Survey of Tennessee Landowners Participating in Conservation Reserve Program Practice Focused on Restoring Native Grasslands and Northern Bobwhite in Tennessee

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Abstract: The State Acres For wildlife Enhancement (SAFE) practice of the Conservation Reserve Program (CRP) in Tennessee is targeted to help restore native habitats to benefit the northern bobwhite (*Colinus virginianus)* and other declining early successional wildlife. A survey of a subset of participating landowners was conducted to assess landowner perceptions of and experiences with the practice and perceived wildlife response. The survey response rate was 58% (73 of 126 surveys mailed). All respondents were owners of the CRP SAFE tracts at the time of the survey, and most (91%) managed the SAFE tracts themselves. SAFE contracts had been active for an average of seven years and ranged from 2 to 213 ha in size, with a mean of 21.0 ± 30.4 ha. Most of the respondents indicated they had received about the right amount of information prior to signing the SAFE contract (over 90%) and technical guidance and assistance after signing the contract and during implementation (over 86%). Almost half (46.2%) of respondents experienced no barriers to establishing SAFE vegetation. Strip disking was the approved mid-contract practice most commonly applied to manage herbaceous vegetation (72.7%) and prescribed fire the least used (16.9%), although 39.2% indicated an interest in applying prescribed fire if they had training. Most (88.5%) respondents were favorable or neutral about liking the appearance of their SAFE vegetation. Respondents most frequently reported that they encountered problems with controlling unwanted tree saplings or other woody vegetation that was not planted (45 respondents; 80.4%), invading agricultural weeds (23 respondents; 41.1%), and failure of planted shrub seedlings in planned woody thickets (16 respondents; 28.6%). Respondents most frequently reported increased populations of cottontail rabbits (*Sylvilagus floridanus*), white-tailed deer (*Odocoileus virginianus*), wild turkey (*Meleagris gallopavo*), bobwhites, and songbirds once SAFE vegetation was established (41.9%–66.2% of respondents). Almost half of the respondents (49.2%) perceived bobwhite covey numbers had increased on their SAFE tract, and only 6.2% perceived a decline. Should perception reflect actual changes in bobwhite numbers, this can provide encouragement to managers considering the small acreage of some SAFE tracts and the general scattered distribution of SAFE tracts on the landscape. General landowner satisfaction with the practice, level of technical guidance, and perception of bobwhite and other wildlife response warrant continued efforts to improve and promote the practice and increase participation.

Key words: bobwhite, conservation, SAFE

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The U.S. Department of Agriculture (USDA) established the State Acres For wildlife Enhancement (SAFE) in 2008 as part of the Conservation Reserve Program (CRP). CRP is a voluntary program where landowners receive payments from USDA for establishing and maintaining long-term vegetative cover on their formerly cropped agricultural lands. SAFE is a CRP practice that is targeted to benefit priority wildlife species selected by individual states.

In Tennessee, the northern bobwhite (*Colinus virginianus*; hereafter referred to as bobwhite) was selected as the target species and the practice named the SAFE Bobwhite Habitat Restoration Practice (BHRP; conservation practice number CP38E). USDA allocated 4,653.9 ha for enrollment in 28 counties. The goal was establishment of early-successional vegetation (Harper 2017) to aid in restoration of declining bobwhite populations. In addition to bobwhite, field sparrow (*Spizella pusilla*), eastern meadowlark (*Sturnella magna*), loggerhead shrike (*Lanius ludovicianus*), dickcissel (*Spiza americana*), and other wildlife that depend on early successional grass and shrub vegetation are expected to benefit from the BHRP.

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The 28 Tennessee counties selected for this practice were based on the National Bobwhite Conservation Initiative biologist ranking information (National Bobwhite Technical Committee 2011)

The Tennessee SAFE is allowed on entire fields or portions of fields and is required to be planted to a choice of mixtures of native warm season grasses and forbs, a native shrub component comprising 2.5% to 30% of SAFE contract acres in thickets and/or hedgerows and allows an optional component of up to 10% of contract acreage to be planted to food plots. Cost-shared mid-contract management practices authorized to maintain the vegetation in a desirable state during the term of the contract include strip-disking, herbicide application, prescribed burning, and legume inter-seeding. Mowing by itself is not an authorized mid-contract practice but is allowed as a preparation for prescribed burning, disking or inter-seeding.

We developed a survey to measure landowners' opinions of the success of SAFE for increasing bobwhite numbers on their lands and their experiences with participating in this practice. We were especially interested in landowner perception of types of habitat being established, perception of wildlife response to the practice, and experiences and barriers to habitat establishment and implementation of mid-contract management on contracted fields. In order to determine the relative importance and success of the SAFE program in Tennessee, the results of this survey are intended to help with assessment of the conservation value of SAFE and to provide guidance to managers for improving the program.

Methods

Survey booklets were designed based on common BHRP issues relayed by Tennessee Wildlife Resources Agency (TWRA) private lands biologists and private landowners. Content validity was checked by several human dimensions of wildlife scientists and TWRA staff. The survey consisted of seven sections of questions on: SAFE land managed for wildlife, technical assistance received, mid-contract management, SAFE vegetation, prescribed fire, wildlife populations, motivating interests, and sociodemographics. Most questions yielded descriptive statistics and are reported as frequencies. Some questions required five-point Likert-type scaled responses that used accepted unipolar and bipolar anchors (Dillman et al. 2014, Vagias 2006).

Using a modified Dillman approach (Dillman et al. 2014), USDA Farm Service Agency (FSA) employees administered the survey to 126 CP83E enrollees in Tennessee that had active contracts for at least four years as of February 2016; these participants would potentially have had the opportunity to implement a required mid-contract management practice (not allowed until year 4 of the contract) and provided enough time for wildlife response to the established vegetation. In July 2016, surveys were mailed using the U.S. Postal Service and included a postage-paid return envelope. A reminder postcard was sent two weeks after the initial mailing. One month after the postcard, a replacement survey with new cover letter was sent to non-respondents.

A blind numbering system for the booklets was used whereby confidential information such as landowner names and addresses and specific contract information was not disclosed by FSA to TWRA. However, the landowner could share this information voluntarily with TWRA on the survey response. A small token of appreciation (multi-use tool) was provided by TWRA to survey respondents as an incentive.

We calculated descriptive statistics for all survey questions, for which we report frequencies and percentages of respondents who answered each question. In addition, we compiled tables of responses to open text questions. Summary statistics, graphs, and tables were prepared in SPSS 23 and Microsoft Excel.

Results

Response Statistics

Of 126 surveys mailed, we received 73 completed surveys and two undeliverable surveys. This resulted in a response rate of 58% (73/126). On average, respondents answered 86.6% of questions in the survey. While the mean item non-response rate was 12.8%, some questions lacked responses from 30%–40% of respondents. Questions with these low response rates were in the sections regarding mid-contract management (i.e., applied management activities, ease of management activity application) and wildlife (i.e., interest in further information on management activities).

Sociodemographics

Respondents were predominantly male (84.8% of respondents) and averaged ($\bar{x} \pm$ SD) 66 ± 12.4 years old. Most respondents earned US$25,000–$49,999 annually (35.5% of respondents), followed by $75,000–$99,999 (16.1% of respondents) and $50,000–$74,999 (12.9% of respondents). With the exception of one respondent who represented a partnership of owners and one respondent who owned the contract until September 2015, all respondents were the owners of the CP38E contract tracts at the time of the survey.

Eight respondents (11.3%) were members of wildlife conservation organizations. This included four members to the National Wild Turkey Federation, three to Quail Forever, two to Quality Deer Management Association, two to Ducks Unlimited, and one each to National Wildlife Federation, Delta Wildlife, Delta Waterfowl Foundation, and South Carolina Waterfowl Association. One respondent was a member of seven organizations, one respondent was a member of two organizations, and the remainder belonged to a single organization.

SAFE Tract Information

Most respondents managed their SAFE tracts themselves (91.0% of respondents), and most respondents did not have more than one SAFE tract (86.8% of respondents). During the study period, contracts had been active for 7 ± 2.8 years and were 2.0–213.3 ha in size.

Contract sites were comprised primarily of entire fields only (60.6% of respondents), followed by portions of fields only (22.7% of respondents). Including the CP38E contract, land owned by respondents was primarily planted crop fields 44.5 ± 147.4 ha, natural forest 27.1 ± 64.7 ha, and native grassland 13.4 ± 34.6 ha. Wildlife management status varied by land use type. All respondents indicated that their native grasslands and other acreage were at least partially managed for wildlife, versus 62.5% of respondents citing natural forests, and 53.8% of respondents planted crop fields.

Technical Assistance

Respondents indicated that prior to signing the SAFE contract; they received the right amount of information about the practice specifications and contract term (65 respondents, 95.6%) and about SAFE practice vegetation (61 respondents, 91.0%). Respondents indicated that since signing the SAFE contract, they have received the right amount of technical guidance from Natural Resources Conservation Service (NRCS) or TWRA (57 respondents, 86.4%). Respondents indicated that during the habitat establishment process they received the right amount of technical assistance from NRCS or TWRA (62 respondents, 92.5%). Respondents requested additional information mainly concerning methods to control overgrown vegetation.

Fifty-five respondents (86.6%) said they received the right amount of information to knowledgably manage their SAFE tract, and 30 respondents (46.2%) indicated they did not experience any barriers in properly establishing the SAFE tract. Among respondents who indicated otherwise, the most frequent barriers were the availability of seed, shrubs, and trees (12 respondents; 18.5%) and weather (8 respondents; 12.3%; Figure 1). Other frequently cited barriers to establishing the SAFE tract included the cost of seed, shrubs, and trees (7 respondents; 10.8%), weeds (7 respondents; 10.8%), and the availability of appropriate equipment (6 respondents; 9.2%; Figure 1). Other barriers to habitat establishment included the abundance of tree growth and incorrect information.

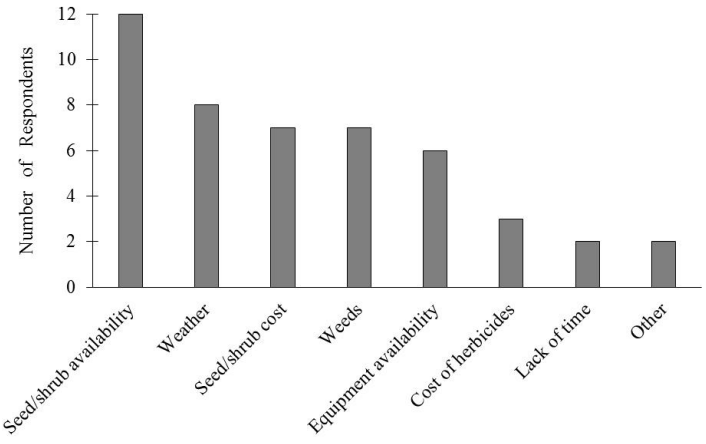

Figure 1. Barriers to habitat establishment reported by respondents ($n = 73$) to the Tennessee State Acres For wildlife Enhancement (SAFE) survey, 2016.

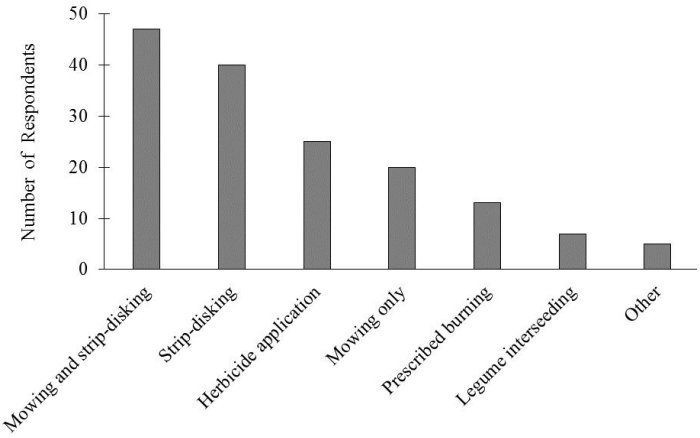

Figure 2. Mid-contract management practices applied by respondents ($n = 73$) to the Tennessee State Acres For wildlife Enhancement (SAFE) survey, 2016.

Mid-Contract Management

Most respondents were aware of mid-contract management practices (64 respondents, 95.5%), and most thought they received the right amount of information regarding mid-contract management practices, including prior to (62 respondents; 91.2%) and since signing the SAFE contract (60 respondents; 88.2%), and since initial planning and habitat establishment (51 respondents; 81.0%).

The most frequent management practice applied to SAFE areas was mowing prior to strip-disking (47 respondents; 88.7%), followed by strip-disking (40 respondents; 72.7%; Figure 2). Herbicide application (25 respondents; 64.1%) and mowing only (20 respondents; 60.6%) were also commonly applied (Figure 2). "Other" management activities indicated by respondents were already included in the management activities listed in the questionnaire or addressed issues outside the question context.

Respondents found the management practices they used varied in their ease of application. Most respondents agreed that strip-disking and mowing in preparation for strip-disking were relatively easy to apply (i.e., respondents agreed or strongly agreed; strip-disking: 30 respondents, 66.7%; mowing in preparation for

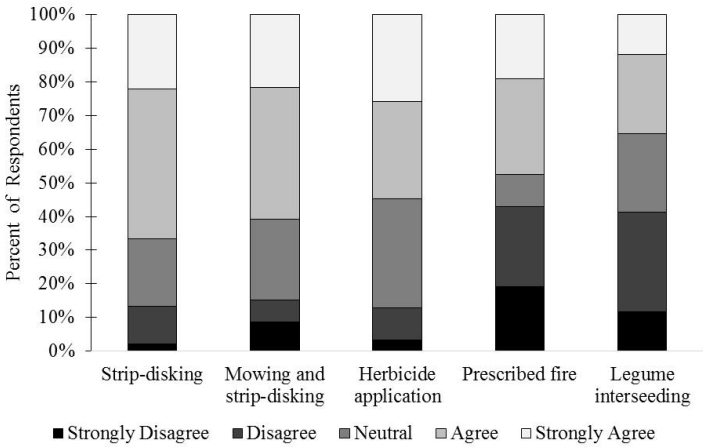

Figure 3. Agreement of respondents ($n = 73$) in the Tennessee State Acres For wildlife Enhancement (SAFE) 2016 survey to the statement "the following mid-contract management practices were relatively easy to apply."

strip-disking: 28 respondents, 60.9%; Figure 3). In contrast, 9 respondents (42.9%) disagreed that prescribed fire was relatively easy to apply and 7 respondents (41.2%) disagreed (i.e., respondents disagreed or strongly disagreed) that legume inter-seeding was relatively easy to apply (Figure 3).

Thirty-nine respondents (62.9%) said they did not experience any barriers while implementing mid-contract management. Weather was the most frequent barrier (11 respondents; 17.7%). No respondents indicated that seed availability was a barrier. Sixty-three respondents (100.0% of those that answered the item) indicated other barriers to mid-contract management, although only four respondents elaborated. Other barriers included unwanted tree growth and TWRA requirements regarding payment for prescribed fire. Four respondents had not yet applied mid-contract management.

SAFE Vegetation

Almost half of respondents liked the appearance of their SAFE vegetation (i.e., agree to strongly agree: 30 respondents; 46.2%). However, some respondents reported encountering problems with their SAFE vegetation; e.g., respondents most frequently reported they encountered problems with controlling unwanted tree saplings or other woody vegetation that was not planted (45 respondents; 80.4%), invading agricultural weeds (23 respondents; 41.1%), and failure of planted shrub seedlings in planned woody thickets (16 respondents; 28.6%). Other problems reported by respondents concerned the control of unwanted vegetation.

Prescribed Fire

While 20 respondents (33.9%) indicated they had experience using prescribed burning for land management, only 12 (16.9%) performed the practice. Most respondents applied the prescribed fire themselves (8 respondents; 66.7%; Table 1). No respondents used a private contractor or the local fire department to perform prescribed burning on their land (Table 1), and most respondents indicated they would not be likely to use a private contractor to apply prescribed burning (32 respondents; 45.1%). Twenty respondents agreed that they would be likely to use prescribed burning on their SAFE tract if they had training (i.e., agree or strongly agree: 39.2%). Regarding prescribed fire, respondents commented on lack of available help, interest in the practice of prescribed burning, and indicated that TWRA had assisted with the practice.

Table 1. Categories of persons from 2016 survey involved in applying prescribed fire ($n = 12$) in Tennessee State Acres For wildlife Enhancement (SAFE) Bobwhite Habitat Restoration Practice. Numbers may not add up because more than one category may have assisted a landowner with applying fire.

Category	*n* respondents	% respondents
Landowner	8	66.7
Neighbors	1	8.3
Employees	1	8.3
Family	4	33.3
Friends	2	16.7
TWRA	3	25.0
Other	4	33.3

Wildlife Populations and Hunting Activity

Whereas 36 respondents indicated, when asked as an isolated question, that they plant wildlife food plots in or near their SAFE tract, 39 respondents indicated they performed this management practice when they were asked in a battery of questions. Planting wildlife food plots was the most frequently employed management practice for wildlife (39 respondents; 73.6%), followed by creating or managing ponds (24 respondents; 45.3%), and planting fruit or nut producing trees (17 respondents; 32.1%). Respondents were most frequently interested in learning more about planting wildlife food plots (22 respondents; 61.1%). No respondents were interested in learning more about maintaining bird feeders, and the remaining management options for wildlife received approximately equal interest (i.e., ranging from 7–11 respondents).

Respondents most frequently reported increased populations of cottontail rabbits (*Sylvilagus floridanus*), white-tailed deer (*Odocoileus virginianus*), wild turkey (*Meleagris gallopavo*), bobwhites, and songbirds once SAFE vegetation was established (41.9%–66.2% of respondents). Respondents most frequently expressed uncertainty about populations of feral hogs (*Sus scrofa*), groundhogs (*Marmota monax*), and nine-banded armadillos (*Dasypus novemcinctus*) (53.2%–89.8% of respondents).

Respondents were divided in their perception of bobwhite pop-

Table 2. Groups allowed to hunt bobwhite and other wildlife on State Acres For wildlife Enhancement (SAFE) lands owned by respondents to the Tennessee State Acres For wildlife Enhancement) Bobwhite Habitat Restoration Practice Survey conducted in 2016.

Group allowed to hunt	Bobwhite	Other Wildlife
Family only	1	20
Family and friends	3	16
Myself only	1	6
Hunter or hunting club leasing the land	2	4
Anyone asking permission other than above	3	3

ulations. When asked in a battery of questions about wildlife populations, 49.2% reported bobwhite populations had increased, 26.2% reported populations had stayed the same, 6.2% reported decreased populations, and 18.5% were uncertain (i.e., unknown). Most respondents reported hearing bobwhite calling on their SAFE tract during spring (37 respondents; 56.9%), and most respondents believed they had one to three coveys (24 respondents; 35.8%) or three to six coveys (14 respondents; 20.9%).

Forty-nine respondents (69.0%) allowed hunting of other wildlife on their SAFE area, and ten respondents (14.7%) allowed bobwhite hunting (Table 2). No respondents indicated they do not monitor or care who hunts bobwhite, or any wildlife, on their property. One respondent allows a "pay to hunt" operation, and an additional four respondents reported releasing pen-reared quail on their SAFE tract.

Motivating Interests

The predominant interests that led respondents to participate in the SAFE practice were increasing existing population of bobwhite, financial incentives from CRP enrollment, restoring bobwhite populations, and improving habitat for wildlife other than bobwhite. Most respondents were not motivated by potential "pay to hunt" programs or training bird dogs on wild bobwhite. Other interests that led respondents to participate in the SAFE practice included erosion control and white-tailed deer habitat improvement.

Respondents most frequently categorized themselves as active hunters (35 respondents, 52.2%). In the past three years, 31 of these active hunters (91.2%) had hunted white-tailed deer and 24 (70.6%) had hunted wild turkey. Four respondents (11.8%) reported hunting bobwhite in the past three years. No respondents reported hunting black bear (*Ursus americanus*).

Forty-nine respondents (76.6%) reported that a biologist had not visited their land in the previous year regarding the SAFE tract. Among respondents that had a biologist visit their SAFE tract, 53.3% indicated the representative was from the NRCS. Regarding their interest in having TWRA, NRCS, or Quail Forever biologists visit SAFE tracts, 60.3% of respondents were interested in an evaluation of further management needs and 69.6% were interested in the offering of management recommendations. However, 71.7% of respondents were not interested in the development of a written management plan for other land they owned or leased.

When asked if they would recommend the SAFE BHRP to others, most respondents indicated they agreed (29 respondents, 46.8%) or strongly agreed (22 respondents, 35.5%). In addition, most respondents (47 respondents, 71.2%) were interested in a periodic newsletter on Tennessee bobwhite management efforts.

Discussion

This survey provides important insight into the ways that SAFE was implemented in Tennessee, the way that it is perceived by landowners, and landowner needs for successfully implementing habitat improvement on their lands. Knowledge of landowner attitudes for this program can help managers make changes to the SAFE BHRP that will enhance its acceptability to landowners as well as add more value to wildlife.

Planting food plots on lands that were on or near to their SAFE tracts to attract wildlife was the most frequent non-CRP practice used by landowners responding to this survey. Planting food plots was also the most frequently cited practice that interested landowners. Food plots, while not having a negative effect on bobwhite populations, are not necessary for restoring populations if early-successional habitat is available (Guthery 1997). However, the option to incorporate food plots may help landowners' participation in and acceptance of the practice, as a high percentage of respondents identified themselves as deer and turkey hunters.

The second most common supplementary non-CRP practice implemented was creating or managing ponds. While increasing numbers of ponds that supply fishing and other recreation on private lands or that provide habitat for other wildlife species are appropriate goals, ponds are not a component of this CRP practice and are not a necessary component of bobwhite habitat.

A third common non-CRP practice was the planting of nut- and fruit-bearing trees, although this practice evoked low interest among landowners compared with other management practices. Other practices that occurred on or near SAFE contract sites include nest box installation, pollinator plantings, mast producing shrub plantings, bird feeder installation, forest habitat manipulation, and wetland creation or management.

Recent recognition of declines in insect pollinators has led to an emphasis on providing plants that are attractive to this important group of insects (Marks 2006). NRCS has partnered with the Xerces Society, an organization that focuses on conservation of insects, to increase knowledge of pollinators and their needs. Pollinator

conservation has been developing in Europe for two decades (Dover 1996) so it is appropriate that the United States now begin to manage for this resource. The CP42 Pollinator Habitat practice, with similar plant components to SAFE BHRP, is increasingly being implemented by CRP participants.

A negative perception of "unkempt" or "weedy" appearance of old field type habitats is often a barrier to landowners (Nassauer 1995, Burger 2001, Harper and Moorman 2006). A continuing program of education on proper bobwhite habitat as well as conducting field trips for landowners to see the ecological benefits of old field habitat needs to be conducted. Providing additional information and/or technical assistance on legume inter-seeding (as a mid-contract practice) and control of volunteer woody vegetation and agricultural weeds could improve SAFE tract management and landowner satisfaction. Information on management of problem vegetation, opportunities for training on prescribed burning (e.g., Tennessee Division of Forestry's Certified Burn Manager course), and other opportunities to establish similar vegetation and receive free technical assistance from TWRA, Quail Forever, and NRCS biologists might not only benefit the SAFE landowners themselves but they also might share techniques with others as a high percentage of SAFE landowners indicated a willingness to recommend the practice. The strong interest in a periodic newsletter on Tennessee bobwhite management efforts could be a positive outreach to SAFE contract holders and others.

The CP38E SAFE BHRP was designed to offer an option for CRP enrollees to establish and maintain high quality bobwhite habitat. Results of our survey indicate many positive perceptions of the practice by participants. Should actual bobwhite occupancy and response on SAFE tracts reflect participant perceptions, this habitat practice could contribute to bobwhite restoration. Efforts by managing agencies and interested partners are warranted to pursue continued enrollment opportunities in CRP and seek to improve information and technical assistance delivery and practice implementation. These findings can also help managers expand participation in the SAFE BHRP.

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