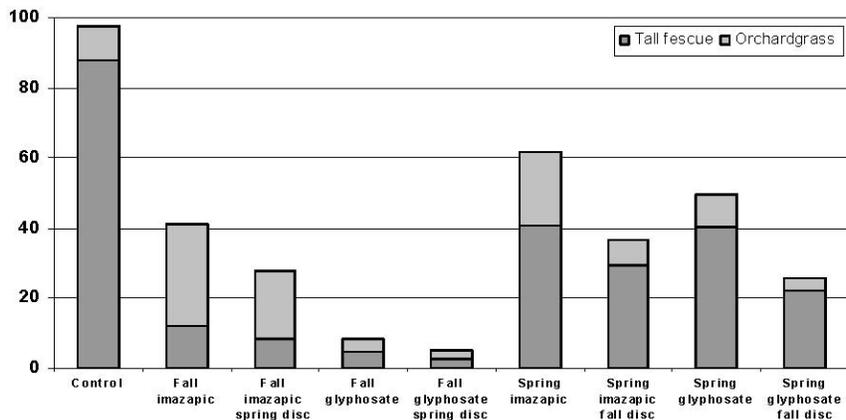
Preliminary results for the 3 sites are presented. All treatments reduced tall fescue coverage one growing season after treatment application. Fall glyphosate, fall glyphosate followed by spring discing, fall imazapic, and fall imazapic followed by spring discing reduced tall fescue coverage more effectively than spring herbicide applications two growing seasons after treatment. Reduction in tall fescue coverage improved openness at ground level during the brooding season and overhead and vertical cover during the wintering period for bobwhites. Discing following herbicide application increased desirable forb coverage, including common ragweed, beggar's-lice, and beggar-ticks (*Bidens* spp.). Imazapic reduced coverage of some undesirable species, such as johnsongrass, and increased coverage of broomsedge; however, on 2 sites, imazapic applications resulted in increased coverage of orchardgrass, which was structurally identical to tall fescue.



**Discussion**

Fall glyphosate applications are recommended to eradicate tall fescue. After tall fescue is killed, a pre-emergence application of imazapic the following spring may be necessary to control johnsongrass, crabgrass, yellow nutsedge, and many other undesirable species. We feel this treatment has great potential throughout the mid-South where broomsedge is present in the seedbank. We do not believe big or little bluestem, indiangrass, or switchgrass provide any better wildlife habitat than broomsedge. Many landowners do not need to spend considerable time and money planting when broomsedge and/or the above species are already present in the seedbank.

Dormant-season discing (before March) is recommended to stimulate desirable forbs in the seedbank and improve bobwhite brood-rearing habitat. Discing later in the spring (April and May) is more likely to stimulate undesirable plants, such as johnsongrass, goosegrass, broadleaf signalgrass, and crabgrass. Although, successfully establishing nwsg without planting is highly dependent on the seedbank, properly managed fallow areas provide excellent wildlife habitat with or without much coverage of nwsg. We feel 20 – 50 percent coverage of nwsg with 50 – 80 percent coverage in desirable forbs and scattered desirable shrubs provides optimum early successional habitat for a diversity of wildlife species. Interspersion of managed unplanted old-fields and planted nwsg fields can be used to increase habitat diversity.



**Objective 2, Controlling woody invasion**—Woody cover is an important component of bobwhite habitat; however, some species such as red maple and sweetgum grow aggressively and may dominate unmanaged areas. Habitat quality for bobwhites is reduced as undesirable woody species become dominant and reduce coverage of desirable forbs and grasses.

### Study design and methods

Six treatments with control areas were implemented in a completely randomized design on a CRP field originally planted to tall fescue with extensive invasion by sweetgum, red maple, winged elm, green ash, and yellow poplar in 2004 to determine the most effective method for reducing coverage of woody plants. Treatments included dormant-season burning in March, applications of triclopyr (Garlon-4<sup>®</sup> at 5qts/acre), imazapyr (Arsenal AC<sup>®</sup> at 24 oz/acre), and glyphosate (Gly-4<sup>®</sup> at 4qts/acre) in July, bushhogging in August, and growing-season burning in September. Vegetation structure and composition were measured one growing season post-treatment.

### Results

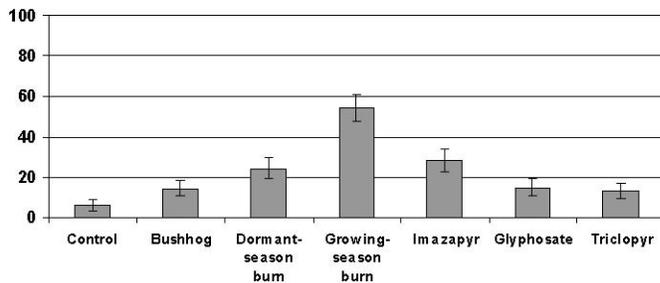
Percentage woody cover was reduced by all treatments except bushhogging. Arsenal<sup>®</sup>, growing-season burn, and Garlon<sup>®</sup> most effectively reduced woody cover. Percentage cover of desirable legumes, such as partridge pea, beggar’s-lice, and native lespedezas, was highest in growing-season burn, Arsenal<sup>®</sup>, and dormant-season burn treatments.

Arsenal<sup>®</sup> increased coverage of forbs and blackberries, whereas Garlon<sup>®</sup> increased coverage of warm- and cool-season grasses.

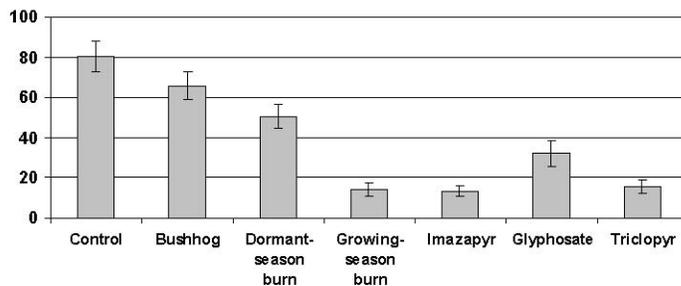
### Discussion

We recommend growing-season fire in September for managing fields invaded by undesirable woody species. If burning is not possible, Arsenal<sup>®</sup> applications should increase coverage of desirable legumes and blackberry while reducing woody cover. Arsenal<sup>®</sup>, however, will harm nwsgr if already present and will not control undesirable legumes, such as sicklepod or locusts. Garlon<sup>®</sup> provides control of sericea lespedeza and will not kill most nwsgr; however, Garlon<sup>®</sup> applications will kill blackberries, which are most desirable, and release residual tall fescue.

**Percentage cover of desirable legumes  
one growing season post-treatment**



**Percentage cover of woody species one  
growing season post-treatment**



### PRESENTATIONS

Gruchy, J.P. Effects of seasonal herbicide applications with and without disking on tall fescue renovation in Tennessee. March 3, 2006. Annual meeting of the Tennessee state chapter of The Wildlife Society, Paris Landing State Park, Tennessee. Awarded outstanding student presentation 2006.

Gruchy, J.P. and C.A. Harper. 2006. Effects of seasonal herbicide applications with and without disking on tall fescue renovation and resulting habitat for bobwhites. 12th Annual Meeting of the Southeast Quail Study Group. Auburn, Alabama. (poster)

- Gruchy, J.P. and C.A. Harper. 2006. Wildlife habitat and herbicides on rights of ways. (*invited presentation*) Safe and Effective Application of ROW herbicides. Training workshop hosted by Townsend Chemical Corp. Sevierville, Tennessee. 12/06
- Gruchy, J.P., C.A. Harper, and W.G. Minser. 2006. Managing early successional habitat for game species at Seven Islands Wildlife Refuge. (*invited presentation*) Seven Islands Foundation Field Day. Knox County, Tennessee. 10/06
- Gruchy, J.P. and C.A. Harper. 2006. Using herbicides to manage early successional habitat for wildlife. (*invited presentation*) Wildlife and Water Quality on North Carolina Farms Field Day. Field day hosted by NC State extension. Ammon, North Carolina. 8/06
- Harper, C.A. and J.P. Gruchy. Managing oldfield habitats for wildlife. (*invited presentation*) Wildlife and Water Quality on North Carolina Farms Field Day. Field day hosted by NC State extension. Ammon, North Carolina. 8/06
- C.A. Harper, and J.P. Gruchy. Managing native warm-season grasses for wildlife. UT/NRCS Early Successional Wildlife Habitat Field Day. McMinn County, Tennessee. 6/06
- Gruchy, J.P. and C.A. Harper. Renovating tall fescue and other non-native grasses. UT/NRCS Early Successional Habitat Field Day. McMinn County, Tennessee. 6/06
- Gruchy, J.P. and C.A. Harper. Controlling woody invasion into oldfields. UT/NRCS Early Successional Habitat Field Day. McMinn County, Tennessee. 6/06

## **PUBLICATIONS**

- Gruchy, J.P., C.A. Harper, and M.J. Gray. In press. Methods for controlling woody invasion into oldfields in Tennessee. Quail VI. Athens, Georgia. (*in review*).
- Gruchy, J.P. and C.A. Harper. 2006. Vegetation response to management practices on two hydric sites planted to native warm-season grasses in west Tennessee. 295. In M.A. Sanderson et al. (eds.). Proceedings of the Fifth Eastern Native Grass Symposium, Harrisburg, Pennsylvania. (*abstract*)
- Gruchy, J.P. and C.A. Harper. 2006. Effects of seasonal herbicide applications with and without disking on tall fescue renovation in Tennessee. Peer-reviewed abstract for the 13th Annual Conference of The Wildlife Society, Anchorage, Alaska. (*abstract*)

## **PARTICIPATING AGENCIES AND LANDOWNERS**

**Mark Gudlin.** TWRA Private Lands Liaison. Helped organize TWRA involvement in the project.

**J.M. Huber Corp.** Provided a tall fescue study site in Rhea County, TN.

**Scotty Mayfield.** Mayfield Dairy Farms. Landowner who provided a NWSG study site, McMinn County, TN.

**Kathy Patton.** Landowner who provided a NWSG study site, Benton Co., TN.

University of Tennessee. Provided tall fescue study site at the Plateau Experiment Station, Cumberland County, TN.

**Joe Whitworth.** Lockhart Farms. Landowner who provided a tall fescue and NWSG study site in Benton County, TN.

Quail Unlimited.

### **NRCS INVOLVEMENT**

**Mike Hansbrough.** NRCS Biologist. Served as local contact with NRCS and helped identify landowners to participate in study.

**James Woodall.** NRCS District Conservationist. Served as local contact in Benton County.